



# LOWER CHURCHILL PROJECT



## DC 1051 - FIELD INVESTIGATION AND CONSTRUCTION INFRASTRUCTURE HVdc TRANSMISSION LINE GULL ISLAND TO SOLDIERS POND

### VOLUME 1 - GEOTECHNICAL REPORT

JUNE, 2009





**DC1051 – FIELD INVESTIGATION AND  
CONSTRUCTION INFRASTRUCTURE  
HVdc TRANSMISSION LINE  
GULL ISLAND TO SOLDIERS POND  
LOWER CHURCHILL PROJECT**

Submitted to:

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**VOLUME 1 – GEOTECHNICAL REPORT**

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June 2009  
Project No: TF8310458

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HVdc Transmission Line – Gull Island to Soldiers Pond  
Lower Churchill Project  
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## FOREWARD

This report is presented in two volumes:

Volume 1 – Geotechnical Report contains the results of the geotechnical investigations carried out on the proposed transmission line corridor in the summer and fall of 2008 together with the relevant appendices incorporated after the text of the report.

Volume 2 – Corridor and Test Location Maps presents the test location map books generated containing all of the geotechnical investigation data collected. These maps illustrate the entire line corridor and identify proposed camps, marshalling yards and access routes.

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## EXECUTIVE SUMMARY

Presented within this report are the results of the 2008 geotechnical field investigation relating to the proposed construction of a 1095 km,  $\pm$  450 kV HVdc, transmission line (hereafter referred to as the transmission line) from the proposed hydroelectric development at Gull Island, Labrador to Soldiers Pond (Holyrood), Newfoundland.

The investigation was conducted to: inventory the surficial and subsoil conditions encountered along the proposed transmission line corridor with particular interest in the identified Points of Intersection (PI); determine the suitability of the proposed construction camps and marshalling yards; determine approximate river/brook crossings width and depth; and graphically present the data in an electronic graphical information system (ArcGIS) format.

The geotechnical program included review of surficial and bedrock geology maps (along the proposed transmission line corridor), air photo interpolation of key points of interest; obtain applicable permits to conduct the field work; prepare and enforce a project specific health and safety plan; conduct a field investigation program; prepare ArcGIS data mapping of the study findings; prepare a factual report to summarize the findings and provide preliminary design values and recommendations.

The geotechnical field investigation involved: excavation of test pits; rock anchor pull-out tests; percussion probing; bog probes; borehole drilling; bedrock mapping; and visual observations. These were conducted at all Points of Intersection (PI), at representative locations along the corridor and at the proposed camps and marshalling yards.

NALCOR Energy - Lower Churchill Project (NE-LCP) had retained the services of Hatch Limited (Hatch) in 2007 to study a 10 km wide proposed corridor to develop up to three 2 km wide corridor scenarios for the transmission line and to assess the requirement for camps, marshalling yards, access roads and tote roads. Upon review of this study NE-LCP had chosen one primary corridor to be further investigated along with the associated camps and marshalling yards. Access and tote roads were limited to general comments and design considerations.

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### Line Corridor Routing

The path of the transmission line corridor will commence at Gull Island and will generally trend to the southeast, crossing the Strait of Belle Isle at L'Anse Amour. From the Newfoundland coast near Flowers Cove (Mistaken Cove), the corridor will continue to trend to the southeast as it runs down the Northern Peninsula and across central and eastern portions of the Island, eventually terminating at Soldiers Pond, near Holyrood.

Of the three corridor options proposed by Hatch, personnel from NE-LCP selected a preferred corridor that would: be practical and shortened the line length as much as possible; avoid difficult terrain; minimize new road construction; avoid areas with heavy ice and strong winds; minimize environmental impacts; and preserve areas of archaeological and historical sites. It is this corridor that was the focus of the geotechnical investigation that is presented within this report.

### Access Roads and Tote Roads

Access throughout the proposed corridor of the transmission line varies from non-existent to good. There is very limited access throughout the length of the line from Gull Island to the Strait of Belle Isle. Some secondary forest roads exist near Gull Island and on the southern coast of Labrador, near PI 45 where the corridor crosses at the intersection of Route 510 and the L'Anse-Amour access turnoff.

There are existing roads in several areas throughout the corridor from the Strait of Belle Isle to Taylor's Brook. These are generally located near the communities of Flowers Cove, Hawke's Bay and Daniel's Harbour. Access and tote roads will have to be constructed over high, hilly terrain from PI 8B to PI 13B and from PI 23 to PI 36C (i.e. the Long Range Mountains) which will require an in depth study to determine their routes which will minimize the road grades and turns and address potential slope stability issues prior to construction.

From Taylor's Brook to Soldiers Pond the corridor becomes more accessible via the Trans Canada Highway and existing forest and transmission line maintenance roads. Accessibility is good from PI 41 to PI 42, PI 44 to PI 49 and PI 63 to PI 102. These roads will generally provide access to within 1.5 km or less to the individual transmission tower sites. New access roads will

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have to be constructed (as required) from PI 51 to PI 63 as the existing roads within this section of the corridor have not been maintained and will need upgrading or replacement. Additionally, road construction will have to occur from PI 42 to PI 44 and PI 49 to PI 50 as no access roads currently exist in these areas.

To assist with access design, an aerial reconnaissance was conducted to examine river/brook crossing along the corridor. Due to time constraints, river/brook crossings east of PI 68 in Lot 3 were not investigated.

### Camps

During construction several campsites will be needed to accommodate transmission line construction personnel. The Hatch study had identified the need for four (4) campsites within Lot 1 (Gull Island to the Strait of Belle Isle). These sites were identified at the proposed main operations camp at Gull Island (additional accommodations may need to be constructed), near the community of L'Anse au Loup, and two (2) remote sites near PI 16 and PI 29.

A limited amount of accommodations are available (i.e. motels / bed & breakfast suites) within Lot 2 (Strait of Bell Isle to Taylor's Brook) in communities located along Route 430. Camps may be required to supplement the capacity of these establishments and to shorten travel time. Three (3) campsites were identified by Hatch: near PI 13B (east of Hawke's Bay); near PI 20 (northeast of Daniel's Harbour); and adjacent to PI 38 (near Eagle Mountain).

No campsites are proposed within Lot 3 (Taylor's Brook to Soldiers Pond) as sufficient accommodations (i.e. motels / bed & breakfast suites) are expected in communities along the proposed corridor and Trans Canada Highway. These include, but are not limited to: Deer Lake, Grand Falls – Windsor, Gander, Clarendville and the St. John's area.

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### Marshalling Yards

Lot 1 (Gull Island to the Strait of Belle Isle) will have two (2) marshalling yards, one at each end. The marshalling yard at Gull Island will accommodate equipment and materials transported to Happy Valley – Goose Bay via ship (or barge) or by road transport via the Trans Labrador Highway. This yard will be a part of the Gull Island Development and was not investigated in this study. The second marshalling yard is proposed to be located in a rock quarry at the intersection of Route 510 and the L'Anse Amour access road. This site was most likely developed during the construction of Route 510 and at the time of the investigation was not in use. This site will be capable of receiving equipment and materials by way of ship (or barge) via the port of Blanc Sablon or via road upon the completion of Phase III of the Trans Labrador Highway (anticipated to be in the Fall of 2009).

For the Island of Newfoundland there will be one main marshalling yard located at the Department of Transportation and Works depot in Deer Lake. This site will serve as the eastern marshalling yard for Lot 2 and the western marshalling yard for Lot 3. This site is accessible by road with transmission line materials and equipment purchased off the Island delivered by tractor trailer using the Marine Atlantic ferry at Port aux Basques or by container (boat) to Corner Brook.

A marshalling yard on the west end of Lot 2 is proposed to be located near the community of Plum Point. The proposed area is approximately three (3) hectares in size, is relatively flat, and has been previously cleared of trees from logging operations. This site is accessible by road with transmission line materials and equipment purchased off the Island delivered by tractor trailer using the Marine Atlantic ferry at Port aux Basques or by container (boat) to Corner Brook. Alternate docking locations may be available pending ship size and offloading procedures. Other potential locations are available in abandoned quarries near St. Barbe on Route 430 and on the Roddickton access road (Route 432).

A marshalling yard on the east end of Lot 3 is proposed to be located off the Trans Canada Highway near the intersection of Witless Bay Line (Route 13) and the existing transmission lines. This site is accessible by road with transmission line materials and equipment purchased off the Island delivered by tractor trailer using the Marine Atlantic ferry at either Port aux

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Basques or Argentinia, or by container (boat) to either St. John's or Argentinia. Alternate docking locations may be available pending ship size and offloading procedures. The nearby Trans Canada Highway has a full diamond interchange to Route 13 which will help facilitate the transporting of the transmission line materials and equipment.





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## **1.0 INTRODUCTION**

### **1.1 TERMS OF REFERENCE**

The Scope of Work for this report was outlined by Work Task Order (WTO) No. DC1051 – Field Investigation and Construction Requirements – HVdc Transmission Line – Gull Island to Soldiers Pond.

In summary, the work included the following:

- Identification and assessment of potential campsites, marshalling yard sites, access roads and tote roads along the proposed 1095 km long  $\pm$  450 kV HVdc transmission line (hereafter referred to as the transmission line) corridor from Gull Island to Soldiers Pond. Selection of such infrastructure was based on strict criteria that could support construction requirements and logistics.
- A geotechnical field investigation to confirm the subsurface and surface conditions at all Points of Intersection (PI), proposed camps, and marshalling yard sites. Additional investigations were also carried out at select representative areas located between PI locations in an attempt to identify varying geotechnical conditions along the transmission line corridor.
- An ArcGIS map book (Volume 2) was generated containing all of geotechnical investigation data collected. These maps illustrate the entire line corridor and identify proposed camps, marshalling yards and access routes.

### **1.2 PREVIOUS STUDIES**

Information and data for this investigation were obtained from a review of the Hatch Limited (Hatch) 2008 Corridor Selection and Construction Report (see bibliography). This report provided NALCOR Energy – Lower Churchill Project (NE-LCP) with up to three possible scenarios for the corridor selection of the transmission line. In turn, personnel from NE-LCP selected and provided details of one corridor requiring study to AMEC Earth and Environmental

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(AMEC). It is this corridor that is the basis of AMEC's investigation, which is subsequently presented within this report.

### **1.3 CONTENTS OF REPORT**

This report presents the findings with respect to the location and number of camps, marshalling yards, access routes, and tote roads required. Also presented are the results of the geotechnical field investigation program which included test pit excavation, rock anchor pull out tests, bog probes, geological mapping, borehole advancement and percolation tests at the campsites.

Hard copies of drawings are presented in Volume 2 (Appendix A1) of the report and an electronic version of pertinent drawings, ArcGIS compatible, are being provided under separate cover.

Information gathered from this study is divided into three sections: Lot 1 (Gull Island to the Strait of Belle Isle); Lot 2 (Strait of Belle Isle to Taylor's Brook); and Lot 3 (Taylor's Brook to Soldiers Pond). Field results (i.e. test pit logs, rock anchor pull-out test records, percussion probe records etc.) are labeled and referenced to the corresponding Lot and Point of Intersection (PI) number. All field data is presented to reflect the path of the corridor, starting at Gull Island and working southeast to Soldiers Pond.

## **2.0 LINE CORRIDOR SELECTION**

### **2.1 General**

In April of 2008 Hatch completed a comprehensive feasibility study on the development of a transmission line for the Lower Churchill Project which included proposed corridor options that span from Gull Island to Soldiers Pond. Personnel from NE-LCP have decided the transmission line corridor would follow a path that would: be practical and shortened the line length as much as possible; avoid difficult terrain; minimize new road construction; avoid areas with heavy ice and strong winds; minimize environmental impacts; and preserve areas of archaeological and historical sites (Hatch, 2008).

The transmission line corridor(s) location is shown on the applicable figures in Volume 2 (Appendix A1).

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## **2.2 LOT 1: Gull Island to the Strait of Belle Isle**

### **2.2.1 Line Corridor Adjustment**

Only one corridor was proposed for the majority of this section. There were two options for the crossing of the transmission line across the Strait of Belle Isle. Option 1 turns south from PI 44, crosses Route 510 and terminates at the cable landing site at L'Anse Amour. Option 2 turns southwest from PI 44, passing between First Pond and Middle Pond, and crosses Route 510 near the cable landing site east of the community of L'Anse au Clair. Option 1 was chosen by NE-LCP to be the focal point of the geotechnical investigations due to its closer proximity to the coast of Newfoundland.

## **2.3 LOT 2: Strait of Belle Isle to Taylor's Brook**

### **2.3.1 Line Corridor Adjustment**

Due to the rough terrain, numerous water bodies and harsh weather conditions, Hatch had recommended as many as three corridor options along many sections of this Lot. After review, NE-LCP selected the most westerly option due to its lower elevation. This option is also effectively shielded from the wind due to higher ground being located on the east and west sides of the corridor. In addition, the protected areas of The Highlands of St. John, Cloud River and Main River would be bypassed. Please note that a corridor runs through Gros Morne National Park and is shown on test location maps presented in Volume 2 (Appendix A1). However, this corridor was not studied during this investigation.

Two proposed landing sites were considered at Mistaken Cove and Winter Cove. Mistaken Cove was chosen to be the preferred landing location for the crossing of the line across the Strait of Belle Isle.

## **2.4 LOT 3: Taylor's Brook to Soldiers Pond**

### **2.4.1 Line Corridor Adjustment**

From Taylor's Brook to Soldiers Pond, Hatch suggested one preferred corridor with two small sections having an alternate corridor, to bypass potential obstructions. The alternative second option for the transmission line occurs near Birchy Lake and Gushue's Pond Park. At Birchy Lake the preferred corridor will be steeper but will shorten the line length by 6 km and limit the shore to shore distance across Birchy Lake at the narrows to 220 m from 285 m. At Gushue's Pond Park both options avoids encroaching Gushue's Pond Provincial Park and the protected

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area of Lockyer's Waters with the preferred corridor minimizing large water crossings as well as potential private property issues. In general, the transmission line will follow a path that parallels existing transmission lines in addition to following the protocol listed in the Section 2.1 above.

In addition to being able to use existing access to the existing transmission line, the primary corridor was chosen as it avoids several protected areas such as Great Gull Lake, Gambo Pond, Bay du Nord Wilderness Reserve, Pitts Pond Provincial Park and Terra Nova National Park.

### **3.0 ACCESS ROUTES AND TOTE ROADS**

#### **3.1 LOT 1: Gull Island to the Strait of Belle Isle**

##### **3.1.1 Access Roads**

Access within this Lot is limited to the existing highways at Gull Island and the Strait of Belle Isle. The remainder of the corridor will cross the Labrador wilderness, which presently have no existing roads. The closest access point (approximately 10 km) along this corridor will be the area of the proposed camp near PI 16, on Phase 3 of the Trans Labrador Highway (TLH). Access roads will have to be constructed to access the corridor. It is anticipated that these roads will originate from both ends of the corridor with access points to Phase 3 of the TLH. The construction of the access roads may require the installation of bridges in several locations including, but not limited to: the Kenamu River, St. Paul River, St. Augustin River, Little Drunken River and Lost River. In areas where the access roads have to divert from the transmission line corridor due to the geography, tote roads will be required to access the transmission line tower locations. At the Churchill River, access would be through a temporary construction bridge for the powerhouse development.

#### **3.2 LOT 2: Strait of Belle Isle to Taylor's Brook**

##### **3.2.1 Access Roads**

There are existing forest roads in several areas throughout Lot 2 that can provide access to the corridor from PI 1 to PI 8B, PI 13B to PI 22 and PI 36C to PI 41. From PI 1 to PI 8B these roads originate near Flowers Cove (and in various locations along Routes 430 and 432), PI 13B to PI 22 from roads near the communities of Hawke's Bay, Bellburns and Daniels Harbour and PI 36C to PI 41 from forestry access roads into Eagle Mountain from Route 420. While many of



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the roads traveled during the investigation were passable, upgrading will be required at some locations, particularly within the area of PI 36C to PI 41. A detailed study is recommended of all proposed existing access routes prior to construction. In addition all encountered bridges and major culvert crossing must be inspected and certified by a Professional Engineer for structural integrity and capacity. Within the sections of the corridor described above, tote roads will have to be constructed as required in order to access individual transmission tower sites.

No access roads exist in the areas of PI 8B to PI 13B (Highlands of St. John) and PI 23 to PI 36C (Long Range Mountains). Access roads and tote roads will have to be constructed over high, hilly terrain within these areas.

### **3.3 LOT 3: Taylor's Brook to Soldiers Pond**

#### **3.3.1 Access Roads**

Much of the proposed corridor in this Lot follow existing transmission lines which have established access and tote roads. The majority of the area has access within 1.5 km from existing forestry roads, the Trans Canada Highway, and secondary highways.

Areas with limited access include:

- an 18 km section between PI 42 and PI 44, where only 4 access points (roads intersecting the corridor) were identified;
- a 15 km section between PI 49 and PI 50;
- a 7 km section between PI 56 and PI 57;
- a 5 km section between PI 58 and PI 59;
- a 72 km section between PI 59 and PI 64, where only 8 access points (roads intersecting the corridor) were identified; and,
- a 26 km section between PI 65 and PI 68, where only 8 access points (roads intersecting the corridor) were identified.

Some of the existing access and tote roads will require upgrading; in addition new roads will be required at many locations, particularly those identified above. Some of the identified forestry roads between PI 51 to PI 63 have not been maintained and will require extensive reconstruction. A detailed study is recommended of all proposed existing access routes prior to construction. In addition all encountered bridges and major culvert crossing must be inspected and certified by a Professional Engineer for structural integrity and capacity.

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Many sections of the corridor will be accessed from the Trans Canada Highway, particularly on the Avalon Peninsula. Additional parking facilities may be required so as to not impede traffic flow. In addition, some of the existing tote road access points may not comply with existing highway regulations for access and line of sight/stopping distance. The Department of Transportation and Works should be consulted prior to final planning to determine their suitability and to determine any additional precautions and work that may be required.

#### **4.0 CAMPS AND MARSHALLING YARDS**

##### **4.1 CAMPS - LOT 1: Gull Island to the Strait of Belle Isle**

###### **4.1.1 General**

During the construction of the transmission line several camps will be needed to accommodate transmission line construction personnel. The Hatch 2008 report identified four (4) camp sites for this Lot. A campsite is proposed at both ends of the corridor (proposed construction camp at Gull Island for the hydro development and near L'Anse au Loup) and at two (2) strategically placed locations along its length (in approximate 1/3 intervals). Locations of the camps were chosen based on several factors including pre-existing infrastructure, freshwater supply, ample area for sewer services and waste disposal and generally flat topographic areas absent of bogs. Figure DC1051-A2.1 (in Appendix A2) shows the general location of the proposed campsites. Figures DC1051-A2.2 to DC1051-A2.5 provide further detail on Campsites A to D, respectively.

###### **4.1.2 Number of Camps**

A total of four (4) camps are being considered for Lot 1. These camps include:

- The main construction camp at Gull Island (termed Campsite A for the purposes of this report);
- Approximately 153 km east of Goose Bay on Phase 3 of the Trans Labrador Highway approximately 6 km north of PI 16 (Campsite B);
- Adjacent to a tributary of the St. Paul River, approximately 1.2 km northwest of PI 29 (Campsite C); and
- Adjacent to the community of L'Anse au Loup near the Strait of Belle Isle crossing (Campsite D).

Campsite A is proposed to utilize the facilities planned for the construction of the Gull Island hydro development and therefore was not investigated as part of this study. Campsite B is

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located on predominantly flat land which is vegetated with small trees and shrubs. Campsite C is predominantly flat with one or two small hills which should not interfere with camp construction. Campsite D is within the town boundaries of L'Anse au Loup with municipal water and sewer services.

Refer to Appendix B8 for a photographic journal of the proposed locations for Campsites B and C. In the event that additional locations for camp areas are considered, there are large areas of land throughout the transmission line corridor that will provide a freshwater supply, ample area for sewer services and have generally flat topographic areas absent of bogs.

#### **4.1.3 Camp Layout**

Each camp will be developed to accommodate approximately 150 workers. The typical camp layout will occupy a space of approximately 135 m x 135 m and will include bunkhouses, a dining hall and recreational complex. The actual layout will be optimized to suit the topography at each location. Figure DC1051-A2.9 in Appendix A2 illustrates the typical camp layout described above.

#### **4.1.4 Water Supply**

The water supply for Campsites B and C will be readily available from adjacent rivers (the St. Augustine River at Campsite B and a tributary of St. Paul River at Campsite C). It is proposed that the water will be supplied to the sites using an intake pumping system which will send the water to a wet well. The water will be treated and chlorinated to comply with the Canadian Drinking Water Quality Guidelines. The water system will be designed to accommodate the fire water requirements for each camp. No water quality testing has been conducted as part of this report.

For the campsite at L'Anse au Loup (Campsite D), town water and fire water services may be used to service the camp.

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#### **4.1.5 Sewer Services**

For Campsites B and C the sewage services will be a tertiary treatment system. The tertiary treatment will be designed to ensure that the discharge concentrations comply with the Environment Control Water and Sewage Regulations, Schedule A, as outlined by the Department of Environment and Conservation.

Percolation testing was performed at Campsite B confirming that this site exhibits an acceptable disposal environment in accordance with the Guidelines for the Design, Construction and Operation of Water and Sewerage Systems, Section 5.15.4.4 as outlined by the Department of Environment and Conservation. Time constraints did not allow for percolation testing to be carried out at Campsite C. Details of the percolation test are included in Appendix B8. Campsite D located in L'Anse au Loup will utilize the town system for sewer services.

#### **4.1.6 Waste Disposal**

Waste disposal at the camps will require that all solid wastes be stored in bear proof containers. The waste will have to be trucked to the nearest approved waste disposal site. A schedule will be required to ensure the storage of waste on site is minimized. For Campsite A, the waste may be trucked to Goose Bay. Waste from Campsites B, C and D may be shipped to one of the local waste disposal sites on the south coast of Labrador.

### **4.2 CAMPS - LOT 2: Strait of Belle Isle to Taylor's Brook**

#### **4.2.1 General**

A limited amount of existing accommodations are available at many locations within Lot 2. Motel and Bed & Breakfast suites exist in the following communities: Flowers Cove, St. Barbe, Plum Point, Roddickton, Port au Choix, Hawke's Bay, Daniel's Harbour, Cow Head, Sop's Arm, Hampton, and Main River. The number of available units was not determined in this study, but it is anticipated that additional units will be required, especially during the tourist season.

The Hatch 2008 report indicated that three (3) camps may be implemented to accommodate transmission line construction personnel. Locations of the camps were chosen based on several factors including the presence of a freshwater supply, ample area for sewer services and waste disposal and generally flat topographic areas absent of bogs. Figure DC1051-A2.1 (in Appendix A2) shows the general location of the proposed camp sites. Figures DC1051-A2.6 to DC1051-A2.8 provide further detail on Camp Sites E to G, respectively.



#### **4.2.2 Number of Camps**

A total of three (3) campsites are being considered for Lot 2. These campsites include:

- Approximately 8 km east - northeast of Hawke's Bay (4 km southwest of PI 13B) which is accessible by a forestry access road (Campsite E);
- Approximately 9 km northeast of Daniel's Harbour (3.5 km west of PI 20) in an area of a pre-existing mine site, which is accessible by the mine access road (Campsite F); and
- Adjacent to an unnamed pond/lake approximately 1.5 km southwest of PI 38 (both the north and south sides are under consideration), which is accessible by a forestry access road (Campsite G).

Campsite E is predominantly flat and covered with small trees and shrubs. Much of Campsite F is underlain by remnant tailing deposits from the previous mining operations. This campsite should be positioned to avoid construction over the mine tailings. Further study is recommended to determine any geotechnical, environmental, and/or health concerns that may originate from the previous mining operation. The two sites under consideration for Campsite G are both predominantly flat with a number of large boulders observed throughout the area. The northern site is covered with mature trees and shrubs while the southern site has been previously cut and is now covered with re-growth including small trees and shrubs.

Refer to Appendix C7 for a photographic journal of the proposed locations for Campsites E and F and G. In the event that additional locations for camp areas are considered, there are areas throughout the transmission line corridor that will provide a freshwater supply, ample area for sewer services and have generally flat topographic areas absent of bogs.

#### **4.2.3 Camp Layout**

The camps will be developed to accommodate approximately 150 workers. The typical camp layout will occupy a space approximately 135 m x 135 m and will include bunkhouses, a dining hall and recreational complex. The actual layout will be optimized to suit the topography at each location. Figure DC1051-A2.9 in Appendix A2 illustrates the typical camp layout described above.

#### **4.2.4 Water Supply**

The water supply for the campsites will be readily available from the adjacent lakes, with the exception of Campsite F. The water for Campsite E and G will be supplied to the sites using an

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intake pumping system which will send the water to a wet well. The water will be treated and chlorinated to comply with the Canadian Drinking Water Quality Guidelines. The water system will be designed to accommodate the fire water requirements for each camp. Campsite F will require that an artesian well(s) be drilled to supply the camp with water and a retention tank/fire water pond may be to supply an adequate supply of fire fighting water. The site is underlain by bedrock of the St. George's Group, a complex succession of limestone and dolostone. Drilled wells within this rock unit typically demonstrate a moderate well yield of 37 L/min (Kingsley, 2008). No water quality testing has been conducted as part of this report.

#### **4.2.5 Sewer Services**

For Campsites E, F and G, the sewage services will be a tertiary treatment system. The tertiary treatment will be designed to ensure that the discharge concentrations comply with the Environment Control Water and Sewage Regulations, Schedule A, as outlined by the Department of Environment and Conservation.

Percolation testing was performed at all three campsites and the sites have acceptable disposal environments for a disposal system in accordance with the Guidelines for the Design, Construction and Operation of Water and Sewerage Systems, Section 5.15.4.4 as outlined by the Department of Environment and Conservation. Details of the percolation tests are included in Appendix C7.

#### **4.2.6 Waste Disposal**

Waste disposal at the camps will require that all solid wastes be stored in bear proof containers. The waste will have to be trucked to the nearest approved waste disposal site. A schedule will be required to ensure the on site storage of waste is minimized.

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### **4.3 CAMPS - LOT 3: Taylor's Brook to Soldiers Pond**

#### **4.3.1 General**

Accommodations for the construction of the transmission line from Taylor's Brook to Soldiers Pond can be provided by the surrounding towns, including, but not limited to: Deer Lake, Grand Falls, Gander, Clarenville and the St. John's area. As a result of the available accommodations (hotel, bed and breakfast, boarding house, short term rental, private accommodations), no campsites will be required for Lot 3.

### **4.4 MARSHALLING YARDS - LOT 1: Gull Island to the Strait of Belle Isle**

#### **4.4.1 Logistics**

The Gull Island to the Strait of Belle Isle corridor (Lot 1) will have two (2) marshalling yards, one at each end. The marshalling yard at Gull Island (Marshalling Yard A) will be situated near the Trans Labrador Highway, which links Happy Valley - Goose Bay to Quebec. Transmission line materials and equipment can be transported by road to the marshalling yard, either from Goose Bay or through Quebec. Materials and equipment shipped to the port at Goose Bay will be limited to approximately mid-June to late November due to winter channel conditions. Access via road through Quebec is open all year round but weather conditions may cause delays and make the road impassable throughout the winter and early spring months.

The marshalling yard at the Strait of Belle Isle (Marshalling Yard B) can receive transmission line materials and equipment by ship or barge via the port at Blanc Sablon or via road upon completion of Phase III of the Trans Labrador Highway, which is anticipated to be in the Fall of 2009. Shipping into Blanc Sablon may be unavailable in the winter months due to pack ice. Access via road through Quebec and Labrador is open all year round but weather conditions may cause delays and make the road impassable throughout the winter and early spring months.

#### **4.4.2 Yard Location**

Marshalling Yard A will be at Gull Island and is proposed to utilize the facilities planned for the construction of the Gull Island hydro development and therefore was not investigated as part of this study. A full description and geotechnical investigation is available for this yard in the SNC Lavalin Report AC1030 - Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls.

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Marshalling Yard B will be located in a rock quarry adjacent to the intersection of Route 510 and the secondary road that leads to L'Anse Amour. There are approximately four (4) hectares of cleared and generally level land in this quarry which can be utilized. A preliminary search with the Department of Mines & Energy did not show an owner for this site, however further investigation will be required.

Refer to Appendix B9 for a photographic journal of the proposed location for Marshalling Yard B. Figure DC1051-A3.1 (in Appendix A3) shows the general location of the proposed marshalling yards. Figures DC1051-A3.2 and DC1051-A3.3 provide further detail on Marshalling Yard A and B, respectively.

#### **4.4.3 Preparation of the Site**

The marshalling yards will have to be fully prepared, leveled, and fenced to accommodate the required transmission line materials and equipment. The marshalling yard sites will require a large level area with limited obstructions to facilitate the smooth flow of equipment and supplies. Up to five (5) hectares of land is required for the yards construction. The delivery schedule should be planned and monitored to minimize the onsite supplies and equipment while ensuring they are readily available when needed. Consideration should also be given to having an ample supply in the event of weather and manufacturing delays.

Figure DC1051-A3.7 in Appendix A3 illustrates the typical marshalling yard layout described above.

### **4.5 MARSHALLING YARDS - LOT 2: Strait of Belle Isle to Taylor's Brook**

#### **4.5.1 Logistics**

The Strait of Belle Isle to Taylor's Brook corridor will have one (1) main marshalling yard (Marshalling Yard D) at Deer Lake. All transmission line materials and equipment can be transported by road to the site. Materials and equipment purchased off the Island will be either sent to Newfoundland via boat to Corner Brook or on road transportation via the Marine Atlantic ferry at Port aux Basques.



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An auxiliary marshalling location (Marshalling Yard C) is proposed to be located near the community of Plum Point. All transmission line materials and equipment can be transported by road to the site. Materials and equipment purchased off the Island will be either sent to Newfoundland via boat to Corner Brook or on road transportation via the Marine Atlantic ferry at Port aux Basques. Alternate docking locations may be available pending the ships size and offloading procedures.

#### **4.5.2 Yard Location**

Marshalling Yard D will be located at the pre-existing Department of Transportation and Works highway maintenance depot in Deer Lake. This depot is located off the Trans Canada Highway approximately 3 km east of the Deer Lake Airport turnoff. This site will be the main marshalling yard for both Lot 2 and Lot 3. There are approximately five (5) to seven (7) hectares available at this location. Due to the size and location of Marshalling Yard D (with office building and security personnel), it is recommended that a water supply be provided. A drilled well should be suitable to supply the yard with water. This site is underlain with a glacial-fluvial deposit with its base (at an approximate depth of 15 m) expected to be a good aquifer.

An auxiliary marshalling location (Marshalling Yard C) is proposed to be located near the community of Plum Point and is adjacent to a forest resource road approximately 3.5 km from Route 432. The area is approximately three (3) hectares in size, relatively flat, and previously cut over during logging operations. Other auxiliary locations and short term storage areas are available in abandoned quarries on Route 430 near St. Barbe and on Route 432 (Roddickton access road).

Refer to Appendix C8 for a photographic journal of proposed Marshalling Yards C and D. Figure DC1051-A3.1 (in Appendix A3) shows the general location of the proposed marshalling yards. Figures DC1051-A3.4 and DC1051-A3.5 provide further detail on Marshalling Yard C and D, respectively.

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### **4.5.3 Preparation of the Site**

The preparation of the marshalling yards for Lot 2 is of importance as the Deer Lake yard will support both Lot 2 and Lot 3. The marshalling yards will have to be fully prepared, leveled, and fenced to accommodate the required transmission line materials and equipment. The marshalling yard sites will require a large level area with limited obstructions to facilitate the smooth flow of equipment and supplies. Up to five (5) hectares of land is required for the yards construction. The delivery schedule should be planned and monitored to minimize the onsite supplies and equipment while ensuring they are readily available when needed. Consideration should also be given to having an ample supply in the event of weather and manufacturing delays.

Figure DC1051-A3.7 in Appendix A3 illustrates the typical marshalling yard layout described above.

## **4.6 MARSHALLING YARDS - LOT 3: Taylor's Brook to Soldiers Pond**

### **4.6.1 Logistics**

The Taylor's Brook to Soldiers Pond corridor will have two (2) marshalling yards. All transmission line materials and equipment can be transported by road to the site. Materials and equipment purchased off the Island will be either sent to Newfoundland via boat to Corner Brook and St. John's or on road transportation via the Marine Atlantic ferry at Port aux Basques and Argentia. Alternate docking locations may be available pending the ships size and offloading procedures at Argentia, Bay Bulls, Lewisporte, and Botwood.

### **4.6.2 Yard Location**

The main marshalling yard for Lot 3 will be the Deer Lake yard (Marshalling Yard Site D), which will be the principal yard for the Island and will be developed to accommodate both Lot 2 and Lot 3 and is discussed above in Section 4.5.2.

The second marshalling yard (Marshalling Yard Site E) was recommended in the Hatch 2008 report to be located near the proposed converter station at Soldiers Pond. This site was rejected due to the hilly terrain and the presence of overhead lines and the proposed converter station. An alternate site was proposed to be located off the Trans Canada Highway, on the Witless Bay Line (Route 13), near the existing transmission lines. This site is predominately

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level and well drained with minimal vegetation cover. The nearby Trans Canada Highway has a full diamond interchange to Route 13 which will help facilitate the transporting of the transmission line materials and equipment.

Refer to Appendix D7 for a photographic journal of proposed Marshalling Yard Site E. Figure DC1051-A3.1 shows the general location of this proposed marshalling yard. Figure DC1051-A3.6 provides further detail on Marshalling Yard E.

#### **4.6.3 Preparation of the Site**

The marshalling yards will have to be fully prepared, leveled, and fenced to accommodate the required transmission line materials and equipment. The marshalling yard sites will require a large level area with limited obstructions to facilitate the smooth flow of equipment and supplies. Up to five (5) hectares of land is required for the yards construction. The delivery schedule should be planned and monitored to minimize the onsite supplies and equipment while ensuring they are readily available when needed. Consideration should also be given to having an ample supply in the event of weather and manufacturing delays.

Figure DC1051-A3.7 in Appendix A3 illustrates the typical marshalling yard layout described above.

## **5.0 GEOTECHNICAL**

### **5.1 GENERAL**

As part of this study, a preliminary geotechnical investigation was required along the corridor. Information gathered from this investigation will assist in foundation design for tower structures, access and tote road routing and design, and campsite/marshalling yard design. In addition, construction and design concerns are identified with recommendations for further study provided.

The Test Location Plan provided in Volume 2 (Appendix A1) show the specific test locations discussed in this report.

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## **5.2 INVESTIGATION PROCEDURES**

The geotechnical program for each section of the proposed corridor (i.e. Lot 1 - Gull Island to the Strait of Belle Isle; Lot 2 - Strait of Belle Isle to Taylor's Brook; Lot 3 - Taylor's Brook to Soldiers Pond) was divided into six tasks:

### **5.2.1 Task 1 – Base Map and Fieldwork Preparation**

NE-LCP provided the coordinates of each PI as well as preferred corridor selection maps prepared by Hatch. This provided useful information in the planning of the work.

Published reports (see bibliography) on surficial and bedrock geology of the areas along the corridor were reviewed. This information was compiled and used to produce corresponding surficial and bedrock geology maps. This work was performed by GIS specialized personnel from AMEC.

Information gathered during this task was used to prepare the field program. Since all PI's along the corridor were required to be investigated along with any areas with varying conditions, the produced maps were used to determine the anticipated subsoil conditions and to plan the best investigative procedure.

### **5.2.2 Task 2 – Reconnaissance**

Three reconnaissance trips were made by helicopter. The first trip was on July 8 to 9, 2008 to become familiar with the corridor and to evaluate any potential access and testing constraints for field investigation. The second trip was on July 24, 2008 to examine the topographic features and soil conditions in remote locations. The corridor maps produced up to this point were used to aid in recording the surficial geology at select locations along the corridor. Of particular interest were areas that represented a change in the surficial geology. The third trip was on November 4, 2008 to investigate significant river/brook crossings that will require consideration during the construction phase of the transmission line. Information gathered during this trip included an estimation of the width, depth, and velocity (described as slow, medium or fast) of each river/brook (see Appendices B7 for Lot 1, C6 for Lot 2, and D6 for Lot 3). Due to time constraints, the investigation of significant river crossings between PI 68 to PI 102 was not conducted. It should be noted that the majority of the corridor between PI 68 and PI 102 follow existing transmission lines with existing access and tote roads. While many of

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these roads will require upgrading, there should be sufficient access available to reduce if not eliminate major stream crossing along this section of corridor.

### **5.2.3 Task 3 – Permits**

All applicable permits were obtained by AMEC prior to any field-related intrusive investigations. Where possible, work was conducted away from streams and water bodies, thereby limiting the number of required permits. Permits required to conduct the field work include:

- Commercial Cutting and Operating Permit – Department of Natural Resources (required from each district along the corridor to clear brush and to operate a chain saw during fire season);
- Permit to Alter a Body of Water – Department of Environment and Conservation (required to ford a stream near Grand Falls-Windsor);
- Permit for Development – Department of Environment and Conservation (required to work within the controlled watersheds: Hawke's Bay - Torrent River; Shoal Harbour River; Lee's Pond; Maloney's River; Gander Lake; Middle Brook; and, Whitbourne).

### **5.2.4 Task 4 – Ground Truthing and Geotechnical Investigations**

Areas at or near the given coordinates for each PI and at representative test locations along the corridor were examined on the ground and intrusive investigations were performed. In total, one hundred and thirty-five (135) test pits were excavated, one hundred and two (102) percussion probes were drilled, sixteen (16) rock anchor pull-out tests were performed, approximately forty-six (46) km of bog terrain was probed, twenty (20) areas were mapped for geological features and two (2) boreholes were drilled at the riverbank locations of the Churchill River crossing.

#### **5.2.4.1 Test Pits**

One hundred and thirty (130) test pits were excavated in representative areas that provided coverage of the anticipated soil conditions at the PI's along the corridor and at four (4) potential campsite areas. Of these test pits, ten (10) were excavated in the campsites. The remaining one hundred and twenty (120) test pits were excavated along the transmission line corridor from Gull Island to Soldiers Pond. Five (5) test pits were also excavated on the north side of the Churchill River crossing in an attempt to locate in-situ material to be potentially used for road construction.

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In accessible areas of Lot 3, a John Deere 160 LC track mounted excavator was used for test pit excavation. A tire mounted BX 24 Kabota was utilized in the remote test locations of Lot 1 and Lot 2 and was transported (slung) via helicopter. Photographs 1 - 3 below show the excavation equipment at work during the field investigation.



Photo 1 and 2: BX-24 Kabota with associated sling equipment and being slung via helicopter.



Photo 3: John Deere 160 LC track mounted excavator utilized in accessible areas of Lot 3.

#### 5.2.4.2 Percussion Probes

Eighty four (84) percussion probes were drilled in 29 different areas of representative soil types (or where high concentrations of boulders impeded the excavation capability of the Kabota) along the length of the corridor. Eighteen (18) percussion probes were also drilled within two (2) proposed marshalling yard sites and one (1) proposed campsite in an attempt to determine depth to bedrock. Utilizing a gas powered Pionjar drill, each probe was advanced to refusal (on

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bedrock or a large boulder) or to the maximum penetration depth of the apparatus, approximately 1.8 m. A photograph of the percussion probing equipment is shown in Photo 4 below.



**Photo 4: Probing for bedrock with a Pionjar drill and 1.8 m drill rod.**

#### **5.2.4.3 Rock Anchor Pull-Out Tests**

Sixteen (16) rock anchor pull-out tests were performed along the length of the corridor at select locations at (or near) PI's where bedrock outcrops were either visible or just below the ground surface. Holes were first drilled in bedrock using the Pionjar drill (also used for percussion probing, see Section 5.2.4.2 above). Prior to installing the rock bolts the holes were cleared of drill cuttings, water and other debris.

Williams Form Hardware and Rockbolt (Canada) Limited supplied 25.4 mm diameter rock bolt anchors used for testing. The anchors were installed from approximately 1.2 m to 1.8 m into bedrock in 45 mm diameter drill holes. The anchor shells were 150 mm long and ribbed. The shell was set by torquing with a 0.6 m long pipe wrench to refusal by hand tightening. No grout was used as the holding resistance of the anchor in the rock was required.

The testing equipment was calibrated in imperial units with field results reported in the same units. The test procedure involved progressively loading the anchor in 2 ton (17.8 kN) increments and holding at that load for two (2) minutes until either the anchor failed or the jack reached its maximum capacity of 18 tons (160 kN). A displacement dial was used to record movement of the anchor and to indicate possible failure of the anchor or rock. Photographs of the rock anchor pull-out test equipment are shown below in Photos 5 and 6.

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Photo 5 and 6: Pionjar drilling a test hole and the hydraulic jack conducting the test

#### 5.2.4.4 Bog Probes

Bog probes were advanced in areas of bogs of substantial size (typically larger than 200 m in length). In total, 235 areas were investigated. These probes were conducted to aid designers in making final decisions on final routing and to determine the quantity of bog that would be encountered during construction.

Probes were composed of a 15 mm diameter, 3 m long reinforcing bar which was advanced by hand until refusal (or to the extent of the probe). Probing was conducted at a spacing of ~20 m along the length of the corridor, with probes at the center line of the proposed transmission line and at 20 m offsets on both sides of center. A photograph of the probing activity is shown in Photo 7 below.



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Photo 7: Field personnel probing boggy terrain with reinforcing bar.

#### 5.2.4.5 Geological Mapping

Twenty (20) areas were geologically mapped along the length of the corridor at select locations at (or near) PI's where bedrock was exposed. At each mapping station, features such as lithology, bedding strike and dip, joint / fracture spacing and orientation and overall bedrock quality were recorded.

#### 5.2.4.6 Boreholes

A total of two (2) boreholes were drilled at strategic points on the north and south sides of the Churchill River crossing to gain information on ground conditions required for tower foundation design. Borehole ID DC1051-LOT1-BH01, drilled on the north side of the crossing, was advanced to a total depth of 14.3 m with a CME 75 rotary drill rig. Borehole ID DC1051-LOT1-BH02 was drilled on the south side of the crossing and was advanced to a total depth of 4.6 m with the use of a heli-portable diamond drill that was also equipped with a gear reduction box for small diameter auger drilling. A photograph of the heli-portable diamond drill is shown below in Photo 8.

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**Photo 8: Drilling on the south side of the Churchill River crossing.**

The results of geotechnical testing described above are presented in Appendices B (Lot 1) C (Lot 2) and D (Lot 3) and are referenced to the corresponding test site. Logs of the boreholes drilled on the north and south sides Churchill River crossing are provided in Appendix B5.

### **5.2.5 Task 5 – Laboratory Testing**

A representative soil sample was collected from all test pit excavations and boreholes, where obtainable. Samples were stored in sealed plastic sample bags and/or buckets and sent to the AMEC laboratories in St. John's, NL and Dartmouth, NS for gradation and natural moisture analysis. A total of fourteen (14) representative samples were also collected at select locations along the corridor for standard proctor density testing and nine (9) for soil index testing. The results of these tests are presented in the corresponding test location logs.

### **5.2.6 Task 6 – Reporting**

All of the reviewed material, field test results, and interpretations are assembled in this technical report.

## **5.3 GEOLOGY**

### **5.3.1 Physiography and Surficial Geology**

Information on the surficial geology of Newfoundland and Labrador was obtained from Liverman and Taylor (1990) and Klassen, R.A. et al. (1992). These reports suggest that the surficial geology of the province is dominated by the effects of the last glaciation, known as Late Wisconsinian, which occurred between 10,000 and 25,000 years ago. Information on the Physiography of the province of was taken from Sanford and Grant (1992), Acres (1990), Price

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(1972) and Batterson (2003). The following sections summarize the surficial features, deposits and physiographic divisions that characterize the proposed corridor of the transmission line.

#### **5.3.1.1 LOT 1: Gull Island to the Strait of Belle Isle**

The majority of central and southern regions of Labrador belong to the Grenville Physiographic Region. The southern coast of Labrador is dominated by hills and mountains and is a low lying peneplain with local relief between 45 m and 455 m with a general elevation of 365 m above sea level (asl). In central portions of Labrador, the topographic features of lower elevation belonging to the Mecatina plateau dominate the landscape and comprise low rolling hills generally devoid of soil and broad valleys with thin glacial soils. Extensive bog lands have developed within this plateau.

The surficial geology of Lot 1 is mainly comprised of glacial till, some glaciofluvial material, areas of bog and also some drift poor areas with exposed bedrock near the coast. Sand ridges (esker complexes) become apparent in central regions.

#### **5.3.1.2 LOT 2: Strait of Belle Isle to Taylor's Brook**

The Northern Peninsula belongs to the Appalachian Physiographic Region. The proposed corridor for the transmission line comprises three (3) differentiated sub-regions within this Region which include: the Great Northern Highlands, West Newfoundland Coastal Lowland, and the Grand Lake Lowlands.

The Great Northern Highlands form the bulk of the study area. They include the Long Range Mountains and a small appendage, known as the Highlands of St. John (Grant, 1992). The mountains form a roughly rectangular high-standing block, which rises westward from 300 m (asl) to 500 m asl (Grant, 1992). The interior consists of an elevated, undulating plateau which generally tilts towards the northeast (Acres, 1990). The plateau has a rolling relief of 100 m on Precambrian rocks, mainly granitic gneisses.

The West Newfoundland Coastal Lowland, situated on the western portion of the Northern Peninsula, generally lies below 50 - 70 m elevation and has a local relief of less than 10 m (Grant, 1992). The lowland is underlain by gently inclined dolomite and limestone of the St. George and Table Head Groups, and sandstone and quartzite of the Bradore and Hawke's Bay Formations.

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The Grand Lake Lowlands are situated to the southeast of the study area. The interior of this sub-region is a plateau like region with frequent undulations in the terrain representing the ridges and slopes of the watersheds carved out by the major stream system. It also supports extensive forest stands, particularly on the gentle slopes of the major watersheds, and thick overburden is found in many areas (Batterson, 2003).

The surficial geology of Lot 2 is characterized by drift poor areas with concealed and exposed bedrock around the Long Range Mountains, glacial till and also some areas of bog.

### **5.3.1.3 LOT 3: Taylor's Brook to Soldiers Pond**

The Physiography of central and eastern Newfoundland belongs to the Appalachian Physiographic Region and is an assortment of three (3) differentiated areas of uplands and lowlands. The names of the major regions are the Grand Lake Lowlands, Newfoundland Central Lowlands, and the Uplands of Newfoundland.

The Grand Lake Lowlands (as described the Section 5.3.1.2) are situated to the northwest of the study area.

The Newfoundland Central Lowlands are relatively rugged and ridged, with elevations attaining approximately 300 m and become lower and flatter to the east. In central regions, it is characterized by rolling topography with an average elevation of about 250 m on a wide variety of bedrock types. Local variations in relief are caused by ice scour and deposits of glacial material.

The Uplands of Newfoundland exhibit characteristic high altitudes of 300 to 400 m. The region ranges from the Newfoundland Highlands, which it borders in the west, to the Avalon Channel, east of St. Johns. Inland, it is comprised of sparsely vegetated rolling plateaus. This sub-region can also be described as a gently southeastward sloping upland of rolling terrain developed chiefly across resistant slate, quartzite, schist, gneiss, granite, and volcanic rocks. The surface is dissected by valleys and in some areas its continuity is broken by lowland developments while in the central part of the Island elevations range from 180 m (asl) to 300 m (asl) (Price, 1972).

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The surficial geology of Lot 3 is dominated by glacial till, moraine landforms such as hummocky terrain and rogen moraine, both exposed and concealed bedrock and also some areas of bog.

### **5.3.2 Bedrock Geology**

For the purposes of this investigation, the geology is discussed mainly in terms of the lithology and distribution of the various rock strata. Information on the bedrock geology of Labrador was obtained from Wardle et al. (1997). Information on the bedrock geology of Newfoundland was obtained from Hayes, J.P. (1987).

#### **5.3.2.1 Introduction**

Labrador is the easternmost part of the Canadian Shield which is dominated by metamorphic, igneous, and lesser sedimentary rocks. The structurally distinct geologic divisions of Labrador reflect the development of five (5) different mountain building episodes called orogenies. Clockwise from the west these divisions are called the Superior Province, Churchill Province, Nain Province, Makkovik Province, and Grenville Province. The proposed transmission line corridor crosses only the Grenville Province of Southern Labrador.

The Island of Newfoundland is the northeast extremity of a chain of deformed and elevated rocks called the Appalachian Orogen. The Appalachian Orogen evolved through a cycle of ocean opening, then ocean closing ending with continental collision. The geologic divisions of Newfoundland record the development of the margins and oceanic tract of this ocean, called Iapetus. From west to east, these divisions are called the Humber Zone, Dunnage Zone, Gander Zone, and Avalon Zone (Williams, H. 1979). The proposed corridor traverses all of these tectonostratigraphic zones.



### **5.3.2.2 LOT 1: Gull Island to the Strait of Belle Isle**

The bedrock geology for this section of the corridor is dominated by Late Mesoproterozoic igneous rocks, Late Paleoproterozoic to Mesoproterozoic crystalline metamorphic rocks (i.e. schist and gneiss) and lesser sedimentary rocks such as sandstone, siltstone and shale of the Grenville Province. The igneous rocks are mainly comprised of late to post-tectonic syenite plutons, gabbroic plutons and rocks mainly of granitic composition. Metamorphic rocks include Paleoproterozoic to Mesoproterozoic gneisses and Late Paleoproterozoic granitic orthogneiss.

### **5.3.2.3 LOT 2: Strait of Belle Isle to Taylor's Brook**

Lot 2 is dominated by rocks of the Humber zone. These rocks include: shelf, passive margin rocks comprised of Cambrian and Ordovician carbonates (i.e. dolomite and limestone); rift rocks comprised of Late Proterozoic to Cambrian siliclastic sediments ( i.e. sandstone and shale) and volcanics (granites, rhyolites and mafic tuff); and basement rocks comprised of Early to Middle Proterozoic granitoid gneiss.

### **5.3.2.4 LOT 3: Taylor's Brook to Soldiers Pond**

The bedrock geology for Lot 3 is dominated by volcanic, sedimentary, and oceanic crust rocks of the Dunnage Zone; sandstone and metamorphic rocks (i.e. gneiss and schist) of the Gander Zone; subaerial sedimentary rocks (i.e. sandstone, shale and siltstone) and volcanic rocks (i.e. granites, rhyolites and tuff) of the Avalon Zone; subaerial sedimentary rocks and shallow marine to subaerial sedimentary and volcanic rocks from successor belts.

## **5.4 INVESTIGATION RESULTS**

The fieldwork for this investigation was performed between July 11, 2008 and November 5, 2008. Helicopter support was used in areas not easily accessible. Work was delayed from August 12, 2008 to September 4, 2008 due to helicopter unavailability and was halted from September 30, 2008 to October 9, 2008 to compile field data obtained up to that date.

### **5.4.1 LOT 1: Gull Island to the Strait of Belle Isle**

The fieldwork for Lot 1 was performed between September 5, 2008 and September 29, 2008. Forty-six (46) test pits, three (3) rock anchor pull-out tests, thirty-six (36) percussion probes, two (2) boreholes, approximately seven (7) km of bog probing, seven (7) geological mapping areas and one (1) percolation test were conducted in Lot 1. Among these, one (1) test pit and one (1) percolation test were conducted at a Campsite B and two (2) percussion probes were

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conducted at Campsite C. Six (6) percussion probes were also conducted at Marshalling Yard B. The remaining investigations were performed along the 407 km long corridor. Refer to Appendix B for the details of Lot 1 test results. Results of tests performed at Campsites B and C and at Marshalling Yard B are discussed in Section 5.4.1.2 and 5.4.1.3 of this report.

#### 5.4.1.1 Transmission Line

The transmission line between the Gull Island and the Strait of Belle Isle is located within a 407 km long, 2 km wide, corridor which included 45 PI's. Upon completion of the map and terrain analysis, calculations were made for the type of soil, bog and rock expected along this section of the corridor. This calculation was further upgraded using data collected during the project fieldwork. The quantities for Lot 1 may be summarized as follows:

- |  |       |
|--|-------|
| • Till   | 70.2% |
| • Glaciofluvial Soil   | 6.9%  |
| • Glaciomarine and Marine                                      | 2.5%  |
| • Bog Land   | 6.9%  |
| • Exposed bedrock or bedrock concealed under thin organic soil | 13.5% |

In the majority of test excavations performed in this section of the corridor, till was the dominant material encountered with relatively thin layers, ranging from 0.2 m to > 4.0 m generally overlying apparent bedrock. However, it may be as deep as 14 m as evidenced in Borehole ID DC1051-LOT1-BH01 located (see Appendix B5). This material generally ranges from a silty sand with trace gravel to a gravelly sand with trace silt with some cobbles and boulders.

A rock anchor pull-out test was attempted at three PI locations along this corridor (at PI 13, PI 41, and PI 44). Due to difficulty in advancing the drill steels, tests at PI 13 and PI 44 were abandoned. The test at PI 41 was successfully carried out and the encountered bedrock was able to hold the maximum 160 kN load applied by the jack.

Extensive bog lands exist throughout the area; however the corridor was selected by NE-LCP and Hatch to avoid most of this terrain. In areas of extensive bog, a series of bog probes were conducted to determine the depths of the bog. Details of the probe locations are presented in Appendix B4.

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Frost penetration in this area is expected to be 2.5 m based on data from the Canadian Foundation Engineering Manual 4<sup>th</sup> Edition. The susceptibility for frost action in glacial till containing significant fines is moderate to objectionable. In clean sand and gravel and glaciofluvial soil away from the water table, frost action will be slight.

#### **5.4.1.2 Camps**

There are four (4) camp locations proposed for Lot 1. Campsite A is located at the proposed Gull Island hydro development and is proposed to utilize its facilities. Campsite D is proposed to be located within town boundaries (location to be determined) and will utilize town water and sewer. These campsites (A and D) are not included in this scope of work. One (1) test pit and one (1) percolation test was performed at Campsite B and two (2) percussion probes were performed at Campsite C. Details of Campsite B and C are presented below.

##### Campsite B

Campsite B is located near coordinates 342792 E, 5824959 N (UTM NAD 83) approximately 60 m south of the Trans Labrador Highway, at kilometer post 152 + 700 on Phase 3 of the Trans Labrador Highway. Geotechnical investigations indicate that the site soil is made up of mostly glacial till consisting of sand and gravel with trace to some silt and occasional cobbles.

The percolation test (1) performed at the site resulted in time (T) of 4 minutes per 25 mm. According to the Guidelines for the Design, Construction, and Operation of Water and Sewerage Systems by the Department of Environment and Conservation, the site has an application rate in the order of  $0.117 \text{ m}^3 / \text{m}^2\text{day}$ , indicating that the site is suitable for a septic disposal field. A recognized standard such as the Department of Environment and Conservation's guidelines should be consulted in the design of a septic disposal field for the site.

The encountered soil is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type and bedrock are presented in Section 5.5.



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It is anticipated that the preferred method of drainage will be open drainage ditches or swales along the perimeter of the campsite combined with galvanized steel culverts, where required. It is recommended that check dams be combined with ditching in areas where fine grained soils are encountered. Check dams may be constructed of well-graded blast rock and constructed to a recognized standard. It is recommended that the site be graded to promote drainage to the perimeter ditches. In addition, the site must be graded to allow water to be channeled away from trailers.

Should fine grain soils be encountered in cut areas, erosion prevention measures such as soil stabilization blankets and matting should be used. Shallow bank slopes alone will not prevent erosion of this material during high water flows. Based on the test pit log from the site, cut slopes in soil of 2H:1V or flatter are required.

#### Campsite C

Campsite C is located near coordinates 452498 E, 5776843 N (UTM NAD 83) approximately 1.2 km northwest of PI 29. Subsoil investigation at this site was limited to percussion probes. Visual observation of the probes, findings from the near by PI 29 and surficial geology maps suggest that the area is comprised of a glacial till veneer overlying bedrock. Bedrock was not encountered in the two percussion probes executed at the site. These probes were advanced up to a depth of 1.4 m.

Percolation tests are required to confirm the soils suitability for a septic disposal field and to determine its absorption rate for design in accordance with the Guidelines for the Design, Construction and Operation of Water and Sewerage Systems set forth by the Department of Environment and Conservation.

The encountered soil is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type and bedrock are presented in Section 5.5.

It is anticipated that the preferred method of drainage will be open drainage ditches or swales along the perimeter of the campsite combined with galvanized steel culverts, where required. It

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is recommended that check dams be combined with ditching in areas where fine grained soils are encountered. Check dams may be constructed of well-graded blast rock and constructed to a recognized standard. It is recommended that the site be graded to promote drainage to the perimeter ditches. In addition, the site must be graded to allow water to be channeled away from trailers.

Should fine grain soils be encountered in cut areas, erosion prevention measures such as soil stabilization blankets and matting should be used. Shallow bank slopes alone will not prevent erosion of this material during high water flows. Based on the test pit log from the site, cut slopes in soil of 2H:1V or flatter are required.

#### **5.4.1.3 Marshalling Yards**

Geotechnical investigations were undertaken at Marshalling Yard B located at the Strait of Belle Isle, near coordinates 508761 E, 5704692 N (UTM NAD 83). The six (6) percussion probes conducted indicate that refusal depths on apparent bedrock are shallow and range 0.25 m to 0.6 m below surface. These refusal depths are interpreted to correspond with the depth to probable bedrock.

The encountered soil and bedrock is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type are presented in Section 5.5.

#### **5.4.2 LOT 2: Strait of Belle Isle to Taylor's Brook**

The fieldwork for Lot 2 was performed between October 10, 2006 and October 24, 2008 with the assistance of helicopter support. Forty-eight (48) test pits, four (4) rock anchor pull-out tests, fifty-four (54) percussion probes, approximately eight (8) km of bog probing, four (4) geological mapping areas and three (3) percolation test were conducted in Lot 2. Among these, four (4) test pits and one (1) percolation test were conducted at Campsite E located near PI 13B; three (3) test pits and one (1) percolation test was conducted at Campsite F near PI 20; two (2) test pits and one (1) percolation test was conducted at Campsite G near PI 38; and ten (10) percussion probes were conducted at Marshalling Yard Site C located near Plum Point. The remaining investigations were performed along the 238 km long corridor. Refer to Appendix C

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for the complete set of Lot 2 field results. Results of tests performed at Campsites E, F and G and at Marshalling Yard C are discussed in Section 5.4.2.2 and 5.4.2.3 of this report.

#### 5.4.2.1 Transmission Line

The transmission line between the Gull Island and the Strait of Belle Isle is located within a 238 km long, 2 km wide, corridor which included 41 PI's. Upon completion of the map and terrain analysis, calculations were made for the type of soil, bog and rock expected along this section of the corridor. This calculation was further upgraded using data collected during the project fieldwork. The quantities for Lot 2 may be summarized as follows:

• Till	33.8%
• Alluvium	<1%
• Glaciofluvial Soil	5.9%
• Colluvium	1.5%
• Bog Land	4.3%
• Glaciomarine and Marine	4.9%
• Exposed Bedrock or bedrock concealed under thin organic soil	49.4%

Subsurface investigations carried out at the PIs indicate that concealed bedrock generally underlies a thin veneer of soil (0.1 m to > 3.1 m) throughout Lot 2. Test results and visual observations of the soil show it to vary from a thin layer of rootmat/topsoil, to a colluvium mixture of frost hove rock fragment and organics, to a sand and gravel glacial till with varying amounts of fines and cobbles/boulders. Bedrock was exposed at the surface in select locations along the corridor, particularly on the hill tops.

A rock anchor pull-out test was attempted at four PI locations (PI 10B, PI 17, PI 35C, and PI 40). Due to difficulty in advancing the drill steels at PI 17, tests were only conducted at PI 10B, PI 35C, and PI 40. All three locations were successfully tested and were able to hold the maximum 160 kN load applied by the jack without failure.

Bog lands exist throughout the area; however the corridor was selected by NE-LCP and Hatch to avoid most of this terrain. In areas of extensive bog, a series of bog probes were conducted to determine the depths of the bog. Details of the probe locations are presented in Appendix C4.

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Frost penetration in this area is expected to be 1.8 m based on data from the Canadian Foundation Engineering Manual 4<sup>th</sup> Edition. The susceptibility for frost action in glacial till containing significant fines is moderate to objectionable. In clean sand and gravel and glaciofluvial soil away from the water table, frost action will be slight.

#### **5.4.2.2 Campsites**

There are three (3) campsite locations proposed for Lot 2, Campsites E, F and G. Four (4) test pits and one (1) percolation test was performed at Campsite E; three (3) test pits and one (1) percolation test was performed at Campsite F; and two (2) test pits and one (1) percolation test was performed at Campsite G.

##### Campsite E

Campsite E is located near coordinates 496877 E, 5611920 N (UTM NAD 83) approximately 8 km east – northeast of Hawke's Bay and 4 km southwest of PI 13B. Geotechnical investigations indicate that the soil is made up of gravelly sand and large angular boulders (also observed as sand and gravel with large boulders) with some silt and some angular cobbles. All test pits were terminated in probable bedrock at depths ranging from 0.4 m to 1.7 m, suggesting that bedrock depth is shallow at the site.

A percolation test performed at one (1) location on the site resulted in time (T) of 13 minutes per 25 mm. This result, according to the Guidelines for the Design, Construction, and Operation of Water and Sewerage Systems by the Department of Environment and Conservation, indicates design application rates for a septic disposal field to be in the order of  $0.064 \text{ m}^3 / \text{m}^2\text{day}$ . This would indicate that the site is suitable for a septic disposal field. A recognized standard such as the Department of Environment and Conservation's guidelines should be consulted in the design of a septic disposal field for the site.

The encountered soil is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type and bedrock are presented in Section 5.5.

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It is anticipated that the preferred method of drainage will be open drainage ditches or swales along the perimeter of the campsite combined with galvanized steel culverts, where required. It is recommended that check dams be combined with ditching in areas where fine grained soils are encountered. Check dams may be constructed of well-graded blast rock and constructed to a recognized standard.

Should fine grain soils be encountered in cut areas, erosion prevention measures such as soil stabilization blankets and matting should be used. Shallow bank slopes alone will not prevent erosion of this material during high water flows. Based on the test pit logs from the site, cut slopes in soil of 2H:1V or flatter are required.

#### Campsite F

Campsite F is located in a pre-existing mine site near coordinates 4467729 E, 5569579 N (UTM NAD 83) approximately 9 km northeast of Daniel's Harbour and 3.5 km west of PI 20. In two (2) of the three (3) test pits excavated at the site remnant deposits of mine tailings were observed. This should be considered when placing the camp as the tailings will have associated geotechnical, environmental, and health issues. Sandy gravel with angular boulders and cobbles was observed in the third test pit executed at the site.

A percolation test performed at one (1) location on the site resulted in time (T) of 6 minutes per 25 mm. This result, according to the Guidelines for the Design, Construction, and Operation of Water and Sewerage Systems by the Department of Environment and Conservation, indicates design application rates for a septic disposal field to be in the order of  $0.103 \text{ m}^3 / \text{m}^2\text{day}$ . This would indicate that the site is suitable for a septic disposal field. A recognized standard such as the Department of Environment and Conservation's guidelines should be consulted in the design of a septic disposal field for the site.

Campsite F may be a suitable location for camp placement; however all structures and personnel are recommended to be located away from the existing mine infrastructure and further investigation is recommended to investigate any environmental and health issues associated with the mine tailings and previous mine workings.

#### Campsite G

Campsite G is located adjacent to an unnamed lake near coordinates 479527 E, 5512936 N (UTM NAD 83) approximately 1.5 km southwest of PI 38. As both the north and south sides of

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the lake are under consideration for camp placement, one (1) test pit was excavated at each location. Geotechnical investigations indicate that the soil on the north side of the lake consists of sandy gravel and large boulders with trace fines and some sub-angular cobbles. Massive boulders up to approximately 2 – 3 m in diameter were observed throughout the general area. The soil on the south side of the lake is comprised of sandy gravel and sub-angular cobbles with some fines and some sub-angular boulders.

A percolation test performed at one (1) location (south of the lake) resulted in time (T) of 4 minutes per 25 mm. This result, according to the Guidelines for the Design, Construction, and Operation of Water and Sewerage Systems by the Department of Environment and Conservation, indicates design application rates for a septic disposal field to be in the order of  $0.117 \text{ m}^3 / \text{m}^2\text{day}$ . This would indicate that the site is suitable for a septic disposal field. A recognized standard such as the Department of Environment and Conservation's guidelines should be consulted in the design of a septic disposal field for the site.

The encountered soil is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type and bedrock are presented in Section 5.5.

It is anticipated that the preferred method of drainage will be open drainage ditches or swales along the perimeter of the campsite combined with galvanized steel culverts, where required. It is recommended that check dams be combined with ditching in areas where fine grained soils are encountered. Check dams may be constructed of well-graded blast rock and constructed to a recognized standard.

Should fine grain soils be encountered in cut areas, erosion prevention measures such as soil stabilization blankets and matting should be used. Shallow bank slopes alone will not prevent erosion of this material during high water flows. Based on the test pit log from the site, cut slopes in soil of 2H:1V or flatter are required.

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### **5.4.2.3 Marshalling Yards**

Geotechnical investigations were undertaken at the auxiliary Marshalling Yard C located near the community of Plum Point (coordinates 526528 E, 5659376 UTM NAD 83). The ten (10) percussion probes conducted indicate that refusal depths range from 0.5 m to 1.5 m below surface. These refusal depths are interpreted to correspond with the depth to probable bedrock.

Geotechnical investigations were not undertaken at the Marshalling Yard Site D site in Deer Lake. This location will have sufficient existing space to store and support the required infrastructure. The soil in the yard is sand and gravel, low in fines of glaciofluvial origin. Some re-grading of the site will be required. Removal of old foundations and organizing of existing stockpiles of salvaged guide rails will be required.

The encountered soil is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type and bedrock are presented in Section 5.5.

### **5.4.3 LOT 3: Taylor's Brook to Soldiers Pond**

The fieldwork for Lot 3 was performed from July 11, 2008 to August 12, 2008 and October 25, 2008 to October 31, 2008. Much of the area was accessible by ground travel but helicopter support was used to remote locations along the corridor. Forty-one (41) test pits, nine (9) rock anchor pull-out tests, twelve (12) percussion probes, approximately thirty-one (31) km of bog probing and nine (9) geological mapping areas were conducted in Lot 3. Refer to Appendix D for the complete set of Lot 3 field results.

#### **5.4.3.1 Transmission Line**

The transmission line between the Gull Island and the Strait of Belle Isle is located within an approximate 450 km long, 2 km wide, corridor which included 61 PI's. Upon completion of the map and terrain analysis, calculations were made for the type of soil, bog and rock expected along this section of the corridor. This calculation was further upgraded upon completion of the fieldwork for the project. The quantities for Lot 3 may be summarized as follows:



- Till 74.9%
- Alluvium <1%
- Glaciofluvial Soil 3.3%
- Colluvium <1%
- Bog Land 6.8%
- Exposed Rock or Rock concealed under thin organic soil 14.9%

Note that time constraints did not allow geotechnical work to be completed on the following PI's:

**Table 5.4.3.1: Points of Intersection Not Investigated Due To Time Constraints (Lot 3)**

PI 72	PI 79	PI 83	PI 96A
PI 73	PI 80	PI 84	PI 97A
PI 77	PI 81	PI 94A	
PI 78	PI 82	PI 95A	

Till was the dominant material encountered throughout Lot 3 with relatively thin layers from 0.3 m to > 4.4 m generally overlying apparent bedrock. This material generally ranges from a silty sand with some gravel to a sandy gravel with cobbles and some boulders and trace silt.

Nine (9) successful rock anchor pull-out tests were conducted in selected bedrock outcrops near PI 49 (to represent PI 49 and PI 50), PI 54, PI 58, PI 59, PI 62, PI 63, PI 65, PI 67 and PI 69. All locations except for one (PI 67) were successfully tested and were able to hold the maximum 160 kN load applied by the jack without failure. The anchor at PI 67 observed slippage at approximately 6 tons (50 kN) in apparent siltstone bedrock.

Visual observations were made at PI 44 and PI 53. Both of these areas were observed to exhibit glaciofluvial outwash deposits of similar composition. These deposits generally comprised cobbly sand and gravel with occasional boulders and low fines (i.e silt / clay) content.

Extensive bog lands exist throughout the area; however the corridor was selected by NE-LCP and Hatch to avoid most of this terrain. In areas of extensive bog, a series of bog probes were



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conducted to determine the depths of the bog. Details of the probe locations are presented in Appendix D4.

Frost penetration in this area is expected to be 1.3 m based on data from the Canadian Foundation Engineering Manual 3<sup>rd</sup> Edition. The susceptibility for frost action in glacial till containing significant fines is moderate to objectionable. In clean sand and gravel and glaciofluvial soil away from the water table, frost action will be slight.

#### **5.4.3.2 Marshalling Yard**

Details of Marshalling Yard Site D are discussed in Section 5.4.2.3. Marshalling Yard Site E was not investigated. Visual observation of this site show it to be predominately barren and requiring some site grading. Soil is anticipated to be shallow and any site grading will require either bedrock excavation onsite and/or importation of offsite fill, most likely from a nearby rock quarry.

The encountered soil is deemed suitable for founding strip footings. Some site grading is anticipated to level the site and used in conjunction with drainage ditches to provide a dry site. Much of the site soils are anticipated to be suitable for reuse as fill. Bedrock may become exposed and require excavation during site grading. Design parameters for each soil type and bedrock are presented in Section 5.5.

### **5.5 GEOTECHNICAL DESIGN PARAMETERS – GULL ISLAND TO SOLDIERS POND**

The main soil found throughout the corridor is glacial till. The till encountered in all cases observed and tested, was a well graded sand and gravel with varying amounts of fines with a trace to some cobbles and boulders. Glaciofluvial and fluvial deposits were also observed at select locations along the corridor, particularly near major river valleys and was typically a fine to medium grained sand with a trace of fines and some gravel. Major bog lands exist throughout the corridor; however, the corridor has been carefully selected to avoid these areas where possible. Exposed bedrock was also encountered, particularly on the hill tops and near the coast. Often associated with the exposed bedrock were thin deposits of colluvium soil and rock tallus in areas near steep embankments.

Frost penetration along the transmission corridor is expected to range from 1.3 to 2.2 m based on data from the Canadian Foundation Engineering Manual, 4<sup>th</sup> Edition. The susceptibility for

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frost in glacial till and glaciofluvial sediments containing significant fines is moderate to objectionable. In clean sand and gravel, away from the water table, frost action will be slight.

The geotechnical parameters for soils expected along the corridor are presented in the following tables:

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**Table 5.5A: Summary of Geotechnical Design Parameters for Tower Installation**

Soil or Rock Type	Allowable Bearing Capacity kPa <sub>a</sub>	K <sub>a</sub>	K <sub>p</sub>	SG	kN/m <sup>3</sup>	kN/m <sup>3</sup> submerged	Φ S <sub>u</sub>	Recommended Anchoring Procedure
Fluvial Sand	250	0.33	3.00	2.3	18	8	30°	Gravity
Fluvial Sand and Gravel	250	0.31	3.26	2.4	19	9	32°	Gravity
Clay/Silt	50*	0.39	2.56	2.2	16	10	25 kPa	Gravity
Glacial Till (undisturbed)	300	0.26	3.85	2.5	22	12	36°	Gravity
Submerged Fill in Bogs or Other Wet Areas	100	0.36	2.77	NA	11	9	28°	Gravity
Bedrock (massive igneous and metamorphic rock)	2000	0.22	4.60	2.6	27	15	40°	Rock Bolts
Bedrock (moderately fractured igneous and metamorphic rock)	1500	0.25	3.91	2.6	24	14	38°	Rock Bolts
Bedrock (moderately fractured sedimentary rock)	1000	0.26	3.85	2.6	24	14	36°	Rock Bolts
Bedrock (highly fractured sedimentary rock)	500	0.26	3.85	2.6	24	14	36°	Rock Bolts or Gravity

K<sub>a</sub>, K<sub>p</sub> – Rankine Assumptions; SG – Specific Gravity; kN/m<sup>3</sup> – Unit Weight; Φ – Friction Angle; S<sub>u</sub> Undrained Shear Strength (Clay/Silt only); NA – Not Applicable

\* This bearing capacity is preliminary. Consolidation testing should be performed during the final design stage of the project to predict the settlement characteristics of this soil which would ultimately determine the bearing capacity.

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**Table 5.5B: Summary of Geotechnical Design Parameters for Campsites and Marshalling Yards**

Soil or Rock Type	Allowable Bearing Capacity $kP_a$	$K_a$	$K_p$	SG	$kN/m^3$	$kN/m^3$ submerged	$\Phi$ $S_u$
Fluvial Sand	150	0.33	3.00	2.2	18	8	$30^\circ$
Fluvial Sand and Gravel	150	0.31	3.26	2.3	19	9	$32^\circ$
Clay/Silt	50*	0.39	2.56	1.9	19	9	25 kPa
Glacial Till (undisturbed)	200	0.26	3.85	2.4	22	12	$36^\circ$
Sand and Gravel and Blast Rock Fill	100	0.36	2.77	2.4	20	10	$28^\circ$
Bedrock	500	0.26	3.85	2.6	25	15	$36^\circ$

$K_a$ ,  $K_p$  – Rankine Assumptions; SG – Specific Gravity;  $kN/m^3$  – Unit Weight;  $\Phi$  – Friction Angle;  $S_u$  Undrained Shear Strength (Clay/Silt only); NA – Not Applicable

\* This bearing capacity is preliminary. Consolidation testing should be performed during the final design stage of the project to predict the settlement characteristics of this soil which would ultimately determine the bearing capacity.

## 5.6 CONSTRUCTION CONSIDERATIONS

### 5.6.1 Materials

Construction of the transmission line will require material for fill and aggregates. In general, clean acceptable fill can be found over the majority of the corridor in the glaciofluvial and glacial till sediments. Hard, durable bedrock is also identified along the corridor which can be used in areas of limited overburden soils or soils of poor quality.

Concrete required for construction of the transmission line can be trucked in from local suppliers or, depending on the amount of concrete needed, can be mixed on site. Concrete and crushed aggregate suppliers are located in: Goose Bay, Blanc Sablon, St. Anthony, Corner Brook, Deer Lake, Grand Falls-Windsor, Gander, Clarenville, Makinsons, Seal Cove and St. John's.

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### **5.6.2 Quality Specifications**

Construction quality assurance must be enforced to ensure a successful project. As a minimum, it is recommended that CSA A23.1-00 Concrete Materials and Methods of Construction/Methods of Test for Concrete be followed.

If grades are such that foundations are required on fill, the fill should be a high quality, well graded, free from organics, with low fines content and placed at optimum moisture content. Granular C, as specified by the Newfoundland and Labrador Department of Transportation and Works, would be acceptable. An alternative to Granular C may be used providing its quality is inspected and approved by a qualified geotechnical engineer prior to its use. The fill should be located away from steep embankments and protected from erosion. It must be placed in lifts not exceeding 150 mm thick and on soil which has been approved by the geotechnical engineer. The fill must be compacted to 100% of its corrected maximum dry density (ASTM D 698-78).

### **5.7 RECOMMENDATIONS**

Fourteen (14) PI locations were not investigated within Lot 3 due to time constraints and will require investigation. Upon review of this report by the designers and planners, further investigations may be required at select locations to better define the geotechnical properties. Any alteration in the corridor route or campsite and marshalling yard locations will require additional study.

An access plan and detailed study of existing access and tote roads is recommended prior to construction. This study should determine the structural integrity of existing bridge and culvert crossings, investigate grades and line of sight distances, identify slope stability concerns, and examine existing tote road access points to identify offloading and parking issues along major roadways.

An access plan and detailed study of new access and tote roads is recommended prior to construction. This study should address culvert and stream crossing design, road grades and line of sight distances, slope stability concerns, and offloading and parking issues at tote road access points along major roadways. An extensive access road study is recommended between

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PI 23 to PI 36C to address slope stability and road grade issues along this hilly section of corridor.

Much of the common fill used for road construction is anticipated to originate from along the access route, but in areas where the surficial geology is predominately exposed bedrock or bog further study is recommended to identification of potential fill sources and to assist in the route design and tendering. In addition a detailed study is recommended to locate acceptable aggregate for road surfacing and structural fill.

A detailed study is recommended at the proposed campsites and marshalling yards to determine any potential design and construction concerns. This work would involve but not be limited to further geotechnical investigations to study the soil and groundwater conditions, identify any slope stability issues, further percolation tests to determine design parameters for the septic disposal system, and drinking water quality tests on the proposed water source.

Conduct hydrological studies on major rivers and streams along the corridor which may pose concerns during and after construction on the nearby infrastructure.

Locate alternate laydown areas for temporary storage of equipment and supplies. This should reduce congestion of the main marshalling yards and reduce travel time and delays.

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**6.0 CLOSURE**

This report was prepared for the exclusive use of NALCOR Energy – Lower Churchill Project for specific application to the project. The geotechnical investigation was conducted in accordance with the work plans developed for this site and verbal requests from the client. The work was performed using generally accepted practices and procedures commonly used in the industry. The limitations of this report are stated in Appendix E.

Respectfully Submitted,

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

Prepared By:

Reviewed By:



**Kevin Penney, P. Eng.**  
 Senior Geotechnical Engineer

**Calvin Miles, P. Geo.**  
 Senior Associate

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HVdc Transmission Line – Gull Island to Soldiers Pond  
Lower Churchill Project  
Volume 1 – Geotechnical Report  
Project No: TF8310458 – June 2009



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**APPENDIX A**

**FIGURES**

**APPENDIX A1**

**Corridor and Test Location Maps  
(Refer to Volume 2)**

**APPENDIX A2**

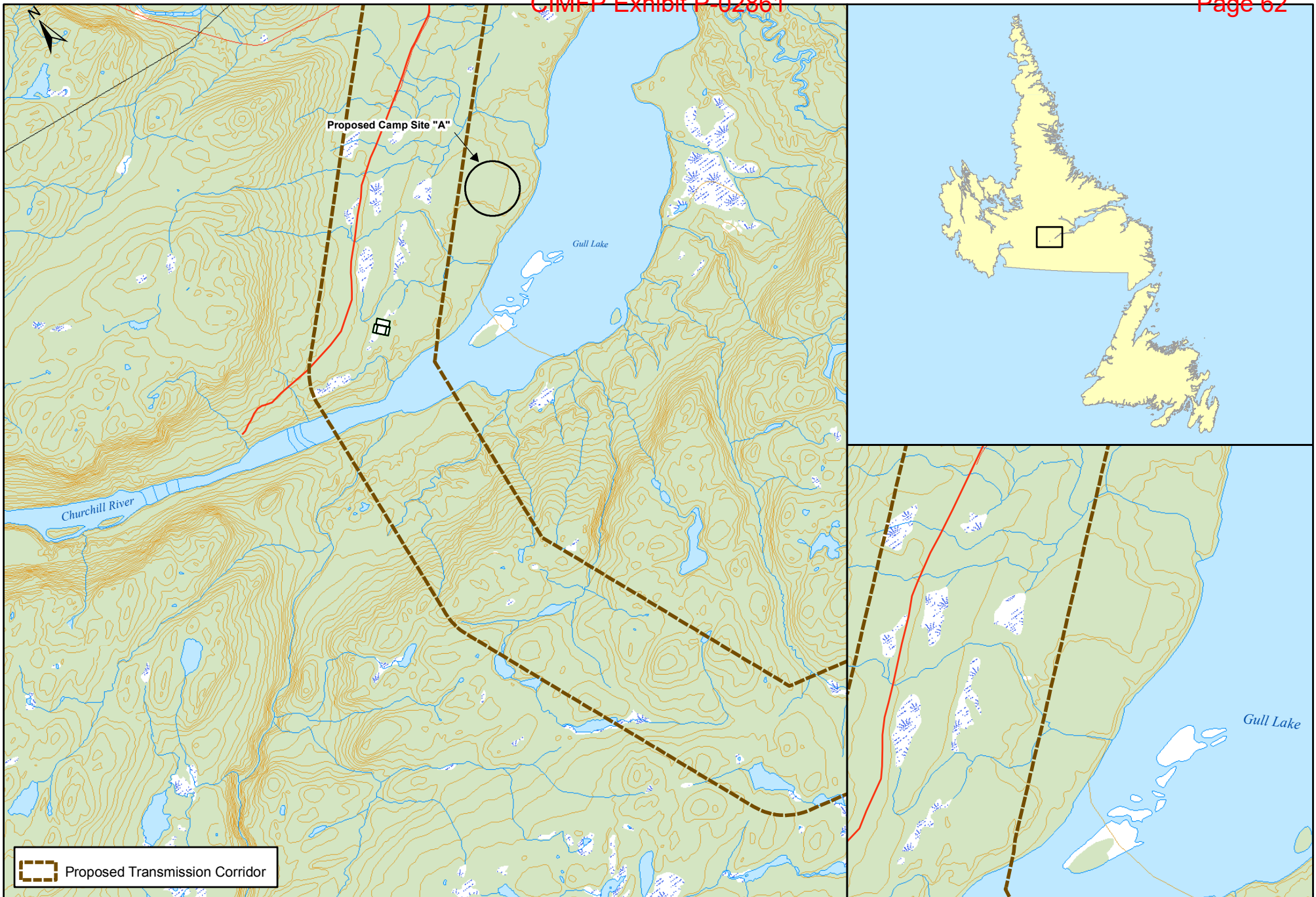
**Campsite Layout and Test Location Maps**



FIGURE DC 1051 - A2.1

LOWER CHURCHILL PROJECT - DC 1051 HVdc TRANSMISSION LINE  
PROPOSED CAMP SITE LOCATIONS





Proposed Transmission Corridor



FIGURE DC 1051 - A2.2

Proposed Location of Camp Site "A" - Lot 1

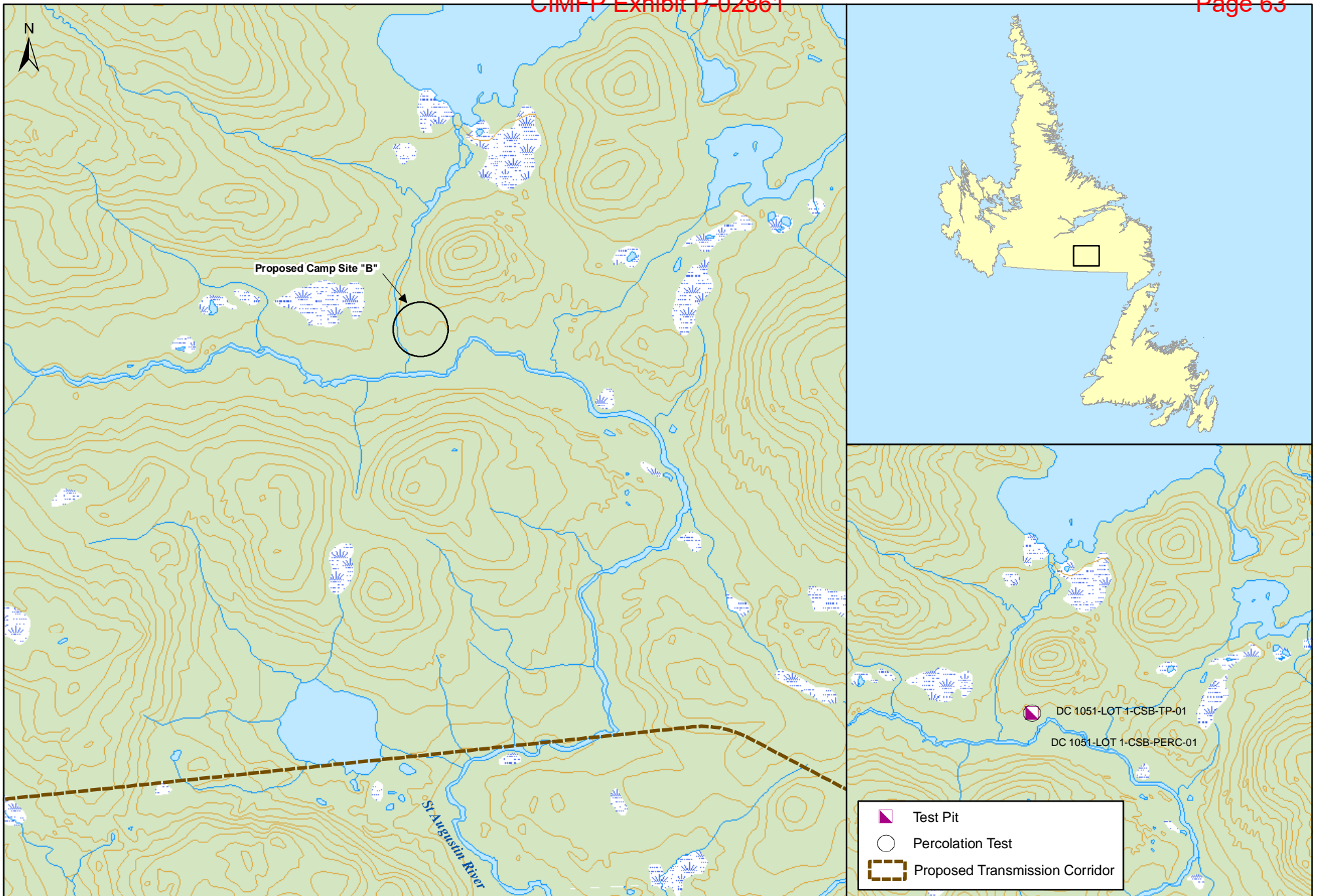


FIGURE DC 1051 - A2.3

Proposed Location of Camp Site "B" - Lot 1

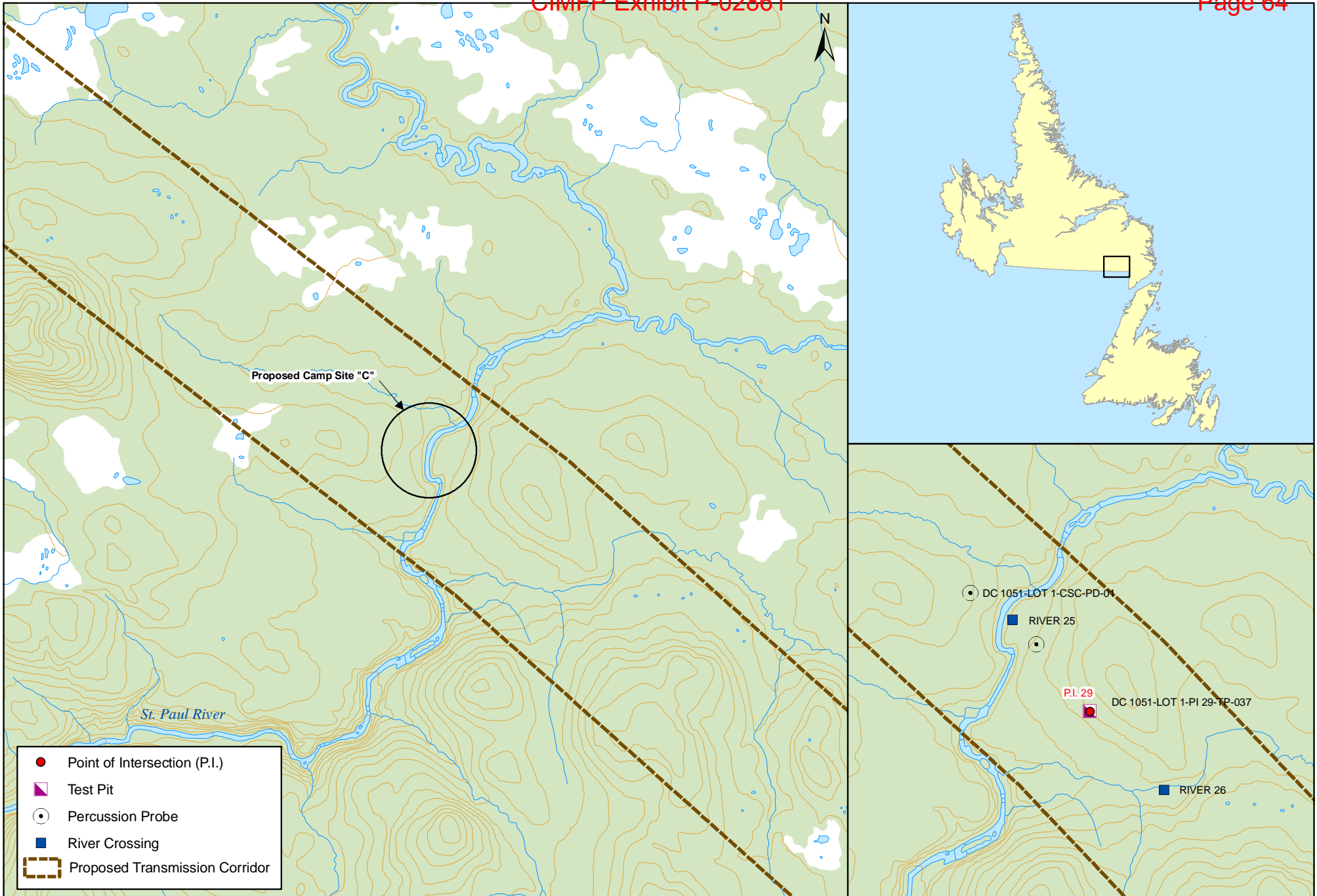
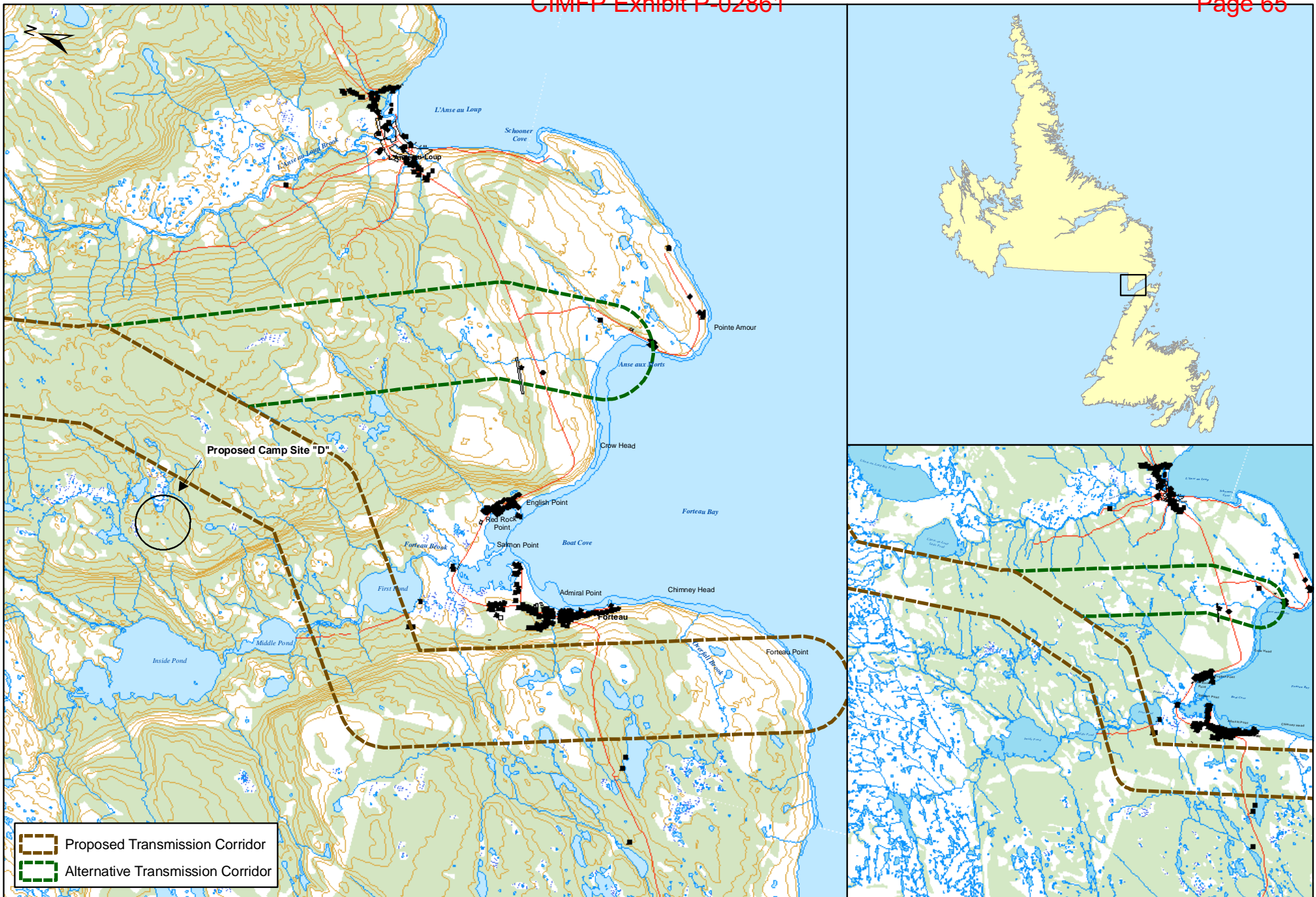


FIGURE DC 1051 - A2.4

Proposed Location of Camp Site "C" - Lot 1





Proposed Transmission Corridor  
Alternative Transmission Corridor



FIGURE DC 1051 - A2.5

Proposed Location of Camp Site "D" - Lot 1

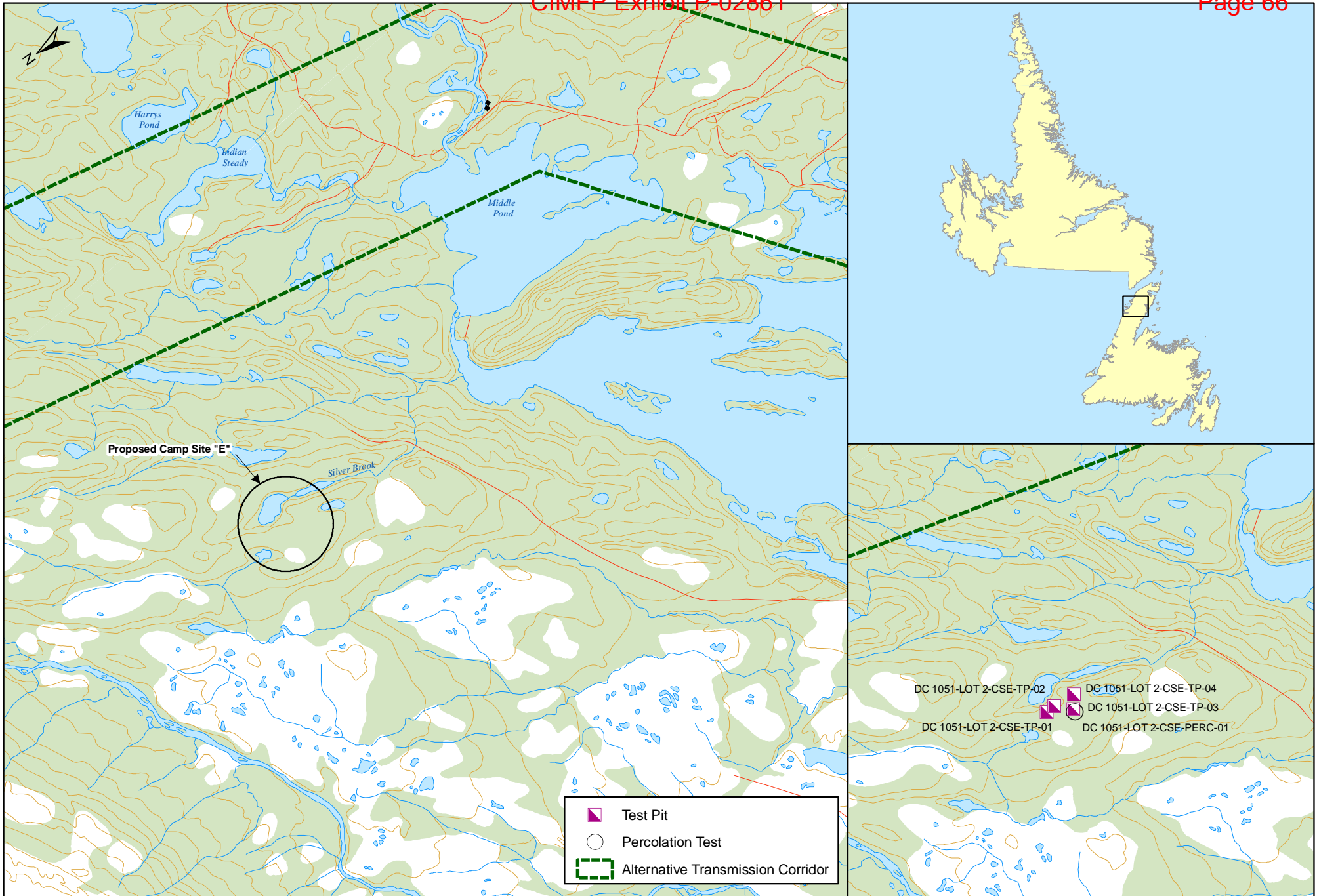


FIGURE DC 1051 - A2.6

Proposed Location of Camp Site "E" - Lot 2

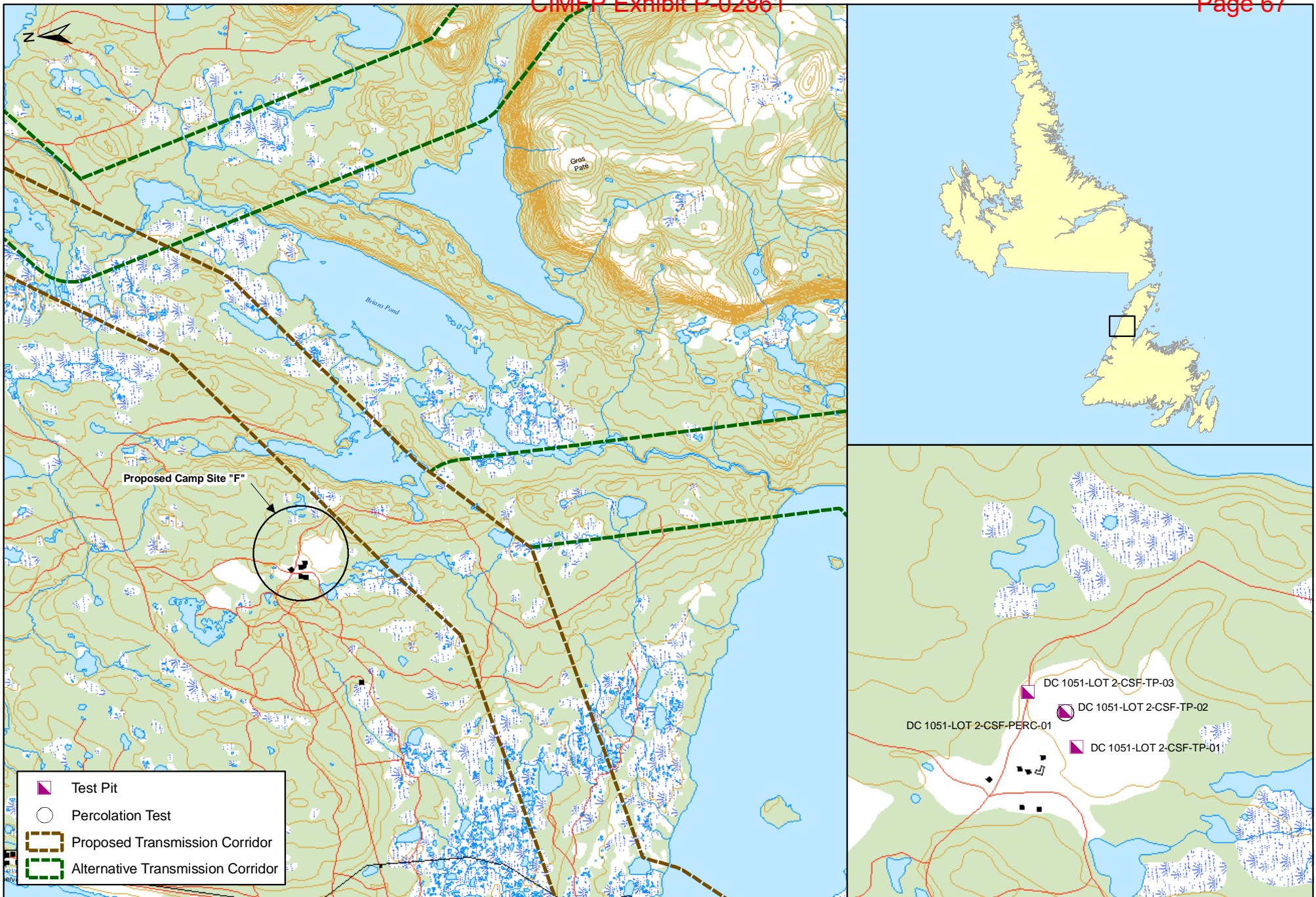


FIGURE DC 1051 - A2.7

Proposed Location of Camp Site "F" - Lot 2

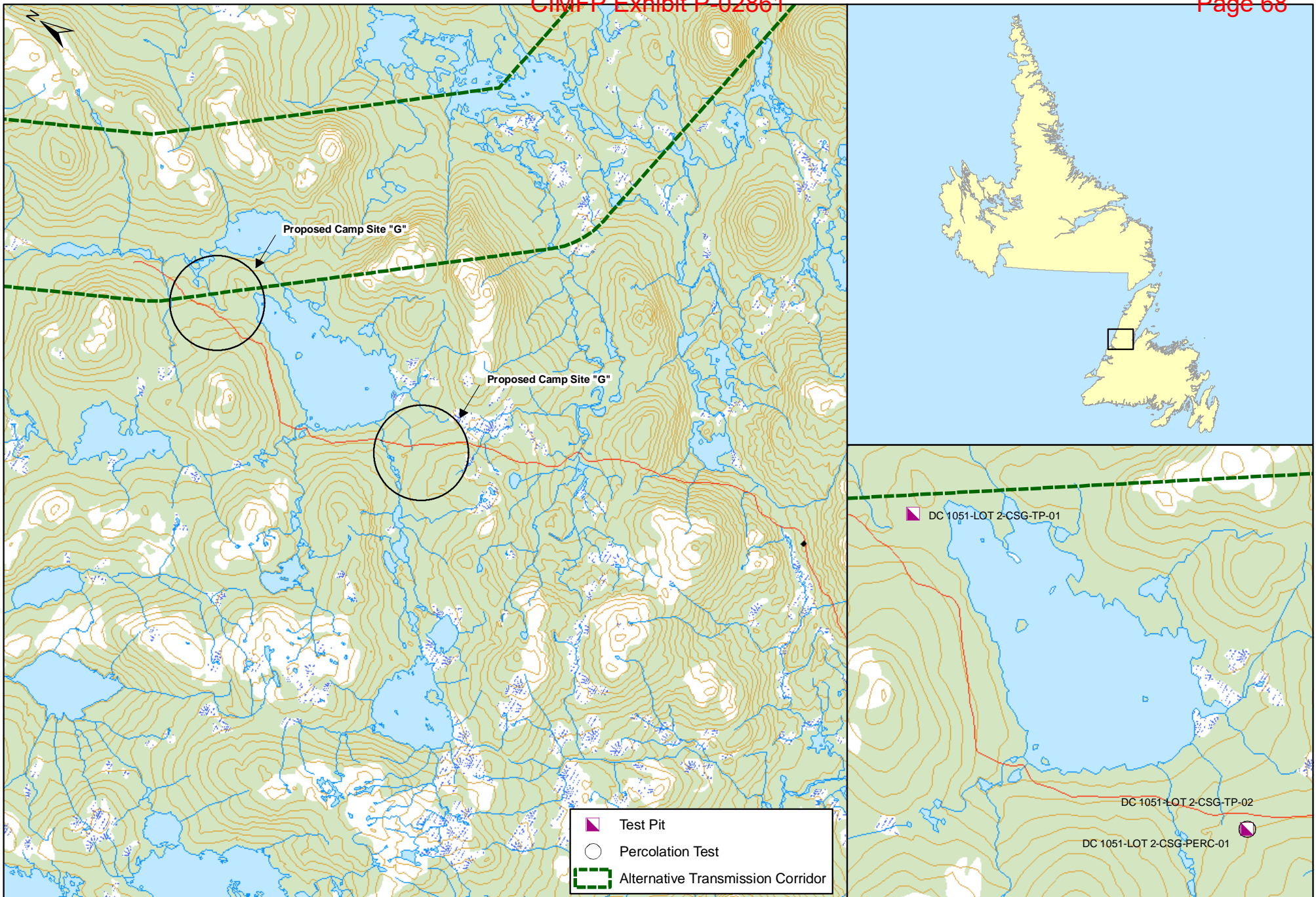
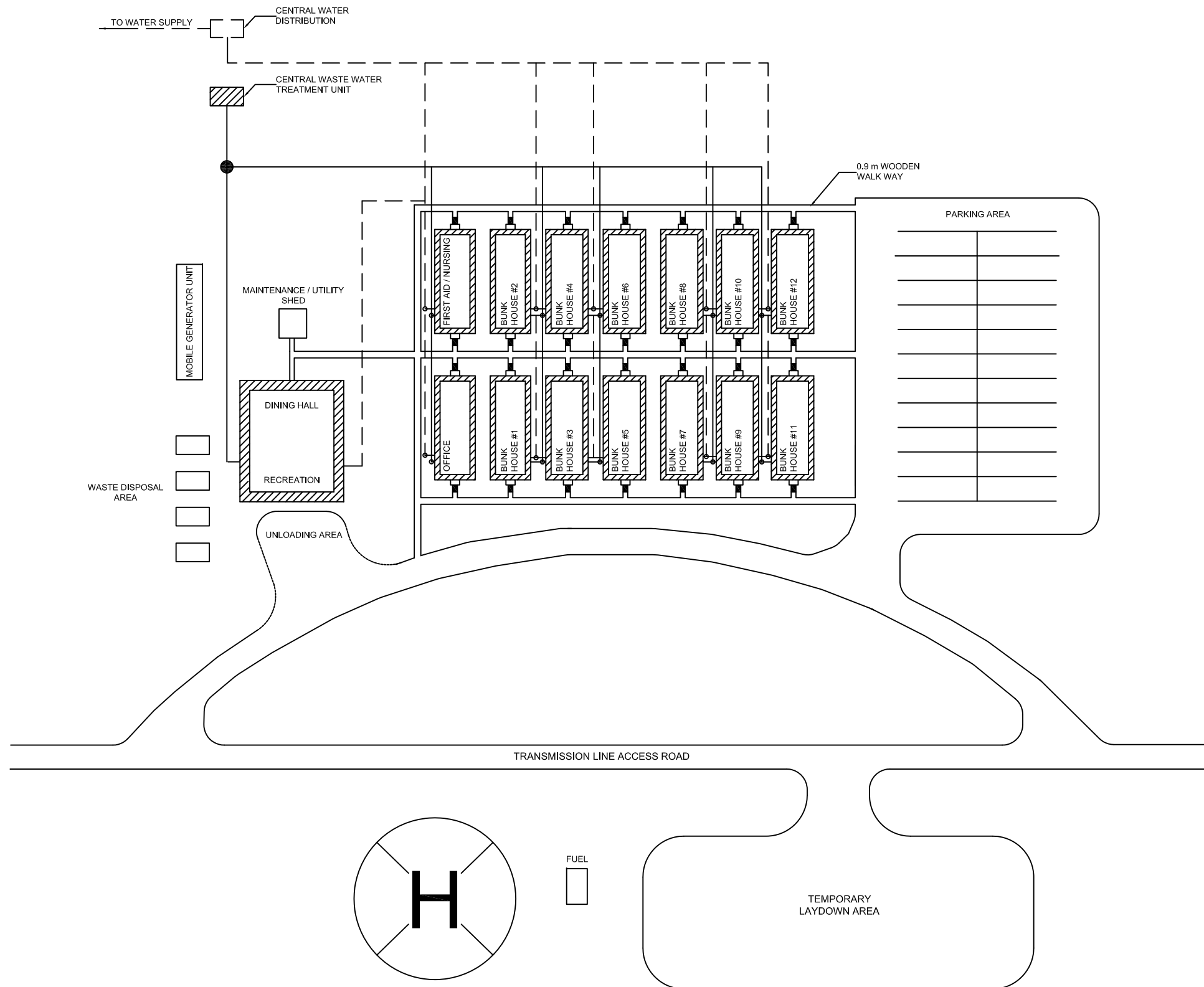


FIGURE DC 1051 - A2.8

Proposed Location of Camp Site "G" - Lot 2



NOTES

- DO NOT SCALE FROM DRAWING.
- ALL LOCATIONS, DIMENSIONS, AND ORIENTATIONS ARE APPROXIMATE.
- THIS DRAWING CONTAINS INTELLECTUAL PROPERTY OF NEWFOUNDLAND HYDRO AND MAY NOT BE REPRODUCED OR COPIED WITHOUT THEIR WRITTEN CONSENT.
- SITE AREA 135 m x 135 m.
- BUNK HOUSE TRAILERS ACCOMMODATE 12 PERSONS WITH SINGLE ROOMS AND COMMON LAVATORY FACILITIES.
- AMENITIES INCLUDE:
  - PRIVATE ROOMS
  - SHARED BATH
  - TV ROOM
  - LAUNDRY ROOM
  - COMMON RECREATION AREA
- DINING HALL TO ACCOMMODATE 96 PERSONS.

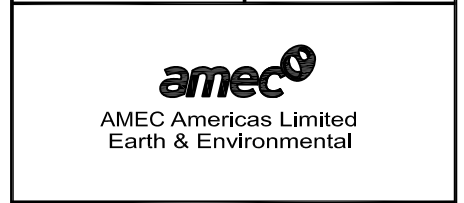
No.	Date	Description	Drawn	Chk'd	App'd
0	02/02/09	ISSUED FOR REVIEW	AH	CS	CM

REVISIONS

A	B	C
A	B	C

A detail no.  
B location drawing no.  
C drawing no. where detailed

Stamp	Reference North



PROJECT  
LOWER CHURCHILL PROJECT  
DC 1051 HVdc TRANSMISSION LINE

FIGURE TITLE  
TYPICAL CAMP SITE LAYOUT

SCALE NTS	PROJECT NUMBER TF8310458	
DRAWN BY A. Hollett	CHECKED BY C. Smith	APPROVED BY C. Miles
FIGURE NO. DC1051-A2.9	DATE JUNE 2009	REV 0

**APPENDIX A3**

**Marshalling Yard Layout and Test Location Maps**

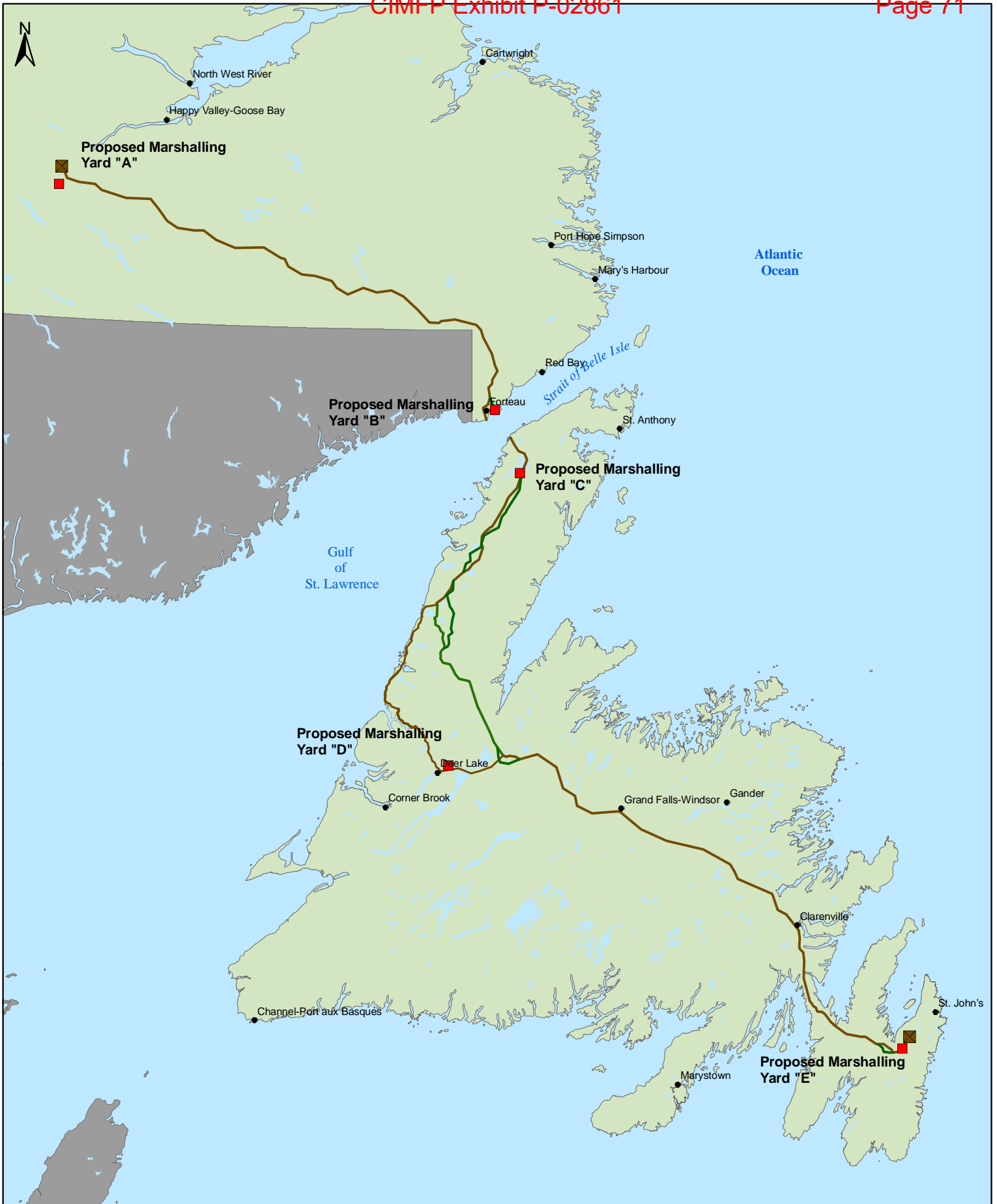
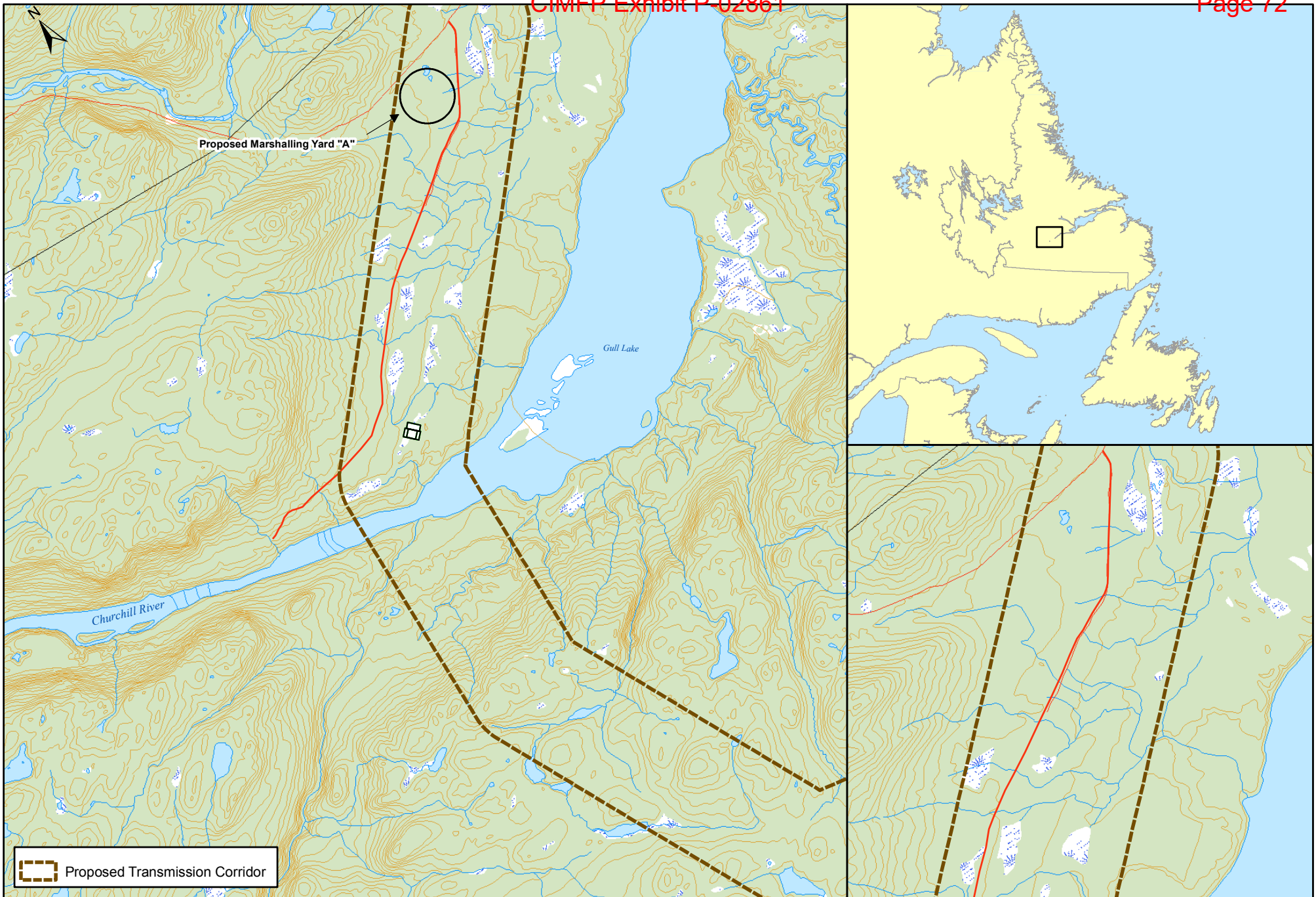


FIGURE DC 1051 - A3.1

LOWER CHURCHILL PROJECT - DC 1051 HVdc TRANSMISSION LINE  
PROPOSED MARSHALLING YARD LOCATIONS





Proposed Transmission Corridor



FIGURE DC 1051 - A3.2

Proposed Location of Marshalling Yard "A" - Lot 1



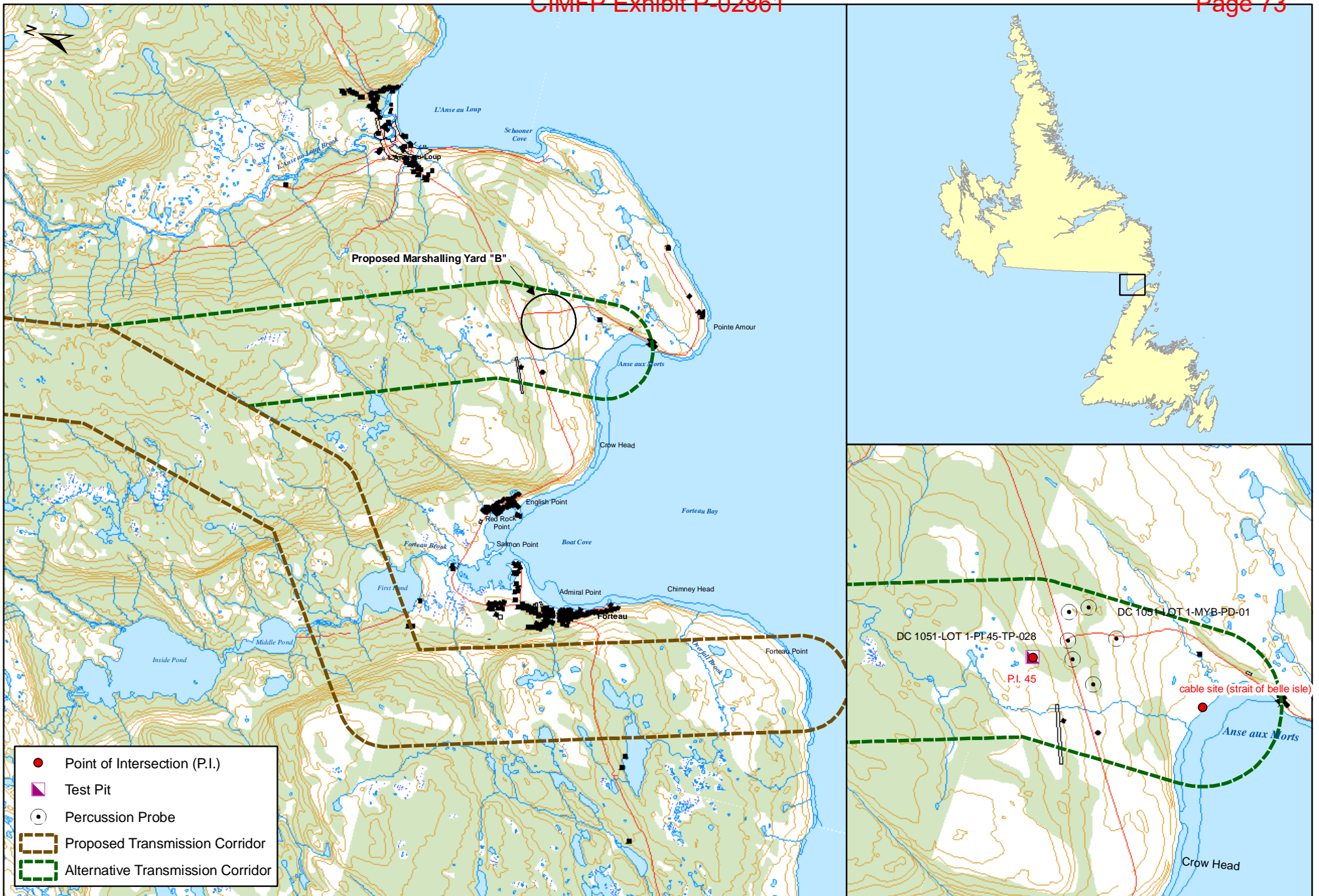
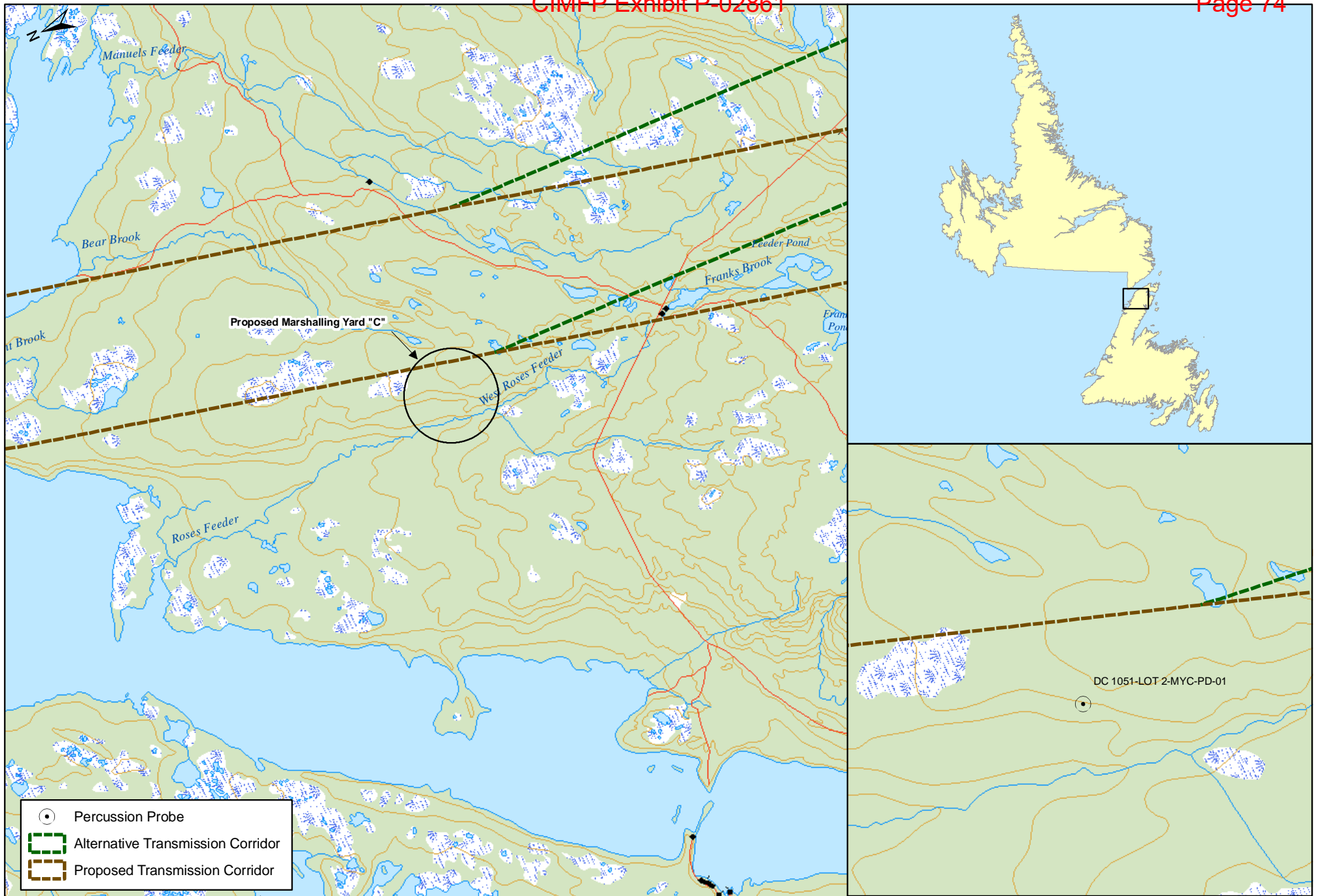
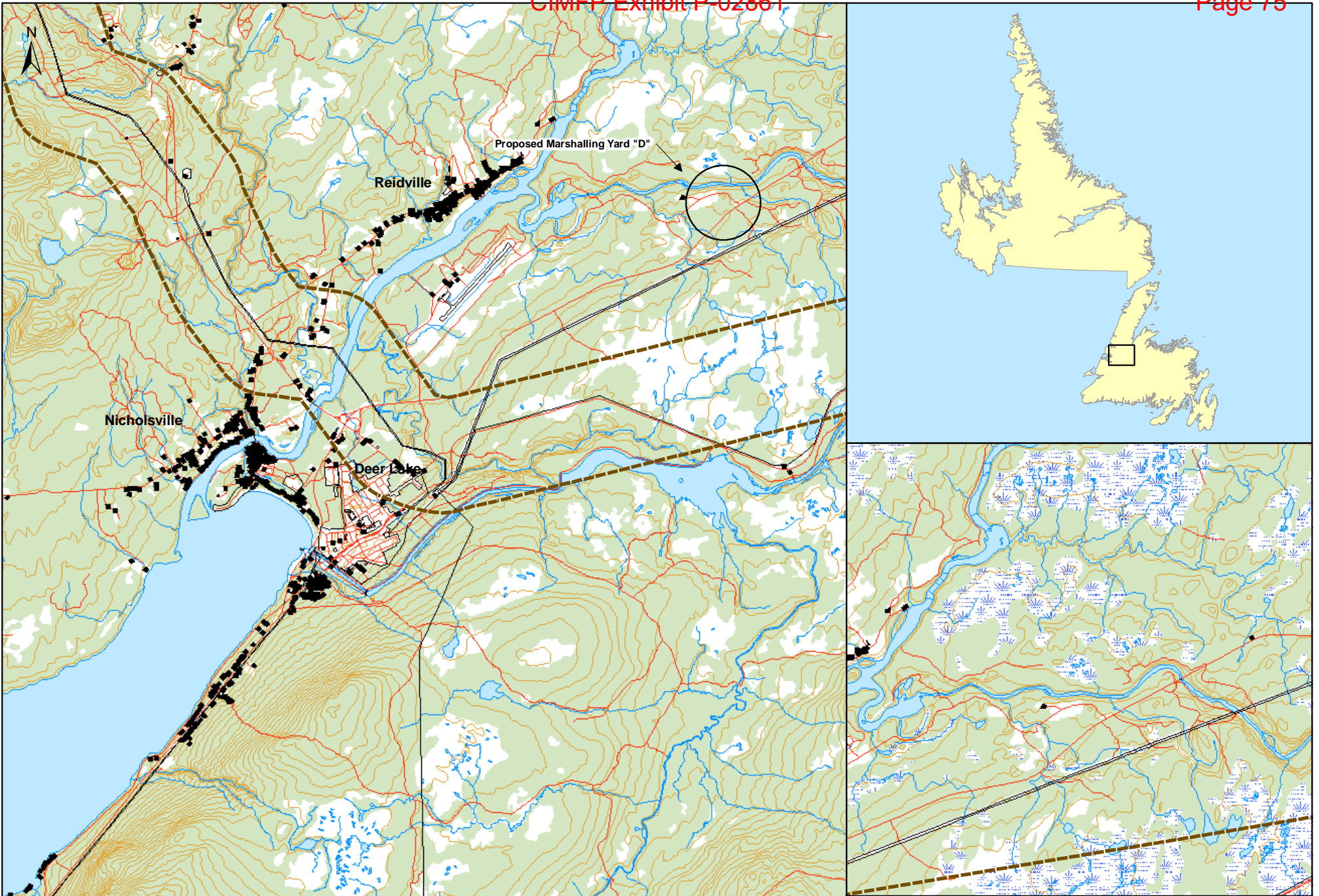


FIGURE DC 1051 - A3.3

Proposed Location of Marshalling Yard "B" - Lot 1





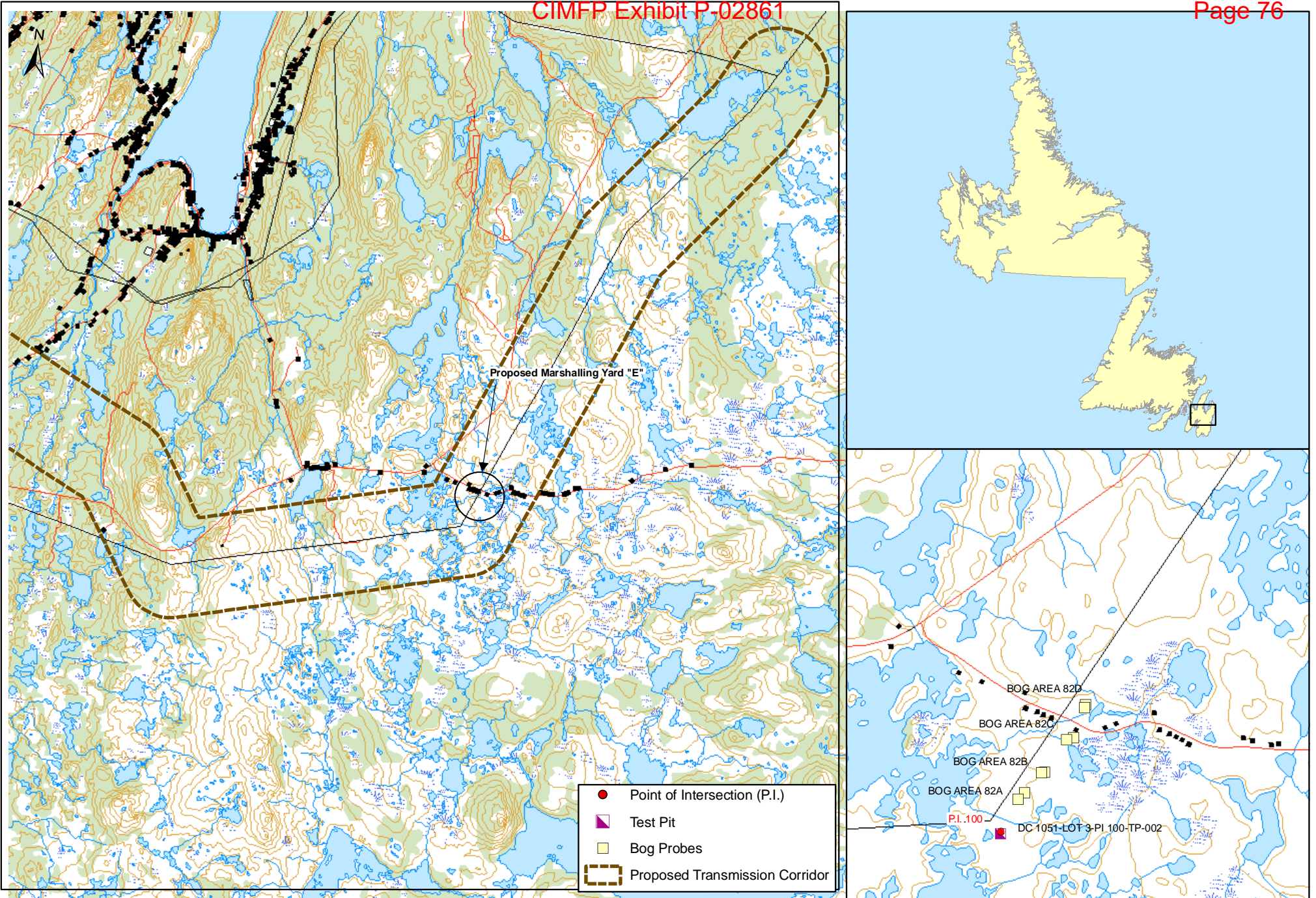
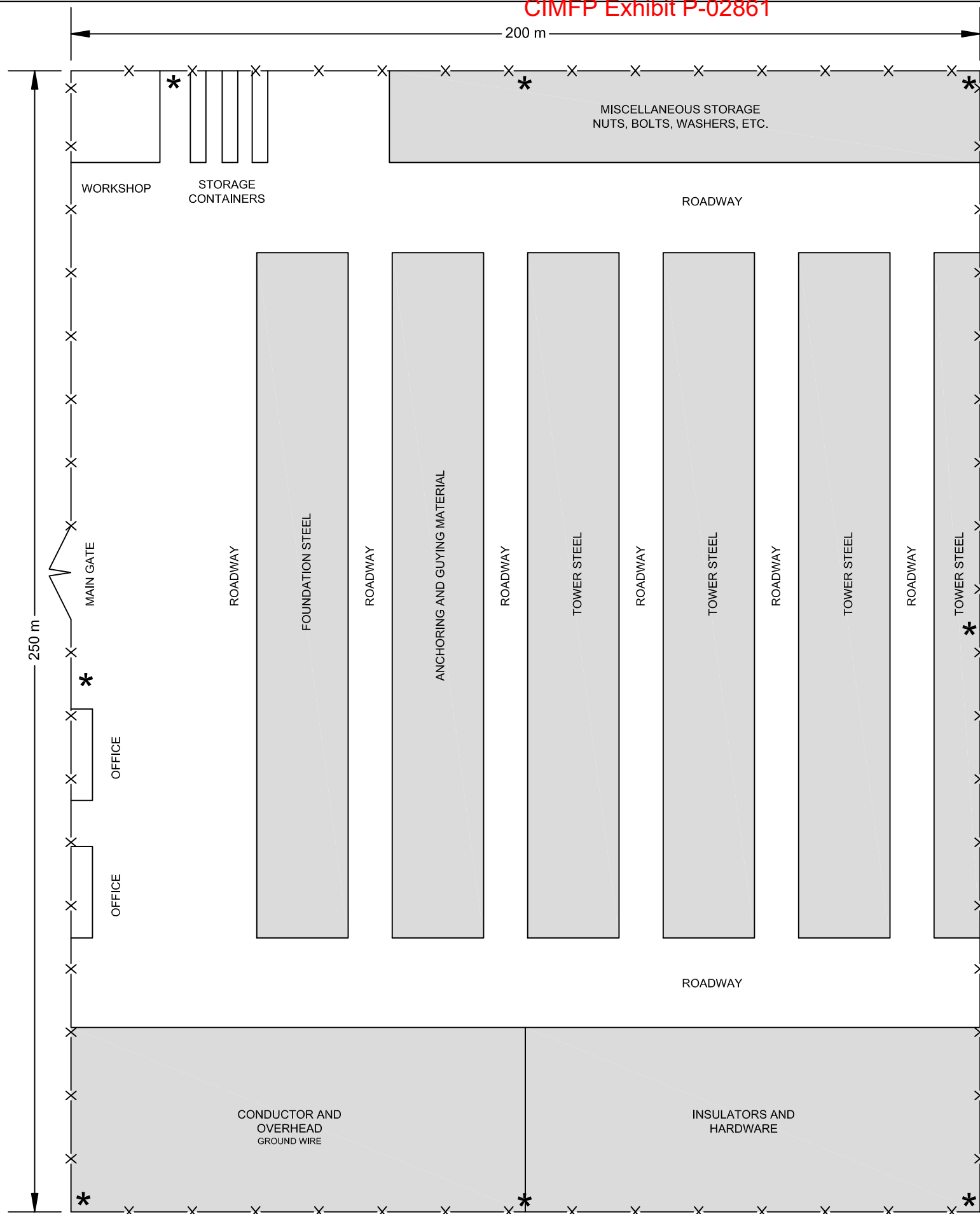


FIGURE DC 1051 - A3.6

Proposed Location of Marshalling Yard "E" - Lot 3



1. DO NOT SCALE FROM DRAWING.
2. ALL LOCATIONS, DIMENSIONS, AND ORIENTATIONS ARE APPROXIMATE.
3. THIS DRAWING CONTAINS INTELLECTUAL PROPERTY OF NEWFOUNDLAND HYDRO AND MAY NOT BE REPRODUCED OR COPIED WITHOUT THEIR WRITTEN CONSENT.

No.	Date	Description	Drawn	Chk'd	App'd
0	02/02/09	ISSUED FOR REVIEW	AH	CS	CM

REVISIONS

A	A	A detail no.
B	C	B location drawing no.
C		C drawing no. where detailed

- LEGEND:
- \* PERIMETER LIGHTING
  - X FENCELINE

Stamp	Reference North
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PROJECT  
 LOWER CHURCHILL PROJECT  
 DC 1051 HVdc TRANSMISSION LINE

FIGURE TITLE  
 TYPICAL MARSHALLING YARD LAYOUT

SCALE NTS	PROJECT NUMBER TF8310458
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DRAWN BY A. Hollett	CHECKED BY C. Smith	APPROVED BY C. Miles
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FIGURE NO. DC1051-A3.7	DATE JUNE 2009	REV
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**APPENDIX B**

**TRANSMISSION LINE DATA – LOT 1**

**Appendix B1**

**Test Pit Logs & Laboratory Results**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-TP-01</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	August 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5869906	E 606830	Inspector:	Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	TOPSOIL/ROOTMAT – black, peat, organics, loose, moist.	N/A	N/A	N/A
0.5 – 1.2	SILTY SAND with cobbles, gap graded, red-brown, moist, compact, weathered.	N/A	N/A	N/A
1.2 – 3.5	SAND AND GRAVEL with some fines, trace to some cobbles and boulders, well graded, grey, moist, compact.	DC1051-LOT 1-TP-01	1.4 – 3.0	Grab
3.5	Test pit terminated at 3.5 m in SAND AND GRAVEL.			
Estimated Cobbles (%) 10 - 20		Estimated Boulders (%) 1 - 10		Estimated Max Diameter (m) 0.4
Start Time: 2:30 p.m.		End Time: 3:15p.m.		

**General Notes**

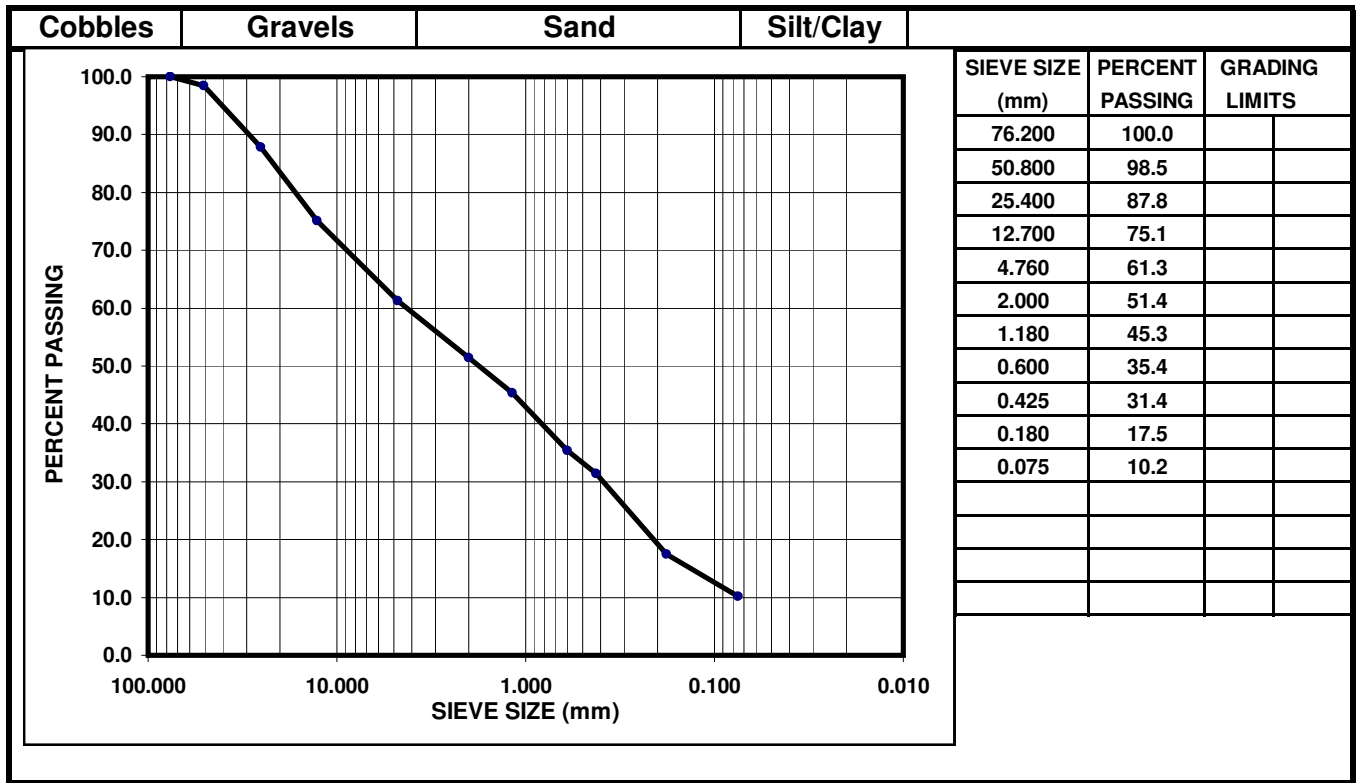
1. Test Pit terminated at 3.5 m in Sand and Gravel.
2. Water seepage observed at 1.4 m.
3. Test pit located at Gull Island, north side of the Churchill River crossing.
4. North and East coordinates obtained using a hand-held ETrex Legend Cx GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.





**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458                      **Sample No.:** DC1051-LOT 1-TP-01  
**Project:** Geotechnical Investigation:    **Sample Type:** Sand and gravel, some silt/clay  
                     HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro                              **Date Sampled:** 13-Aug-08  
**Sampled By:** Aisha Hyde of AMEC         **Date Tested:** 8-Dec-08  
**Location:** TP-01                                **Sample Depth:** 1.4 m - 3.0 m



**Comments:**    %Cobbles 0.0                  %Gravel 38.7                  %Sand 51.1                  %Silt/Clay 10.2  
                     Natural Moisture content of 9.0%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

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 Tel. (709) 722-7023  
 Fax. (709) 722-7353

Construction Materials Laboratory  
 36 Pippy Place  
 P.O. Box 13216, St. John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-5062  
 Fax. (709) 722-5025



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-TP-02</b>					
Client:	Nalcor Energy - Lower Churchill Project				Date: August 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5869903	E 606836	Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	TOPSOIL/ROOTMAT – dark brown organics, loose, moist.	N/A	N/A	N/A
0.3 – 2.3	COBBLY SAND, some gravel, trace small boulder, moist to saturated, well graded, brown, compact.	N/A	N/A	N/A
2.3 – 3.5	CLAY – firm.	N/A	N/A	N/A
3.5	Test pit terminated at 3.5 m in CLAY.			

Estimated Cobbles (%) 20 – 35	Estimated Boulders (%) 1 – 10	Estimated Max Diameter (m) 0.5
Start Time: 3:30 p.m.	End Time: 4:00 p.m.	

**General Notes**

1. Test Pit terminated at 3.5 m in Clay.
2. Water seepage observed at 1.5 m.
3. Test pit located at Gull Island, north side of the Churchill River crossing.
4. North and East coordinates obtained using a hand-held ETrex Legend Cx GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 1-TP-03				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5870224	E 606944 Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	TOPSOIL/ROOTMAT – dark brown organics with rootlets, moist, loose.	N/A	N/A	N/A
0.5 – 0.7	SAND with sub-rounded to rounded cobbles, some fines, trace gravel, reddish-brown, moist, compact.	N/A	N/A	N/A
0.7 – 3.2	SAND AND SILT with sub-rounded to rounded cobbles, trace gravel, medium grey, moist, loose to compact.	DC1051-LOT 1-TP-03	3.0	Grab
3.2	Test Pit terminated at 3.2 m in SAND AND SILT.			
Estimated Cobbles (%) 25		Estimated Boulders (%) 0		Estimated Max Diameter (m) N/A
Start Time: 11:00 a.m.		End Time: 11:45 a.m.		

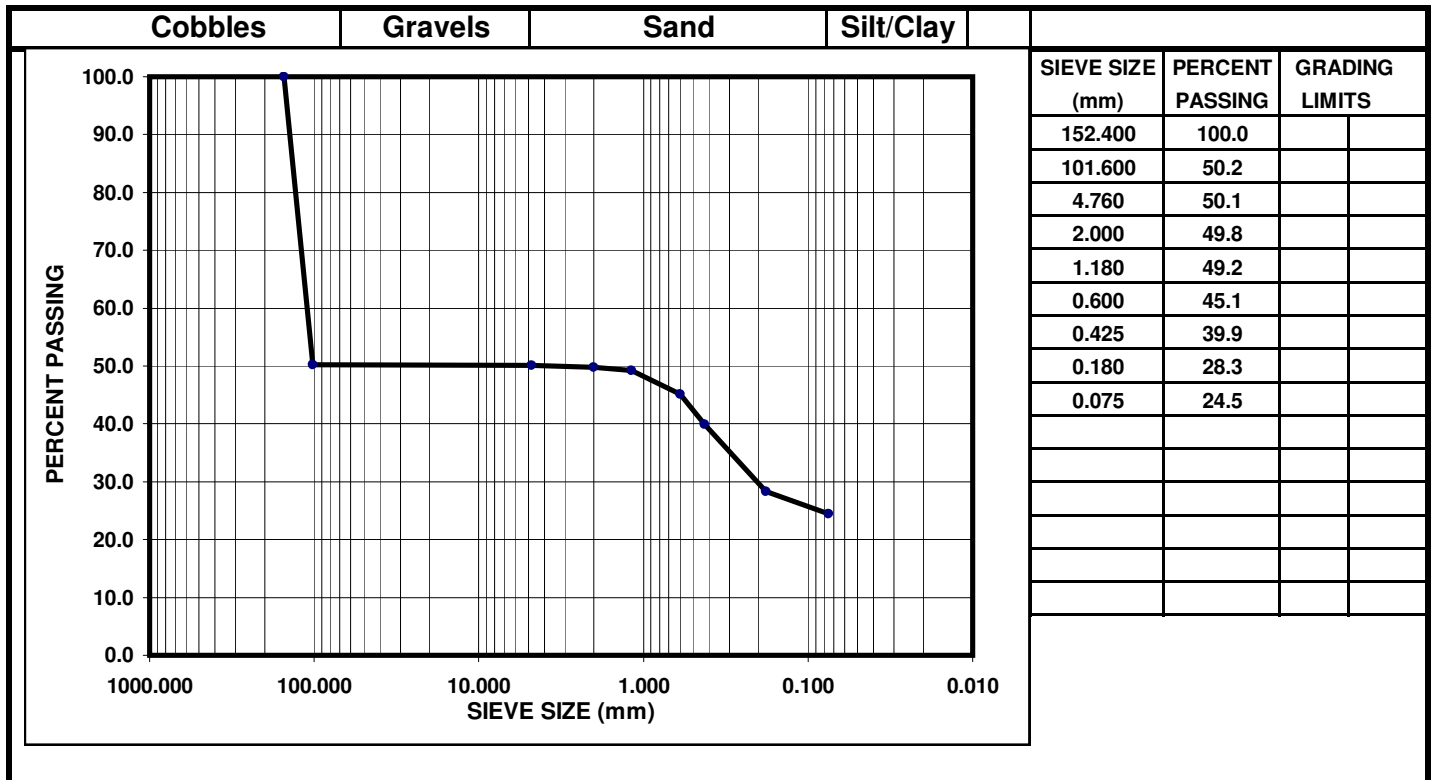
**General Notes**

1. Test Pit terminated at 3.2 m in Sand and Silt.
2. Water entering from the base of pit.
3. Test pit located at Gull Island, north side of the Churchill River crossing.
4. North and East coordinates obtained using a hand-held ETrex Legend Cx GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 1-TP-03
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sandy, silty cobbles
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 15-Aug-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 8-Dec-08
<b>Location:</b> TP-03	<b>Sample Depth:</b> 3.0 m



**Comments:** %Cobbles 49.9 %Gravel 0.1 %Sand 25.6 %Silt/Clay 24.5  
Natural Moisture content of 23.7%.

Reporting of these test results constitutes a testing service only.  
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**AMEC Earth & Environmental**

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1- TP-04</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	August 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5870552	E 607058	Inspector:	Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	TOPSOIL/ROOTMAT– dark brown organics with rootlets, moist, loose.	N/A	N/A	N/A
0.2 – 0.8	SAND with trace to some fines, fine grained, poorly graded grey, moist, loose to compact.	N/A	N/A	N/A
0.8 – 4.0	GRAVELLY SAND with some fines, some sub-rounded cobbles, trace sub-rounded boulders, well graded, grey, saturated, compact to dense.	DC1051-LOT 1-TP-04	2.0	Grab
4.0	Test Pit terminated at 4.0 m in GRAVELLY SAND.			
Estimated Cobbles (%) 10 – 20		Estimated Boulders (%) >5		Estimated Max Diameter (m) 0.7
Start Time: 12:10 p.m.		End Time: 12:55 p.m.		

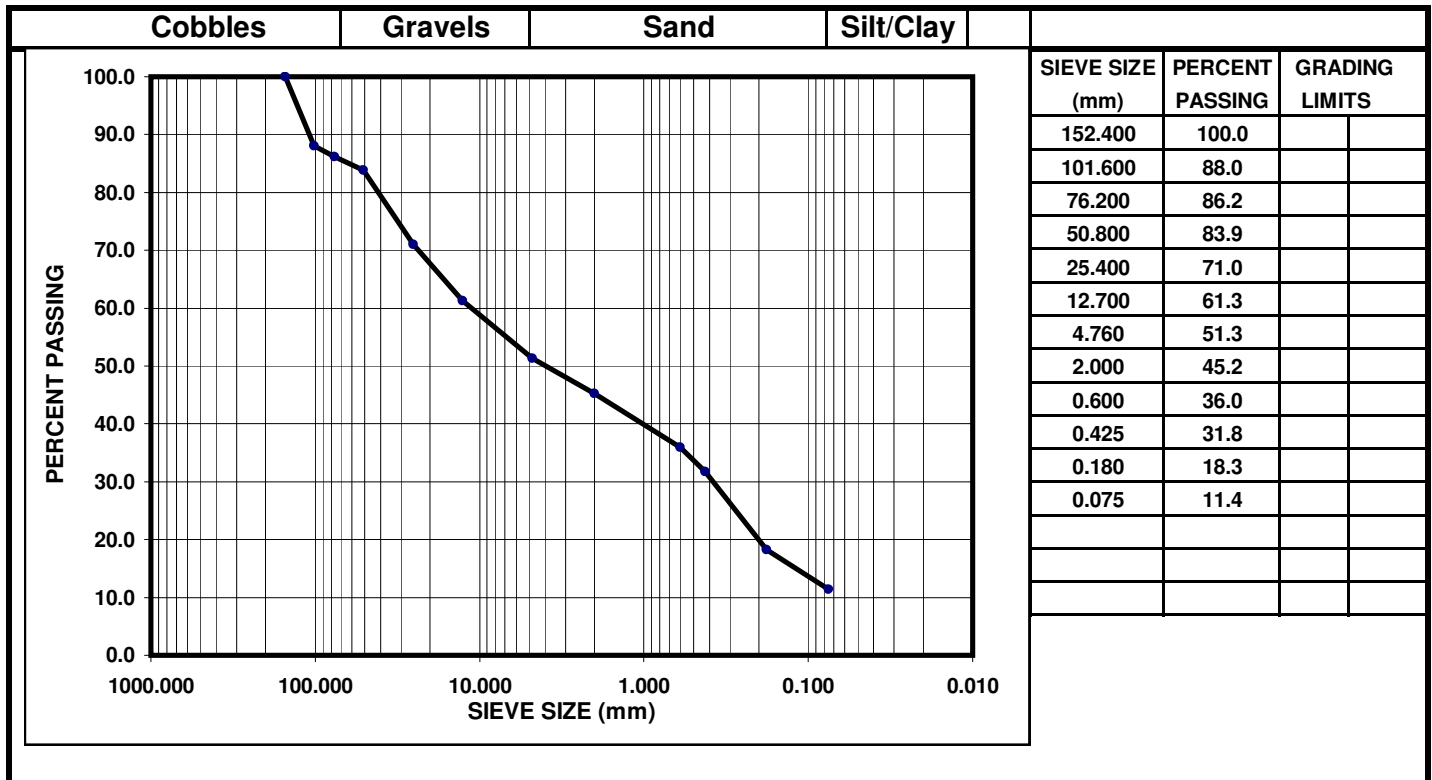
**General Notes**

1. Test Pit terminated at 4.0 m in Gravelly Sand.
2. Water entering pit at 2.1 m.
3. Test pit located at Gull Island, north side of the Churchill River crossing.
4. North and East coordinates obtained using a hand-held ETrex Legend Cx GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-TP-04
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Gravelly sand, some silt/clay with cobbles
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	15-Aug-08
<b>Sampled By:</b>	Aisha Hyde of AMEC	<b>Date Tested:</b>	13-Jan-09
<b>Location:</b>	TP-04	<b>Sample Depth:</b>	2.0 m



**Comments:**    %Cobbles 13.8                    %Gravel 34.9                    %Sand 39.9                    %Silt/Clay 11.4  
                          Natural Moisture content of 6.6%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-TP-05</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	August 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5870792	E 607206	Inspector:	Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	TOPSOIL/ROOTMAT– dark brown organics with rootlets, moist, loose.	N/A	N/A	N/A
0.1– 0.8	SAND with trace fines, fine to medium grained, poorly graded, grey, dry to moist, compact.	N/A	N/A	N/A
0.8 – 1.8	SAND with fines, fine grained, poorly graded, grey, moist, compact to dense. Some small black layers present indicating glaciofluvial origins.	N/A	N/A	N/A
1.8 – 3.8	SAND with trace gravel, trace fines, poorly graded, reddish-brown, moist, loose to compact.	DC1051-LOT 1-TP-05	1.0 – 3.0	Grab
3.8	Test Pit terminated at 3.8 m in SAND.			
Estimated Cobbles (%) 0		Estimated Boulders (%) 0		Estimated Max Diameter (m) N/A
Start Time: 2:00 p.m.		End Time: 2:45 p.m.		

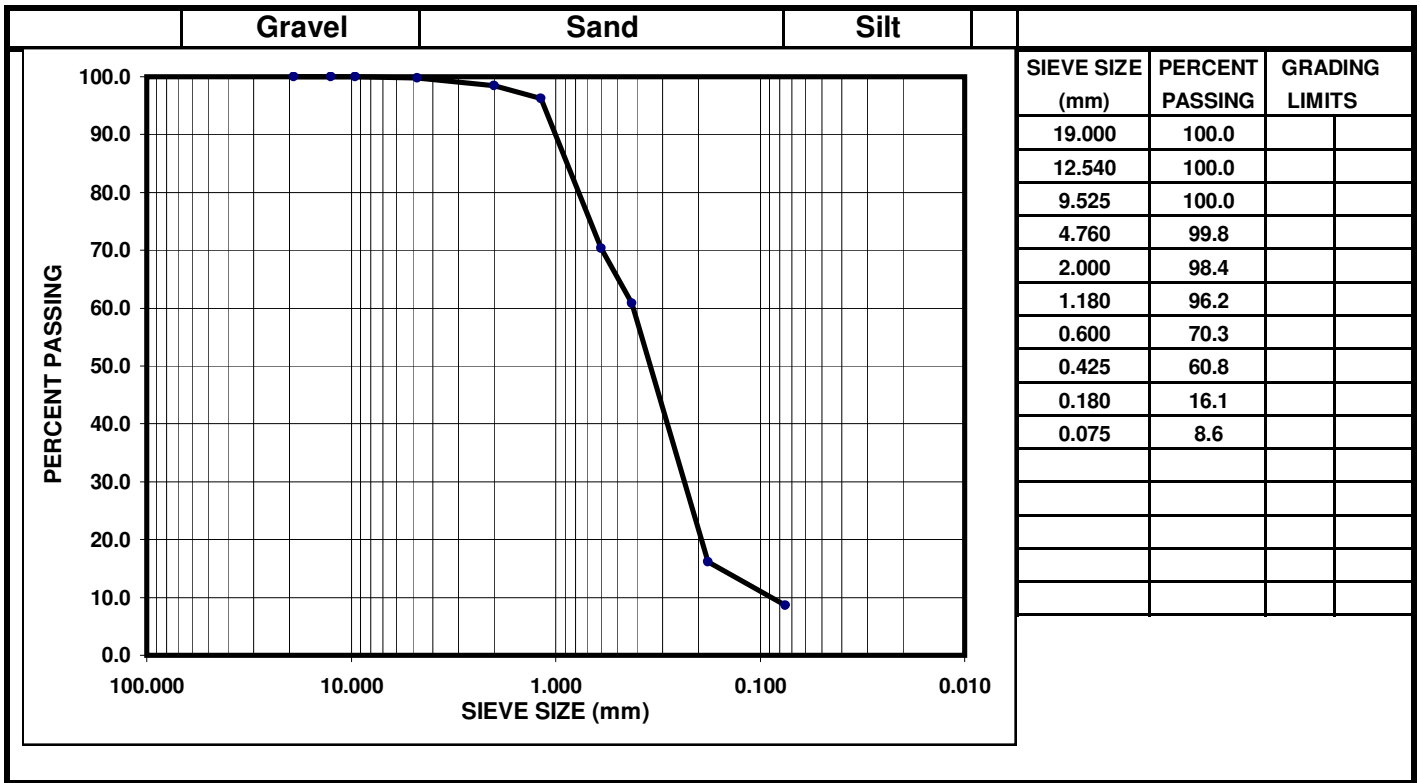
**General Notes**

1. Test Pit terminated at 3.8 m in Sand.
2. Water entering from the base of the pit.
3. Test pit located at Gull Island, north side of the Churchill River crossing.
4. North and East coordinates obtained using a hand-held ETrex Legend Cx GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-TP-05
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sand, trace of silt and gravel
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	15-Aug-08
<b>Sampled By:</b>	Brad Walsh of AMEC	<b>Date Tested:</b>	8-Dec-08
<b>Location:</b>	TP-05	<b>Sample Depth:</b>	1.0 - 3.0 m



**Comments:**                %Cobbles 0.0                %Gravel 0.2                %Sand 91.2                %Silt/Clay 8.6  
 Natural Moisture content of 20.2%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 2-TP-067</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 25 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5866177	E 606843	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic, moist, loose dark brown to black.	N/A	N/A	N/A
0.1 – 0.3	SILTY SAND, moist, compact, medium grey.	N/A	N/A	N/A
0.3 – 1.3	GRAVELLY, SILTY SAND, trace sub angular boulders and cobbles, wet, loose to compact, medium brown.	DC1051-LOT 1-PI 2-TP-067	0.25 – 1.3	Grab
1.3	Test pit terminated at 1.3 m on BOULDERS.			
Estimated Cobbles (%) 15 - 25		Estimated Boulders (%) 20		Estimated Max Diameter (m) > 3m
Start Time: 11:45 a.m.		End Time: 1:05 p.m.		

**General Notes**

1. Test Pit terminated at 1.3 m on large boulders.
2. Groundwater observed at 0.70 m flowing at an approximate rate of 0.25 L/min.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 3-TP-066</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 25 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5861120	E 608987	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, trace cobbles, moist, loose dark brown to black.	N/A	N/A	N/A
0.2 – 0.7	COBBLY SAND with some fines, trace boulders, some cobbles, moist, loose, medium brown to dark brown.	N/A	N/A	N/A
0.7 – 1.7	GRAVELLY SILTY SAND, trace angular boulders, well sorted, wet, loose, medium to dark grey.	DC1051-LOT 1-PI 3-TP-066	0.4 – 1.5	Grab
1.7 – 1.8	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 30		Estimated Boulders (%) Trace		Estimated Max Diameter (m) 0.40m
Start Time: 2:31 p.m.		End Time: 3:43 p.m.		

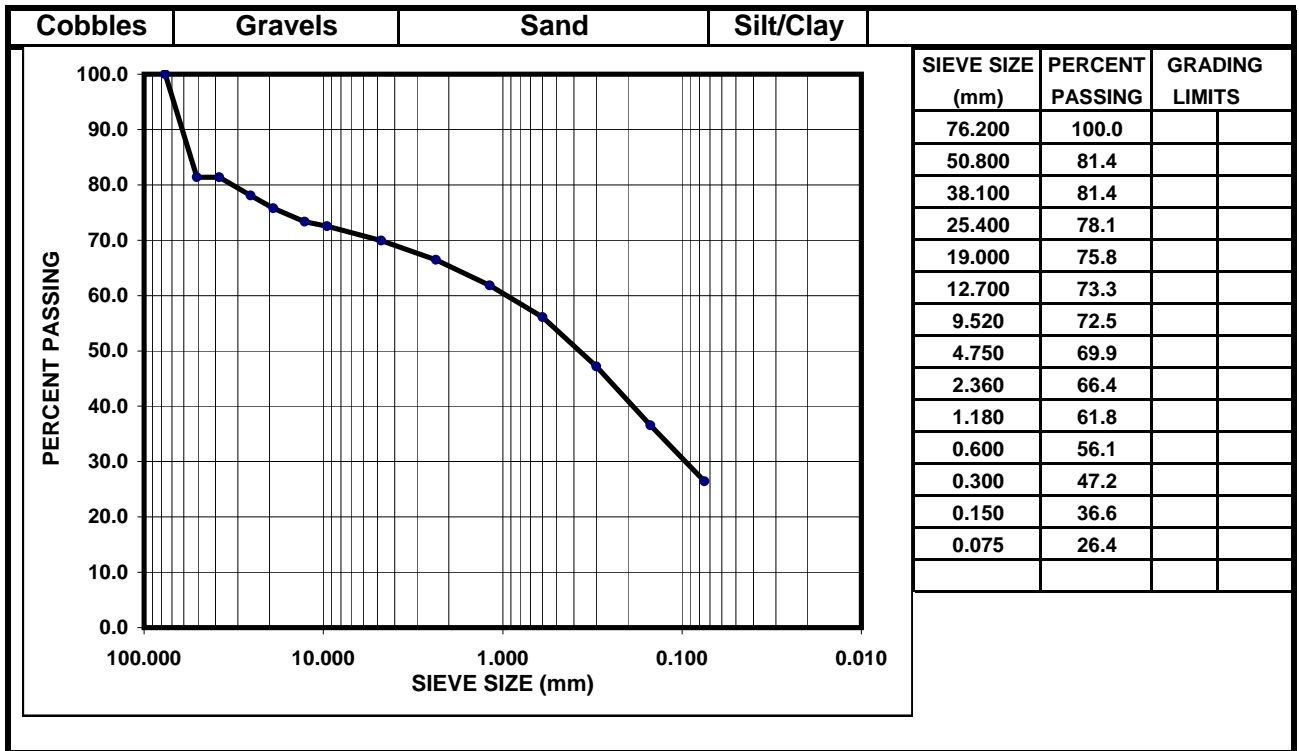
**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 1.8 m using pionjar drill.
2. Groundwater encountered at 0.75 m.
3. Severe sloughing of test pit walls during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 3-TP-066  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly, silty sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 25-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-066      **Sample Depth:** 0.4 m - 1.5 m



**Comments:**    %Cobbles 0.0                      %Gravel 29.3                      %Sand 43.5                      %Silt/Clay 26.4  
 Natural Moisture content of 8.5%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 4-TP-065</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 25 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5859137	E 617762	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.6	ROOTMAT / TOPSOIL – rootlets, organic material, trace boulders and cobbles, moist to wet, loose dark brown to black.	N/A	N/A	N/A
0.6 – 1.2	SILTY SAND – trace gravel, pyrite scattered throughout, moist, firm, medium to dark grey.	N/A	N/A	N/A
1.2 – 1.9	SILTY GRAVELLY SAND with trace to some sub angular boulders and cobbles, moist, compact, light to medium brown.	DC1051-LOT 1-PI 4-TP-065	0.75 – 1.5	Grab
1.5 – 1.9	SAND COBBLES and BOULDERS – sub angular, trace fines, well sorted, wet, loose, medium brown to dark brown.	N/A	N/A	N/A
1.9 – 2.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 30		Estimated Boulders (%) 35 - 40		Estimated Max Diameter (m) 0.65m
Start Time: 12:35 p.m.		End Time: 1:51 p.m.		

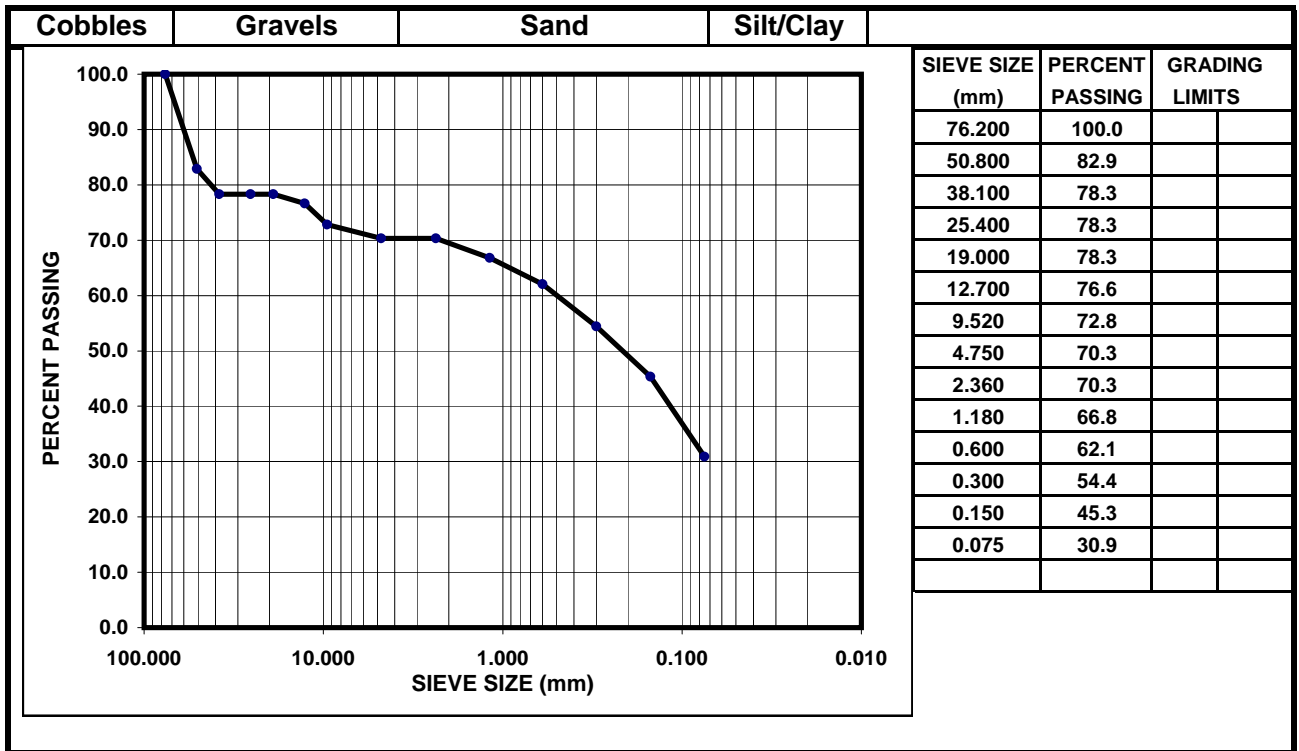
**General Notes**

1. Test pit excavated to 1.9 m with backhoe and probed from 1.90 m to 2.30 m using pionjar drill.
2. Surface water encountered at 0.2 m. Test pit walls sloughing during excavation.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458 **Sample No.:** DC1051-LOT 1-PI 4-TP-065  
**Project:** Geotechnical Investigation: **Sample Type:** Silty, gravelly sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro **Date Sampled:** 25-Sep-08  
**Sampled By:** Brian Walsh of AMEC **Date Tested:** 2-Nov-08  
**Location:** TP-065 **Sample Depth:** 0.75m - 1.5 m



**Comments:** %Cobbles 0.0      %Gravel 29.0      %Sand 39.4      %Silt/Clay 30.9  
 Natural Moisture content of 11.13%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 5-TP-064</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 25 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5858432	E 629126	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.4 – 0.7	COBBLY SAND and GRAVEL with some fines, sub angular boulders present, moist, loose, medium brown.	N/A	N/A	N/A
0.7 – 2.3	GRAVELLY SAND with trace fines, trace cobbles and boulders, wet, loose, dark brown to dark grey.	DC1051-LOT 1-PI 5-TP-064	0.5 – 1.25	Grab
2.3 – 2.4	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 30		Estimated Boulders (%) 40		Estimated Max Diameter (m) 0.80m
Start Time: 9:58 a.m.		End Time: 11:05 a.m.		

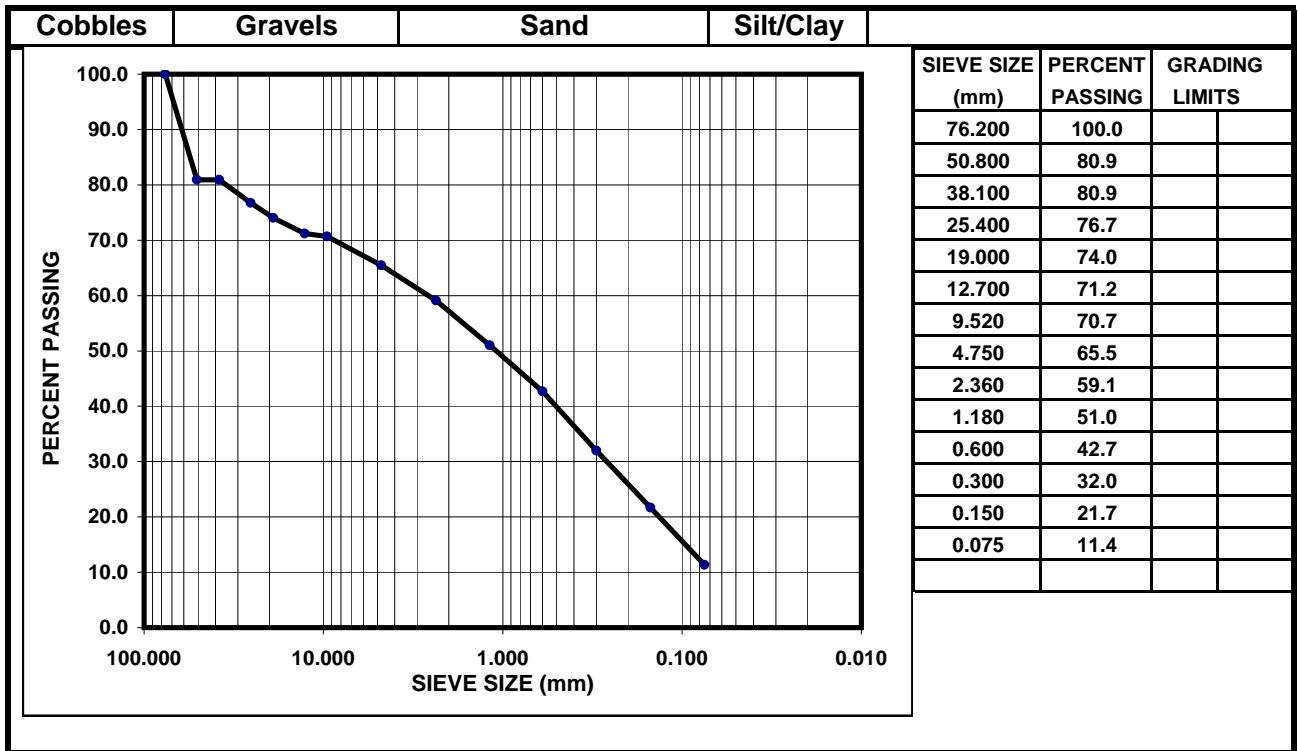
**General Notes**

1. Test pit excavated to 1.3 m with backhoe and probed from 1.3 m to 2.4 m using pionjar drill.
2. Groundwater encountered at 1.1 m.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 5-TP-064  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, trace silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 25-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-064      **Sample Depth:** 0.5 m - 1.25 m



**Comments:**    %Cobbles 0.0                      %Gravel 33.8                      %Sand 54.1                      %Silt/Clay 11.4  
 Natural Moisture content of 8.89%.

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**MOISTURE DENSITY RELATIONSHIP**

AMEC Lab No: 5300

Client: Hydro Newfoundland Project #: TF8310458  
 Project: Transmission Line Lab No: \_\_\_\_\_  
 Sample Type / Source: DC1051-LOT 1-PI 5-TP-064

Date Sampled: September 1, 2008 Sampled By AMEC

Date Sampled: \_\_\_\_\_ Sampled By \_\_\_\_\_

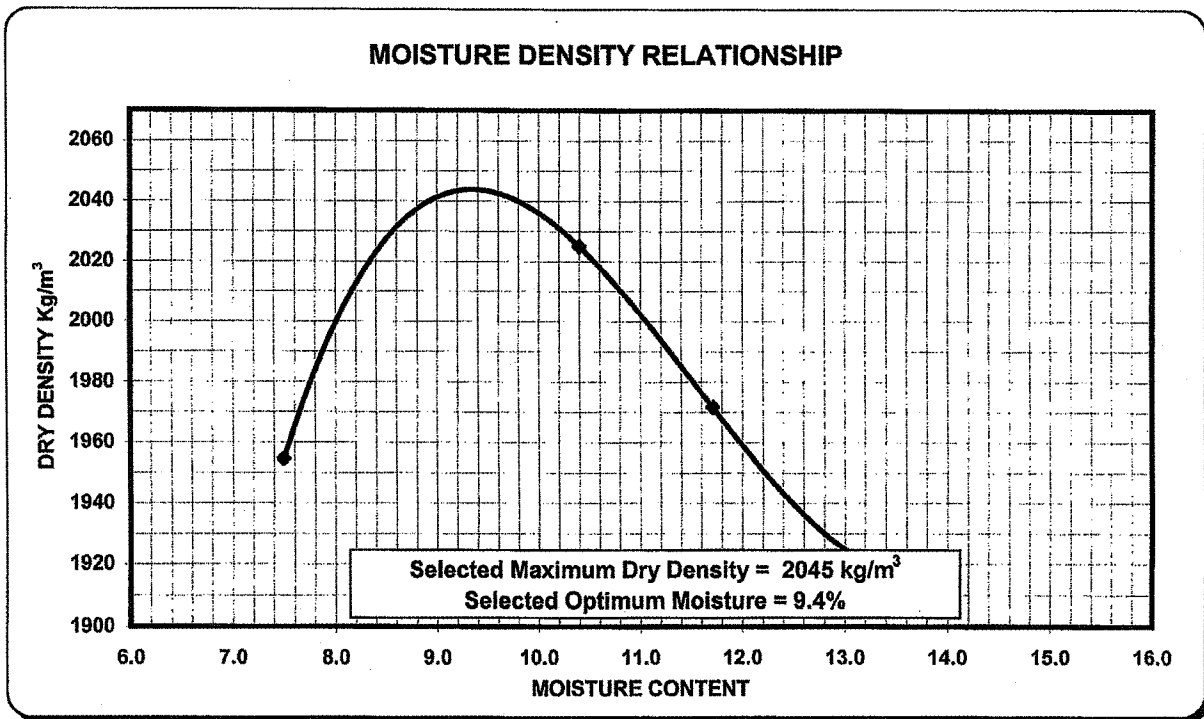
Date Received: Sept 8 2008 Preparation 

Moist	Dry
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Percent Retained:	5mm	Percent Retained:	9.5mm	18%
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Compaction Std.	ASTM D698	ASTM D1557	Method	B
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Moisture Content	7.5	10.4	11.7	13.4
Dry Density kg/m <sup>3</sup>	1954	2025	1972	1917



Note : Oversized Material Correction = 18.3%  
 Corrected Maximum Dry Density 2138 kg/m<sup>3</sup>  
 Corrected Maximum Moisture 8.1 %

Tested by, J.Ingram

Reviewed by, *[Signature]*



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 6-TP-063</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 24 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5854880	E 634112 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, some angular boulders and cobbles, wet, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 1.5	SANDY GRAVEL, some fines, trace sub angular boulders and cobbles, wet, loose, dark.	DC1051-LOT 1-PI 6-TP-063	0.5 – 1.25	Grab
1.5 – 1.6	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 30		Estimated Boulders (%) 60		Estimated Max Diameter (m) 0.60m
Start Time: 2:45 p.m.		End Time: 3:30 p.m.		

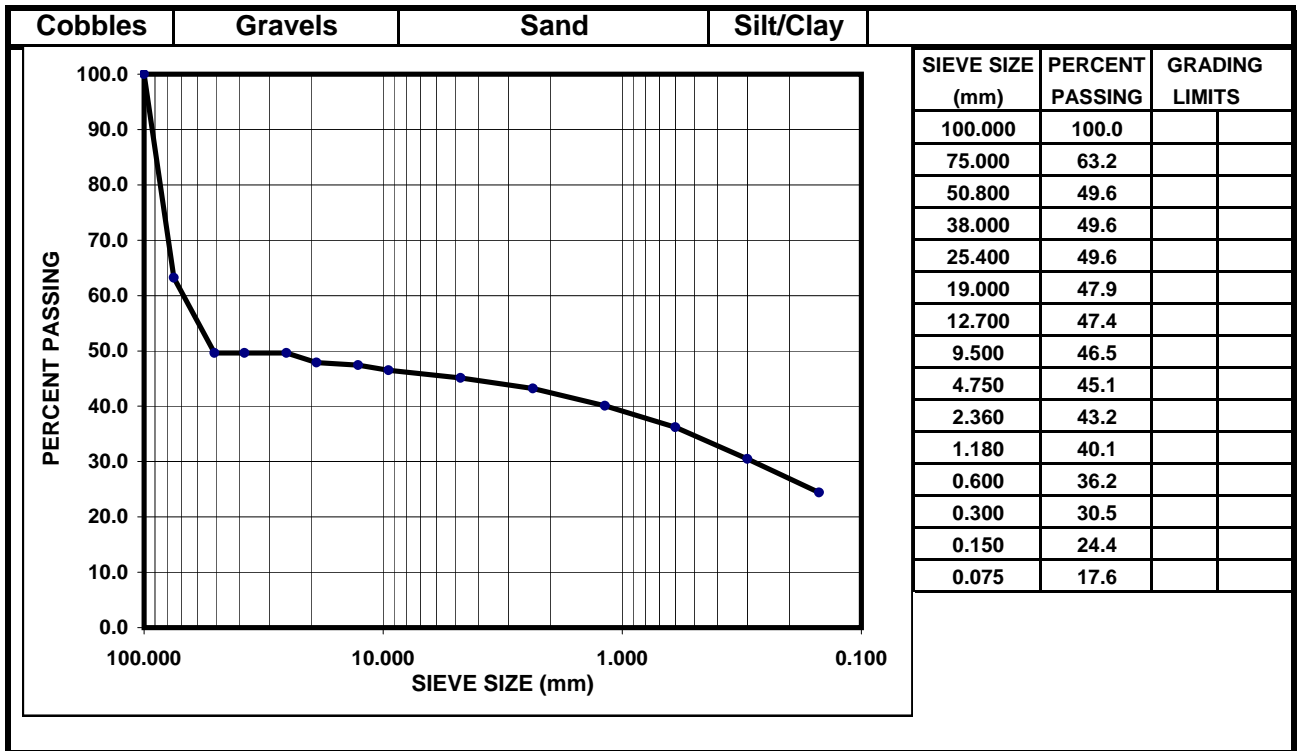
**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 1.6 m using pionjar drill.
2. Groundwater encountered at 0.5 m.
3. Boulders are composed of granites and granitoid gneiss.
4. Sloughing in test pit during excavation.
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
6. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No.:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 1-PI 6-TP-063
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sandy gravel, some silt/clay
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 24-Sep-08
<b>Sampled By:</b> Brian Walsh of AMEC	<b>Date Tested:</b> 2-Nov-08
<b>Location:</b> TP-063	<b>Sample Depth:</b> 0.5 m - 1.25 m



**Comments:** %Cobbles 0.0            %Gravel 54.9            %Sand 27.5            %Silt/Clay 17.6  
 Natural Moisture content of 11.90%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 7-TP-062</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 24 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5850598	E 651883	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, dry, firm, dark brown to black.	N/A	N/A	N/A
0.3 – 0.9	SAND – trace fines, trace gravel, some sub angular boulders and cobbles present, moist, firm, light to medium brown.	N/A	N/A	N/A
0.9 – 1.7	SILTY SAND with trace gravel, trace sub angular boulders and cobbles, wet, loose, medium to dark grey.	DC1051-LOT 1-PI 7-TP-062	0.5 – 1.7	Grab
1.7	Test pit terminated at 1.7 m on BEDROCK.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 10		Estimated Max Diameter (m) 0.55m
Start Time: 9:06 a.m.		End Time: 10:01 a.m.		

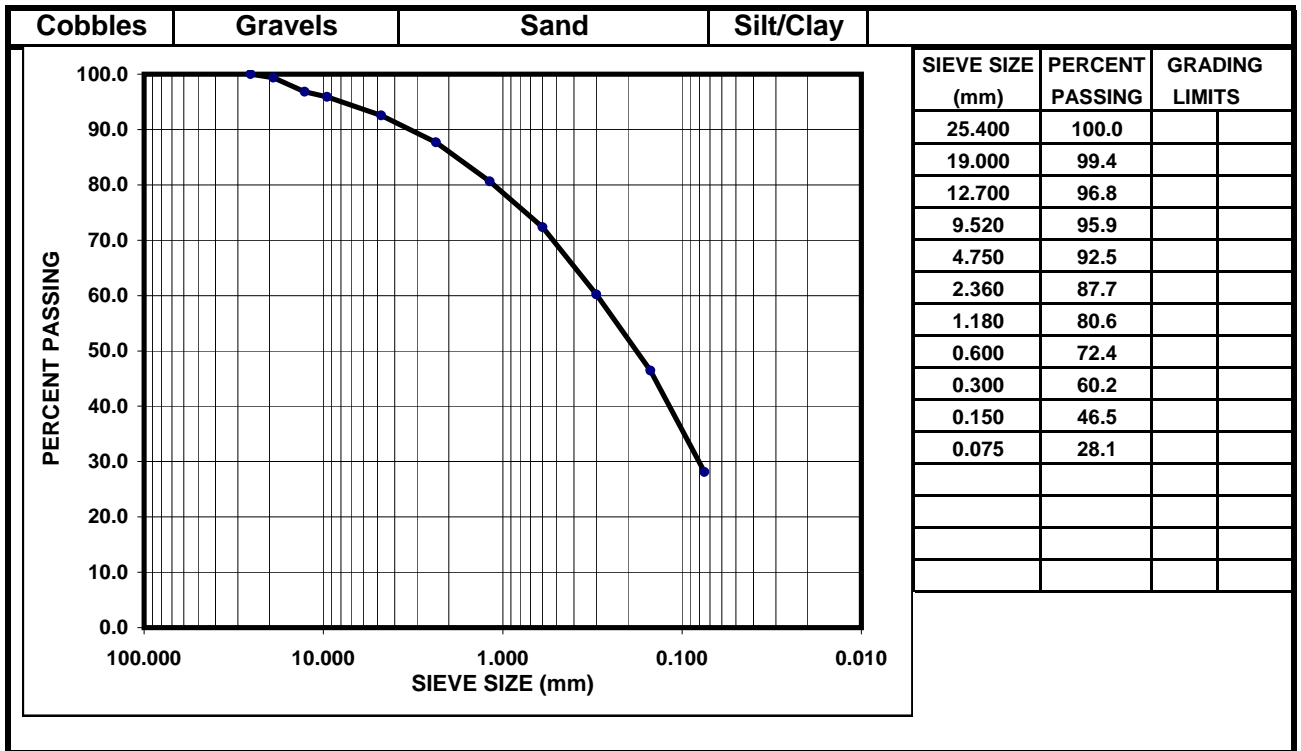
**General Notes**

1. Test Pit terminated at 1.7 m on Bedrock.
2. Groundwater encountered at 0.9 m.
3. Some sloughing within the Silty Sand layer during excavation.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 7-TP-062  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty sand, trace gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 24-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-062      **Sample Depth:** 0.5 m - 1.7 m



**Comments:**    %Cobbles 0.0                      %Gravel 7.5                      %Sand 64.4                      %Silt/Clay 28.1  
 Natural Moisture content of 10.84%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**



Per:

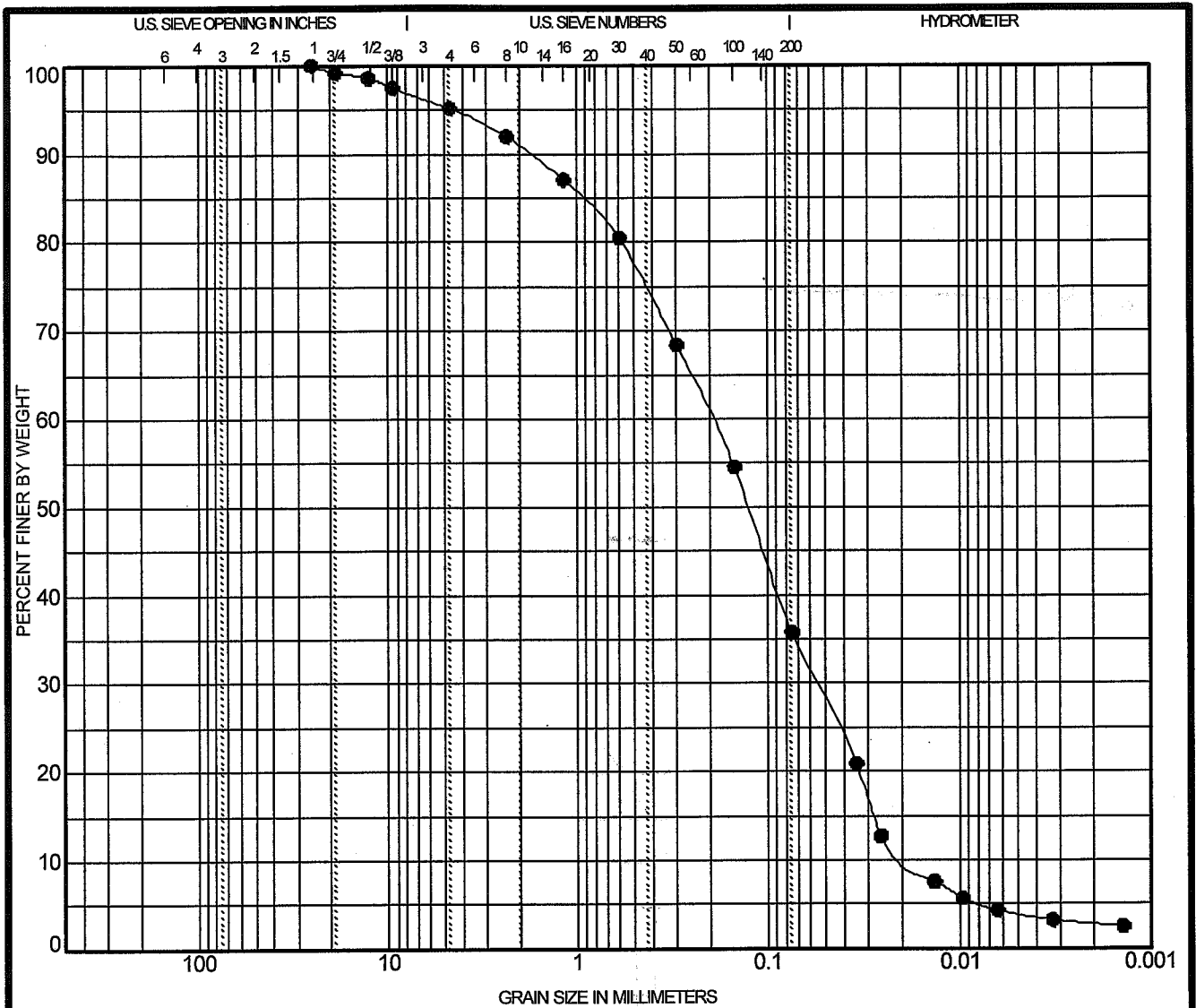
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 8-TP-061</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5851134	E 669219 Inspector: Brian Walsh
<b>PHOTOGRAPHS</b>				
				
<b>Soil and Groundwater Conditions</b>				
Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material dry, firm dark brown to black.	N/A	N/A	N/A
0.2 – 1.9	SILTY SAND with trace gravel, trace cobbles, dry, compact, light to medium grey.	DC1051-LOT 1-PI 8-TP-061	0.25 – 1.5	Grab
1.9 – 2.1	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 5	Estimated Boulders (%) None observed	Estimated Max Diameter (m) 0 m		
Start Time: 3:21 p.m.	End Time: 4:15 p.m.			
<b>General Notes</b>				
1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.1 m using pionjar drill.				
2. No groundwater encountered.				
3. Very easy digging.				
4. No sloughing in test pit.				
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.				
6. Test pit excavated with a BX24 Kabota.				



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
DC1051-LOT 1-PI 8-TP-061	SILTY SAND(SM)	NP	NP	NP	0.85	10.72

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
DC1051-LOT 1-PI 8-TP-061	25.4	0.197	0.055	0.018	4.8	59.4	33.0	2.8

**GRAIN SIZE DISTRIBUTION**



Project No.: TF8310458  
 Client: Newfoundland Hydro  
 Project Name: Transmission Line  
 Location: Newfoundland

CAN EM GRAIN SIZE NOV. 2, 2008 - GRAIN SIZE ANALYSIS.GPJ AMEC HALIFAX.GDT 12/16/08

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**



<b>TEST PIT: DC1051-LOT 1-PI 9-TP-060</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5844532	E 675598 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, trace cobbles, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.7	SILTY SAND – trace gravel, dry, firm, trace boulders, some cobbles, dry, firm, light to medium grey.	N/A	N/A	N/A
0.7 – 1.7	SILTY SAND AND GRAVEL - well sorted, trace sub angular cobbles, dry, firm, light grey to dark grey.	DC1051-LOT 1-PI 9-TP-060	0.5 – 1.6	Grab
1.7	Test pit terminated at 1.7 m on BEDROCK.			
Estimated Cobbles (%) 15		Estimated Boulders (%) Trace		Estimated Max Diameter (m) 0.30m
Start Time: 1:38 p.m.		End Time: 2:35 p.m.		

**General Notes**

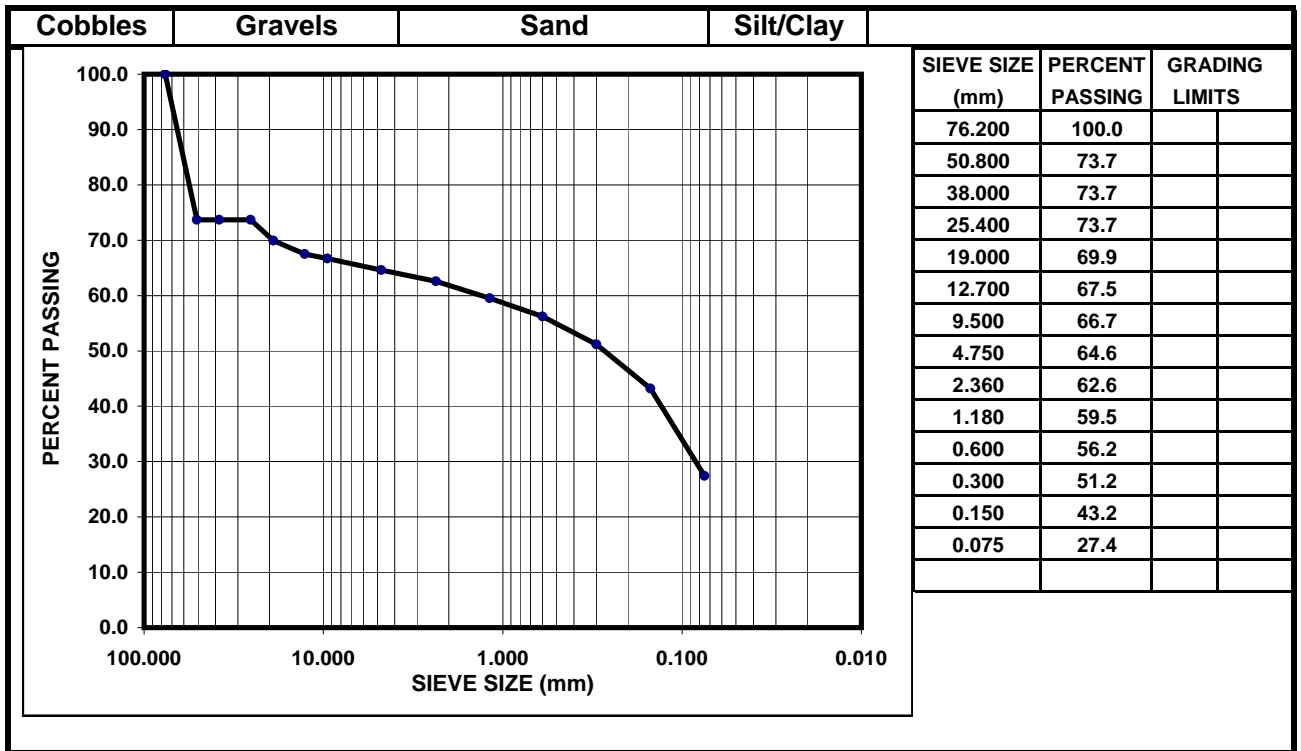
1. Test Pit terminated at 1.7 m on Bedrock.
2. Test pit dry upon completion.
3. Some sloughing in test pit during excavation
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 9-TP-060  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty sand and gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 23-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-060      **Sample Depth:** 0.5 m - 1.6 m



**Comments:**    %Cobbles 0.0                      %Gravel 35.4                      %Sand 37.2                      %Silt/Clay 27.4  
 Natural Moisture content of 13.80%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 10-TP-059</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5836540	E 682116 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.7	SAND with some fines and gravel, trace cobbles, rootlets, dry, loose, light to medium brown, weathered.	N/A	N/A	N/A
0.7 – 3.1	SAND with some fines and gravel, trace cobbles, dry, loose, medium grey to dark grey	DC1051-LOT 1-PI 10-TP-059	0.5 – 2.0	Grab
3.1 – 3.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10	Estimated Boulders (%) None observed	Estimated Max Diameter (m) N/A		
Start Time: 10:43 a.m.	End Time: 12:05 p.m.			

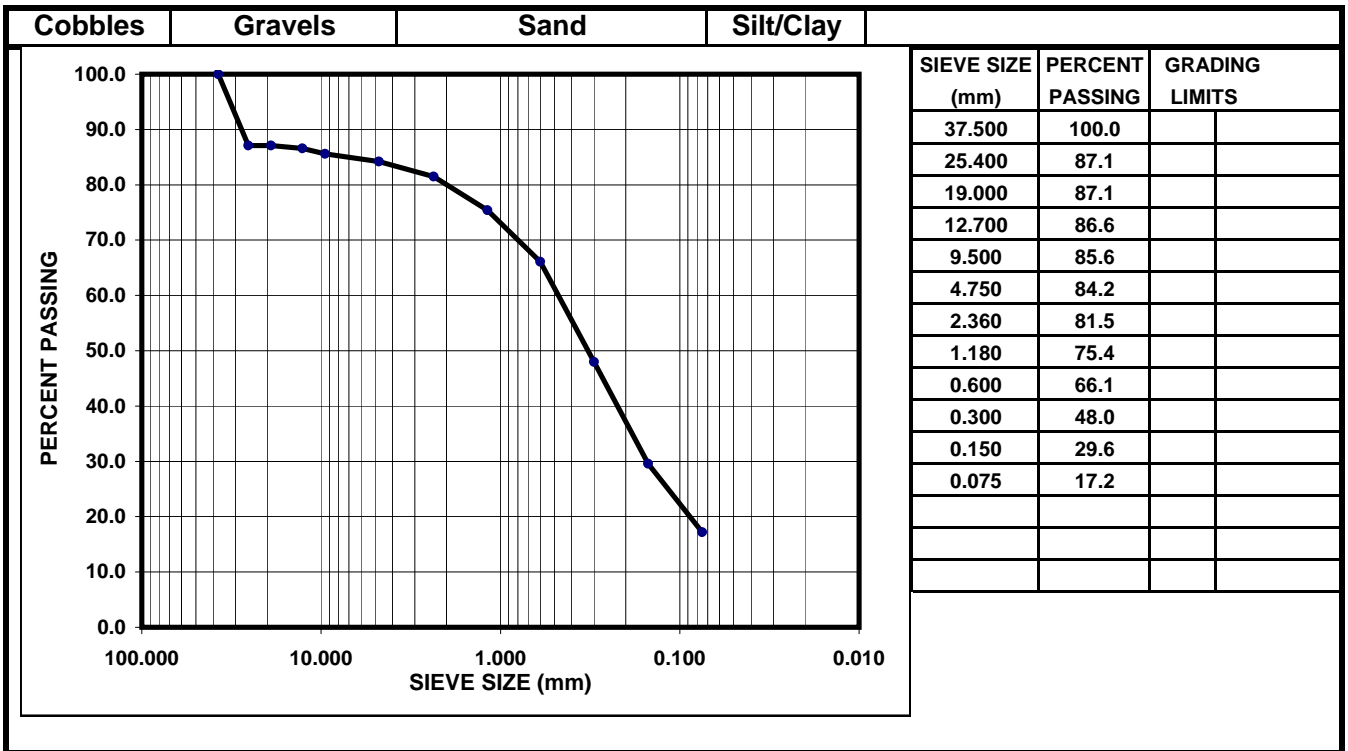
**General Notes**

1. Test pit excavated to 2.1 m with backhoe and probed from 2.1 m to 3.2 m using pionjar drill.
2. No groundwater encountered.
3. Minor sloughing in test pit during excavation
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 10-TP-059  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, some gravel, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 23-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-059      **Sample Depth:** 0.5 m - 2.0 m



**Comments:**    %Cobbles 0.0                    %Gravel 15.8                    %Sand 67.0                    %Silt/Clay 17.2  
 Natural Moisture content of 8.80%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 11-TP-058</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 23 <sup>rd</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5832478	E 689921	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black	N/A	N/A	N/A
0.4 – 1.0	SILTY SAND with some gravel, some sub angular to sub round boulders and cobbles, thin laminations present dry, firm, light brown to medium brown.	DC1051-LOT 1-PI 11-TP-058	0.65 – 1.0	Grab
1.0 – 1.7	SAND, COBBLES and BOULDERS with some fines and gravel, medium to coarse grained, sub angular to sub round, moist, firm, dark brown to dark grey.	N/A	N/A	N/A
1.7	Test pit terminated at 1.7 m on BEDROCK.			
Estimated Cobbles (%) 35		Estimated Boulders (%) 40		Estimated Max Diameter (m) 1.00
Start Time: 8:12 a.m.		End Time: 9:30 a.m.		

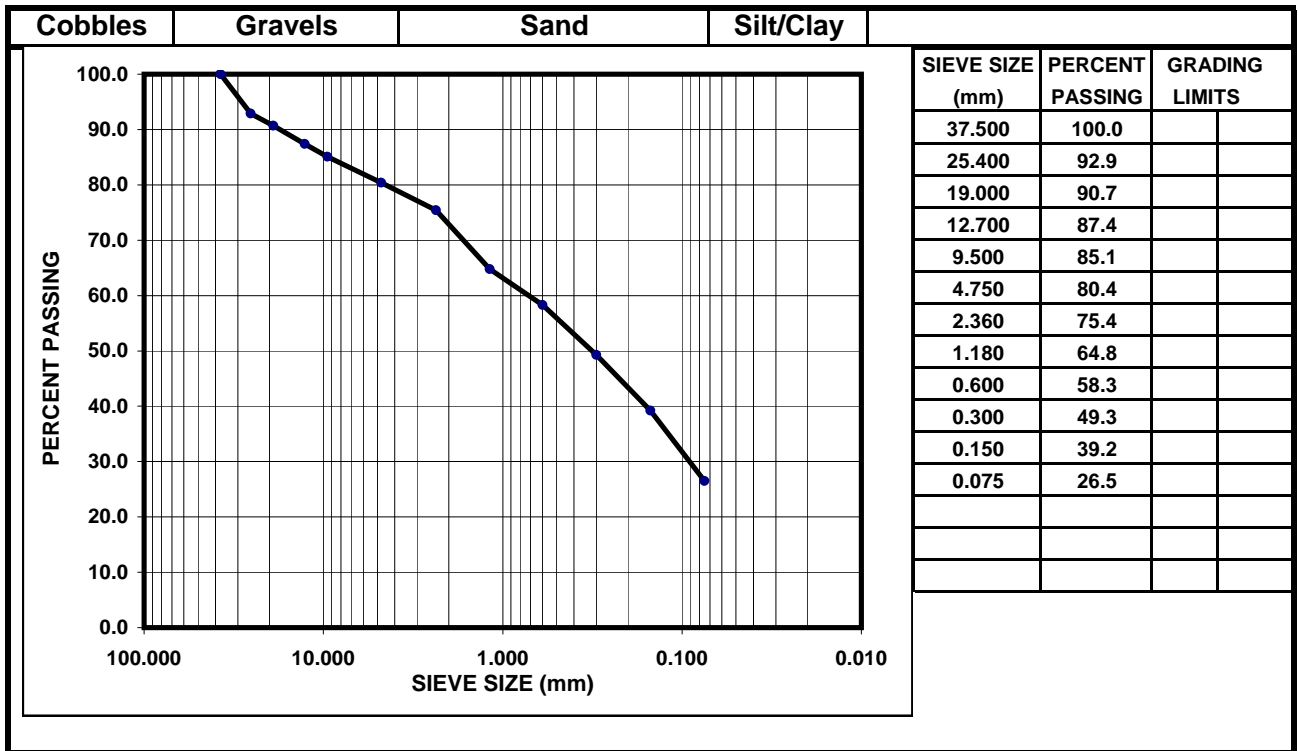
**General Notes**

1. Test Pit terminated at 1.7 m on Bedrock.
2. No groundwater encountered.
3. Large sub angular to sub round boulders present ranging in size to 0.75 m to 1.0 m.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 11-TP-058  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty sand, some gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 23-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-058      **Sample Depth:** 0.65 m - 1.0 m



**Comments:**    %Cobbles 0.0                      %Gravel 19.6                      %Sand 53.9                      %Silt/Clay 26.5  
 Natural Moisture content of 6.50%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 12-TP-057</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 22 <sup>nd</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5831560	E 701758	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 3.0	SAND with some fines, trace gravel and sub-rounded to rounded cobbles, moist, loose, brown.	DC1051-LOT 1-PI 12-TP-057	0.25 – 1.8	Grab
3.0	Reached extent of pionjar drill with no refusal on bedrock or boulders.			
Estimated Cobbles (%) 10	Estimated Boulders (%) None observed	Estimated Max Diameter (m) N/A		
Start Time: 1:12 p.m.	End Time: 2:05 p.m.			

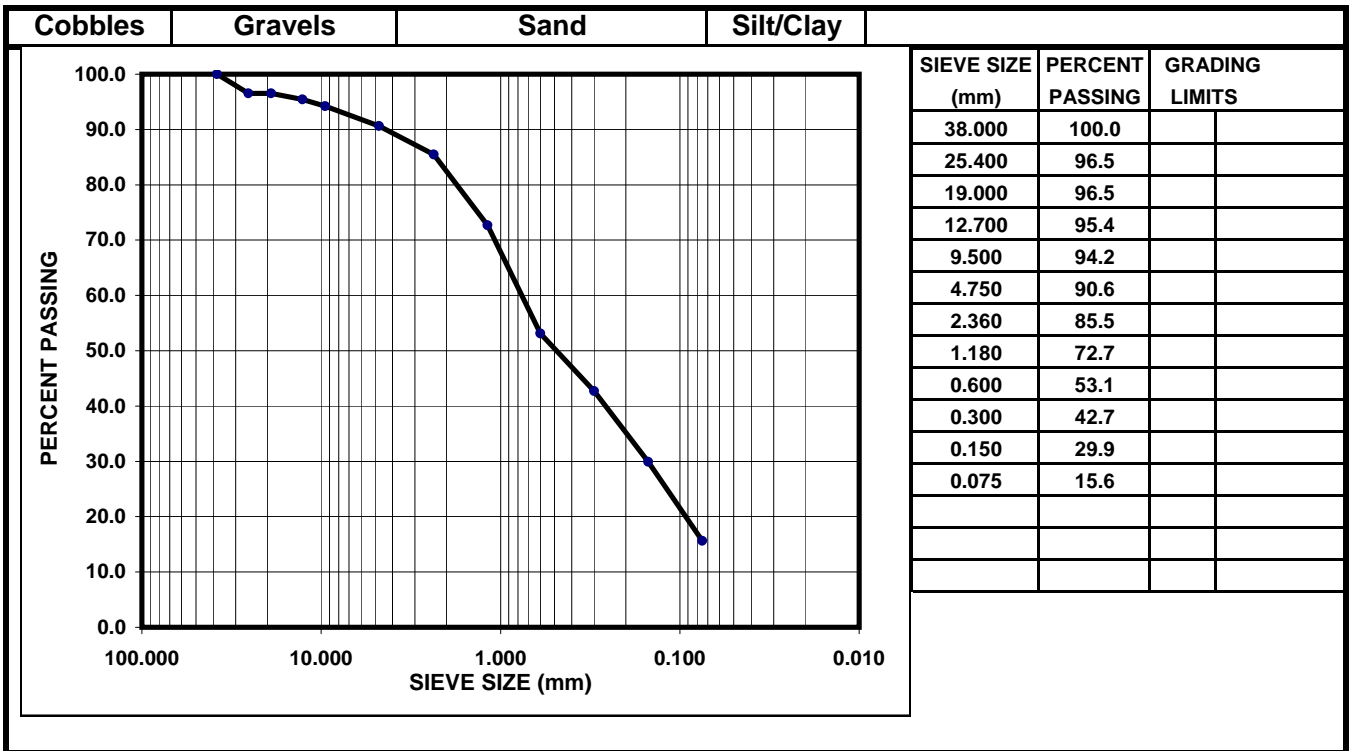
**General Notes**

1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 3.0 m using pionjar drill. Did not encounter bedrock or boulders.
2. Slight groundwater seepage observed at 1.8 m.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 20; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 12-TP-057  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, some silt/clay, trace gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 22-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-057      **Sample Depth:** 0.25 m - 1.8 m



**Comments:**    %Cobbles 0.0                  %Gravel 9.4                  %Sand 75.0                  %Silt/Clay 15.6  
 Natural Moisture content of 21.10%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 13-TP-056</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 22 <sup>nd</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5831626	E 302309	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 1.0	SAND with some fines poorly graded, moist, loose, medium to dark brown.	N/A	N/A	N/A
1.0 – 2.2	COBBLY SAND with some fines and gravel, some sub angular boulders and cobbles, wet, compact, dark brown to dark grey.	DC1051-LOT 1-PI 13-TP-056	1.0 – 1.6	Grab
2.2 – 2.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 25		Estimated Max Diameter (m) 0.60
Start Time: 10:55 a.m.		End Time: 12:05 p.m.		

**General Notes**

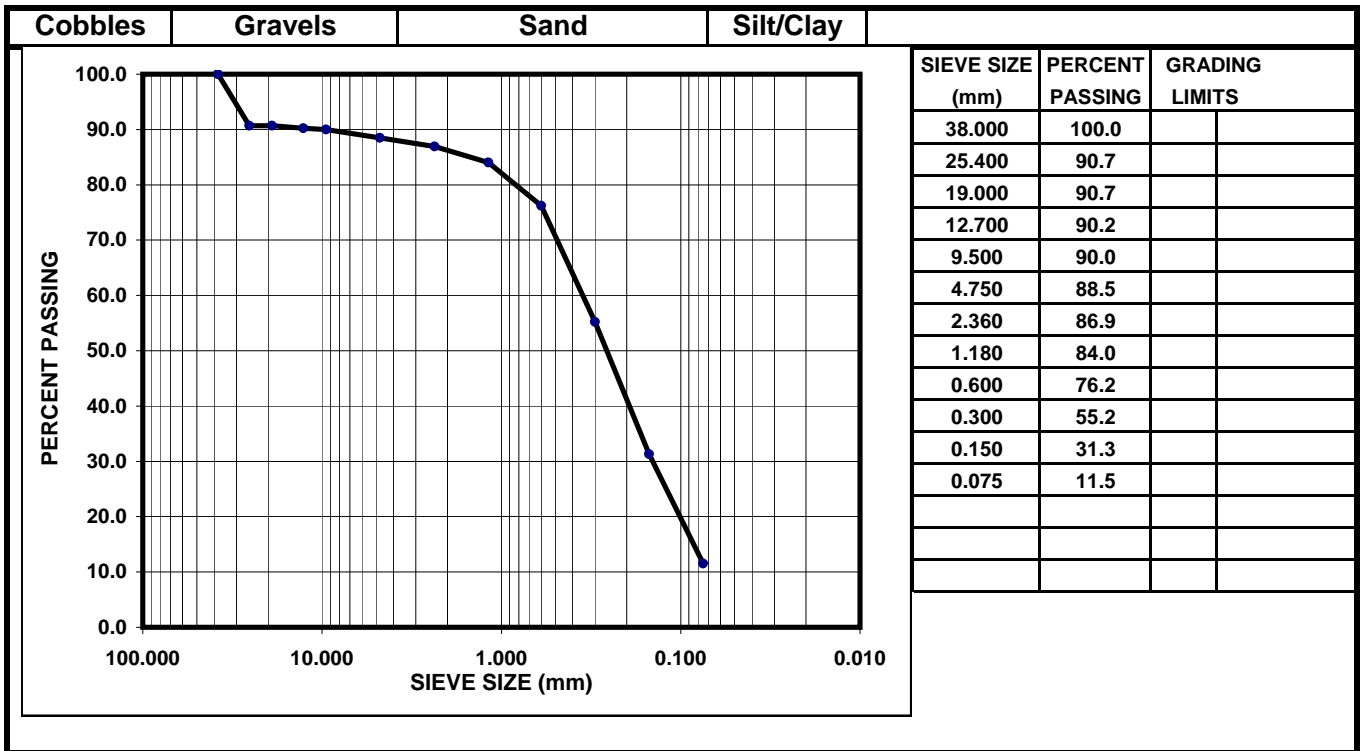
1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.3 m using pionjar drill.
2. Groundwater observed at 0.9 m flowing at an approximate rate of 2 L/min.
3. Sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 13-TP-056  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, some gravel, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 22-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-056      **Sample Depth:** 1.0 m - 1.6 m



**Comments:**    %Cobbles 0.0                      %Gravel 11.5                      %Sand 77.0                      %Silt/Clay 11.5  
 Natural Moisture content of 22.70%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 14-TP-055</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 21 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5824789	E 310969 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 1.0	SAND with some fines, some angular boulders and cobbles, moist, compact, dark brown.	N/A	N/A	N/A
1.0 – 1.6	GRAVELLY SAND with some fines, trace to some sub angular boulders and cobbles, wet, compact, medium brown to black .	DC1051-LOT 1-PI 14-TP-055	1.3 – 1.6	Grab
1.6	Test pit terminated at 1.6 m on BEDROCK.			
Estimated Cobbles (%) 15		Estimated Boulders (%) 10		Estimated Max Diameter (m) 0.4
Start Time: 2:49 p.m.		End Time: 3:30 p.m.		

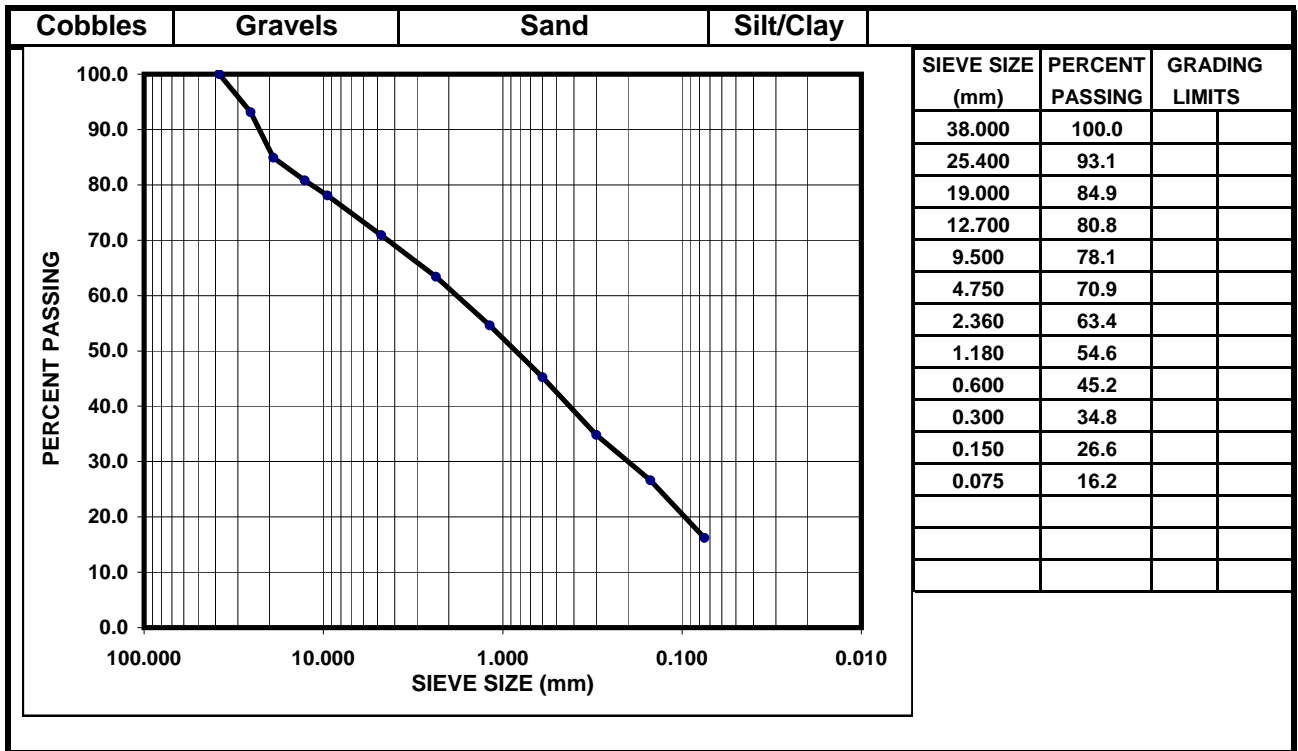
**General Notes**

1. Test Pit terminated at 1.6 m on Bedrock
2. Groundwater observed at 1.0 m flowing at an approximate rate of 0.5 L/min.
3. Some sloughing of Gravely Sand layer in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 14-TP-055  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 21-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-055      **Sample Depth:** 1.3 m - 1.6 m



**Comments:**    %Cobbles 0.0                    %Gravel 29.1                    %Sand 54.7                    %Silt/Clay 16.2  
 Natural Moisture content of 15.60%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 15-TP-054</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 21 <sup>st</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5819243	E 324492	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.7	SAND with trace some angular cobbles and boulders, some gravel, moist, loose, light brown to medium brown.	N/A	N/A	N/A
0.7 – 2.5	SILTY SAND with some gravel, some large boulders and cobbles, wet, loose, dark brown to dark grey.	DC1051-LOT 1-PI 15-TP-054	0.8 – 1.6	Grab
2.5 – 2.6	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 15 - 20		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.50
Start Time: 11:17 a.m.		End Time: 12:05 p.m.		

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.6 m using pionjar drill.
2. Groundwater observed at 0.7 m flowing at an approximate rate of 1.0 L/min.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**MOISTURE DENSITY RELATIONSHIP**

AMEC Lab No: 5300

Client: Hydro Newfoundland Project #: TF8310458  
 Project: Transmission Line Lab No: \_\_\_\_\_  
 Sample Type / Source: DC1051-LOT 1-PI 15-TP-054

Date Sampled: September 1, 2008 Sampled By AMEC

Date Sampled: \_\_\_\_\_ Sampled By \_\_\_\_\_

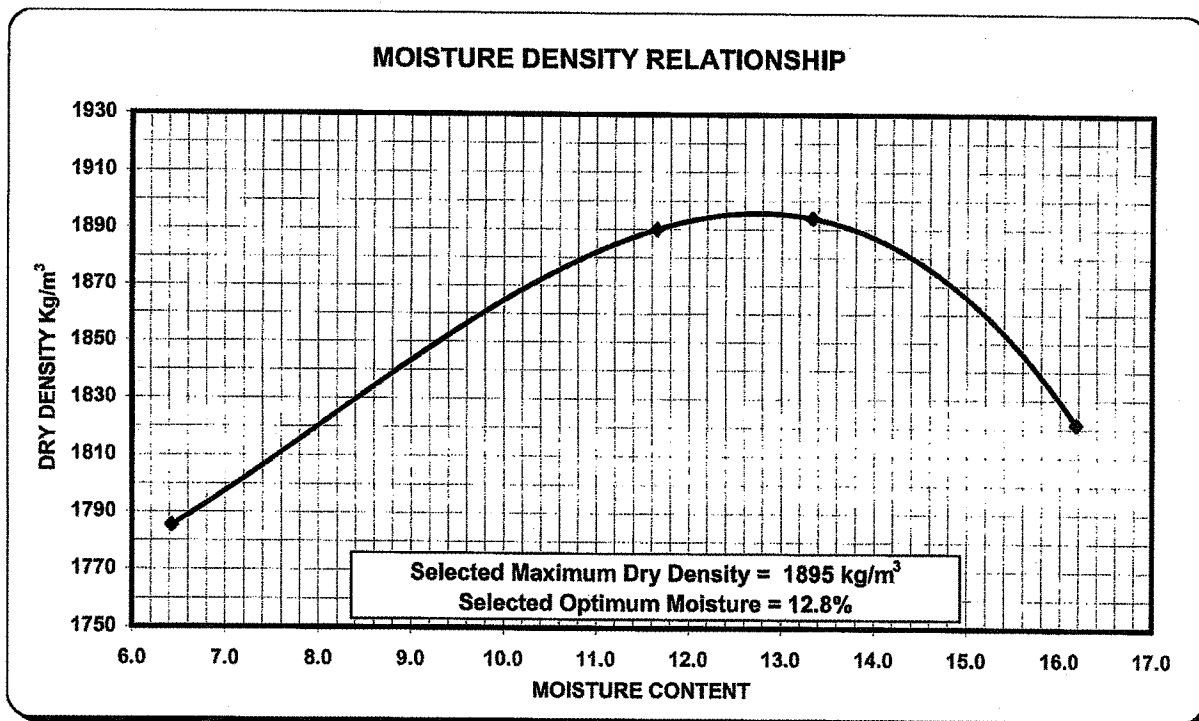
Date Received: Sept 8 2008 Preparation 

Moist	Dry
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Percent Retained:	5mm	17%	Percent Retained:	20mm	
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Compaction Std.	ASTM D698	ASTM D1557	Method	A
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Moisture Content	6.4	11.7	13.3	16.2	
Dry Density kg/m <sup>3</sup>	1785	1890	1894	1822	



Note : Oversized Material Correction = 16.7%

Corrected Maximum Dry Density      1992 kg/m<sup>3</sup>  
 Corrected Maximum Moisture      10.9 %

Tested by, J.Ingram

Reviewed by,



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 16-TP-053</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 20 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5819693	E 344979 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.9	COBBLY SAND with some gravel, some sub-rounded boulders and cobbles, moist, loose, medium brown to light grey.	N/A	N/A	N/A
0.9 – 1.7	SILTY SAND with some gravel, some boulders and cobbles, wet, loose medium brown to medium grey.	DC1051-LOT 1-PI 16-TP-053	1.0 – 1.7	Grab
1.7 – 1.8	. Refusal on probable bedrock or large boulder.			

Estimated Cobbles (%) 25	Estimated Boulders (%) 15	Estimated Max Diameter (m) 0.7
Start Time: 4:00 p.m.	End Time: 4:30 p.m.	

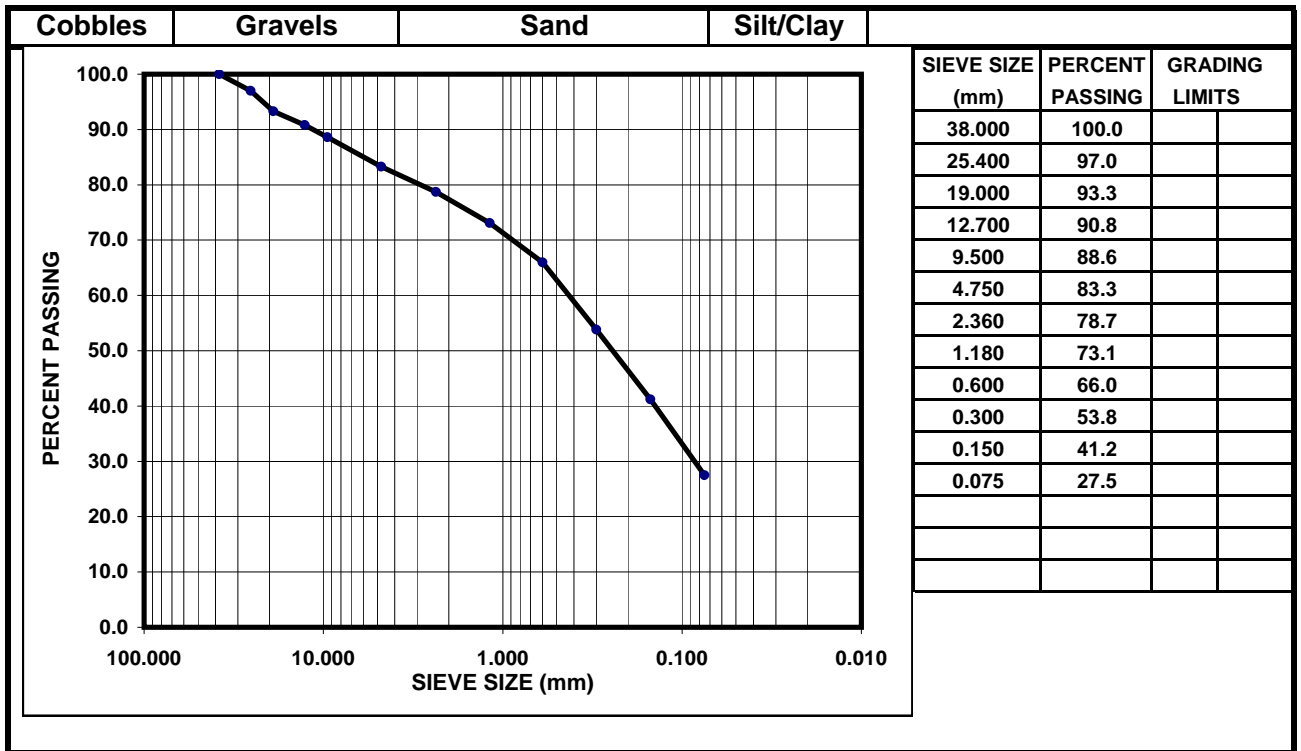
**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.70 m to 1.8 m using pionjar drill.
2. Water observed at the base of the pit. Location of water inflow could not be observed in soil horizon.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 16-TP-053  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty sand, some gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 20-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-053      **Sample Depth:** 1.0 m - 1.7 m



**Comments:**    %Cobbles 0.0                      %Gravel 16.7                      %Sand 55.8                      %Silt/Clay 27.5  
 Natural Moisture content of 10.00%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 1-REP-PI 16 to PI 17-TP-052**

Client:	Nalcor Energy - Lower Churchill Project			Date: September 20 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5816146	E 350522
				Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.6	SAND with some fines, some boulders and cobbles, moist, firm, medium brown.	N/A	N/A	N/A
0.6 – 3.0	SAND and GRAVEL with some fines, trace boulders and cobbles, wet, loose, layer, dark brown to black.	DC1051-LOT 1-REP-PI 16 to PI 17-TP-052	0.4 – 1.7	Grab
3.0 – 3.1	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 25		Estimated Boulders (%) 25		Estimated Max Diameter (m) 0.7
Start Time: 3:10 p.m.		End Time: 4:00 p.m.		

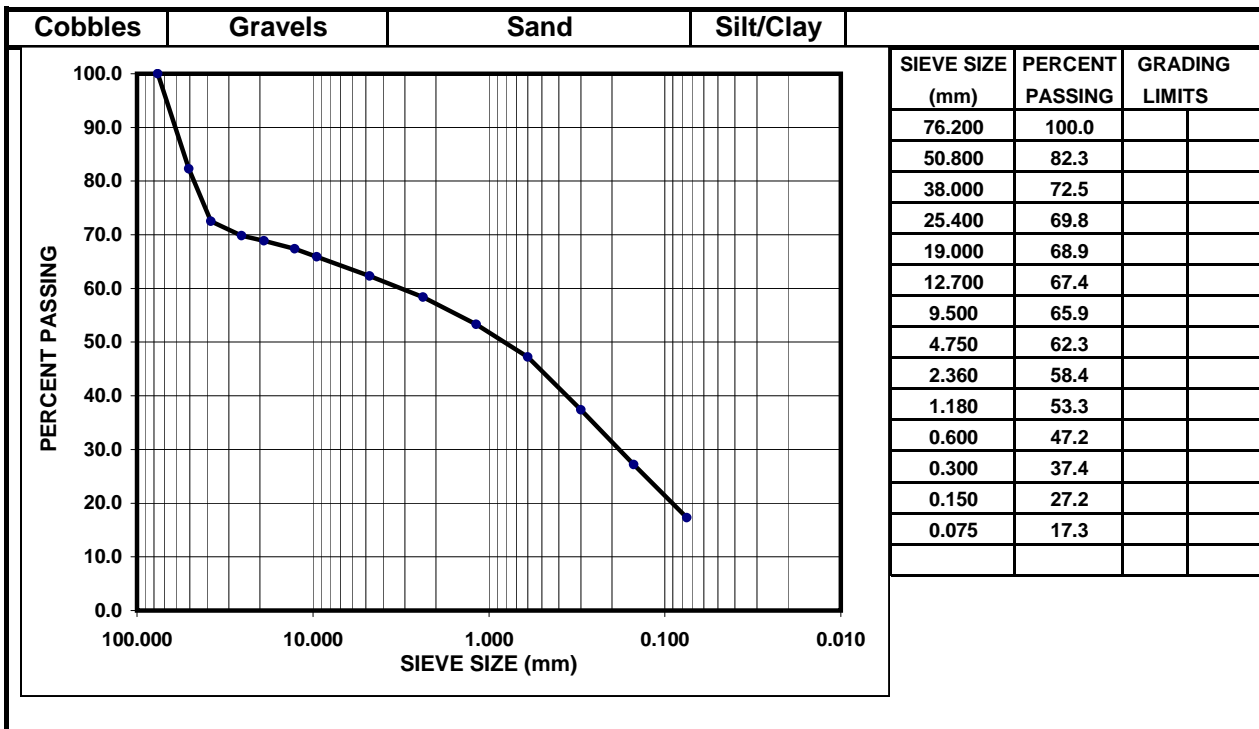
**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 3.1 m using pionjar drill.
2. Groundwater observed at 1.5 m.
3. Some sloughing of the Sand and Gravel layer in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Representative test between PI 16 and PI 17.
6. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-REP-PI 16 to PI 17-TP-052  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand and gravel, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 20-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-052      **Sample Depth:** 0.4 m - 1.7 m



**Comments:**    %Cobbles 0.0            %Gravel 37.7            %Sand 45.0            %Silt/Clay 17.3  
 Natural Moisture content of 9.42%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 17-TP-051</b>					
Client:	Nalcor Energy - Lower Churchill Project				Date: September 20 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5812165	E 356759	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 2.8	SILTY, GRAVELLY SAND, some boulders and cobbles well graded, wet to saturated, loose, medium grey to dark grey.	DC1051-LOT 1-PI 17-TP-051	0.5 – 1.4	Grab
2.8	Reached extent of pionjar drill with no refusal on bedrock or boulders.			
Estimated Cobbles (%) 20	Estimated Boulders (%) 20	Estimated Max Diameter (m) 1.0		
Start Time: 1:47 p.m.	End Time: 2:30 p.m.			

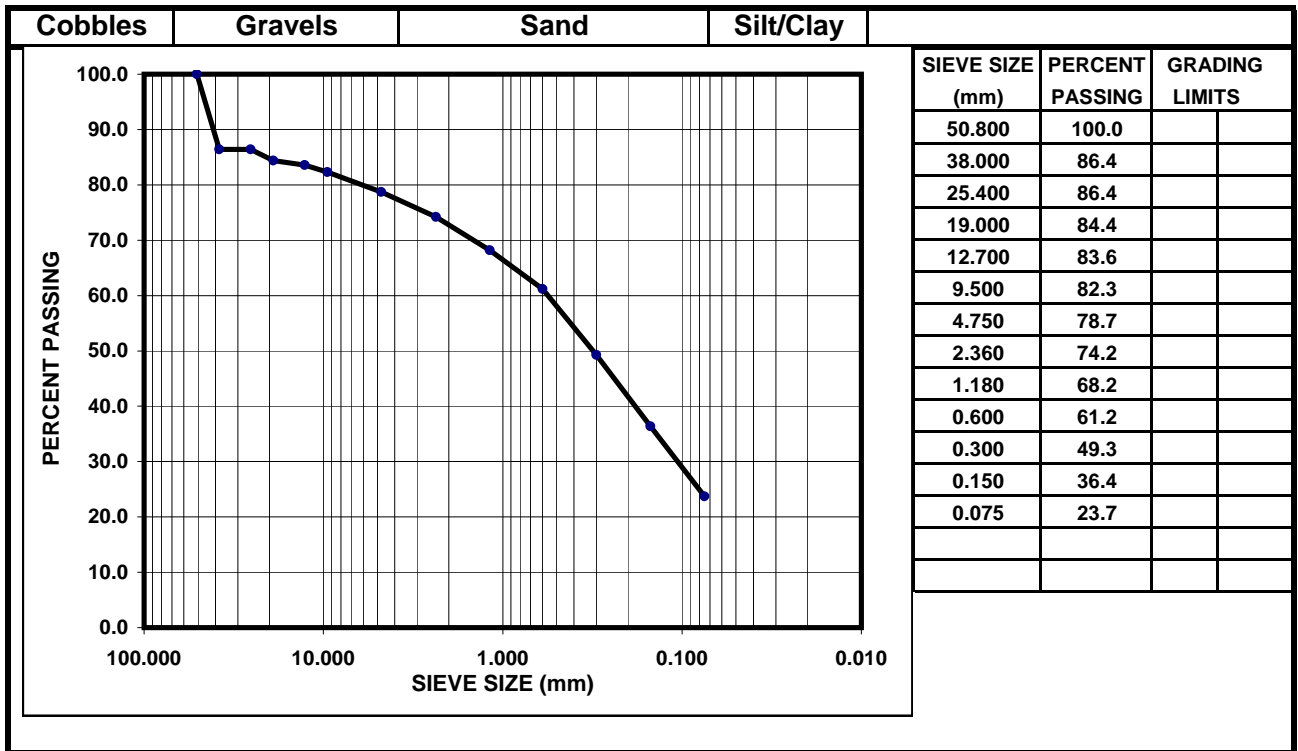
**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.8 m using pionjar drill. Did not encounter bedrock or boulders.
2. Groundwater observed at 1.3 m flowing at an approximate rate of 0.4 L/min.
3. Walls very unstable, severe sloughing of pit walls.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 17-TP-051  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty, gravelly sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 20-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-051      **Sample Depth:** 0.5 m - 1.4 m



**Comments:**    %Cobbles 0.0                      %Gravel 21.3                      %Sand 55.0                      %Silt/Clay 23.7  
 Natural Moisture content of 10.80%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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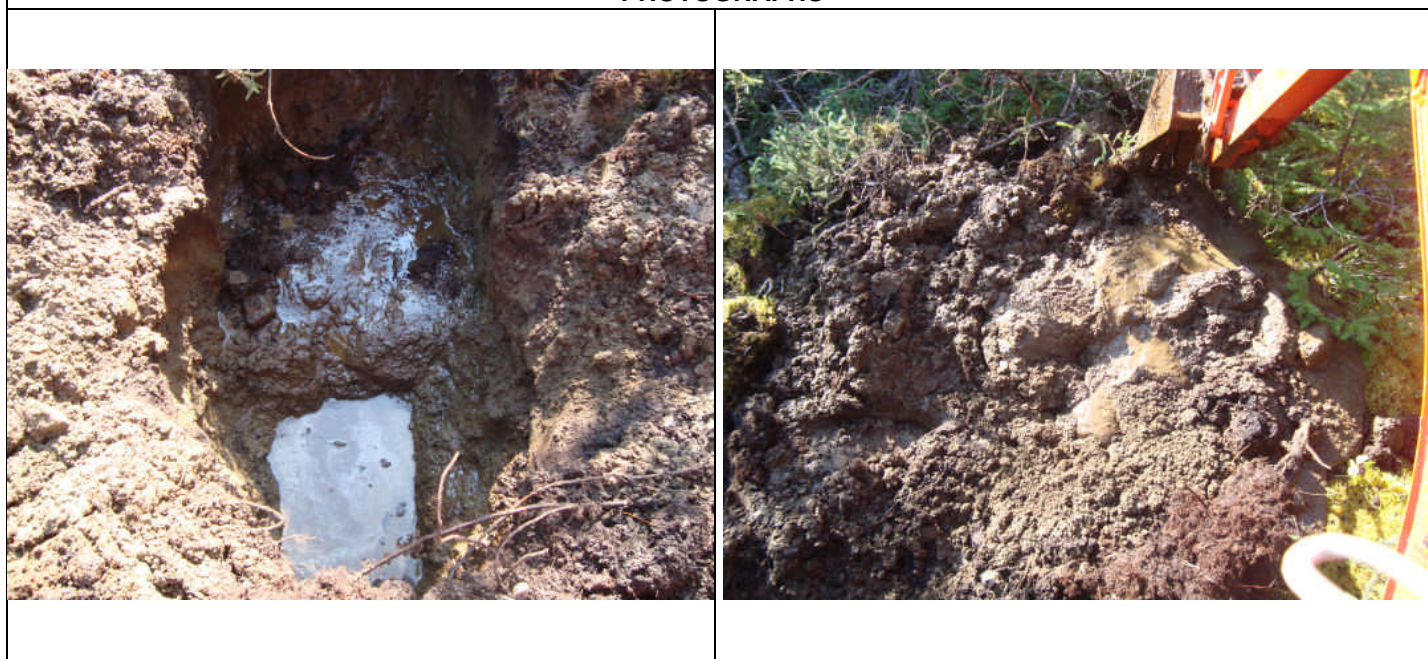
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 18-TP-050</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 20 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5811551	E 359619	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, moist, loose.	N/A	N/A	N/A
0.3 – 0.7	SAND with some fines, trace gravel, wet, loose, trace boulders and cobbles, layer is very loose and weak, weathered, medium brown to dark brown.	N/A	N/A	N/A
0.7 – 2.0	GRAVELLY SAND with fines, some large sub-angular to sub-round boulders and cobbles, well graded, wet, compact, dark brown to black.	DC1051-LOT 1-PI 18-TP-050	0.9 – 1.45	Grab
2.0 – 2.1	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20	Estimated Boulders (%) 25	Estimated Max Diameter (m) 1.0 – 2.0		
Start Time: 11:00 am	End Time: 11:45 am			

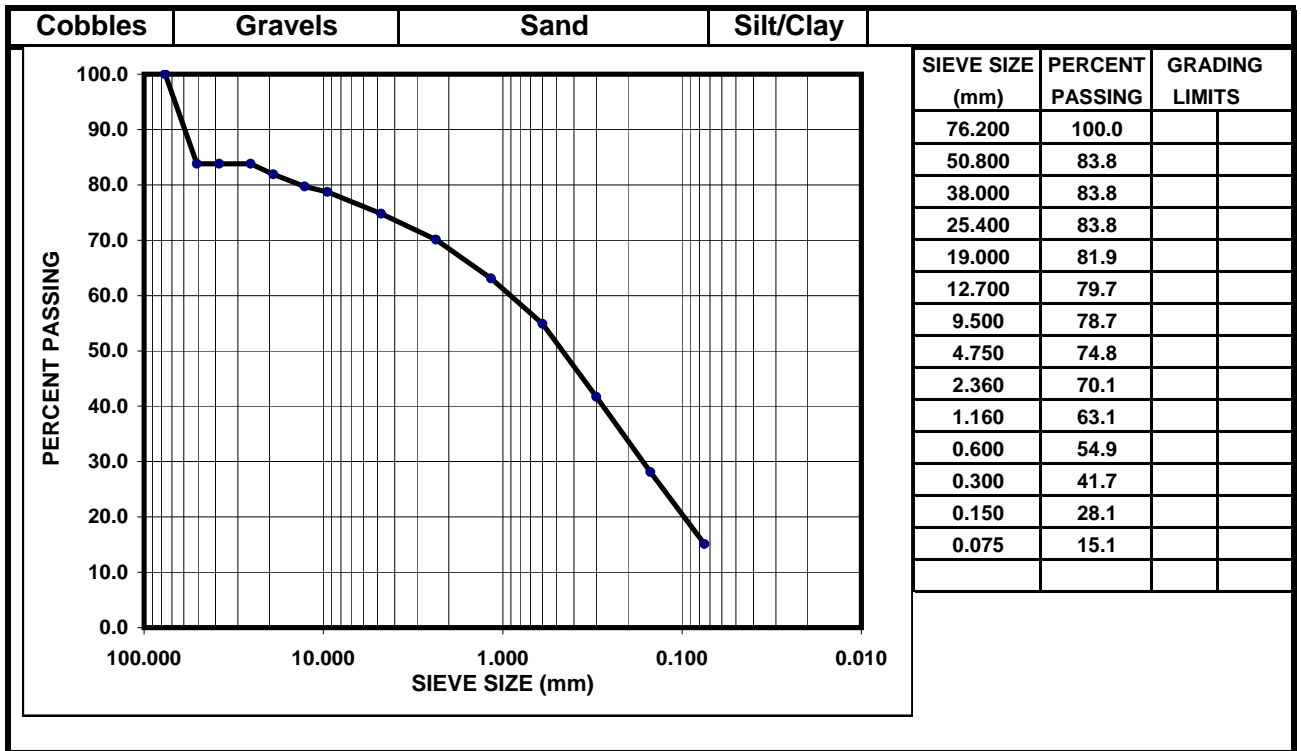
**General Notes**

1. Test pit excavated to 1.4 m with backhoe and probed from 1.4 m to 2.1 m using pionjar drill.
2. Groundwater observed at 0.8 m flowing at an approximate rate of 0.5 L/min.
3. Some sloughing in test pit during excavation.
4. Boulders are composed of granite.
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
6. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 18-TP-050  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 20-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-050      **Sample Depth:** 0.9 m - 1.45 m



**Comments:**    %Cobbles 0.0                      %Gravel 24.6                      %Sand 59.7                      %Silt/Clay 15.1  
 Natural Moisture content of 27.40%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 19-TP-049</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 19 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5806104	E 362183	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, dry, loose.	N/A	N/A	N/A
0.3 – 0.5	SAND with some cobbles, medium brown, dry, compact.	N/A	N/A	N/A
0.5 – 1.7	SILTY SAND with some gravel, trace to some large sub angular boulders, well sorted, dark brown, dry, compact.	DC1051-LOT 1-PI 19-TP-049	0.6 – 1.7	Grab
1.7 – 1.8	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 10 – 15		Estimated Max Diameter (m) 0.8
Start Time: 4:15 pm		End Time: 5:26 pm		

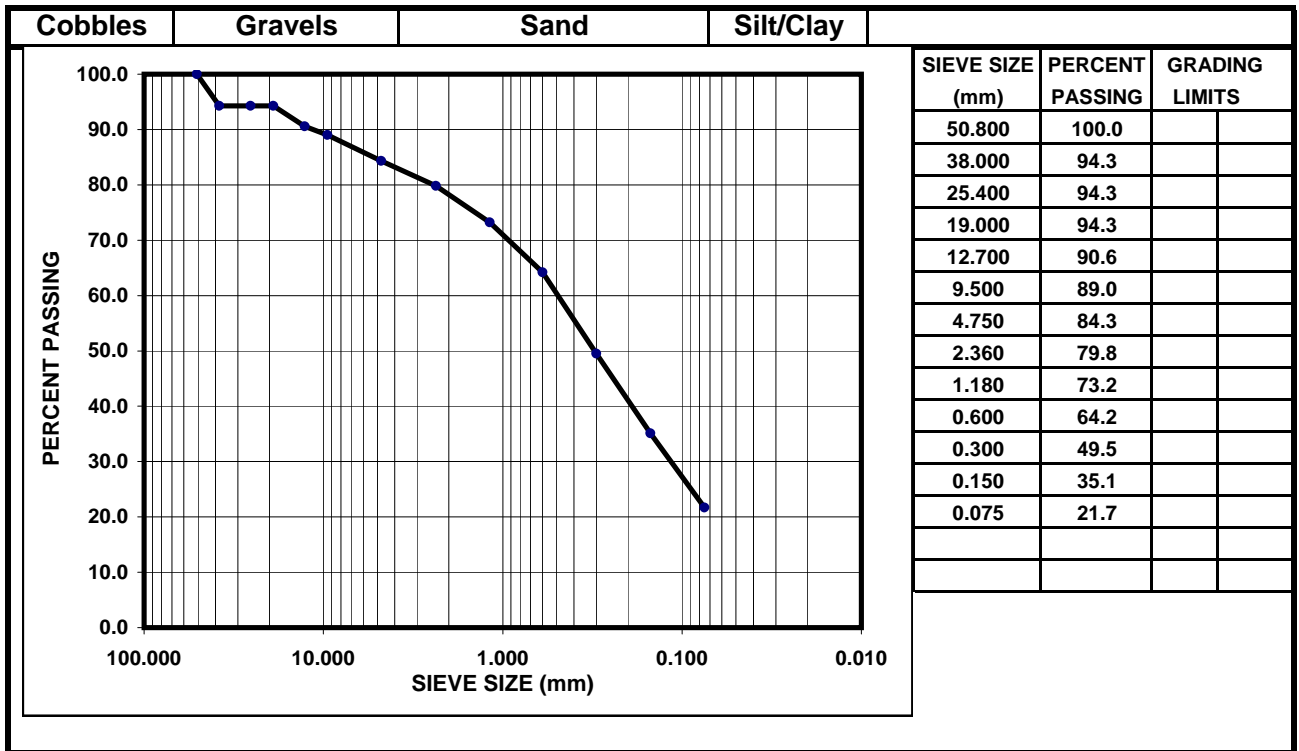
**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 1.8 m using pionjar drill.
2. No groundwater encountered.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 19-TP-049  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty sand, some gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 19-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-049      **Sample Depth:** 0.6 m - 1.7 m



**Comments:**    %Cobbles 0.0                      %Gravel 15.7                      %Sand 62.6                      %Silt/Clay 21.7  
 Natural Moisture content of 21.30%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 20-TP-048</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 19 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5800510	E 371669 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type	
0.0 – 0.5	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A	
0.5 – 1.6	SAND with some fines, trace gravel, trace sub-angular to sub-round boulders and cobbles, poorly graded, saturated, loose, light grey to medium brown.	DC1051-LOT 1-PI 20-TP-048	0.75 – 1.6	Grab	
1.6	Test pit terminated due to limits of backhoe.				
Estimated Cobbles (%)	10	Estimated Boulders (%)	Trace	Estimated Max Diameter (m)	0.20 m
Start Time:	11:45 a.m.	End Time:	12:57 p.m.		

**General Notes**

1. Test pit terminated at 1.6 m due to limits of Kabota.
2. Groundwater observed at 0.10 m flowing at an approximate rate of > 5 L/min.
3. Sloughing of test pit walls.
4. Unable to probe to determine depth of bedrock due to the extensive water in test pit.
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
6. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 21-TP-047</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 19 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5799403	E 381589	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, moist, loose.	N/A	N/A	N/A
0.2 – 0.8	COBBLY SAND with some silt, some angular to sub-angular boulders, moist, compact to dense, medium grey to dark brown.	N/A	N/A	N/A
0.8 – 1.9	SAND and COBBLES with some boulders, some silt, trace gravel, well graded, light brown to red-brown wet, loose, light brown to red-brown.	DC1051-LOT 1-PI 21-TP-047	0.5 – 1.64	Grab
1.9 – 2.0	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 30		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.6 m
Start Time: 10:25 a.m.		End Time: 11:10 a.m.		

**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.0 m using pionjar drill.
2. Groundwater encountered at 0.8 m.
3. Some sloughing of test pit walls.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 22-TP-046</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 19 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5795935	E 393151 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.2 – 0.9	SAND AND GRAVEL, with some cobbles, some fines, some sub angular to sub round boulders, well graded, dark brown to black, wet, dense.	DC1051-LOT 1-PI 22-TP-046	0 – 0.9	Grab
0.9	Test pit terminated at 0.9 m on BEDROCK.			
Estimated Cobbles (%) 40	Estimated Boulders (%) 10 – 20	Estimated Max Diameter (m) 0.4		
Start Time: 9:32 a.m.	End Time: 10:00 a.m.			

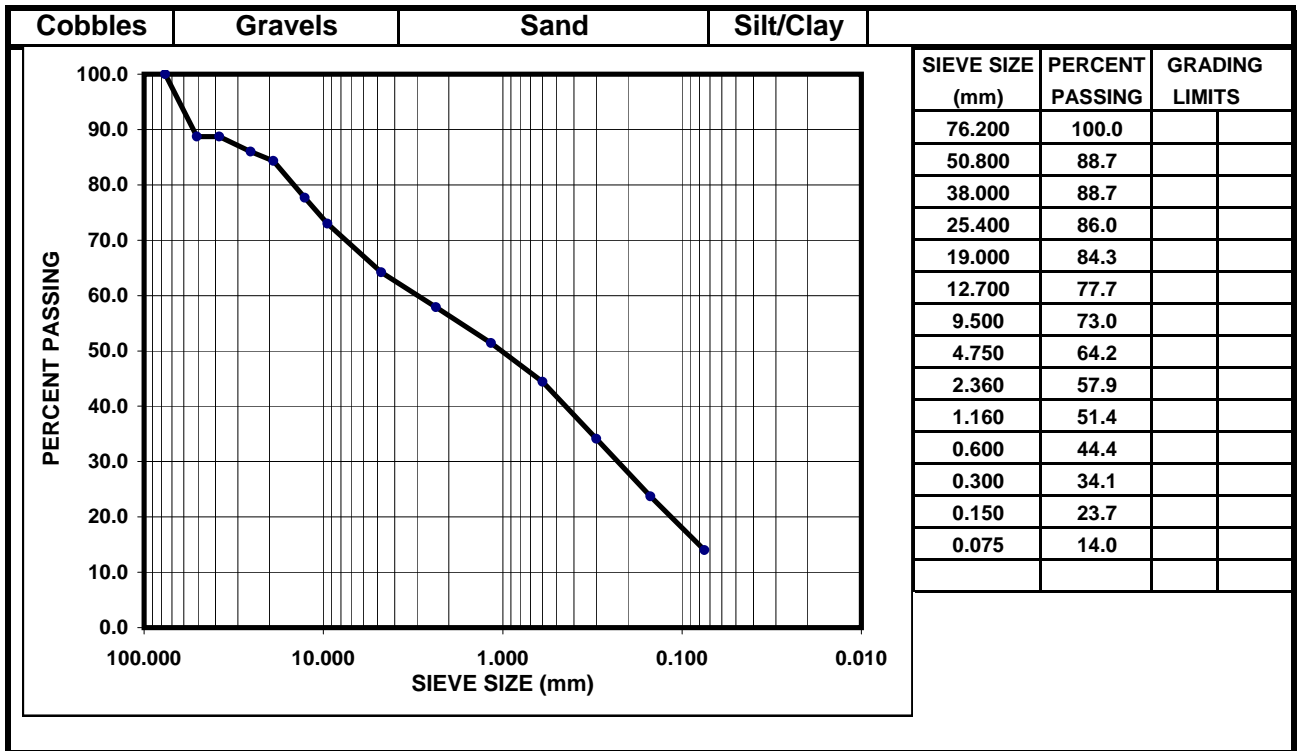
**General Notes**

1. Test Pit terminated at 0.9 m on Bedrock.
2. Groundwater encountered at 0.9 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 22-TP-046  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand and gravel, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 19-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-046      **Sample Depth:** 0.0 m - 0.9 m



**Comments:**    %Cobbles 0.0                      %Gravel 35.4                      %Sand 50.6                      %Silt/Clay 14.0  
 Natural Moisture content of 11.90%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 23-TP-045</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 17, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5790780	E 396776	Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.9	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.9 – 1.6	SAND with trace gravel and cobbles, trace boulders, trace fines, medium grained, well graded, dark brown, wet, loose to compact.	DC1051-LOT 1-PI 23-TP-045	1.5	Grab
1.6	Refusal on BOULDERS.			
Estimated Cobbles (%) 10 – 20	Estimated Boulders (%) 10	Estimated Max Diameter (m) 0.3		
Start Time: 4:10 p.m.	End Time: 4:45 p.m.			

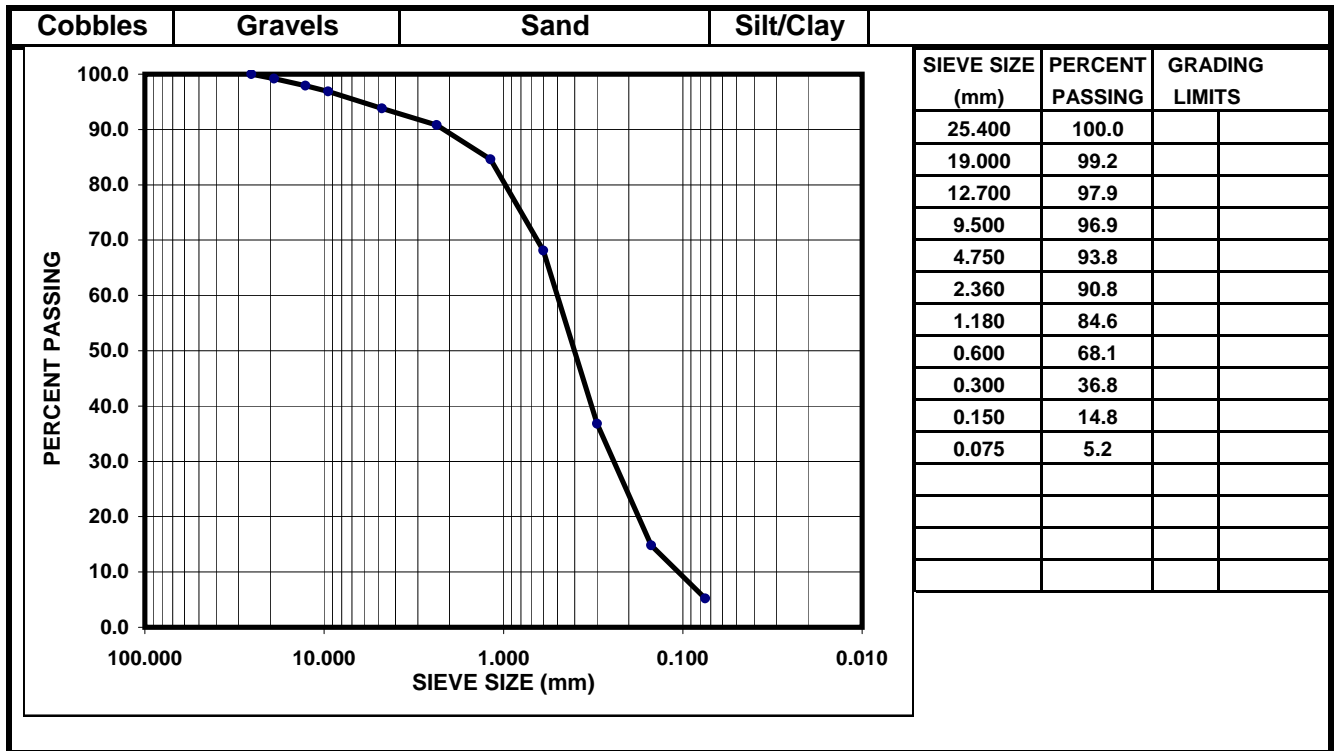
**General Notes**

1. Test Pit terminated at 1.6 m due to refusal on boulders.
2. Groundwater encountered at 0.3 m.
3. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 23-TP-045  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, trace gravel, trace silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 17-Sep-08  
**Sampled By:** Aisha Hyde of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-045      **Sample Depth:** 0.0 m - 1.5 m



**Comments:**    %Cobbles 0.0            %Gravel 6.2            %Sand 88.6            %Silt/Clay 5.2  
 Natural Moisture content of 30.26%.

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**MOISTURE DENSITY RELATIONSHIP**

AMEC Lab No: 5300

Client: Hydro Newfoundland Project #: TF8310458  
 Project: Transmission Line Lab No: \_\_\_\_\_  
 Sample Type / Source: DC1051-LOT 1-PI 23-TP-045

Date Sampled: September 1, 2008 Sampled By AMEC

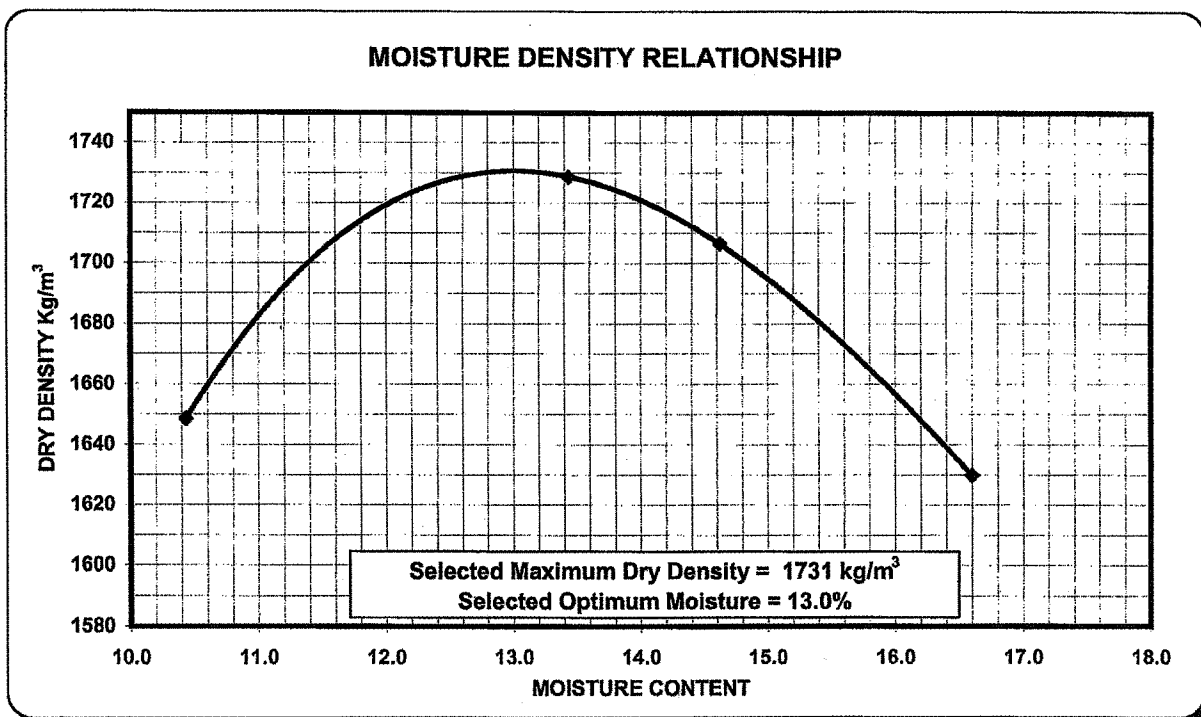
Date Sampled: \_\_\_\_\_ Sampled By \_\_\_\_\_

Date Received: Sept 8 2008 Preparation  Moist  Dry

Percent Retained:	5mm	20%	Percent Retained:	20mm
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Compaction Std.	ASTM D698	ASTM D1557	Method	A
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Moisture Content	10.4	13.4	14.6	16.6
Dry Density kg/m <sup>3</sup>	1649	1729	1706	1630



Note : Oversized Material Correction = 20.2%

Corrected Maximum Dry Density 1866 kg/m<sup>3</sup>  
 Corrected Maximum Moisture 10.6 %

Tested by, J.Ingram

Reviewed by,





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 24-TP-043</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5786245	E 404339 Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.2 – 2.0	SAND with some gravel and cobbles, some fines, trace boulders, medium to coarse grained, well graded, brown, moist, compact.	DC1051-LOT 1-PI 24-TP-043	2.0	Grab
2.0 – 2.1	Refusal on probable bedrock or large boulder			
Estimated Cobbles (%) 10 - 20	Estimated Boulders (%) 1 - 10	Estimated Max Diameter (m) 0.4		
Start Time: 12:45 p.m.	End Time: 2:00 p.m.			

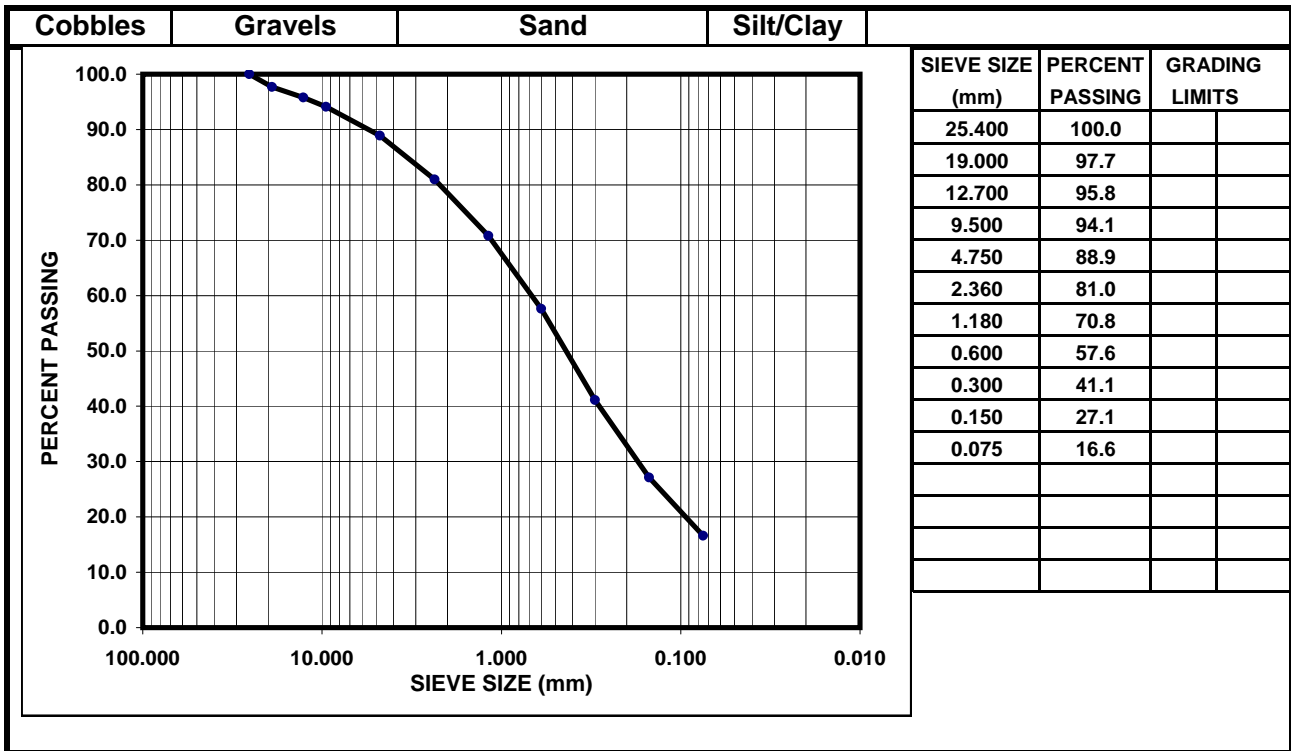
**General Notes**

1. Test Pit excavated to 1.7 m in with backhoe and probed from 1.7 m to 2.1 m with pionjar drill.
2. Groundwater encountered at 0.9 m.
3. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 24-TP-043  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, Some Silt/Clay, Trace to Some Gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 17-Sep-08  
**Sampled By:** Aisha Hyde of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-043      **Sample Depth:** 2.0 m



**Comments:**    %Cobbles 0.0                      %Gravel 11.1                      %Sand 72.3                      %Silt/Clay 16.6  
 Natural Moisture content of 11.20%.

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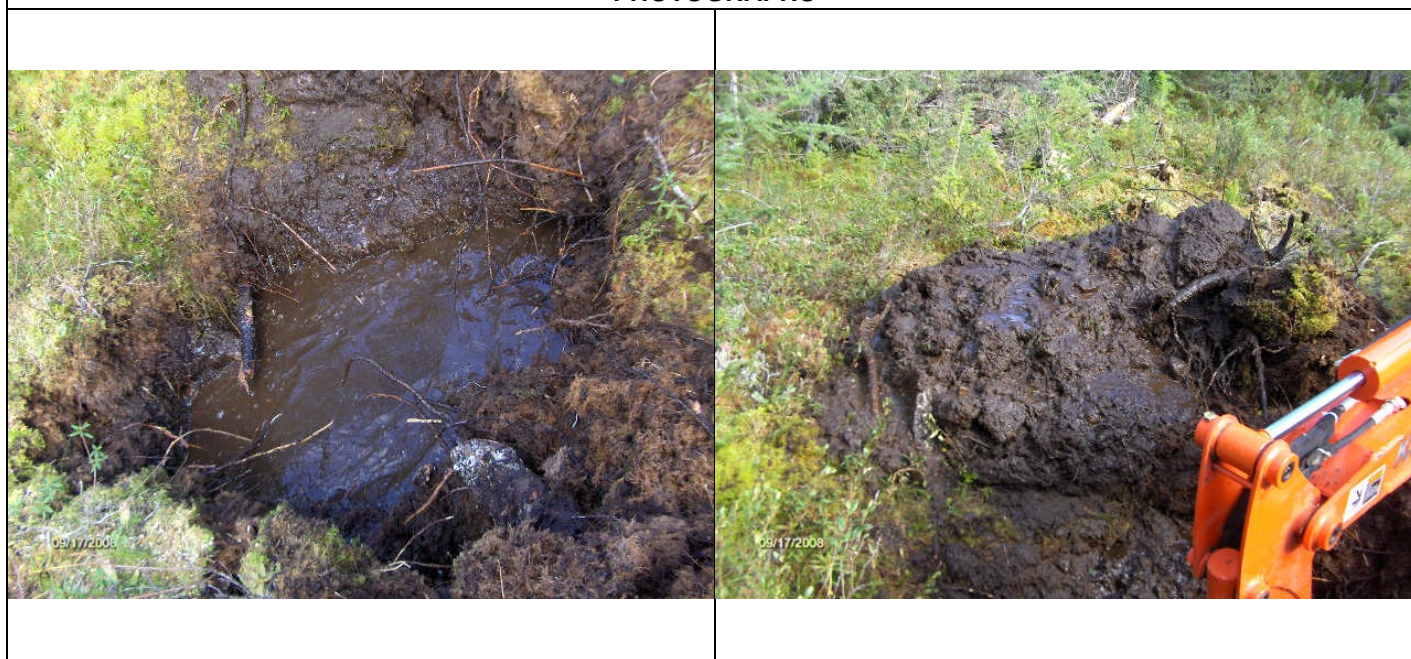


**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 1-REP-PI 24 to PI 25-TP-044**

Client:	Nalcor Energy - Lower Churchill Project			Date:	September 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5788732	E 410499	Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.5 – 1.1	SAND AND GRAVEL with some cobbles and small boulders, trace fines, medium grained, poorly graded, brown, wet, loose to compact.	DC1051-LOT 1-REP-PI 24 to PI 25-TP-044	1.0	Grab
1.1	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 – 20	Estimated Boulders (%) 10 – 20	Estimated Max Diameter (m)		
Start Time: 2:45 p.m.	End Time: 3:10 p.m.			

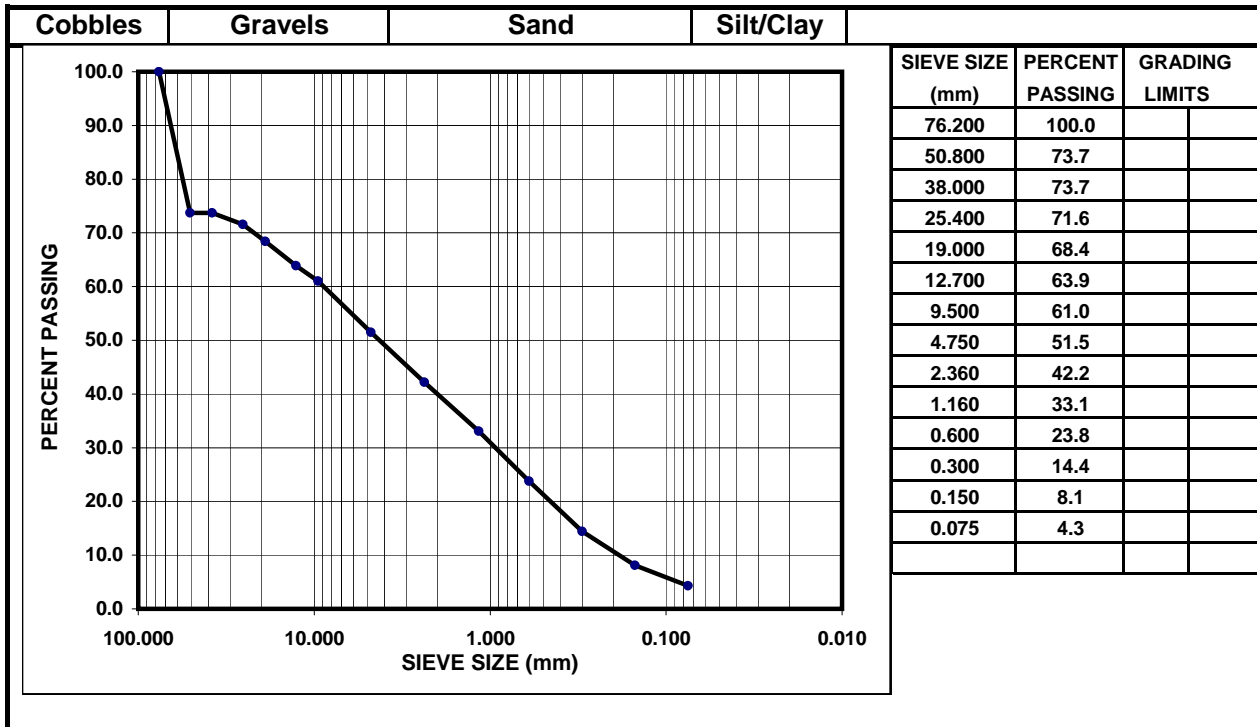
**General Notes**

1. Representative test between PI 24 and PI 25
2. Test Pit terminated at 1.1 m in due to refusal on probable bedrock or large boulder.
3. Groundwater encountered at 0.5 m.
4. Base of pit not probed due to extensive water; located at the edge of a bog.
5. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS – UTM; Zone 21; NAD 83.
6. Representative test between PI 24 and PI 25.
7. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 1-REP-PI 24 to PI 25-TP-044
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sand and gravel, trace silt/clay
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 17-Sep-08
<b>Sampled By:</b> Aisha Hyde of AMEC	<b>Date Tested:</b> 2-Nov-08
<b>Location:</b> TP-044	<b>Sample Depth:</b> 1.0 m



**Comments:**    %Cobbles 1.0            %Gravel 47.5            %Sand 47.2            %Silt/Clay 4.3  
 Natural Moisture content of 60.20%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 1-PI 25-TP-042**

Client:	Nalcor Energy - Lower Churchill Project			Date:	September 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5790783	E 415661	Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.5 – 1.5	GRAVELLY SILTY SAND ,with cobbles, some fines, trace boulders, medium grained, well graded, brown, saturated, loose to compact.	DC1051-LOT 1-PI 25-TP-042	1.5	Grab
1.5	Refusal on BOULDERS.			
Estimated Cobbles (%) 10 - 20	Estimated Boulders (%) 1 - 10	Estimated Max Diameter (m) 0.4		
Start Time: 4:30 p.m.	End Time: 5:00 p.m.			

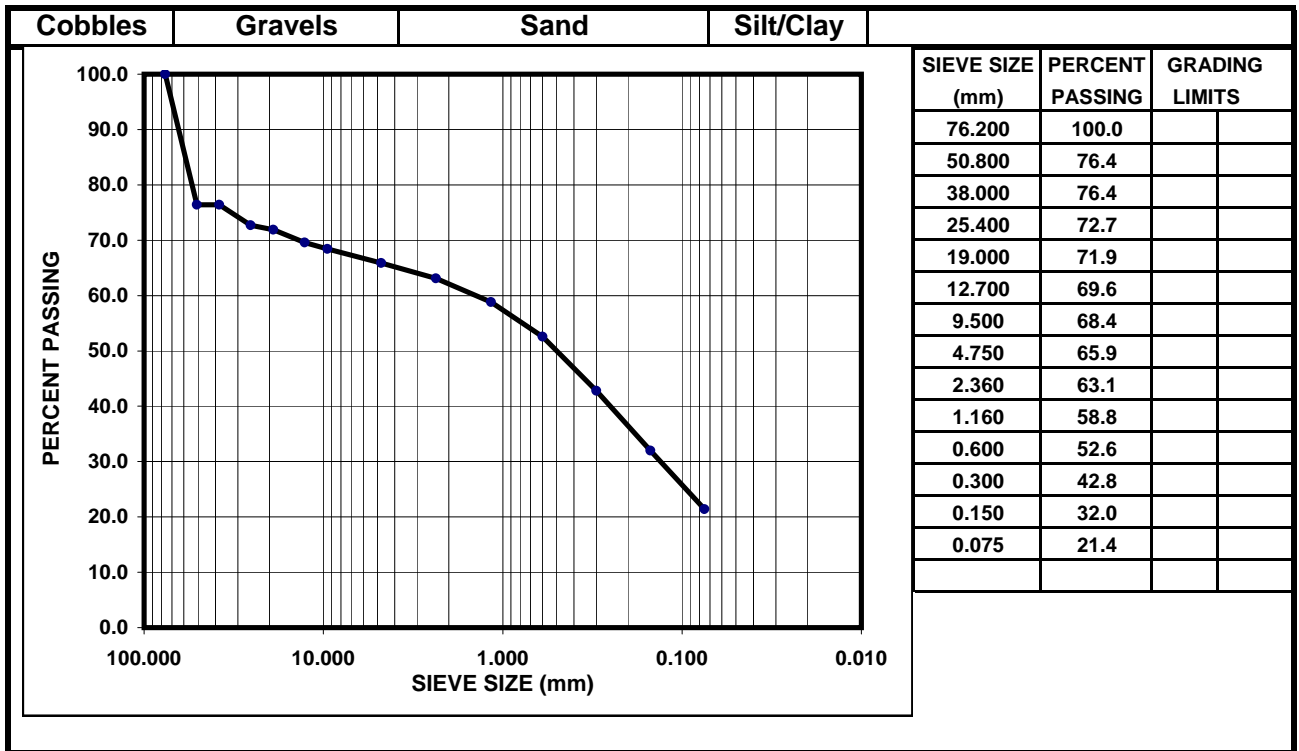
**General Notes**

1. Test Pit terminated at 1.5 m on boulders.
2. Groundwater encountered at 0.5 m.
3. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 25-TP-042  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly, silty sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 16-Sep-08  
**Sampled By:** Aisha Hyde of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-042      **Sample Depth:** 1.5 m



**Comments:**    %Cobbles 0.0                      %Gravel 33.2                      %Sand 44.5                      %Silt/Clay 22.3  
 Natural Moisture content of 12.10%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 26-TP-041</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 16, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5787669	E 425001	Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	TOPSOIL/ROOTMAT – organics, rootlets, dark brown to black, moist, loose.	N/A	N/A	N/A
0.3 – 3.1	GRAVELLY SAND with some fines, trace boulders, well graded, moist to saturated, loose to compact, brown.	DC1051-LOT 1-PI 26-TP-041	1.5	Grab
3.1 – 3.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%)		Estimated Boulders (%) 1 - 10	Estimated Max Diameter (m) 0.4	
Start Time: 2:45 p.m.		End Time: 3:30 p.m.		

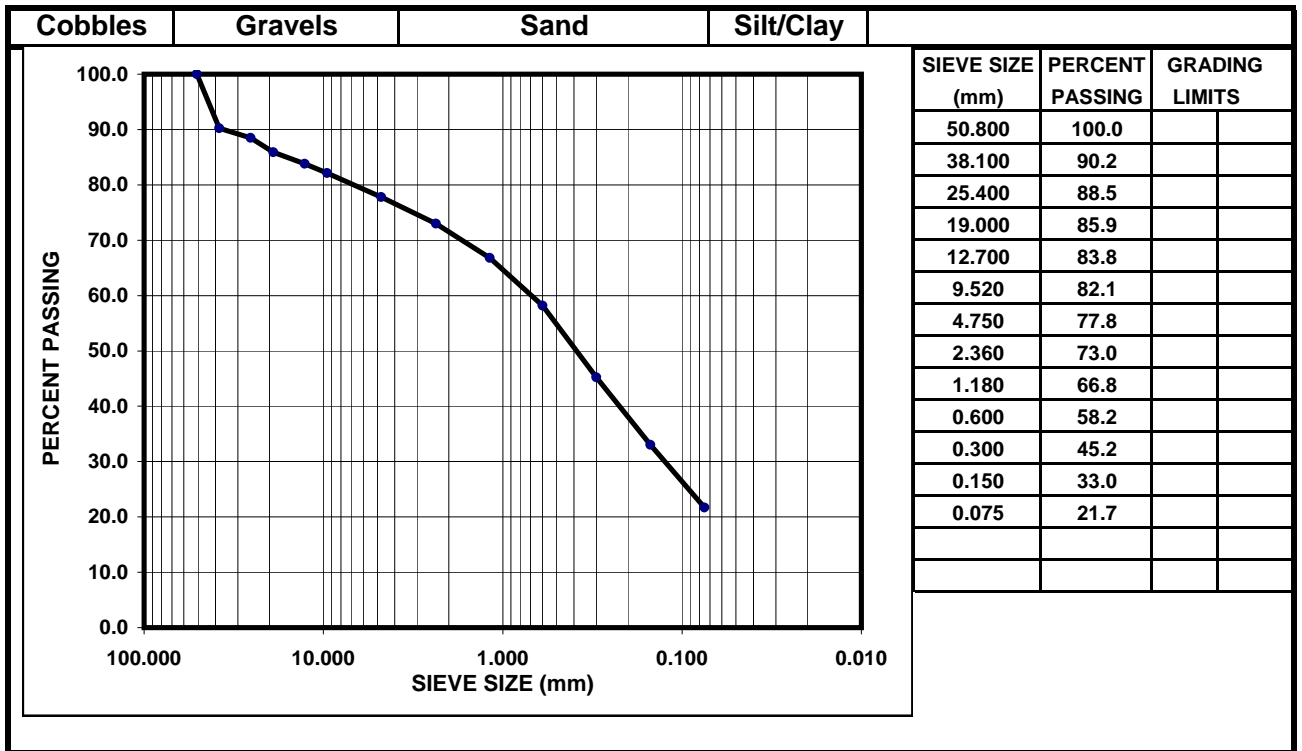
**General Notes**

1. Test Pit excavated to 2.0 m with backhoe and probed from 2.0 m to 3.3 m using pionjar drill.
2. Groundwater observed at 1.4 m flowing at an approximate rate of 0.3 L/min.
3. Some sloughing of test pit walls.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458 **Sample No.:** DC1051-LOT 1-PI 26-TP-041  
**Project:** Geotechnical Investigation: **Sample Type:** Gravelly, silty sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro **Date Sampled:** 16-Sep-08  
**Sampled By:** Aisha Hyde of AMEC **Date Tested:** 2-Nov-08  
**Location:** TP-041 **Sample Depth:** 1.5 m



**Comments:**    %Cobbles 0.0                    %Gravel 22.2                    %Sand 56.1                    %Silt/Clay 21.7  
 Natural Moisture content of 7.90%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 27-TP-040</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 12 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5788967	E 435530	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material with, dark brown to black, moist, loose.	N/A	N/A	N/A
0.2 – 0.5	SAND with trace gravel, moist, compact, medium to dark brown.	N/A	N/A	N/A
0.5 – 1.2	SAND, some fines, some sub-angular to sub-rounded cobbles , trace to some boulders, trace gravel, well graded, light brown to medium brown, moist, loose.	DC1051-LOT 1-PI 27-TP-040	0.5 – 1.2	Grab
1.2	Test pit terminated at 1.24 m on BEDROCK.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 10 - 15		Estimated Max Diameter (m) 0.20 m
Start Time: 4:00 p.m.		End Time: 5:00 p.m.		

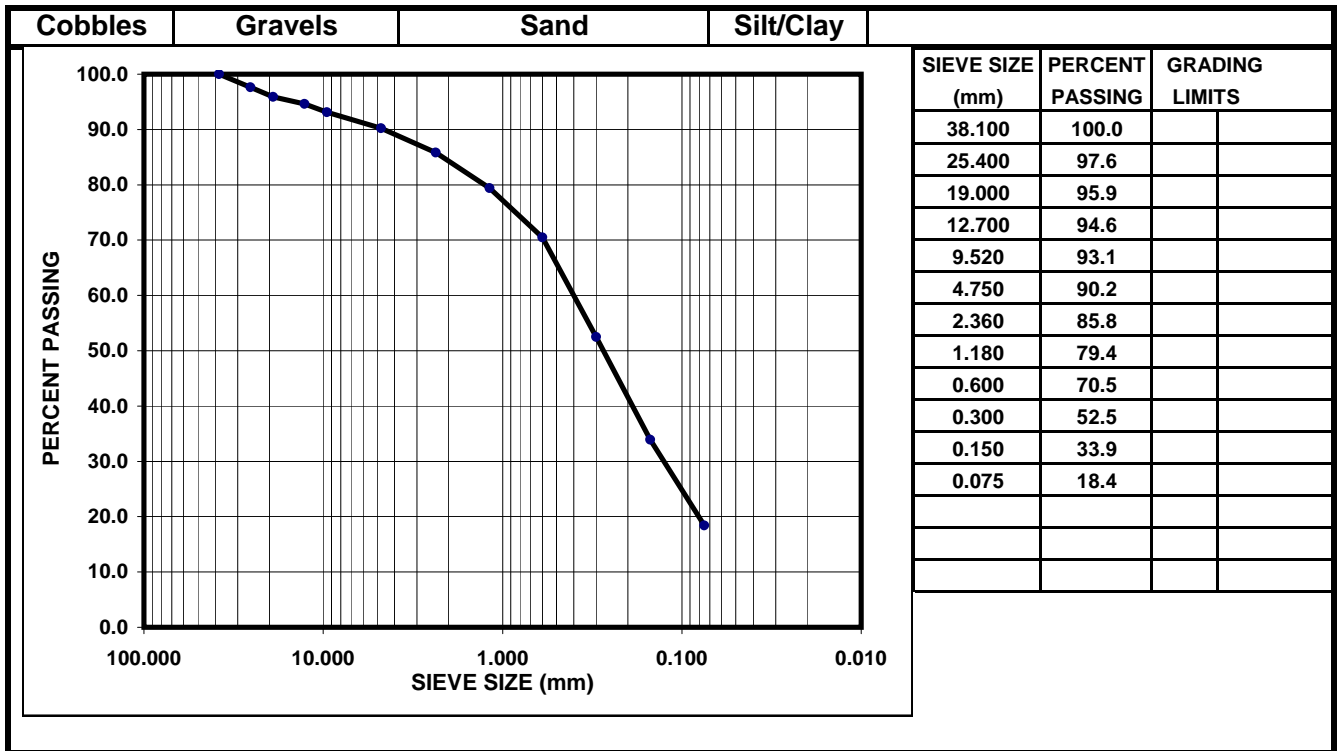
**General Notes**

1. Test Pit terminated at 1.2 m on Bedrock.
2. No groundwater encountered.
3. Some sloughing of test pit walls.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 27-TP-040  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, some silt/clay, trace gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 12-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-040      **Sample Depth:** 0.5 m to 1.2 m



**Comments:**      %Cobbles 0.0      %Gravel 9.8      %Sand 71.8      %Silt/Clay 18.4  
 Natural Moisture content of 13.80%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 28-TP-039</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5784725	E 443763
				Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.2 – 0.5	SAND AND GRAVEL, moist, very loose, sand has manganese dioxide staining throughout the layer giving it a purplish tint, black to a dark purple.	N/A	N/A	N/A
0.5 – 1.0	GRAVELLY SAND with some sub-angular cobbles and boulders, trac fines, well graded, medium brown, wet, loose.	DC1051-LOT 1-PI 28-TP-039	0.35 – 1.0	Grab
1.0	Test pit terminated at 1.0 m on BEDROCK.			
Estimated Cobbles (%) 25		Estimated Boulders (%) 30		Estimated Max Diameter (m) 0.40 m
Start Time: 2:10 p.m.		End Time: 3:06 p.m.		

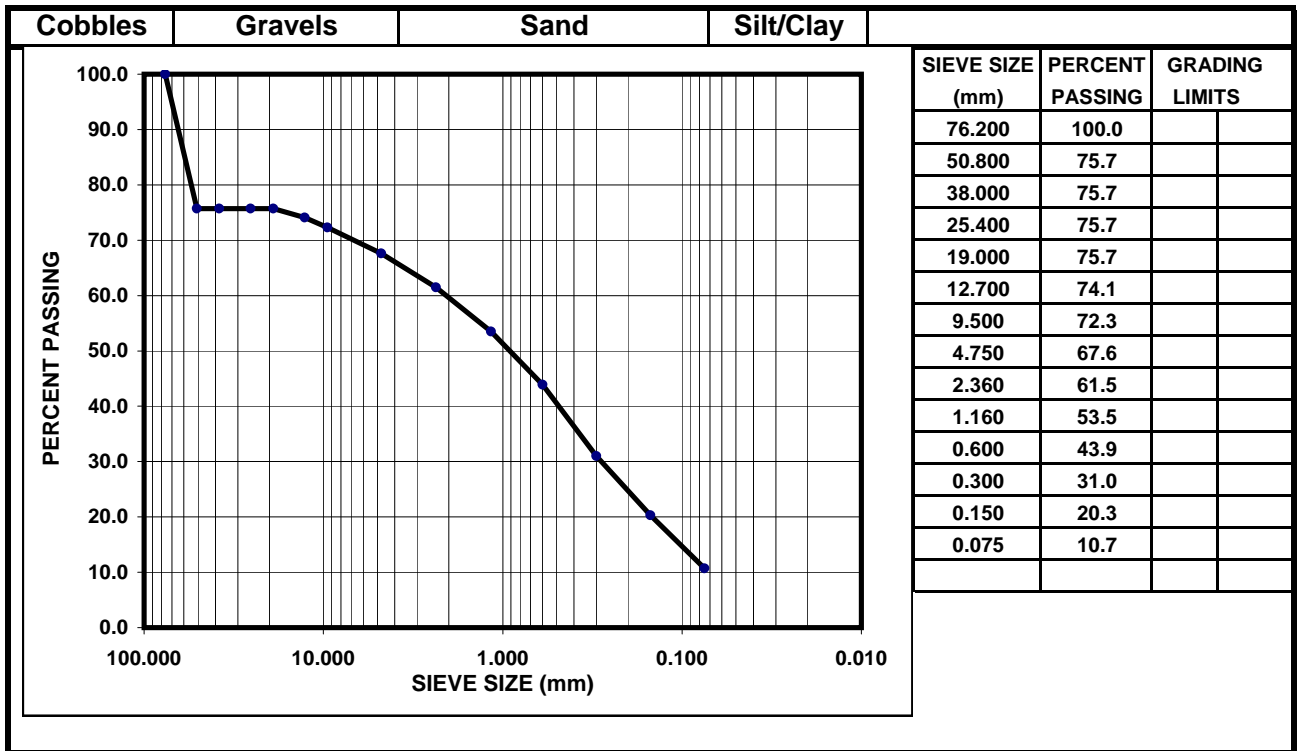
**General Notes**

1. Test Pit terminated at 1.0 m on Bedrock.
2. Groundwater encountered at 0.76 m.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 28-TP-039  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, some silt/clay, trace cobbles  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 12-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-039      **Sample Depth:** 0.35 m to 1.0 m



**Comments:**    %Cobbles 1.0                      %Gravel 31.4                      %Sand 56.9                      %Silt/Clay 10.7  
 Natural Moisture content of 18.30%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 1-REP-PI 28 to PI 29-TP-038**

Client:	Nalcor Energy - Lower Churchill Project			Date: September 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5780407	E 448511
				Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material with some moss, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.6	SAND with trace fines, trace sub-angular boulders and cobbles, dark brown to red-brown, moist, compact, weathered.	N/A	N/A	N/A
0.6 – 3.3	SILTY SAND with some sub-angular cobbles and boulders, trace gravel, poorly graded light to medium brown, wet, loose.	DC1051-LOT 1-REP-PI 28 to PI 29-TP-038	0.27 – 1.75	Grab
3.3 – 3.4	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 25		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.45
Start Time: 11:20 a.m.			End Time: 12:15 p.m.	

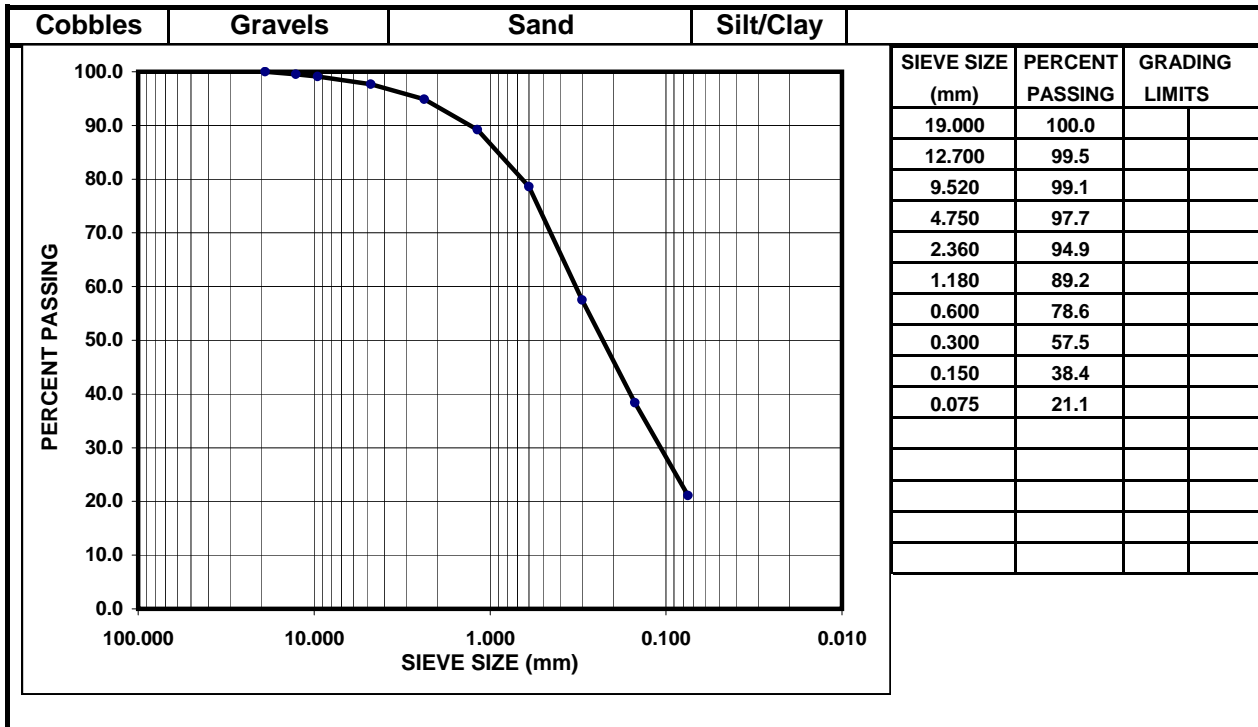
**General Notes**

1. Test Pit excavated to 1.75 m with backhoe and probed from 1.75 m to 3.4 m using pionjar drill.
2. Groundwater encountered at 0.8 m.
3. The Silty Sand layer readily sloughs into the test pit.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Representative test between PI 28 and PI 29.
6. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 1-REP-PI 28 to PI 29-TP-038
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Silty sand, trace gravel
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 12-Sep-08
<b>Sampled By:</b> Brian Walsh of AMEC	<b>Date Tested:</b> 2-Nov-08
<b>Location:</b> TP-038	<b>Sample Depth:</b> 0.27 m to 1.75 m



**Comments:** %Cobbles 0.0      %Gravel 2.3      %Sand 76.6      %Silt/Clay 21.1  
 Natural Moisture content of 17.80%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 29-TP-037</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5775684	E 453670 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, moist, loose.	N/A	N/A	N/A
0.4 – 2.0	SAND with some cobbles, some fines, some gravel, trace angular boulders, well graded, moist, compact, medium brown to black.	DC1051-LOT 1-PI 29-TP-037	0.5 – 1.7	Grab
2.0 – 2.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 25		Estimated Boulders (%) 5 - 10		Estimated Max Diameter (m) 0.5
Start Time: 2:30 p.m.		End Time: 4:00 p.m.		

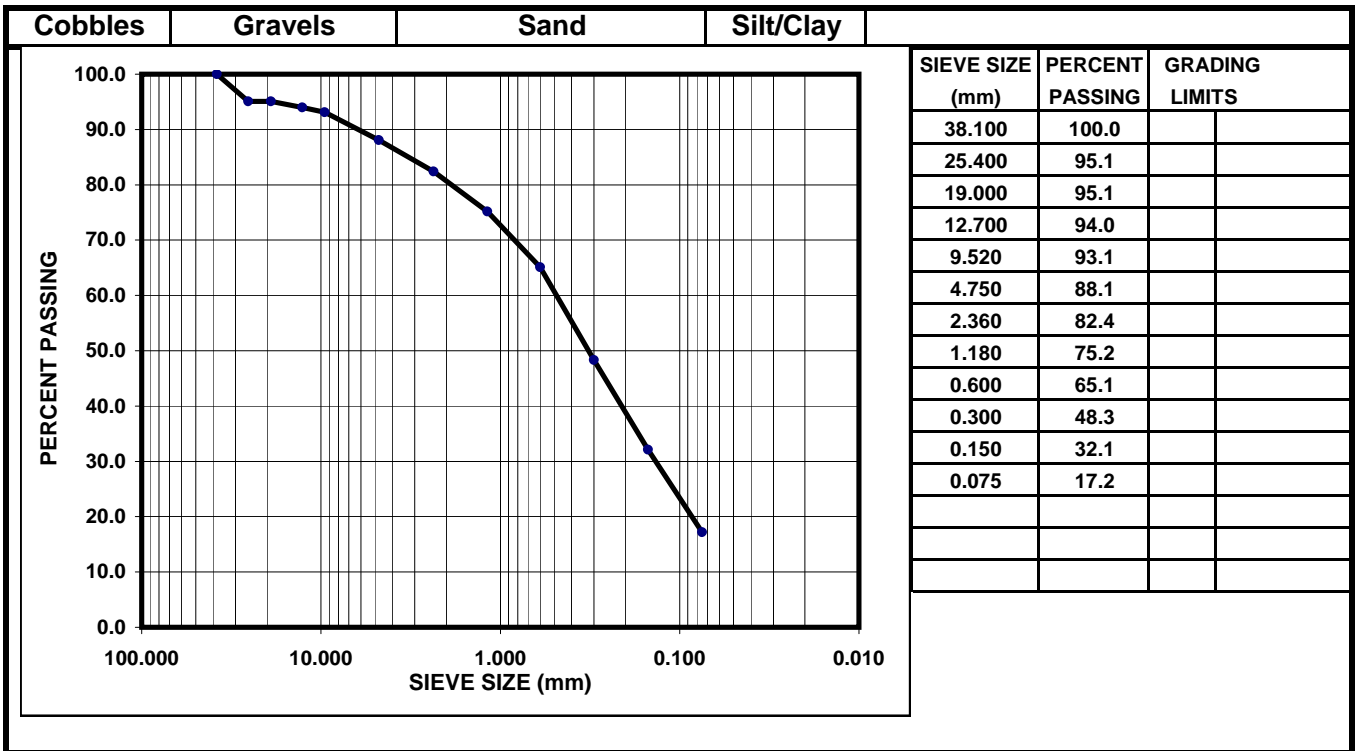
**General Notes**

1. Test Pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.3 m using pionjar drill.
2. Groundwater encountered at 0.75 m flowing at an approximate rate of 0.2 L/min.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-PI 29-TP-037
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sand, some silt/clay, some gravel
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	11-Sep-08
<b>Sampled By:</b>	Brian Walsh of AMEC	<b>Date Tested:</b>	2-Nov-08
<b>Location:</b>	TP-037	<b>Sample Depth:</b>	0.5 m to 1.7 m



**Comments:**    %Cobbles 0.0                    %Gravel 11.9                    %Sand 70.9                    %Silt/Clay 17.2  
 Natural Moisture content of 13.50%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 30-TP-036</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 11 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5766381	E 462476	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, wet, loose.	N/A	N/A	N/A
0.4 – 3.1	SAND with trace fines, trace gravel, trace cobbles and boulders, poorly graded, medium brown to dark grey, wet, loose.	DC1051-LOT 1-PI 30-TP-036	0.45 – 1.5	Grab
3.1 – 3.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 1 - 10		Estimated Boulders (%) 1 - 10		Estimated Max Diameter (m) 0.20
Start Time: 10:45 a.m.		End Time: 12:05 p.m.		

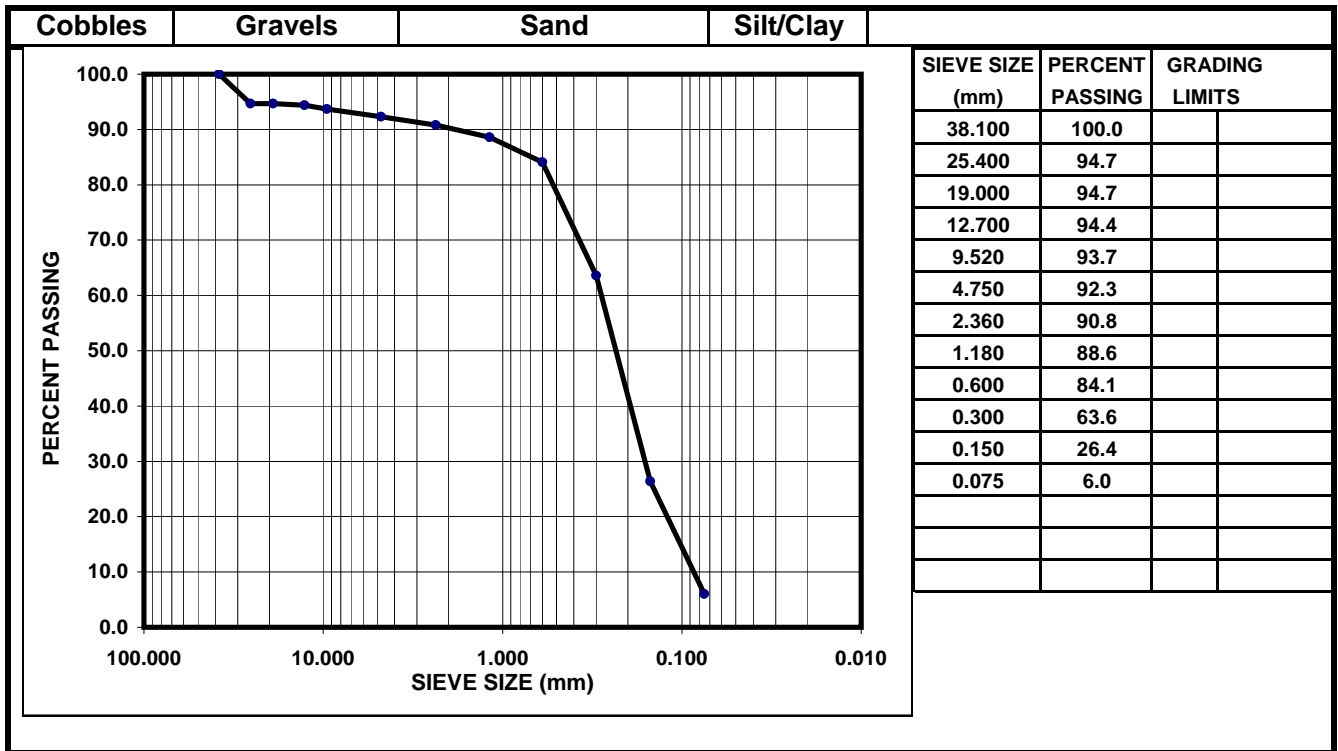
**General Notes**

1. Test Pit excavated to 1.6 m with backhoe and probed from 1.6 m to 3.3 m using pionjar drill.
2. Groundwater encountered at 0.75 m.
3. Severe sloughing in test pit during entire excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 30-TP-036  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, trace silt/clay, trace gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 11-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-036      **Sample Depth:** 0.45 m to 1.5 m



**Comments:**    %Cobbles 0.0                      %Gravel 7.7                      %Sand 86.3                      %Silt/Clay 6.0  
 Natural Moisture content of 34.50%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 31-TP-035</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 10 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5766369	E 469217	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	PEAT – organics, rootlets, wet, medium brown to dark brown, loose to compact.	N/A	N/A	N/A
0.4 – 2.8	GRAVELLY SAND with trace fines, trace cobbles, well graded, moist, loose to compact, medium to dark grey.	DC1051-LOT 1-PI 31-TP-035	0.37 – 2.1	Grab
2.8 – 2.8	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) < 5		Estimated Boulders (%) < 5		Estimated Max Diameter (m) 0.50
Start Time: 4:00 p.m.		End Time: 5:45 p.m.		

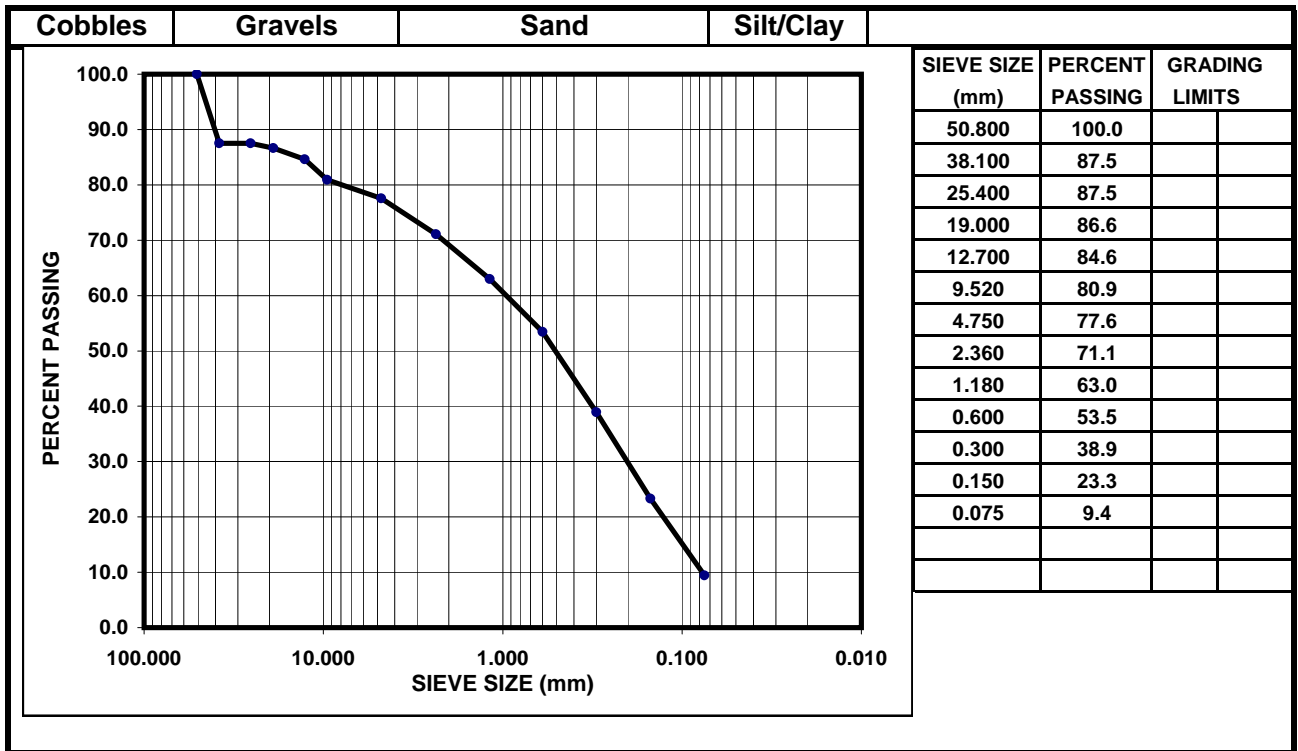
**General Notes**

1. Test Pit excavated to 2.1 m with backhoe and probed from 2.1 m to 2.8 m using pionjar drill.
2. Groundwater encountered at 0.4 m.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 31-TP-035  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, trace silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 10-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-035      **Sample Depth:** 0.37 m to 2.1 m



**Comments:**    %Cobbles 0.0                      %Gravel 22.4                      %Sand 68.1                      %Silt/Clay 9.4  
 Natural Moisture content of 43.33%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 32-TP-034</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 8 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5767345	E 470882	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, dark brown to black, moist, loose.	N/A	N/A	N/A
0.2 – 0.4	SAND with some fines, trace boulders, light grey to beige, dry, loose.	N/A	N/A	N/A
0.4 – 1.5	GRAVELLY SAND with some fines, trace boulders and cobbles, well graded, moist, compact, medium brown to black.	DC1051-LOT 1-PI 32-TP-034	0.24 – 1.52	Grab
1.5	Test Pit terminated at 1.52 m on BEDROCK.			
Estimated Cobbles (%) 10		Estimated Boulders (%) 1 - 10		Estimated Max Diameter (m) 0.6
Start Time: 2:30 p.m.		End Time: 4:30 p.m.		

**General Notes**

1. Test Pit terminated at 1.5 on Bedrock.
2. Test Pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**MOISTURE DENSITY RELATIONSHIP**

AMEC Lab No: TF8310458

Client: Hydro Newfoundland Project #: TF8310458  
 Project: Transmission Line Lab No: \_\_\_\_\_  
 Sample Type / Source: DC1051-LOT 1-PI 32-TP-034

Date Sampled: September 1, 2008 Sampled By AMEC

Date Sampled: \_\_\_\_\_ Sampled By \_\_\_\_\_

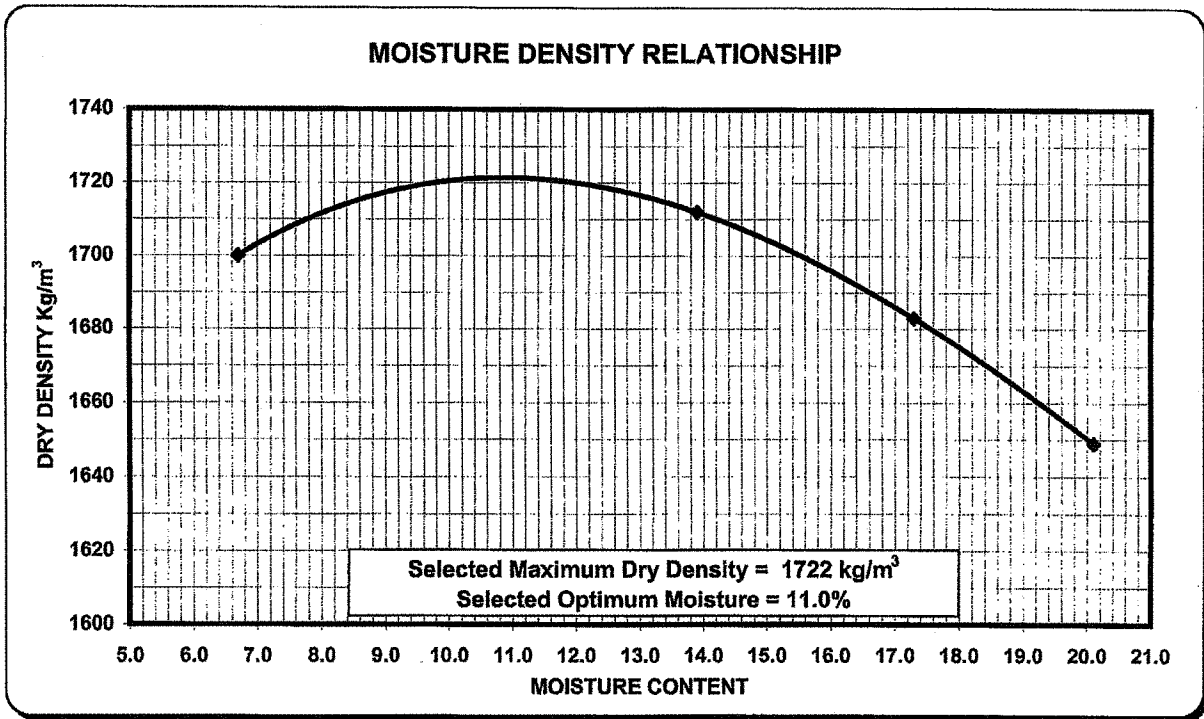
Date Received: Sept 8 2008 Preparation 

<input checked="" type="checkbox"/> Moist	<input type="checkbox"/> Dry
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Percent Retained:	9.5mm	22%	Percent Retained:	20mm	
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Compaction Std.	ASTM D698	ASTM D1557	Method	B
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Moisture Content	6.7	13.9	17.3	20.1
Dry Density kg/m <sup>3</sup>	1700	1712	1683	1649



Note : Oversized Material Correction = 21.5%  
 Corrected Maximum Dry Density 1865 kg/m<sup>3</sup>  
 Corrected Maximum Moisture 9.0 %

Tested by, J.Ingram

Reviewed by,



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 33-TP-033</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 8 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5767811	E 475266	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.15	TOPSOIL/ROOTMAT –rootlets and organic material, dark brown to black, moist, loose.	N/A	N/A	N/A
0.15– 0.6	SAND with some fines, trace cobbles and boulders, trace organic material, poorly graded medium brown to black, moist, compact.	N/A	N/A	N/A
0.6 – 3.0	SAND with some fines, trace gravel, trace sub-angular boulders and cobbles, poorly graded, light brown to dark brown, moist, compact.	DC1051-LOT 1-PI 33-TP-033	0.16 – 1.6	Grab
3.0 – 3.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 1 - 10	Estimated Boulders (%) 1 - 10	Estimated Max Diameter (m) 0.3		
Start Time: 11:30 a.m.	End Time: 1:00 p.m.			

**General Notes**

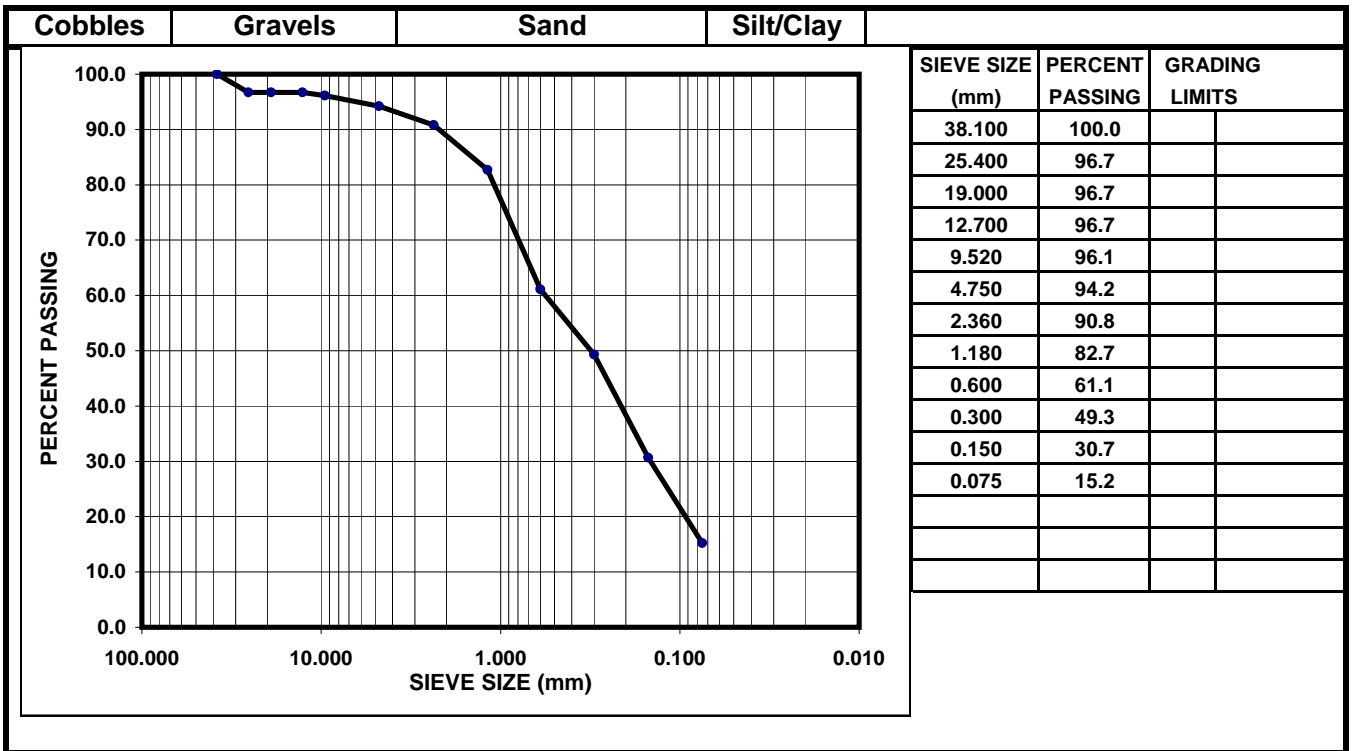
1. Test Pit excavated to 1.6 m with backhoe and probed from 1.6 m to 3.2 m using pionjar drill.
2. Groundwater encountered at 1.45 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 1-PI 33-TP-033
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sand, some silt/clay, trace gravel
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 8-Sep-08
<b>Sampled By:</b> Brian Walsh of AMEC	<b>Date Tested:</b> 2-Nov-08
<b>Location:</b> TP-033	<b>Sample Depth:</b> 0.16 m to 1.6 m



**Comments:**    %Cobbles 0.0                  %Gravel 5.8                  %Sand 79.0                  %Silt/Clay 15.2  
                          Natural Moisture content of 28.40%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 34-TP-032</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 8 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5768573	E 480677 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	TOPSOIL/ROOTMAT –rootlets and organic material, dark brown to black, moist, loose.	N/A	N/A	N/A
0.4– 0.6	SILTY SAND – dry, loose to compact, orange to red.	N/A	N/A	N/A
0.6 – 2.1	SILTY SAND with trace gravel, trace boulders and cobbles, sub angular to sub round, moist, loose to compact, medium to dark brown.	DC1051-LOT 1-PI 34-TP-032	0.6 – 2.1	Grab
2.1 – 2.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 1 - 10		Estimated Boulders (%) < 5		Estimated Max Diameter (m) 0.4
Start Time: 9:30 p.m.		End Time: 11:00 a.m.		

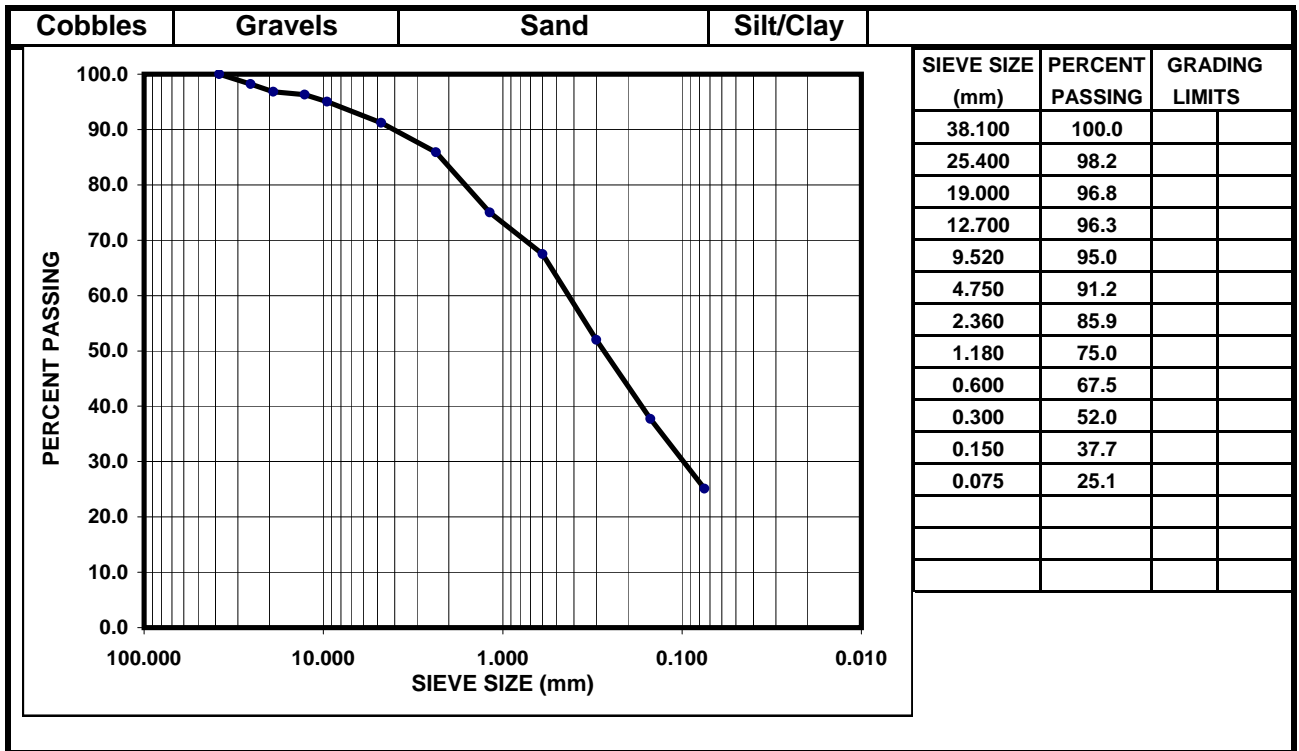
**General Notes**

1. Test Pit excavated to 2.1 m with backhoe and probed from 2.1 m to 2.3 m using pionjar drill.
2. Test Pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 34-TP-032  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty sand, trace gravel  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 8-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-032      **Sample Depth:** 0.6 m to 2.1 m



**Comments:**    %Cobbles 0.0                      %Gravel 8.8                      %Sand 66.1                      %Silt/Clay 25.1  
 Natural Moisture content of 12.40%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 36-TP-029</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 7 <sup>th</sup> , 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5760904	E 498866	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – dark brown to black, some organics and rootlets, loose, wet.	N/A	N/A	N/A
0.3 – 1.3	SAND with some gravel, trace fines, trace sub angular boulders and cobbles, poorly graded, wet, loose, medium grey to black.	DC1051-LOT 1-PI 36-TP-029	0.3 – 1.3	Grab
1.3	Test pit terminated at 1.3 m on BEDROCK.			
Estimated Cobbles (%) Trace	Estimated Boulders (%) None	Estimated Max Diameter (m) 0.10		
Start Time: 08:45 a.m.	End Time: 09:50 a.m.			

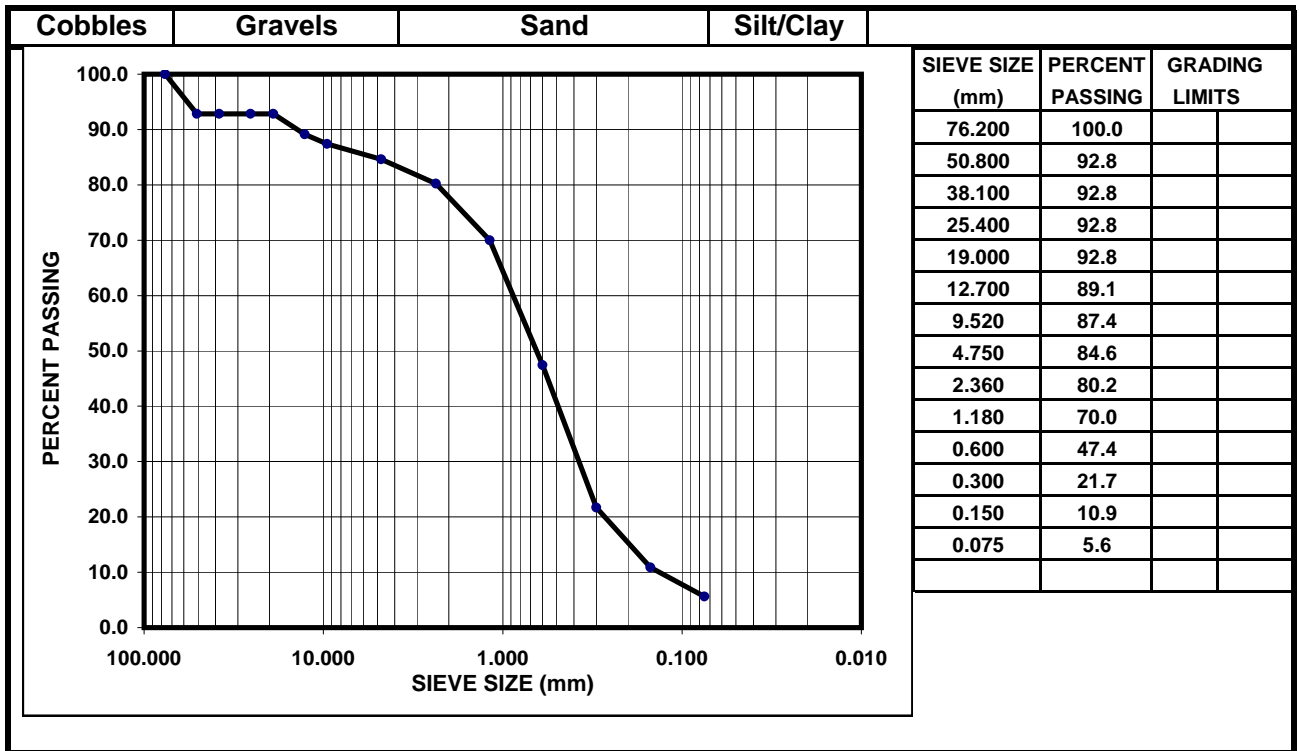
**General Notes**

1. Test Pit terminated at 1.3 m on Bedrock.
2. Groundwater encountered at 1.0 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 36-TP-029  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand, some gravel, trace silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 7-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-029      **Sample Depth:** 0.3 m to 1.3 m



**Comments:**    %Cobbles 0.3                      %Gravel 15.1                      %Sand 79.0                      %Silt/Clay 5.6  
 Natural Moisture content of 19.65%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 1-PI 37-TP-031**

Client:	Nalcor Energy - Lower Churchill Project			Date: September 8 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5755590	E 500830
				Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – dark brown to black, some organics and rootlets, moist, loose.	N/A	N/A	N/A
0.3 – 1.1	SAND with trace gravel, trace fines, trace large boulders and cobbles, poorly graded wet, loose, dark brown to black.	DC1051-LOT 1-PI 37-TP-031	0.3 – 1.05	Grab
1.1 – 1.3	Refusal on probable bedrock or large boulder.			

Estimated Cobbles (%) 1 - 10	Estimated Boulders (%) 1 - 10	Estimated Max Diameter (m) 0.50
Start Time: 3:30 p.m.	End Time: 4:45 p.m.	

**General Notes**

1. Test Pit excavated to 1.1 m with backhoe and probed from 1.1 m to 1.3 m using pionjar drill.
2. Groundwater encountered at 0.5 m.
3. Some Sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 38-TP-030</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 7 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5744090	E 506955 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	PEAT – dark brown to black, some organics and rootlets, wet, compact.	N/A	N/A	N/A
0.4 – 1.3	GRAVELLY SAND with trace fines, trace sub-angular to sub-rounded cobbles, well graded, wet, loose, dark grey to black.	DC1051-LOT 1-PI 38-TP-030	0 - 1.3	Grab
1.3	Test pit terminated at 1.3 m on BEDROCK.			
Estimated Cobbles (%) 1 - 10		Estimated Boulders (%) None		Estimated Max Diameter (m)
Start Time: 1:15 p.m.		End Time: 2:25 p.m.		

**General Notes**

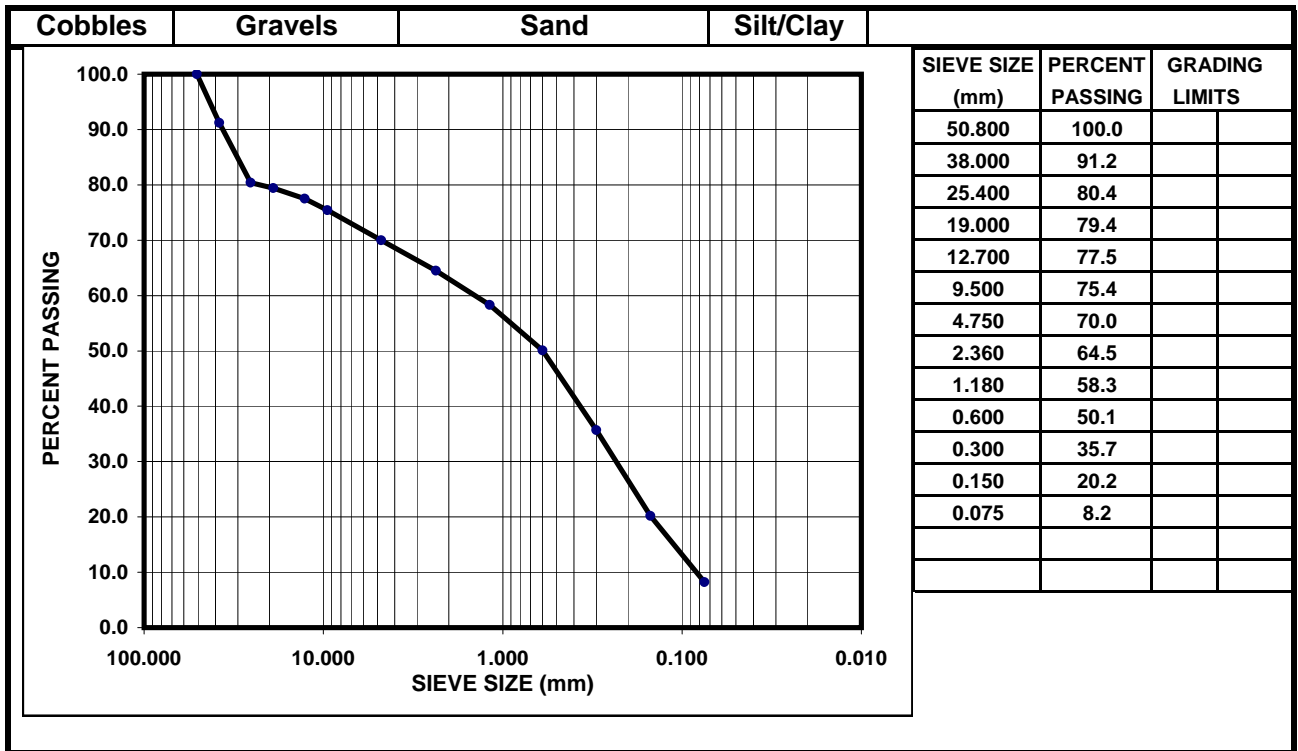
1. Test pit terminated at 1.3 on Bedrock.
2. Groundwater encountered at 0.4 m.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 38-TP-030  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, trace silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 7-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-030      **Sample Depth:** 0.0 m to 1.3 m



**Comments:**    %Cobbles 0.0                      %Gravel 30.0                      %Sand 61.8                      %Silt/Clay 8.2  
 Natural Moisture content of 26.43%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

AMEC Earth & Environmental  
 133 Crosbie Road  
 P.O. Box 13216, St John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-7023  
 Fax. (709) 722-7353

Construction Materials Laboratory  
 36 Pippy Place  
 P.O. Box 13216, St. John's NL  
 Canada, A1B 4A5  
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 Fax. (709) 722-5025



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 1-PI 45-TP-028</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 6 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5705045	E 508419 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SAND and GRAVEL with some fines, some angular cobbles, trace organics, moist, loose, light brown to grey.	<b>DC1051-LOT 1-PI 45-TP-028</b>	0.2 – 0.5	Grab
0.5 – 1.3	FRACTURED BEDROCK – Shale, highly fractured, platy, dry, dense to compact light brown to red-black.	N/A	N/A	N/A
1.3	Test pit terminated at 1.3 m on BEDROCK.			

Estimated Cobbles (%) 35	Estimated Boulders (%) 5	Estimated Max Diameter (m) 0.3
Start Time: 11:30 a.m.	End Time: 12:35 p.m.	

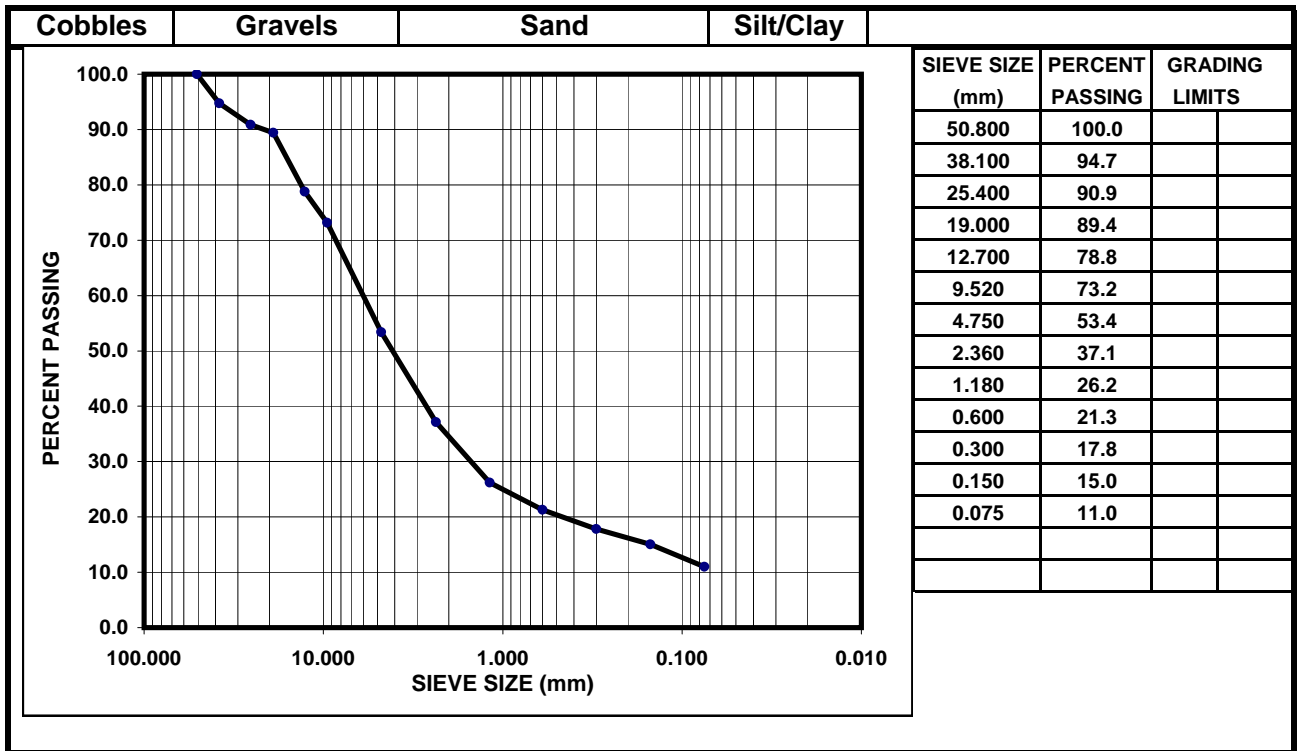
**General Notes**

1. Test Pit terminated at 1.3 m on Bedrock.
2. No groundwater encountered.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 1-PI 45-TP-028  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand and gravel, trace silt/clay, trace cobbles  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 6-Sep-08  
**Sampled By:** Brian Walsh of AMEC      **Date Tested:** 2-Nov-08  
**Location:** TP-028      **Sample Depth:** 0.2 m to 0.5 m



**Comments:**    %Cobbles 0.3                      %Gravel 46.6                      %Sand 42.4                      %Silt/Clay 11.0  
 Natural Moisture content of 16.40%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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 Fax. (709) 722-5025



**MOISTURE DENSITY RELATIONSHIP**

AMEC Lab No: 5300

Client: Hydro Newfoundland Project #: TF8310458  
 Project: Transmission Line Lab No: \_\_\_\_\_  
 Sample Type / Source: DC1051-LOT 1-PI 45-TP-028

Date Sampled: September 1, 2008 Sampled By AMEC

Date Sampled: \_\_\_\_\_ Sampled By \_\_\_\_\_

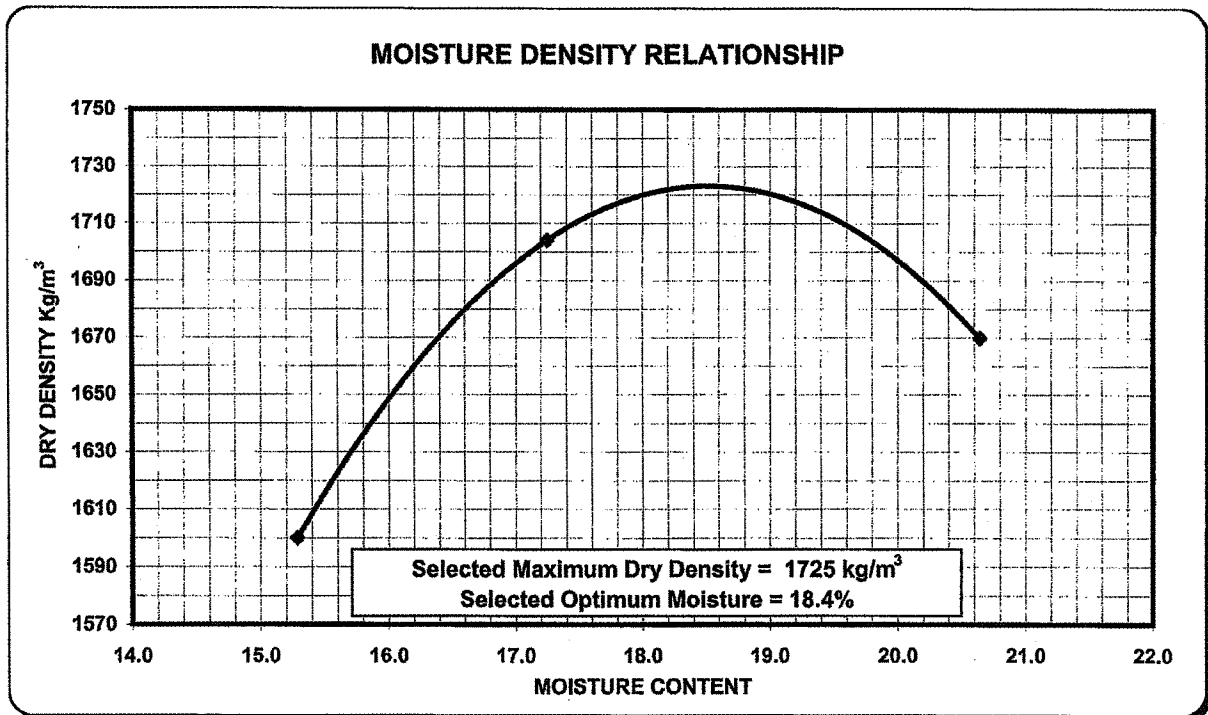
Date Received: Sept 8 2008 Preparation 

Moist	Dry
-------	-----

Percent Retained:	5mm	Percent Retained:	20mm	10%
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Compaction Std.	ASTM D698	ASTM D1557	Method	C
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Moisture Content	15.3	17.3	20.6
Dry Density kg/m <sup>3</sup>	1600	1704	1670



Note : Oversized Material Correction = 10.1%

Corrected Maximum Dry Density 1789 kg/m<sup>3</sup>  
 Corrected Maximum Moisture 16.7 %

Tested by, J.Ingram

Reviewed by,

**Appendix B2**

**Rock Anchor Pull-Out Test Logs**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 1-PI 13-APT-03</b>		
Client:	Nalcor Energy - Lower Churchill Project	September 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5831673	<b>Easting</b>	302267
<b>Start Time</b>	10:00	<b>Finish Time</b>	13:45
<ul style="list-style-type: none"> <li>• Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>• Test conducted on rock outcrop approximately 60 m northwest of the coordinates given for PI 13.</li> </ul>			

<b>ROCK CONDITION OBSERVATIONS</b>
<ul style="list-style-type: none"> <li>• Rock out-crop predominated by weathered, dark-grey granite with close joint spacing.</li> <li>• Outcrop is 4 m x 2 m and trending to the 120° azimuth. Accurate dip direction could not be determined.</li> <li>• No observable evidence of water in borehole during drilling.</li> <li>• Small joint fractures present with joint sets trending to the 120° azimuth, spaced 6 inches to 8 inches apart. This outcrop is suspected of exhibiting exfoliating jointing.</li> <li>• Difficult drilling from 0 m to 1.5 m due to hardness of the rock.</li> <li>• At a depth of 1.5 m the drill rod became lodged in a down-hole joint or fracture. Drill rod could not be retrieved. Abandoned test.</li> </ul>

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (cm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
11:40				<ul style="list-style-type: none"> <li>• Drill rod became stuck at 1.5 m and could not be retrieved.</li> </ul>
13:30				<ul style="list-style-type: none"> <li>• Abandoned test.</li> </ul>





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 1-PI 41-APT-01</b>		
Client:	Nalcor Energy - Lower Churchill Project	September 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5725876	<b>Easting</b>	507003
<b>Start Time</b>	12:20	<b>Finish Time</b>	14:05
<ul style="list-style-type: none"> <li>• Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>• Test conducted on rock outcrop approximately 30 m west of the coordinates given for PI 41.</li> </ul>			
<b>ROCK CONDITION OBSERVATIONS</b>			
<ul style="list-style-type: none"> <li>• Rock out-crop predominated by feldspar rich, pinkish-white, coarse-grained granite with wide joint spacing.</li> <li>• Outcrop is 30 m x 3 m, beds dipping 015°/50° E.</li> <li>• No major evidence of jointing or fracturing.</li> <li>• Drilling was at a steady constant rate from 0 to 1.5 m.</li> </ul>			

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (cm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
13:35	13:36	1.5	0	• Anchor setting into rock.
13:37	13:39	3	0	• Held at 3 tons.
13:39	13:41	4.5	0.4	• 4mm rise in anchor when 4.5 Tons of pressure is applied.
13:41	13:43	6	0.5	• Anchor slipped slightly in rock with 6 Tons applied.
13:43	13:45	7.5	0	• Increased load to 7.5 Tons with 2 pumps of jack • Held at 7.5 Tons.
13:45	13:47	9	0	• Held at 9 Tons.
13:47	13:49	11	0.1	• 1mm rise in anchor with 11 Tons of pressure applied.
13:49	13:51	13	0	• Increased load to 13 Tons with 2.5 pumps of jack. • Held at 13 Tons.
13:51	13:53	16	0.3	• Anchor slipped in rock 3 mm with 16 Tons applied.
13:53	13:55	18	0.4	• 4 mm rise of anchor in rock with 18 Tons applied. • End of test. Anchor moved 1.7 cm in total within the granite with 18 Tons of pressure applied.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 1-PI 44-APT-02</b>		
Client:	Nalcor Energy - Lower Churchill Project	September 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5713113	<b>Easting</b>	505368
<b>Start Time</b>	11:00	<b>Finish Time</b>	13:00
<ul style="list-style-type: none"> <li>• Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>• Test conducted on rock outcrop approximately 10 m east of the coordinates given for PI 44.</li> </ul>			

<b>ROCK CONDITION OBSERVATIONS</b>	
<ul style="list-style-type: none"> <li>• Rock out-crop predominated by weathered and fractured dark-grey limestone with close joint spacing.</li> </ul>	
<ul style="list-style-type: none"> <li>• Outcrop is approximately 20 m x 10 m with beds generally dipping 005°/10°W and 010°/15°W.</li> </ul>	
<ul style="list-style-type: none"> <li>• No observable evidence of water in borehole during drilling.</li> </ul>	
<ul style="list-style-type: none"> <li>• Fractured, moderately fractured with dominate joint sets trending 090°, spaced 1.0 m apart and subordinate joint sets trend to the 115° azimuth, spaced 0.75 m apart.</li> </ul>	
<ul style="list-style-type: none"> <li>• Drilling was at a steady constant rate from 0 to 1.5 m.</li> </ul>	
<ul style="list-style-type: none"> <li>• At a depth of 1.5 m the drill rod became lodged in a down-hole joint or fracture. Drill rod could not be retrieved. Abandoned test.</li> </ul>	
<ul style="list-style-type: none"> <li>• Drilling was at a steady constant rate from 0 to 1.5 m.</li> </ul>	

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (cm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
11:50				<ul style="list-style-type: none"> <li>• Drill rod became stuck at 1.5 m and could not be retrieved.</li> </ul>
12:50				<ul style="list-style-type: none"> <li>• Abandoned test.</li> </ul>





**Appendix B3**

**Percussion Drilling Logs**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 1-REP-PI 34 to PI 35-PD-10**

Client:	Nalcor Energy - Lower Churchill Project	Date:	September 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 34 and PI 35
		Inspector:	Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5766607	488686	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
2	5766643	488644	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
3	5766587	488637	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).

**Generalized Observations**

Wooded area with no observable exposed bedrock or large erratic boulders in the immediate area between PI 34 and PI 35.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 1-PI 35-PD-09</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 7 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 35	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5764530	495788	0.4	Encountered a thin layer of soil before refusal on bedrock or very large boulder(s).
2	5764511	495816	0.9	Encountered a layer of soil and cobbles / boulders before refusal on bedrock or very large boulder(s).

<b>Generalized Observations</b>
Thin veneer of vegetative growth with large erratic boulders (ranging from 0.5 m – 1.5 m in diameter) and some areas of exposed bedrock composed of fractured pink to buff white, coarse-grained granite.

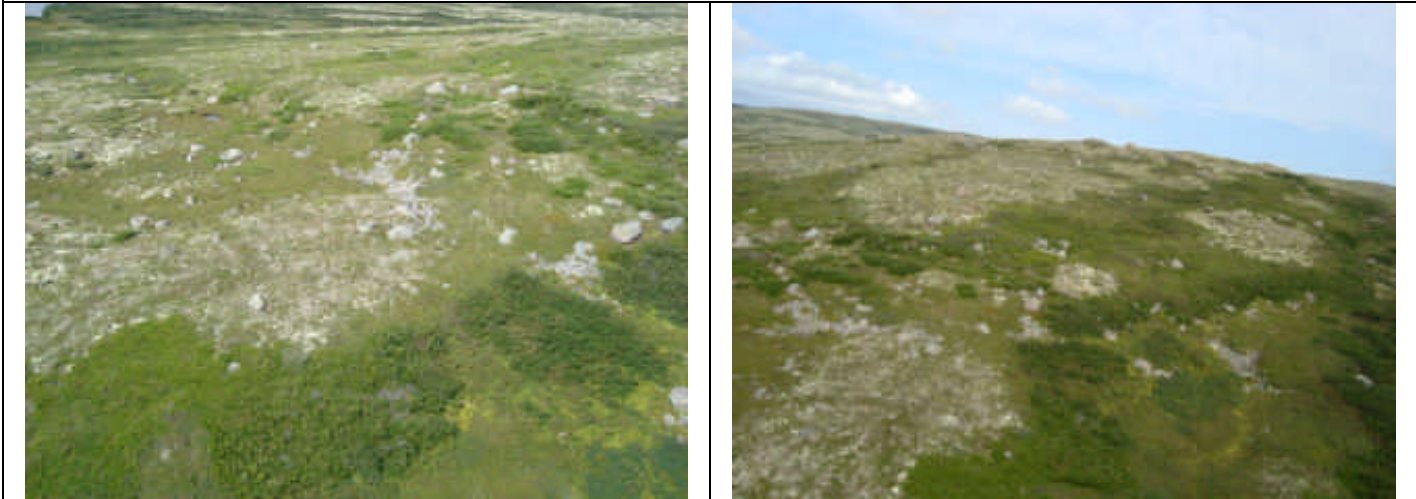


**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 1-REP-PI 37 to PI 38-PD-08**

Client:	Nalcor Energy - Lower Churchill Project	Date:	September 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 37 and PI 38
		Inspector:	Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5749426	503918	0.3	Encountered a thin layer of soil before refusal on probable bedrock.
2	5749401	503944	0.25	Encountered a thin layer of soil before refusal on probable bedrock.
3	5749416	503889	0.3	Encountered a thin layer of soil before refusal on probable bedrock.

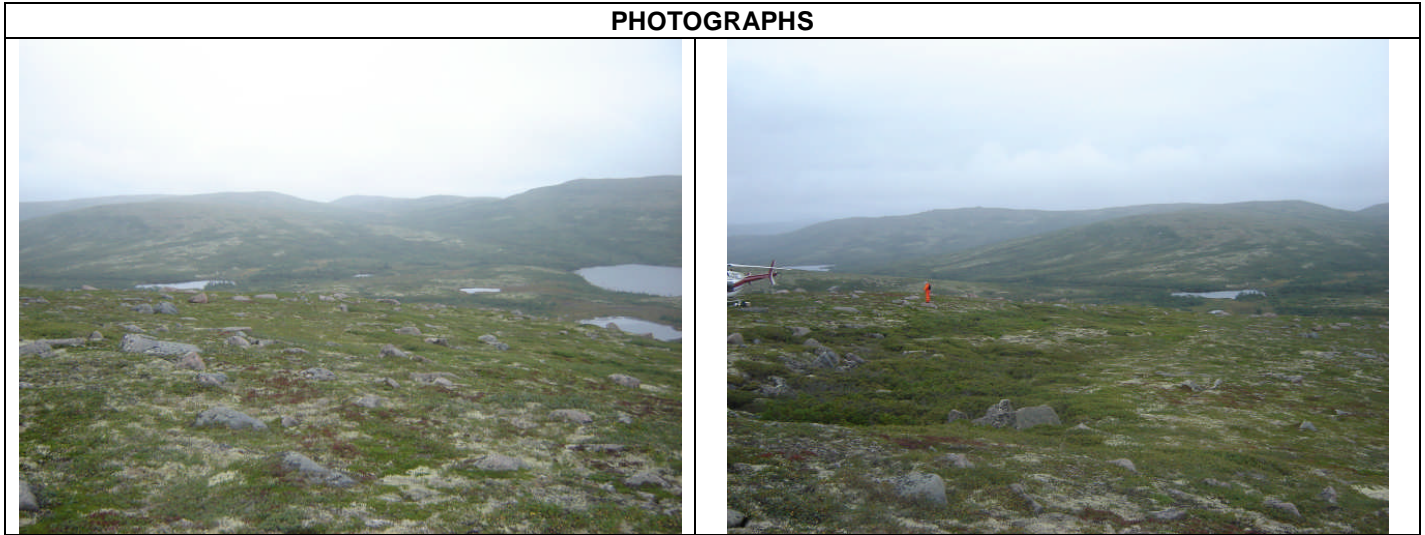
**Generalized Observations**

Thin veneer of vegetative growth with large erratic boulders (ranging from 0.5 m – 3.0 m in diameter) and some areas of exposed bedrock composed of fractured pinkish grey to buff white, coarse - grained granite.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 1-PI 39-PD-07</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 6 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 39	Inspector: Brad Walsh



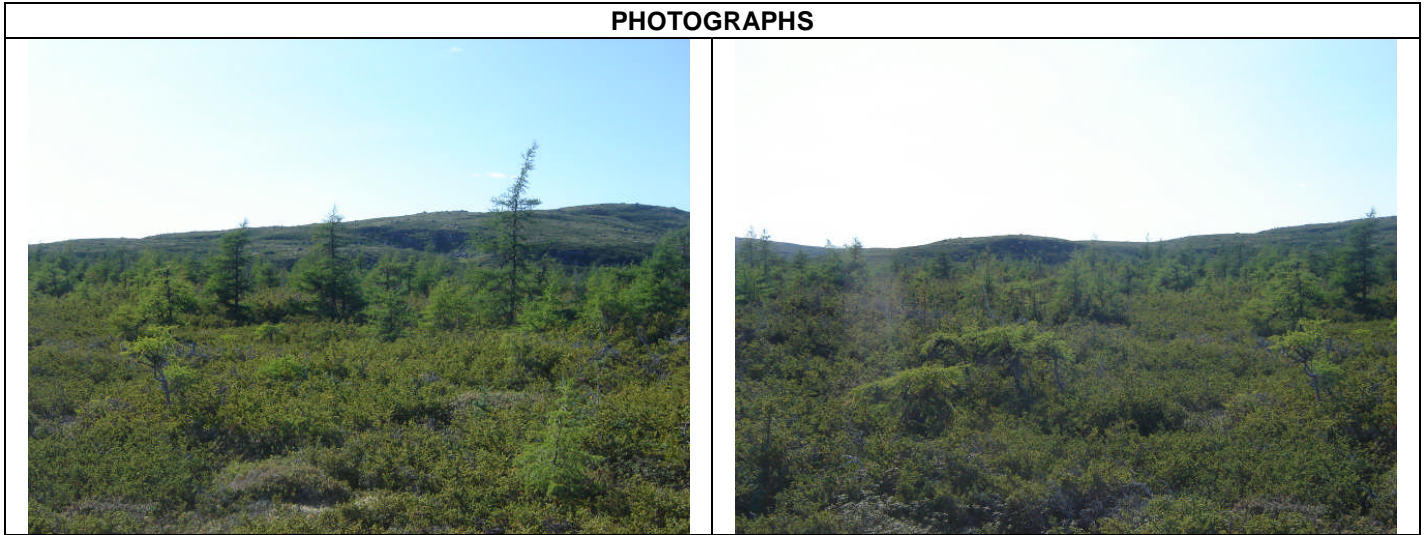
Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5735738	508729	0.3	Encountered a thin layer of soil before refusal on probable bedrock.
2	5735756	508706	0.5	Encountered a thin layer of soil before refusal on probable bedrock.
3	5735720	508776	0.6	Encountered a thin layer of soil before refusal on probable bedrock.

<b>Generalized Observations</b>
Thin veneer of vegetative growth (moss and lichen) with large erratic boulders (ranging from 1 m - 3 m in diameter) and some areas of exposed bedrock composed of pink to buff white, coarse - grained granite.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 1-PI 40-PD-06</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 5 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 40 Inspector: Brad Walsh



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5731780	510867	1.3	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
2	5731820	510762	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
3	5731777	510799	1.4	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).

<b>Generalized Observations</b>
Wooded area with no observable exposed bedrock or large erratic boulders in the immediate area of PI 40.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 1-REP-PI 40 to PI 41-PD-05**

Client:	Nalcor Energy - Lower Churchill Project	Date:	September 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 40 and PI 41
		Inspector:	Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5729194	509139	1.8	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
2	5729214	509133	1.4	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
3	5729176	5091114	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).

**Generalized Observations**

Wooded area with no observable exposed bedrock or large erratic boulders in the immediate area between PI 40 and PI 41.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 1-PI 41-PD-04</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 5 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 41	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5725864	507036	0.4	Encountered a thin layer of soil before refusal on bedrock.
2	5725849	507047	0.3	Encountered a thin layer of soil before refusal on bedrock.
3	5725856	507007	0.5	Encountered a thin layer of soil before refusal on bedrock.

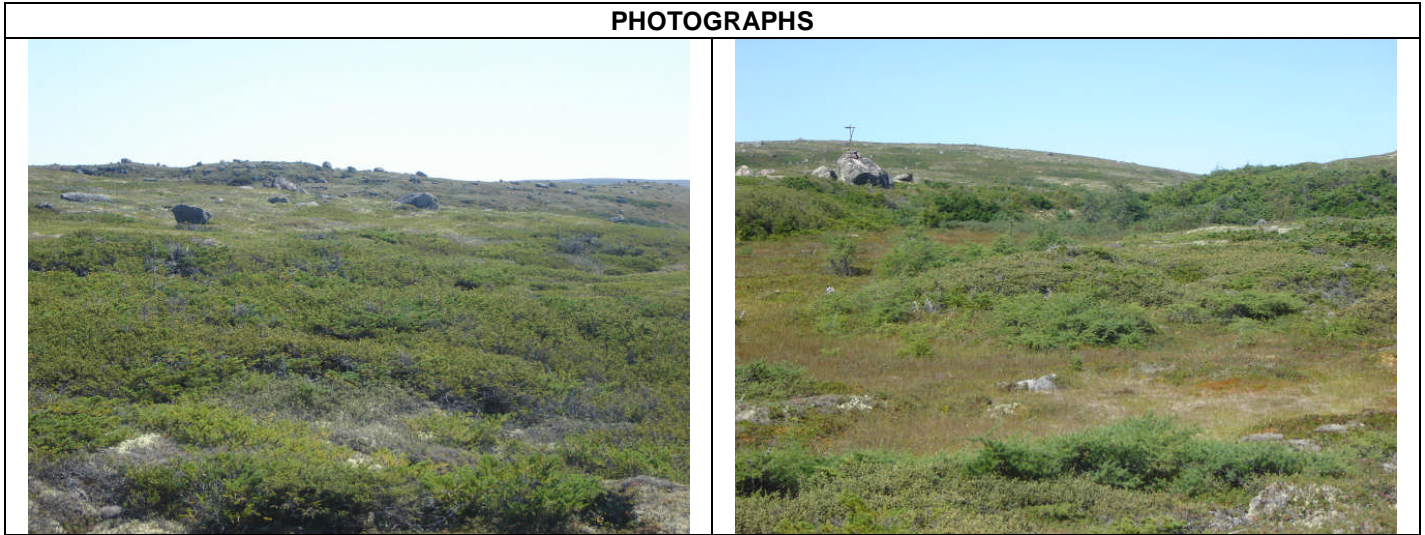
<b>Generalized Observations</b>
Thin veneer of vegetative growth (moss and lichen) with large erratic boulders (ranging from 1 m - 2 m in diameter) and some areas of exposed bedrock composed of pink to buff white, coarse-grained granite.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 1-PI 42-PD-03</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 5 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 42 Inspector: Brad Walsh



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5722698	506628	1.3	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
2	5722684	506639	0.8	Encountered a thin layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).

<b>Generalized Observations</b>
Thin veneer of vegetative growth with large erratic boulders that range from 1 m - 3 m in diameter. Exposed bedrock was minimal in the immediate area of PI 42.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 1-PI 43-PD-02**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 5 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 43 Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5720019	504410	0.2	Encountered a thin layer of soil before refusal on bedrock.
2	5720013	504432	0.6	Encountered a thin layer of soil before refusal on bedrock.
3	5719988	504432	0.15	Encountered a thin layer of soil before refusal on bedrock.

**Generalized Observations**

Thin veneer of vegetative growth with large erratic boulders (ranging from 1 m - 4 m in diameter) and some areas of exposed bedrock composed of pink, coarse – grained granite.

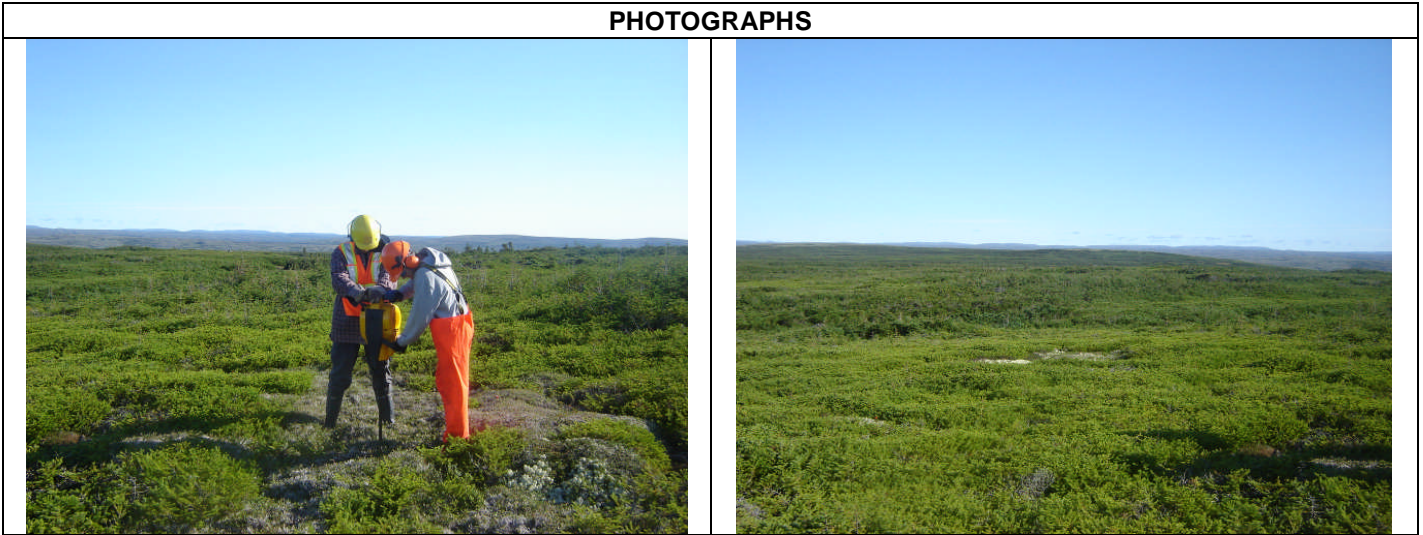


**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 1-PI 44-PD-01**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 5 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 44 Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5713130	505325	0.7	Encountered a thin layer of soil and cobbles / boulders before refusal on bedrock.
2	5713122	505359	0.3	Encountered a thin layer of soil before refusal on bedrock.
3	5713147	505350	0.7	Encountered a thin layer of soil and cobbles / boulders before refusal on bedrock.

**Generalized Observations**

Thin veneer of vegetative growth with areas of exposed bedrock composed of dark grey, weathered limestone.

**Appendix B4**  
**Bog Probing Logs**

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 1 – LOT 1</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 3 and PI 4
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 1
			Left Line	Center Line	Right Line	
1	615002	5859782	1.25	1.00	2.00	
2	615010	5859763	0.50	1.50	2.00	
3	615025	5859753	2.00	2.00	2.00	
4	615043	5859743	2.50	2.50	2.00	
5	615067	5859733	2.00	2.00	1.75	
6	615183	5859713	1.50	1.75	2.00	
7	615205	5859697	1.75	2.00	2.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 2 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 4 and PI 5
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 2
			Left Line	Center Line	Right Line	
1	615002	5858447	0.50	0.50	0.50	
2	628441	5858443	1.50	1.50	0.50	
3	628447	5858464	1.50	1.50	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 3 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 5 and PI 6
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 3
			Left Line	Center Line	Right Line	
1	633447	5855368	1.50	2.00	1.50	
2	633454	5855347	1.50	1.50	1.00	
3	633470	5855337	1.50	1.00	1.50	
4	633493	5855330	1.00	1.75	1.75	
5	633505	5855313	2.00	1.25	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 4 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date:	September 26, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	Between PI 6 and PI 7	Inspector:	Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 4
			Left Line	Center Line	Right Line	
1	641315	5853078	0.50	0.50	0.50	
2	641338	5853073	0.50	0.50	0.50	
3	641370	5853065	0.75	0.80	0.80	
4	641391	5853054	1.00	0.90	0.75	
5	641410	5853041	2.50	2.50	2.25	
6	641431	5853029	3.0+	2.50	3.0+	
7	641454	5853015	2.50	1.00	2.75	
8	641480	5853002	3.0+	3.0+	3.0+	
9	641500	5852995	3.0+	3.0+	3.0+	
10	641521	5852986	0.50	1.00	1.25	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 5 – LOT 1</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 7 and PI 8
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 5
			Left Line	Center Line	Right Line	
1	655511	5850698	0.50	0.50	0.50	
2	655533	5850695	0.50	0.50	0.50	
3	655554	5850701	1.50	1.00	1.75	
4	655577	5850704	1.50	0.75	1.60	
5	655604	5850712	2.00	1.75	2.25	
6	655626	5850713	2.00	3.0+	2.25	
7	655647	5850718	3.0+	3.0+	3.0+	
8	655673	5850720	1.50	2.00	1.75	
9	655696	5850721	1.00	1.25	1.00	
10	655719	5850719	1.50	1.50	1.75	
11	655742	5850719	1.50	0.50	1.75	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 6A – LOT 1</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 8 and PI 9
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 6A
			Left Line	Center Line	Right Line	
1	670044	5850278	0.75	1.00	0.50	
2	670025	5850291	1.40	1.30	0.75	
3	670010	5850305	1.25	1.45	1.50	
4	669992	5850319	2.25	2.50	2.00	
5	669976	5850335	1.75	1.50	1.50	
6	669962	5850352	2.00	2.25	1.50	
7	669947	5850352	3.00	3.00	2.00	
8	669934	5850370	3.00	3.0+	3.00	
9	669914	5850386	2.25	2.25	2.50	
10	669901	5850398	2.25	2.00	2.25	
11	669886	5850414	2.25	2.25	2.25	
12	669865	5850428	2.25	2.50	2.50	
13	669853	5850448	2.00	2.00	2.00	
14	669840	5850463	1.75	1.75	1.75	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 6B – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 8 and PI 9	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 6B
			Left Line	Center Line	Right Line	
1	671638	5848622	2.00	1.50	1.75	
2	671621	5848635	1.00	1.00	1.25	
3	671603	5848648	2.00	2.25	2.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 6C – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 8 and PI 9	Inspector: Brian Walsh

Probe No.:	Easting	Northing	Depth Penetrated (m)			BOG 6C
			Left Line	Center Line	Right Line	
1	671860	5848341	1.00	1.00	2.00	
2	671857	5848362	0.50	0.50	1.00	
3	671848	5848386	0.75	0.75	2.00	
4	671837	5848409	1.00	1.25	Woods	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 6D – LOT 1**


Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 8 and PI 9
		Inspector: Brian Walsh	

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 6D
			Left Line	Center Line	Right Line	
1	672844	5847327	0.75	0.50	0.50	
2	672845	5847352	1.50	1.65	1.50	
3	672847	5847374	1.50	1.50	2.50	
4	672845	5847397	1.40	1.45	1.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 7A – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 13 and PI 14	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 7A
			Left Line	Center Line	Right Line	
1	306757	5828103	1.00	1.00	1.00	
2	306743	5828121	1.00	1.50	1.00	
3	306731	5828139	1.00	1.25	1.25	
4	306715	5828159	2.00	2.25	2.25	
5	306623	5828225	0.25	2.00	0.25	
6	306605	5828237	1.25	1.50	1.75	
7	306582	5828261	2.50	2.50	2.00	
8	306563	5828273	2.50	2.50	2.25	
9	306539	5828292	1.00	1.00	1.50	
10	306515	5828319	0.50	0.50	2.00	
11	306359	5858430	0.25	0.25	0.25	
12	306338	5828441	0.25	0.25	0.25	
13	306316	5828460	0.50	0.50	0.75	
14	396292	5828474	0.50	0.50	0.75	
15	306261	5828480	0.50	1.00	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 7B – LOT 1</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 13 and PI 14
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 7B
			Left Line	Center Line	Right Line	
1	307655	5827406	0.50	0.50	0.50	
2	307639	5827421	0.50	0.75	0.50	
3	307615	5827436	0.75	0.50	1.00	
4	307595	5827450	1.10	1.25	1.50	
5	307578	5827461	1.50	2.00	2.50	
6	307520	5827464	Woods	2.50	3.00+	
7	307496	5827476	Woods	2.50	3.00+	
8	307486	5827472	Woods	3.00	3.00+	
9	307432	5827515	Woods	3.00+	3.00+	
10	307410	5827541	Woods	3.00+	3.00+	
11	307391	5827555	Woods	3.00+	3.00+	
12	307368	5827572	Woods	2.00	2.25	
13	307342	5827592	Woods	2.50	2.25	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 8 – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 14 and PI 15	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 8
			Left Line	Center Line	Right Line	
1	321280	5820570	0.30	0.80	0.50	
2	321255	5820580	0.75	0.75	0.75	
3	321236	5820589	1.50	1.50	2.00	
4	321216	5820591	1.75	2.00	2.25	
5	321194	5820596	2.00	2.25	2.00	
6	321175	5820605	0.50	0.50	0.50	
7	321151	5820612	0.50	1.00	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 9A – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project	Date:	September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 15 and PI 16
		Inspector:	Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 9A
			Left Line	Center Line	Right Line	
1	330375	5819375	0.50	0.75	0.50	
2	330352	5819376	0.50	1.00	1.00	
3	330327	5819374	0.50	1.50	0.50	
4	330304	5819372	1.00	1.00	0.75	
5	330282	5819371	1.00	1.25	0.50	
6	330257	5819371	1.00	1.25	1.00	
7	330235	5819370	0.75	2.50	1.00	
8	330211	5819369	1.25	1.00	0.75	
9	330181	5819370	1.10	1.25	0.80	
10	330158	5819368	0.80	1.50	2.00	
11	330134	5819356	1.40	1.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 9B – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 15 and PI 16	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 9B
			Left Line	Center Line	Right Line	
1	333921	5819391	2.50	2.25	2.25	
2	333898	5819397	2.50	2.50	2.00	
3	333873	5819398	2.00	1.75	2.00	
4	333854	5819413	2.50	2.25	2.25	
5	333838	5819446	2.60	2.50	2.00	
6	333813	5819449	1.75	2.00	2.50	
7	333789	5819442	2.00	1.75	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 10 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 16 and PI 17
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 10
			Left Line	Center Line	Right Line	
1	350438	5816196	1.20	0.25	0.20	
2	350424	5816207	1.25	1.50	1.75	
3	350407	5816221	1.25	1.50	1.40	
4	350391	5816237	1.25	1.25	1.50	
5	350375	5816244	1.25	1.50	0.50	
6	350353	5816255	1.00	1.25	0.50	
7	350335	5816264	1.00	1.25	1.00	
8	350322	5816271	0.50	0.75	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 11 – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 17 and PI 18	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 11
			Left Line	Center Line	Right Line	
1	357806	5811941	0.25	0.25	0.70	
2	357790	5811925	0.25	0.25	1.20	
3	357767	5811960	0.10	0.35	1.40	
4	357745	5811962	0.25	0.25	1.00	
5	357722	5811962	1.00	0.50	1.50	
6	357701	5811967	1.00	0.75	1.60	
7	357684	5811974	1.00	1.00	Woods	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 12 – LOT 1</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 19 and PI 20
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 12
			Left Line	Center Line	Right Line	
1	370314	5801308	0.50	1.25	1.50	
2	370301	5801324	0.30	1.00	1.50	
3	370279	5801334	0.40	1.50	1.50	
4	370260	5801343	0.40	0.90	1.00	
5	370243	5801355	1.40	1.00	0.50	
6	370225	5801366	1.60	1.50	1.50	
7	370205	5801374	1.30	1.00	1.50	
8	370188	5801388	Water	1.40	1.50	
9	370167	5801400	1.20	1.50	1.50	
10	370149	5801412	1.10	1.10	2.00	
11	370130	5801422	1.50	1.75	2.00	
12	370110	5801431	0.80	1.75	2.00	
13	370088	5801439	2.00	2.00	2.00	
14	370076	5801454	0.70	1.75	2.00	
15	370053	5801462	Water	2.00	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 13 – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 21 and PI 22	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 13
			Left Line	Center Line	Right Line	
1	392321	5796182	0.50	0.60	0.75	
2	392302	5796190	0.75	0.30	0.60	
3	392269	5796205	0.75	0.45	1.00	
4	392253	5796200	0.50	0.65	0.50	
5	392236	5796207	0.50	0.65	0.50	
6	392217	5796210	0.75	0.65	0.75	
7	392198	5796216	1.00	0.75	0.90	
8	392178	5796222	0.50	0.75	0.90	
9	392158	5796230	0.75	0.60	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 14A – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 23 and PI 24	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 14A
			Left Line	Center Line	Right Line	
1	399980	5788870	1.25	0.25	0.70	
2	399996	5788844	1.40	1.75	1.25	
3	400032	5788835	1.00	1.50	2.40	
4	400048	5788812	1.25	0.85	1.50	
5	400072	5788797	1.50	1.50	1.50	
6	400090	5788790	1.50	1.50	1.50	
7	400112	5788774	1.25	1.45	1.40	
8	400133	5788763	1.00	1.25	1.40	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 14B – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 23 and PI 24	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 14B
			Left Line	Center Line	Right Line	
1	400558	5788512	1.25	1.40	1.00	
2	400542	5788520	1.50	1.40	1.50	
3	400520	5788531	1.25	1.25	1.50	
4	400503	5788542	0.50	1.00	1.50	
5	400487	5788552	0.50	1.00	1.50	
6	400468	5788561	1.00	0.75	1.30	
7	400449	5788572	1.25	1.25	1.50	
8	400435	5788588	1.50	1.35	1.50	
9	400417	5788596	1.75	1.65	1.80	
10	400394	5788609	1.25	1.40	1.75	
11	400369	5788628	1.50	1.50	1.60	
12	400344	5788639	1.25	1.25	1.25	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 15 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project	Date:	September 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 26 and PI 27
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)		
			Left Line	Center Line	Right Line
1	425848	5787722	1.00	1.00	0.60
2	425822	5787715	0.60	0.60	Water
3	425792	5787707	1.50	1.75	Water
4	425767	5787708	0.90	1.25	Water
5	425742	5787721	0.60	0.50	Water
6	425710	5787720	1.10	1.10	Water
8	425679	5787724	0.75	0.80	Water
9	425643	5787734	1.00	1.30	Water
No Photo Available					

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 16A – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 27 and PI 28	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 16A
			Left Line	Center Line	Right Line	
1	438556	5787413	0.50	1.00	1.00	
2	438537	5787424	0.70	1.00	1.10	
3	438516	5787433	1.30	1.00	1.25	
4	438499	5787444	1.40	1.15	1.30	
5	438478	5787453	1.50	1.00	1.25	
6	438458	5787463	1.30	1.00	1.60	
7	438437	5787474	2.00	1.00	1.25	
8	438416	5787485	0.70	0.90	0.75	
9	438403	5787495	0.50	0.25	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 16B – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 27 and PI 28	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 16B
			Left Line	Center Line	Right Line	
1	439077	5787148	1.25	1.25	1.50	
2	439063	5787162	1.50	1.35	1.40	
3	439046	5787175	1.50	1.45	1.80	
4	439027	5787185	1.25	1.45	1.50	
5	439003	5787184	0.70	1.20	1.30	
6	438968	5787191	1.25	1.20	1.00	
7	438944	5787214	1.25	1.00	1.20	
8	438921	5787224	2.00	1.50	1.75	
9	438906	5787236	2.00	2.00	2.5+	
10	438885	5787245	2.5+	1.95	2.00	
11	438864	5787254	2.5+	2.00	2.00	
12	438845	5787265	2.5+	2.5+	2.00	
13	438822	5787275	2.00	2.5+	2.20	
14	438808	5787281	2.5+	2.5+	2.5+	
15	438786	5787295	2.00	1.75	1.75	
16	438765	5787305	2.00	2.5+	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 17 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 28 and PI 29
		Inspector: Brian Walsh	


Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 17
			Left Line	Center Line	Right Line	
1	450893	5778239	Woods	0.50	0.60	
2	450877	5778253	Woods	0.50	0.80	
3	450861	5778264	Woods	0.25	0.80	
4	450842	5778273	Woods	0.75	0.80	
5	450822	5778278	Woods	0.25	0.75	
6	450805	5778287	Woods	0.75	1.00	
7	450787	5778297	Woods	1.00	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 18 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: September 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 30 and PI 31
		Inspector: Brian Walsh	

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 18
			Left Line	Center Line	Right Line	
1	465434	5766067	1.00	1.00	1.20	
2	465425	5766120	1.00	1.40	1.40	
3	465404	5766122	0.80	0.50	1.60	
4	465382	5766125	1.00	0.90	1.50	
5	465360	5766126	1.50	1.00	2.00	
6	465338	5766128	1.50	1.50	2.40	
7	465316	5766130	1.50	1.85	1.60	
8	465294	5766131	1.75	1.65	1.80	
9	465272	5766131	1.25	1.60	0.50	
10	465252	5766137	1.50	1.50	0.30	
11	465231	5766139	0.50	0.85	0.20	
12	465206	5766139	0.50	0.25	0.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 19 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: Sept 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 31 and PI 32
			Inspector: Aisha Hyde

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 19
			Left Line	Center Line	Right Line	
1	470146	5766639	0.75	1.00	1.25	No Photo Available
2	470128	5766625	1.50	1.25	1.25	
3	470114	5766608	1.50	1.50	1.50	
4	470095	5766596	1.00	1.25	1.25	
5	470079	5766581	1.25	0.50	0.50	
6	470065	5766570	1.00	0.50	1.50	
7	470048	5766555	1.00	0.50	0.50	
8	470033	5766542	0.75	0.75	0.70	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 20 – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: Sept 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 32 and PI 33	Inspector: Aisha Hyde

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 20
			Left Line	Center Line	Right Line	
1	475145	5767791	0.50	0.50	0.50	No Photo Available
2	475125	5767789	0.50	0.50	0.50	
3	475104	5767788	0.75	0.75	0.60	
4	475081	5767783	0.75	0.75	0.60	
5	475060	5767783	0.50	0.75	0.50	
6	475037	5767781	0.60	0.50	0.50	
7	475017	5767779	0.50	0.50	0.50	
8	474997	5767775	0.50	0.50	0.70	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 21 – LOT 1**

Client:	Nalcor Energy - Lower Churchill Project		Date: Sept 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 33 and PI 34
			Inspector: Aisha Hyde

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 21
			Left Line	Center Line	Right Line	
1	477483	5768136	2.25	2.5+	1.50	
2	477463	5768133	2.5+	2.5+	2.5+	
3	477442	5768129	2.5+	2.5+	2.5+	
4	477421	5768123	2.5+	2.00	2.5+	
5	477394	5768124	2.5+	2.5+	2.5+	
6	477375	5768118	2.5+	1.25	2.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



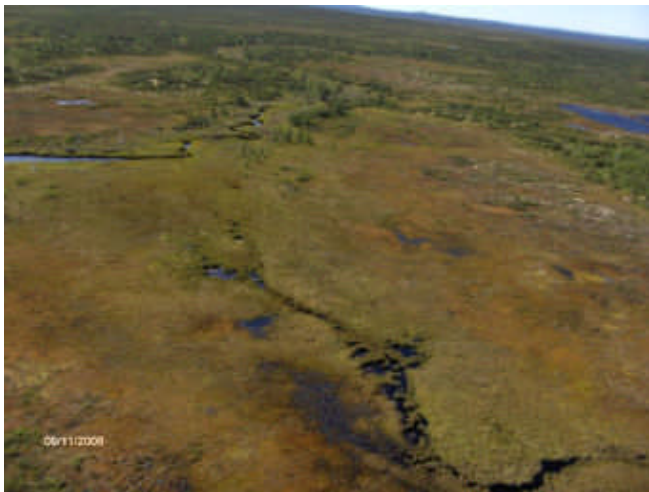
<b>BOG AREA 22 – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: Sept 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 34 and PI 35	Inspector: Aisha Hyde

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 22
			Left Line	Center Line	Right Line	
1	488750	5766416	1.25	1.50	1.00	
2	488723	5766427	2.5+	2.50	2.5+	
3	488702	5766435	2.5+	2.50	2.5+	
4	488681	5766441	2.5+	2.5+	2.5+	
5	488661	5766444	2.5+	2.5+	2.5+	
6	488640	5766452	2.5+	2.5+	2.5+	
7	488609	5766460	2.5+	2.00	2.5+	
8	488588	5766465	2.5+	2.5+	2.5+	
9	488569	5766471	1.75	1.75	2.50	
10	488548	5766473	2.00	1.75	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 23 – LOT 1</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: Sept 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 35 and PI 36	Inspector: Aisha Hyde

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 23
			Left Line	Center Line	Right Line	
1	498412	5761397	1.25	1.00	1.25	
2	498399	5761417	1.50	1.25	2.50	
3	498382	5761435	1.50	1.75	2.25	
4	498367	5761454	2.5+	2.5+	2.5+	
5	498351	5761472	2.5+	2.5+	2.5+	
6	498333	5761491	2.00	2.00	2.5+	
7	498319	5761508	1.50	1.50	1.50	
8	498307	5761527	1.00	1.00	1.00	
9	498289	5761542	0.50	0.50	0.50	
10	498146	5761713	0.50	0.50	0.50	
11	498135	5761731	1.50	1.25	0.50	
12	498119	5761749	1.50	1.25	1.25	
13	498104	5761766	1.75	1.25	1.25	
14	498092	5761782	1.25	0.75	1.25	
15	498078	5761799	1.50	0.75	2.00	
16	498065	5761815	1.25	1.00	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 24 – LOT 1</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: Sept 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 36 and PI 37
			Inspector: Aisha Hyde

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 24
			Left Line	Center Line	Right Line	
1	499488	5758945	1.00	0.75	0.50	
2	499482	5758968	1.50	1.25	0.50	
3	499475	5758989	1.50	1.50	1.25	
4	499467	5759010	1.50	1.50	1.25	
5	499459	5759029	1.50	1.50	2.00	
6	499454	5759049	1.25	1.50	1.25	
7	499450	5759065	1.00	1.00	1.25	
8	499441	5759085	1.10	1.25	1.25	
9	499431	5759105	1.25	1.50	1.25	
10	499427	5759130	2.00	1.50	1.50	
11	499420	5759150	2.00	1.50	2.00	
12	499410	5759175	1.00	0.75	2.50	
13	499405	5759194	0.50	0.50	2.5+	
14	499356	5759340	1.00	0.50	1.00	
15	499347	5759361	1.00	1.50	2.00	
16	499344	5759385	2.00	1.75	2.00	
17	499337	5759405	1.75	1.75	1.25	

**Appendix B5**

**Borehole Logs & Gradation Analysis**

**LOG OF BOREHOLE DC1051-LOT1-BH01**

PROJECT No.:	<b>TF8310458</b>	CONTRACTOR:	<b>AMEC E&amp;E</b>
CLIENT:	<b>Nalcor Energy - Lower Churchill Project</b>	EQUIPMENT:	<b>CME 75</b>
PROJECT NAME:	<b>Lower Churchill Project - HVdc Transmission Line - Soldiers Pond to Gull Island</b>	LOGGED BY:	<b>A. Hyde</b>
LOCATION:	<b>Gull Island - North Side of Churchill River Crossing</b>	ELEVATION (m):	
DATE STARTED:	<b>August 15, 2008</b>	DATE COMPLETED:	<b>August 15, 2008</b>

ELEVATION (m)	DEPTH (m)	SYMBOL	STRATIGRAPHIC DESCRIPTION	SAMPLES					REMARKS
				No.	TYPE	RECOVERY (%)	N VALUE or RQD (%)		
			FLUVIAL SOIL - Very loose to loose, brown/grey sand and silt/clay, trace gravel, moist to saturated.	1	SS	92	4		
	1			AUGER					
	2		MARINE OR LACUSTRINE SEDIMENTS - Compact, grey sandy gravel and silt/clay, saturated.	2	SS	100	3		
	3			AUGER					
	4		PROBABLE GLACIAL TILL - Compact to very dense, grey/pink sand and gravel, with some silt/clay, saturated.	3	SS	8	13		
	4			AUGER					
	5			4	GR				
	5			AUGER					
	6			5	SS	54	26		
	6			AUGER					
	7			6	SS	75	69		
	7			AUGER					
	8			7	SS	100			
	8			AUGER					
	9								
	9.2								SPT Refusal at 9.2 m (33,53,50 for 0.1 m)

VERTICAL SCALE: 1:50

CHECKED BY: C. Miles



**LOG OF BOREHOLE DC1051-LOT1-BH01**

PROJECT No.:	<b>TF8310458</b>	CONTRACTOR:	<b>AMEC E&amp;E</b>
CLIENT:	<b>Nalcor Energy - Lower Churchill Project</b>	EQUIPMENT:	<b>CME 75</b>
PROJECT NAME:	<b>Lower Churchill Project - HVdc Transmission Line - Soldiers Pond to Gull Island</b>	LOGGED BY:	<b>A. Hyde</b>
LOCATION:	<b>Gull Island - North Side of Churchill River Crossing</b>	ELEVATION (m):	
DATE STARTED:	<b>August 15, 2008</b>	DATE COMPLETED:	<b>August 15, 2008</b>

ELEVATION (m)	DEPTH (m)	SYMBOL	STRATIGRAPHIC DESCRIPTION	SAMPLES				REMARKS
				No.	TYPE	RECOVERY (%)	N VALUE or RQD (%)	
			PROBABLE GLACIAL TILL - Compact to very dense, grey/pink sand and gravel, with some silt/clay, saturated.		AUGER			
	11			8	SS	100		SPT Refusal at 10.6 m (83 for 0.1 m)
	12				AUGER			
				9	SS	100		SPT Refusal at 12.2 m (75 for 0.076 m)
	13				AUGER			
	14			10	SS	50	71	
			Borehole terminated @ 14.3 m below ground surface.					

VERTICAL SCALE: 1:50

CHECKED BY: C. Miles





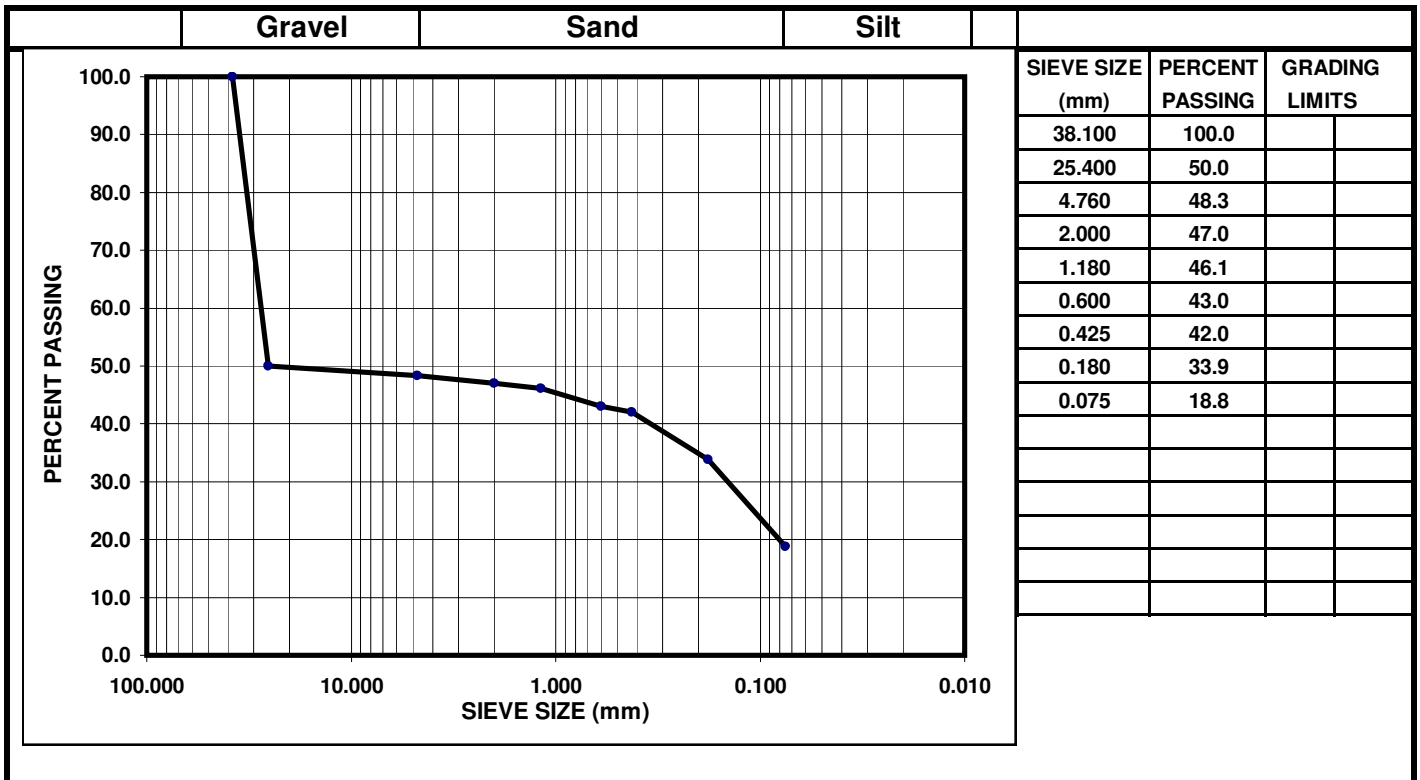






**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-BH-01-SA3
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sandy gravel some silt/clay
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	14-Aug-08
<b>Sampled By:</b>	Aisha Hyde of AMEC	<b>Date Tested:</b>	5-Dec-08
<b>Location:</b>	BH-01	<b>Sample Depth:</b>	3.0m - 3.6 m



**Comments:**            %Cobbles 0.0            %Gravel 51.7            %Sand 29.5            %Silt/Clay 18.8  
 Natural Moisture content of 11.6%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

AMEC Earth & Environmental  
 133 Crosbie Road  
 P.O. Box 13216, St John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-7023  
 Fax. (709) 722-7353

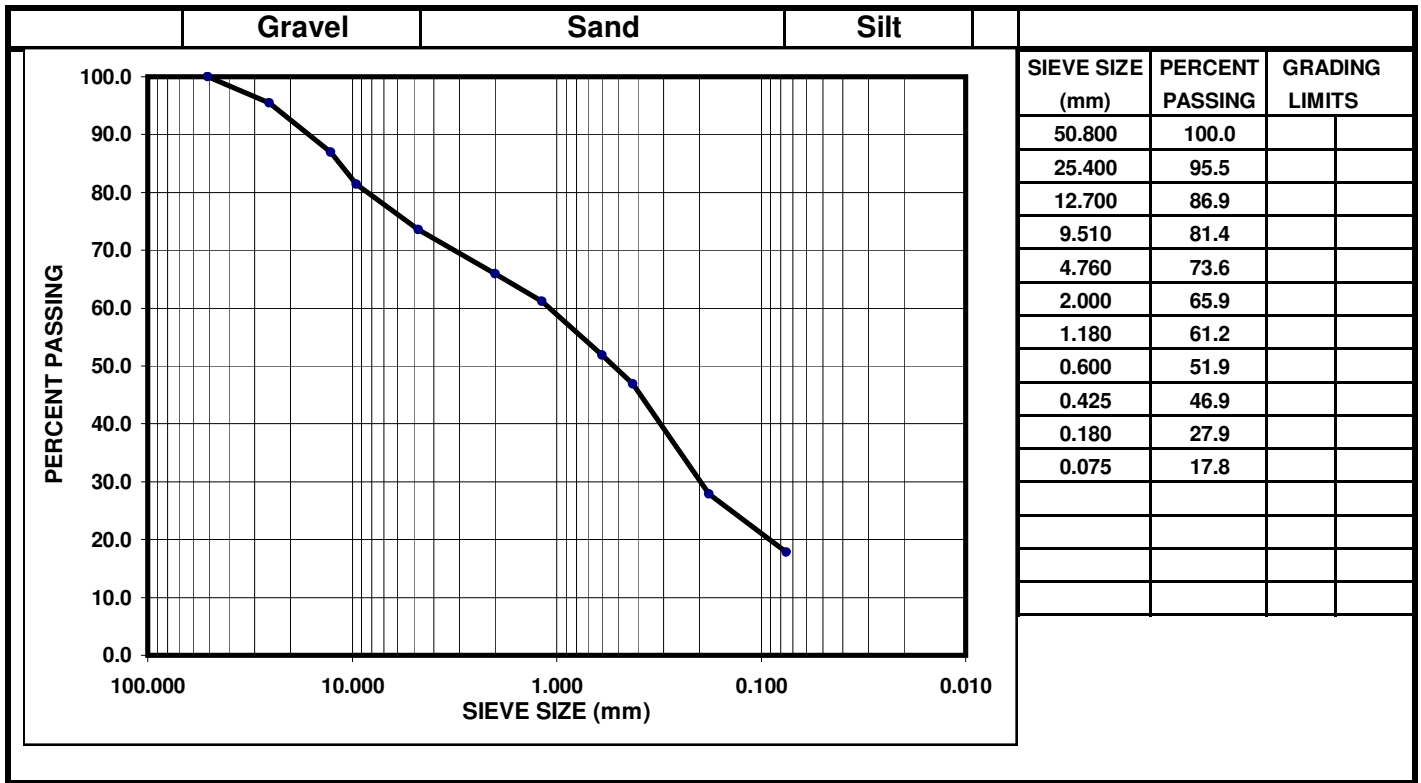
Construction Materials Laboratory  
 36 Pippy Place  
 P.O. Box 13216, St. John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-5062  
 Fax. (709) 722-5025





**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-BH-01-SA5
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Gravelly sand, some silt/clay
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	14-Aug-08
<b>Sampled By:</b>	Aisha Hyde of AMEC	<b>Date Tested:</b>	5-Dec-08
<b>Location:</b>	BH-01	<b>Sample Depth:</b>	4.6m - 5.2 m



**Comments:**                    %Cobbles 0.0                    %Gravel 26.4                    %Sand 55.8                    %Silt/Clay 17.8  
 Natural Moisture content of 9.0%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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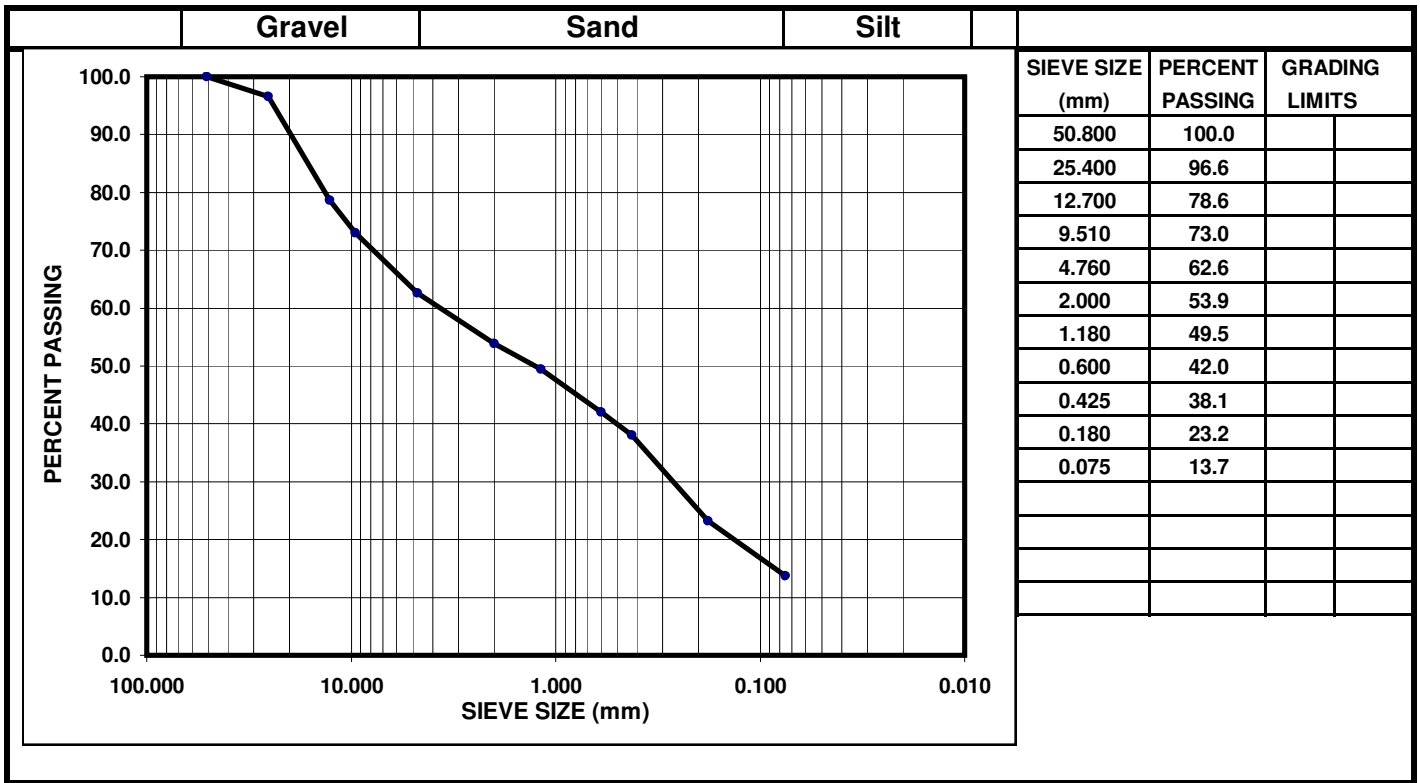
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 Canada, A1B 4A5  
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 Fax. (709) 722-5025





**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-BH-01-SA7
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sand and gravel, some silt/clay
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	15-Aug-08
<b>Sampled By:</b>	Aisha Hyde of AMEC	<b>Date Tested:</b>	5-Dec-08
<b>Location:</b>	BH-01	<b>Sample Depth:</b>	9.1m - 9.6 m



**Comments:**                    %Cobbles 0.0                    %Gravel 37.4                    %Sand 48.9                    %Silt/Clay 13.7  
 Natural Moisture content of 5.7%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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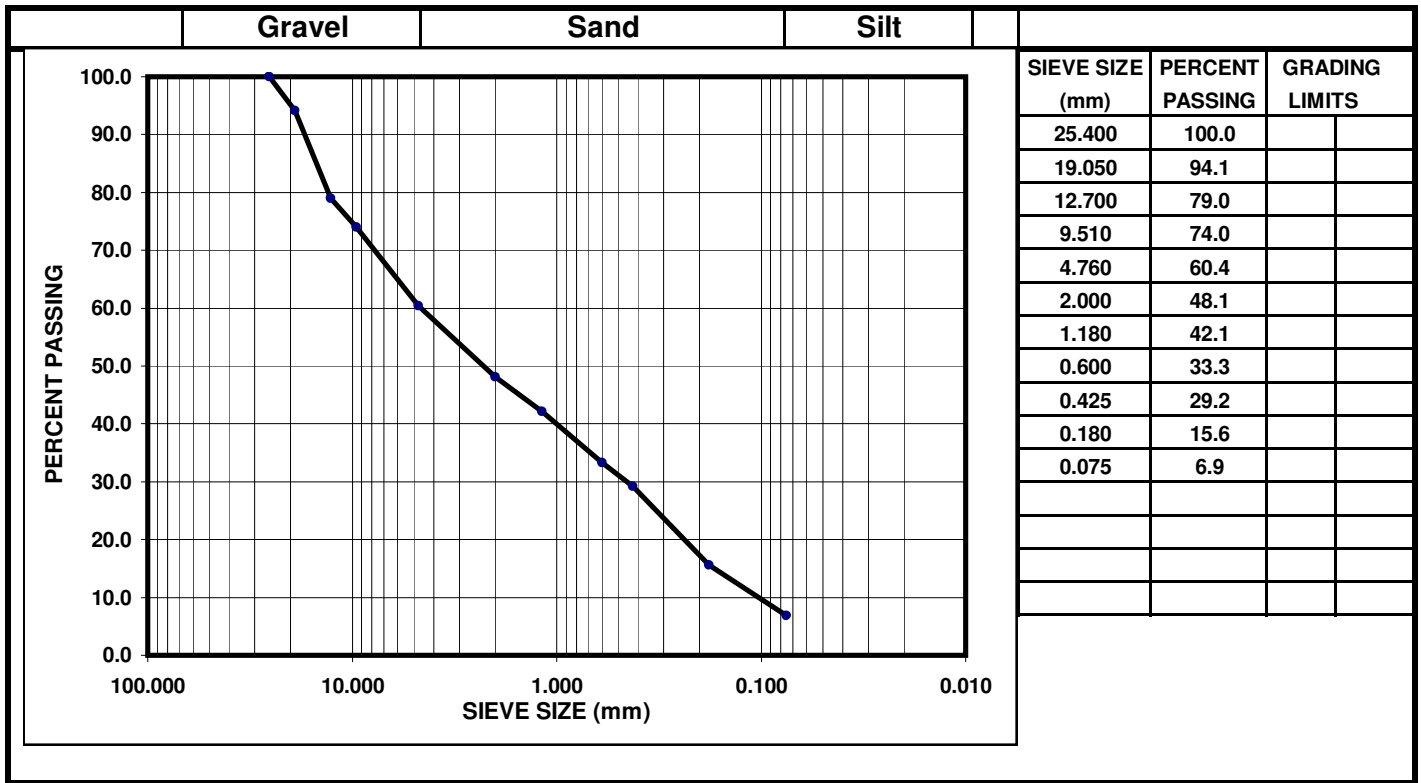
Construction Materials Laboratory  
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 Fax. (709) 722-5025





**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-BH-01-SA9
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sand and gravel, trace silt/clay
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	15-Aug-08
<b>Sampled By:</b>	Aisha Hyde of AMEC	<b>Date Tested:</b>	5-Dec-08
<b>Location:</b>	BH-01	<b>Sample Depth:</b>	12.2m - 12.3 m



**Comments:**                      %Cobbles 0.0                      %Gravel 39.6                      %Sand 53.5                      %Silt/Clay 6.9  
 Natural Moisture content of 8.0%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

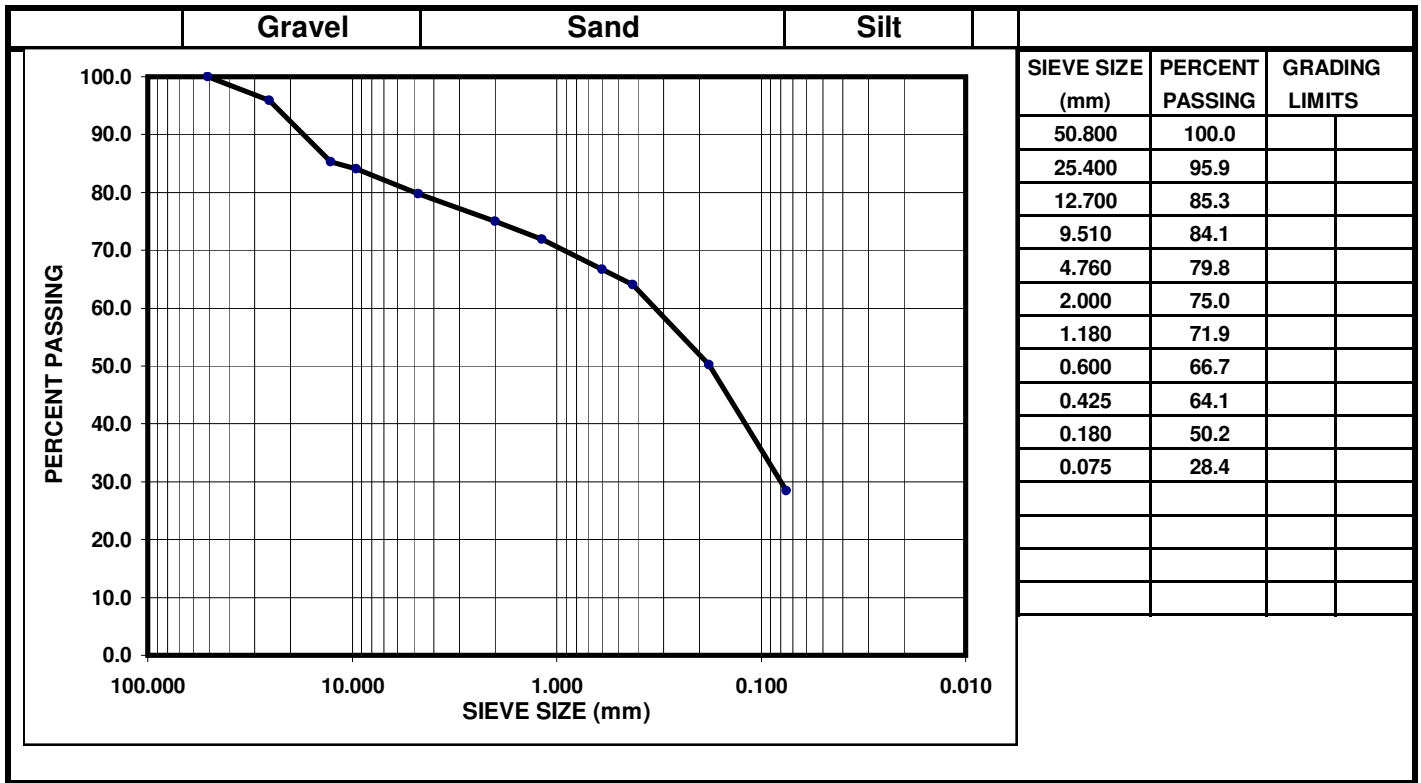
AMEC Earth & Environmental  
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 Fax. (709) 722-5025



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 1-BH-01-SA10
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Silty/clayey gravelly sand
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	15-Aug-08
<b>Sampled By:</b>	Aisha Hyde of AMEC	<b>Date Tested:</b>	5-Dec-08
<b>Location:</b>	BH-01	<b>Sample Depth:</b>	13.7m - 14.3 m



**Comments:**            %Cobbles 0.0            %Gravel 20.2            %Sand 51.4            %Silt/Clay 28.4  
 Natural Moisture content of 11.0%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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**LOG OF BOREHOLE DC1051-LOT1-BH02**

PROJECT No.:	TF8310458-5000	CONTRACTOR:	AMEC E&E
CLIENT:	Nalcor Energy - Lower Churchill Project	EQUIPMENT:	Winkie Drill
PROJECT NAME:	Lower Churchill Project - HVdc Transmission Line - Soldiers Pond to Gull Island	LOGGED BY:	Sheldon Adey
LOCATION:	Gull Island - South Side of Churchill River Crossing	ELEVATION (m):	
DATE STARTED:	September 26, 2008	DATE COMPLETED:	September 27, 2008

ELEVATION (m)	DEPTH (m)	SYMBOL	STRATIGRAPHIC DESCRIPTION	SAMPLES				REMARKS
				No.	TYPE	RECOVERY (%)	N VALUE or RQD (%)	
			TOPSOIL - roots and moss, loose, occasional small boulders.					
			Weathered sand, gravel and cobbles, occasional small boulders, reddish brown, compact.					
			FLUVIAL SOIL - Sand, gravel and cobbles, occasional small boulders, well rounded particles, very dense, moist. Occasional silt layers.	1	AUGER			
	1							
				2	SPT	100	>50	SPT refusal at 1.80 m (12, 78 for 0.15 m)
	2							
				3	AUGER			
	3							
				4	CORE			
	4							
			Borehole terminated at 4.6 m below ground surface due to limitations of drilling equipment in well rounded gravel, cobbles and small boulders.					

VERTICAL SCALE: 1:30

CHECKED BY: C. Miles



**Appendix B6**

**Bedrock Mapping Records**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

**MAPPING STATION: DC1051-LOT 1-PI 2-STN-07**

Client:	Nalcor Energy - Lower Churchill Project				Date:	September 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5866232	E 606905	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

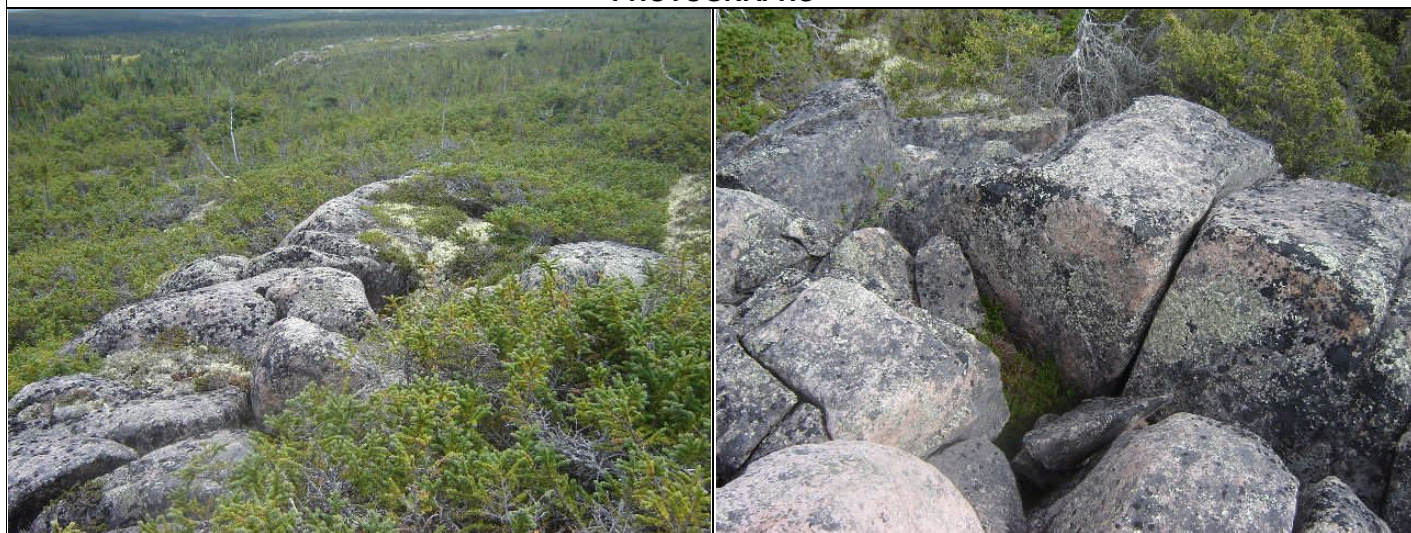
<b>Outcrop dimensions (m)</b>	18 x 17	
<b>Lithology</b>	White with a pinkish tint, feldspar - quartz rich, coarse - grained, weathered granite. Outcrop appears on the side of a hill. Bedrock is jointed and appears to have been heaved from the ground due to frost action and erosion of hill side.	
<b>Structure</b>	Bedding orientation:	Jointing:
	180°/35°NW	Dominant joint set trending 140°/75° and spaced 0.5 m apart. Secondary joint set trending 060°/90° and spaced 0.25 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 1-PI 35-STN-06</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	September 7, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5764543	E 495816	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	10 x 15	
<b>Lithology</b>	Pinkish white, feldspar - rich, coarse - grained monzonite. Bedrock is jointed and appears to have been heaved from the ground due to frost action.	
<b>Structure</b>	Bedding orientation:	Jointing:
	340°/15°SE	Dominant joint set trending 180°/90° and spaced 2.0 m apart. Secondary joint set trending 090°/90° and spaced 0.75 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 1-PI 35-STN-05</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	September 7, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5764509	E 495820	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	10 x 15	
<b>Lithology</b>	Pinkish white, feldspar - rich, coarse - grained monzonite.	
<b>Structure</b>	Bedding orientation:	Jointing:
	015°/45°W 012°/41°W 010°/55°W	Dominant joint set trending 038°/90° and spaced 0.75 m apart. Secondary joint set trending 240°/90° and spaced 0.75 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 1-PI 41-STN-04</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	September 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5725887	E 506988	Inspector: Brad Walsh	

**PHOTOGRAPHS**



<b>Description</b>	
<b>Outcrop dimensions (m)</b>	10 x 25
<b>Lithology</b>	Pinkish white, feldspar rich, coarse - grained granite.
<b>Structure</b>	Bedding orientation:
	035°/25°E 040°/45°E
	Jointing:
	Joints trending 085°/90° and spaced 0.25 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 1-PI 41-STN-03</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	September 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5725871	E 507000	Inspector: Brad Walsh	



<b>Description</b>		
<b>Outcrop dimensions (m)</b>	3 x 30	
<b>Lithology</b>	Ridge of pinkish white, feldspar rich, coarse - grained granite.	
<b>Structure</b>	Bedding orientation:	Jointing:
	015°/50°E 020°/45°E	None observed.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 1-PI 43-STN-02</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	September 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5720012	E 504367	Inspector: Brad Walsh	

**PHOTOGRAPHS**



<b>Description</b>		
<b>Outcrop dimensions (m)</b>	3 x 8	
<b>Lithology</b>	Coarse grained, pink, feldspar - rich granite.	
<b>Structure</b>	Bedding orientation:	Jointing:
	320°/15°W	Joints trending 080°/90° and spaced 1.0 m apart.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 1-PI 44-STN-01</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	September 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5713113	E 505368	Inspector: Brad Walsh	

**PHOTOGRAPHS**



Description		
<b>Outcrop dimensions (m)</b>	10 x 20	
<b>Lithology</b>	Dark grey, weathered limestone	
<b>Structure</b>	Bedding orientation:	Jointing:
	005°/10°W 010°/15°W 012°/13°W	Dominate joint set trending 090°/90° and spaced 1.0 m apart. Secondary joint set trending 115°/90° and spaced 0.75 m apart.

**Appendix B7**

**River Crossing Data**

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 01</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5859599	E 615700	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	3 – 30	Located between PI 3 and PI 4
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles and sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 02</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5858794	E 624761	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 30	Located between PI 4 and PI 5
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles, boulders, sand and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 03</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5858487	E 628524	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	10 – 15	600 m west of PI 5
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles, boulders, sand and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 04</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5852296	E 644792	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 6 and PI 7
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles sand and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 05</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5851541	E 648038	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>  Located between PI 6 and PI 7 Low sloping banks
<b>Estimated Width (m)</b>	3 – 10	
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles sand and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 06</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5850902	E 663583	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 7 and PI 8 Low sloping banks
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles and sand	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 07 (Kenamu River)</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5851064	E 666742	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	40 – 50	2.5 km west of PI 8 Shallow in some places but deep in others
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles, boulders, sand, mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 08</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5845129	E 675006	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	5.0 (approx)	830 m northwest of PI 9 Appears deep in places
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 09 (Kenamu River)</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5838316	E 680635	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 40	2.3 km northwest of PI 10 Large river crossing
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles, sand and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 10</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5837943	E 680981	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	1.8 km northwest of PI 10 Banks are shallow
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles, sand and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 11</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5834915	E 685016	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 10 and PI 11 Banks are shallow
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles, sand and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 12</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5832176	E 693699	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>  Located between PI 11 and PI 12 Banks are shallow
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles, sand and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 13</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5831760	E 299888	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	1 – 3	Located between PI 12 and PI 13
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 14 (Joir River)</b>					
Client:	Nalcor Energy - Lower Churchill Project				Date: November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 5824346	E 312135	Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 15	1.2 km southeast of PI 14
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Bottom not visible	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 15</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 5, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5820217	E 322664	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 15	2.0 km northeast of PI 15
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles and sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 16</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5819618	E 335578	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 15 and PI 16 Tributary of the St. Augustin River
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 17 (St. Augustin River)</b>					
Client:	Nalcor Energy - Lower Churchill Project				Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 5819709	E 342596	Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 40	Located between PI 15 and PI 16 Tributary of the St. Augustin River
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Boulders, cobbles and sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 18</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5818985	E 346227	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 30	1.4 km southeast of PI 16
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders and cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 19</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5804383	E 365192	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
Estimated Depth (m)	0.3 – 1.2	<b>Notes</b>
Estimated Width (m)	5 – 30	Located between PI 19 and PI 20
Estimated Velocity (fast or slow)	Fast	
Estimated Substrate Composition	Boulders and cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 20</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5800417	E 372729	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	4 – 8	Located 1.0 km east of PI 20
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Boulders, cobbles and sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



**RIVER 21 (St. Paul River, First Crossing)**

Client:	Nalcor Energy - Lower Churchill Project			Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 5787504	E 407429	Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations From Air**

Estimated Depth (m)	> 1.0	Notes
Estimated Width (m)	30 – 40 to > 40	Located between PI 24 and PI 25
Estimated Velocity (fast or slow)	Medium to fast	
Estimated Substrate Composition	Boulders, cobbles, sand and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 22 (St. Paul River, Second crossing)</b>					
Client:	Nalcor Energy - Lower Churchill Project				Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 414646	E 5790336	Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	25 – 40	1.0 km southwest of PI 25
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Boulders, cobbles and sand	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 23</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5787591	E 425503	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	3 – 10	Located adjacent to PI 26
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Mud, sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 24 (St. Paul River)</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5788716	E 433719	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	10 – 20	Located between PI 26 and PI 27
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Mud, cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 25 (St. Paul River)</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 5776583	E 452913	Inspector: Brian Walsh

**PHOTOGRAPH**



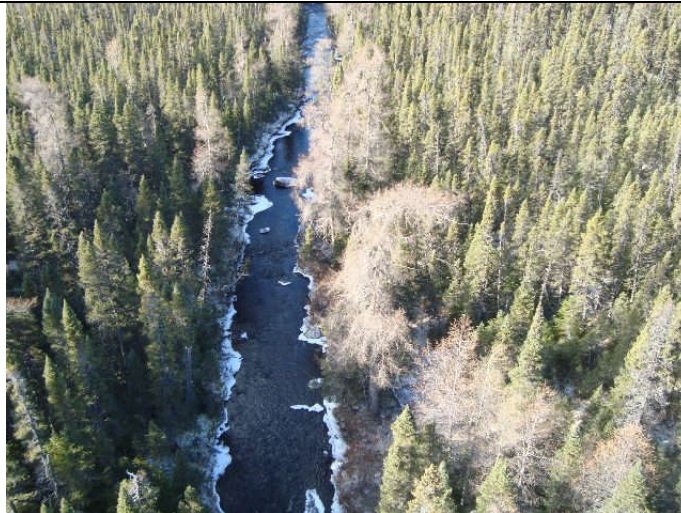
<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 30	1.2 km northwest of PI 29
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 26</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5774913	E 454397	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>
<b>Estimated Width (m)</b>	10 (approx)	1.0 km southeast of PI 29
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 27</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5771501	E 457553	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.0 (or deeper)	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 29 and PI 30
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders, cobbles and sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 28</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5766243	E 464472	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 15	2.0 km east of PI 30
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Boulders and cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 29</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5763370	E 496743	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
Estimated Depth (m)	0.6 – 1.2	Notes
Estimated Width (m)	10 (approx)	Located between PI 35 and PI 36 Banks are shallow
Estimated Velocity (fast or slow)	Medium to fast	
Estimated Substrate Composition	Mud and cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 30 (Beaver Brook)</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5753661	E 501622	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	30 (approx)	Located between PI 37 and PI 38 Banks are shallow
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Mud, trees, cobbles	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 31</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5747051	E 505187	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>
<b>Estimated Width (m)</b>	10 – 15	Located between PI 37 and PI 38 Banks steep in places
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders, bedrock	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 32 (Lost River)</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location:	N 5730709	E 510122	Inspector:	Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 - 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	15 (approx)	Located 1.3 km southwest of PI 40
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders, bedrock	

**Appendix B8**

**Campsite Data**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE B – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of Campsite B located approximately 5 km north-northwest of PI 16.**



**Photo 2 – View of Campsite B looking north.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE B – PHOTOGRAPHIC JOURNAL**



**Photo 3 – View of Campsite B from ground level.**



**Photo 4 – View of Campsite B from ground level.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE B – TEST PIT LOG**

<b>TEST PIT: DC1051-LOT 1-CSB-TP-01</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 24 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5824959 E 342792	Inspector: Calvin Miles

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material with moss, mixed with some sand and gravel, occasional boulders on surface moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.4	WEATHERED GLACIAL TILL – SAND AND GRAVEL with some cobbles, moist, loose to compact, reddish brown.	N/A	N/A	N/A
0.4 – 1.3	GLACIAL TILL – SAND AND GRAVEL with trace to some silt, occasional sub angular cobbles, moist, compact to dense, grey.	DC1051-Lot1-CampB-TP01	0.20 – 0.90	Grab
1.3 – 1.4	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 35		Estimated Boulders (%) Trace		Estimated Max Diameter (m) 0.20
Start Time: 9:30 a.m.		End Time: 4:35 p.m.		

**General Notes**

1. Test Pit excavated to 0.90 m with pick-axe and probed from 0.9 m to 1.4 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit manually excavated by hand.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE B – PERCOLATION TEST RECORD**

<b>PERCOLATION TEST: DC1051-LOT 1-CSB-PERC-01</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: September 24, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract:	WTO DC 1051	Location	N 5824959	E 342792	Inspector: Calvin Miles

<b>TEST LOCATION &amp; DEPTH</b>
<b>LOT 1 – POTENTIAL CAMPSITE B</b>

- Campsite B – Located approximately 5 km north-northwest of PI 16.
- Coordinates are UTM; NAD83; Zone 21.
- Percolation Test conducted from 0.5 m to 0.75 m below ground surface.

<b>STRATIGRAPHY &amp; TEST DETAILS</b>
--

- **STATIGRAPHY:** 0.4 m – 0.9 m: SAND and GRAVEL (Glacial Till).
- **SOIL DESCRIPTION AT TEST DEPTH:** Performed in sand with some gravel and trace silt.
- **TEST HOLE DIMENSIONS:** 330 mm (diameter) x 375mm (depth).
- **ELEVATION:** 442 m
- **TEST HOLE PREPERATION:** Small cobbles and gravel loosely placed at bottom of test hole. Tap water used.

<b>PERCOLATION TEST RESULTS</b>
---------------------------------

<b>TIME</b>	<b>REFERENCE MEASUREMENT (mm)</b>	<b>WATER LEVEL DROP (mm)</b>	<b>Notes</b>
13:31:00	0	-	• Start Test
13:35:00	-25	25	• Time (t) achieved
13:37:30	-50	50	• End Test
	<b>Time (t) =</b>	<b>4 minutes</b>	

**Note: The Time (t) is expressed as the time required for the water level to drop 2.5 cm.**

<b>PHOTOS</b>
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE C – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of Campsite C located approximately 150 m east - northeast of HVDC proposed route and 1.2 km northwest of PI 29.**



**Photo 2 – View of Campsite C looking west.**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE C – PHOTOGRAPHIC JOURNAL**



**Photo 3 – View of Campsite C looking east.**



**Photo 4 – View of Campsite C looking south.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL CAMPSITE C – PERCUSSION DRILLING LOG**

<b>PROBE ID: DC1051-LOT 1-CSC-PD-01</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of Campsite C (approximately 1.2 km northwest of PI 29)	Inspector: Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Depth (m)	Notes
1	5776843	452498	1.4	Bedrock not encountered.
2	5776343	453146	1.4	Bedrock not encountered.

<b>Generalized Observations</b>
Area is greater than 5 ha in size and comprised mainly of small trees and shrubs. A river 20 m – 30 m in width is adjacent to the site.

**Appendix B9**

**Marshalling Yard Data**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL MARSHALLING YARD SITE B – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of Marshalling Yard Site B located adjacent to the intersection of Route 510 and the secondary road that leads to L'Anse Amour.**



**Photo 2 – View of Marshalling Yard Site B looking southeast.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL MARSHALLING YARD SITE B – PHOTOGRAPHIC JOURNAL**



**Photo 3 – View of the rock quarry located within the vicinity. Note the exposures of the arkosic sandstone and siltstone of the Brador Formation.**



**Photo 4 – View of Marshalling Yard Site B looking southwest.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 1 – POTENTIAL MARSHALLING YARD SITE B - PERCUSSION DRILLING LOG**

<b>PROBE ID: DC1051-LOT 1-MYB-PD-01</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: September 5 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of Marshalling Yard Site B (located adjacent to Route 510) Inspector: Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5704692	508761	0.25	Encountered a thin layer of soil before refusal on bedrock.
2	5704560	508557	0.5	Encountered a thin layer of soil before refusal on bedrock.
3	5704213	508337	0.3	Encountered a thin layer of soil before refusal on bedrock.
4	5704123	508984	0.4	Encountered a thin layer of soil before refusal on bedrock.
5	5704583	509245	0.4	Encountered a thin layer of soil before refusal on bedrock.
6	5704800	509110	0.6	Encountered a thin layer of soil before refusal on bedrock.

<b>Generalized Observations</b>
The potential site for Marshalling Yard B is located adjacent to Route 510. A thin veneer of soil and vegetative growth was encountered before refusal on bedrock. Also within the vicinity is a rock quarry that exposes the arkosic sandstone and siltstone belonging to the Brador Formation of Southern Labrador.

**APPENDIX C**  
**TRANSMISSION LINE DATA – LOT 2**

**Appendix C1**

**Test Pit Logs & Laboratory Results**

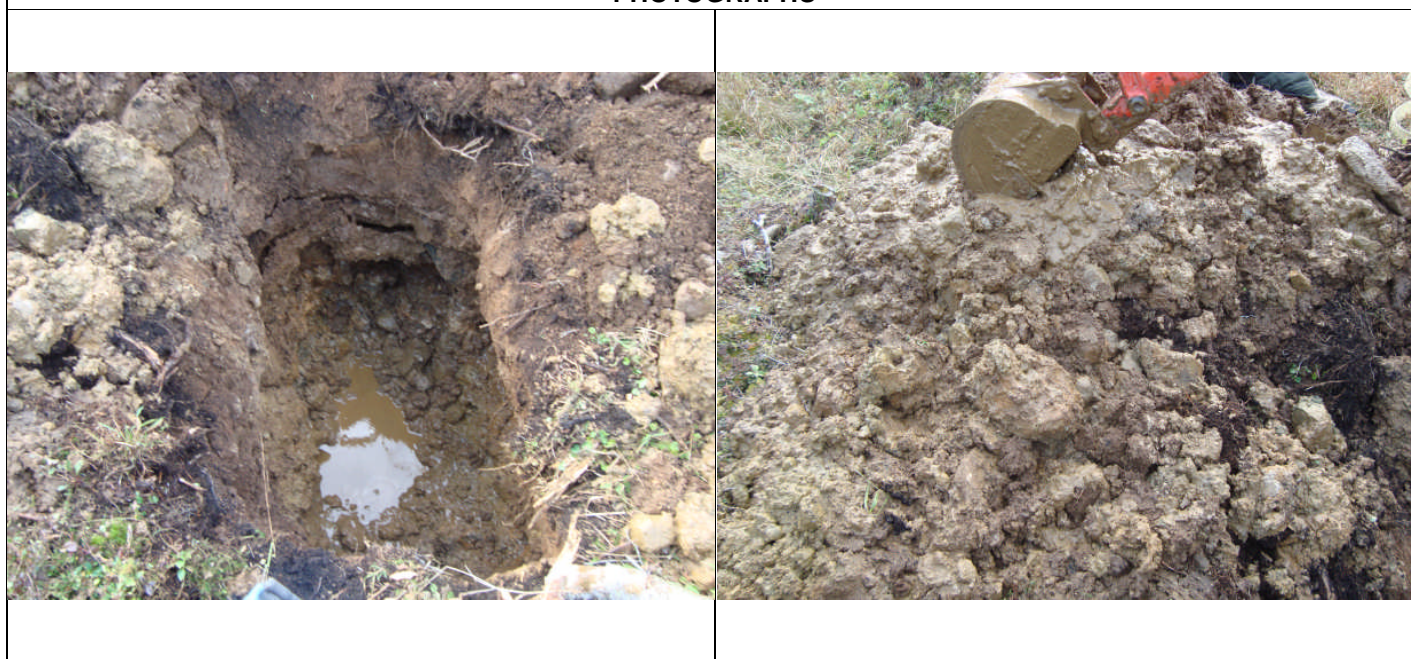




**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 1-TP-071				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 10 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5680045 E 522298	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.8	SILTY SAND with some gravel, some sub-angular cobbles, moist, compact, light grey.	N/A	N/A	N/A
0.8 – 2.3	SILTY, SANDY GRAVEL with some sub-angular cobbles, trace angular boulders, wet, dense, dark brown.	DC1051-LOT 2-PI 1-TP-071	1.0 - 1.5	Grab
2.3 – 2.5	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 5		Estimated Max Diameter (m) 0.5
Start Time: 3:05 pm		End Time: 4:00 pm		

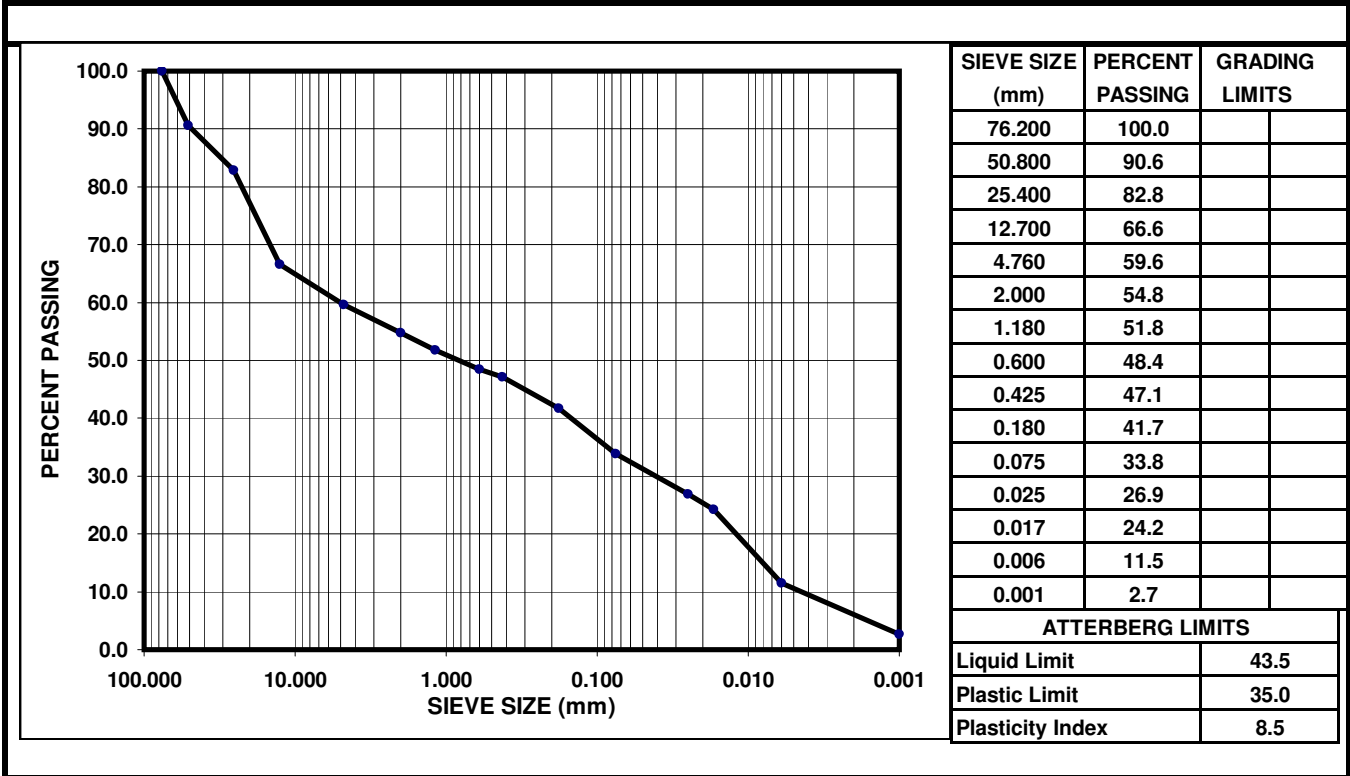
**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 2.5 m using pionjar drill.
2. Groundwater observed at 1.1 m flowing at an approximate rate of 0.5 L/min.
3. Some sloughing in test pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-Lot 2-PI01-TP071  
**Project:** Geotechnical Investigation:      **Sample Type:** Sandy, Silty GRAVELS, trace  
 HVDC Gull Island to Soldiers Pond      Clay  
**Client:** NL Hydro      **Date Sampled:** 10-Oct-08  
**Sampled By:** Brad Walsh of AMEC      **Date Tested:** 25-May-09  
**Location:** TP071      **Sample Depth:** 1.0m - 1.5m



**Comments:** %Cobbles=0.0 %Gravel=40.4 %Sand=25.8 %Silt=23.7 %Clay=7.4 %Colloids=2.7  
 Natural Moisture content of 55.5%.  
 Organics present in sample

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per: *[Signature]*

AMEC Earth & Environmental  
 133 Crosbie Road  
 P.O. Box 13216, St John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-7023  
 Fax. (709) 722-7353

Construction Materials Laboratory  
 36 Pippy Place  
 P.O. Box 13216, St. John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-5062  
 Fax. (709) 722-5025



# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT 2-PI 1-TP-071  
Test pit

Date Sampled: October 10, 2008 Sampled By B. Walsh of AMEC

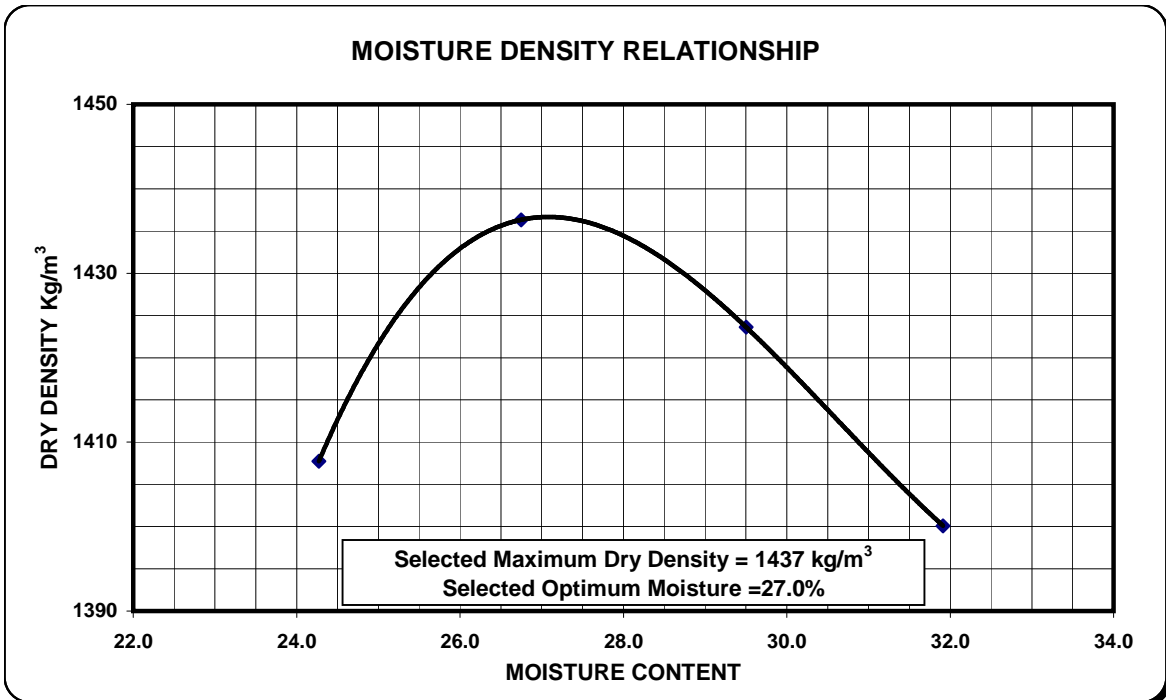
Date Received: November 12, 2008 Preparation 

Moist	
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Percent Retained:		Percent Retained:	20mm	29.5%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content		24.3	26.7	29.5	31.9	
Dry Density kg/m <sup>3</sup>		1408	1436	1424	1400	



Note : Oversized Material Correction = 29.5%  
 Maximum Dry Density 1725 kg/m<sup>3</sup>  
 Maximum Moisture 27.0 %

Tested by, Bill Motty Reviewed by, R. Collins



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 2-TP-072</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 10 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5674886	E 525618 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.4	SANDY GRAVEL with some silt, some sub-rounded cobbles, some sub-rounded boulders, dry, loose to compact, dark brown.	N/A	N/A	N/A
0.4 – 1.5	SANDY GRAVEL with sub-angular cobbles, some silt, some angular boulders, moist, compact, dark grey.	DC1051-LOT 2-PI 2-TP-072	0.8 – 1.0	Grab
1.5	Test pit terminated at 1.5 m on BEDROCK.			
Estimated Cobbles (%) 20%		Estimated Boulders (%) 15		Estimated Max Diameter (m) 0.8
Start Time: 4:20 pm		End Time: 4:55 pm		

**General Notes**

1. Test pit terminated at 1.5 m on Bedrock.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 3-TP-073</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5673297 E 529752	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.4	SANDY GRAVEL with some silt, some organics throughout, some sub-rounded cobbles, dry, loose, dark brown.	N/A	N/A	N/A
0.4 – 1.3	SANDY GRAVEL AND SILT with some sub-rounded cobbles, some sub-rounded boulders, dry, compact, dark grey.	DC1051-LOT 2-PI 3-TP-073	0.5 – 1.0	Grab
1.3	Test pit terminated at 1.3 m on BEDROCK.			
Estimated Cobbles (%) 15		Estimated Boulders (%) 15		Estimated Max Diameter (m) 0.5
Start Time: 9:00 am		End Time: 10:10 am		

**General Notes**

1. Test pit terminated at 1.3 m on Bedrock.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 4-TP-074</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5668942	E 531709 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material with moss, fibrous, moist, loose, dark brown to black.	N/A	N/A	N/A
0.4 – 2.0	PEAT – organic soil, rootlets, wet, loose, dark brown.	DC1051-LOT 2-PI 4-TP-074	1.0 – 1.5	Grab
2.0	Test pit terminated at 2.0 m in PEAT.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 10:15 am	End Time: 10:45			

**General Notes**

- Test pit terminated at 2.0 m in Peat due to limits of kabota.
- Base of pit was not probed due to sloughing of test pit; was not safe to attempt.
- Groundwater observed at 0.6 m flowing at an approximate rate of 1.0 L/min.
- Some sloughing within Peat layer during excavation.
- North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
- Test pit excavated with a BX24 Kabota.







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 5-TP-075</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5664374 E 529693	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, fibrous, dry, loose, dark brown to black.	N/A	N/A	N/A
0.4 – 1.7	PEAT – organic soil, rootlets, wet, loose, dark brown.	N/A	N/A	N/A
1.7 – 2.6	SILTY SAND AND GRAVEL, moist, compact, medium grey.	DC1051-LOT 2-PI 5-TP-075	2.0	Grab
2.6	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 11:05 am	End Time: 11:30 am			

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.6 m using pionjar drill.
2. Groundwater observed at 0.3 m flowing at an approximate rate of 2 – 3 L/min.
3. Some sloughing within Peat layer during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 6-TP-076</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5648831 E 524510	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 1.2	SAND AND GRAVEL with some silt, some angular cobbles, some angular boulders, moist, compact, medium grey.	DC1051-LOT 2-PI 6-TP-076	0.5	Grab
1.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 10		Estimated Max Diameter (m) 0.4
Start Time: 12:45 pm		End Time: 1:20 pm		

**General Notes**

1. Test pit excavated to 0.7 m with backhoe and probed from 0.7 m to 1.2 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 7-TP-077				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5643066 E 519337	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.6	SAND AND GRAVEL with some silt, some angular cobbles, trace angular boulders, wet, compact, medium to dark grey.	N/A	N/A	N/A
0.6 – 2.4	COBBLY SAND AND GRAVEL with trace silt, trace angular boulders, moist, compact, dark grey.	DC1051-LOT 2-PI 7-TP-077	0.8 – 1.0	Grab
2.4 – 2.5	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 5		Estimated Max Diameter (m) 0.5
Start Time: 1:50 pm		End Time: 2:10 pm		

**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 2.5 m using pionjar drill.
2. Groundwater observed at 1.3 m flowing at an approximate rate of 0.5 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 8B-TP-078</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5635820	E 515519 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.9	SANDY GRAVEL AND COBBLES with trace silt, some angular boulders, dry to moist, loose to compact, brown.	DC1051-LOT 2-PI 8B-TP-078	0.5	Grab
0.9 – 1.0	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 35		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.4
Start Time: 2:45 pm		End Time: 3:20 pm		

**General Notes**

1. Test pit excavated to 0.8 m with backhoe and probed from 0.8 m to 1.0 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.







# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT 2-PI 8B-TP-078  
Test pit

Date Sampled: October 11, 2008 Sampled By B. Walsh of AMEC

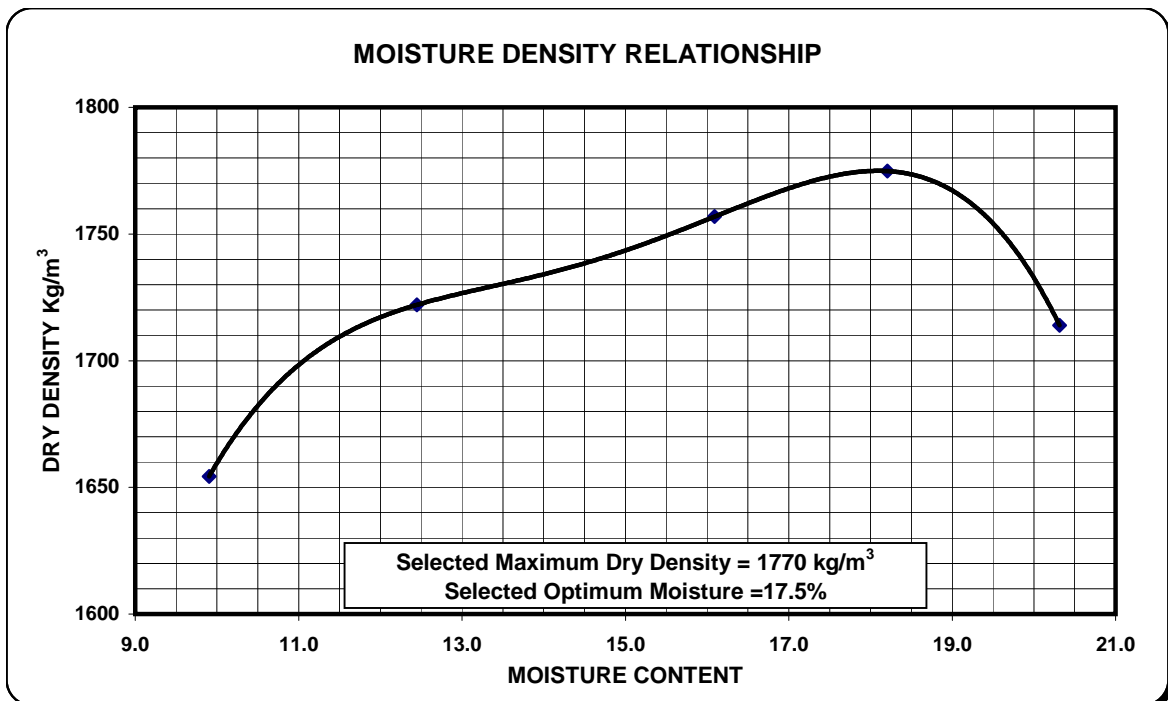
Date Received: November 11, 2008 Preparation 

Moist	
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Percent Retained:		Percent Retained:	20mm	41.0%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content		9.9	12.4	16.1	18.2	20.3
Dry Density kg/m <sup>3</sup>		1654	1722	1757	1775	1714



Note : Oversized Material Correction = 41.0%  
 Maximum Dry Density      2032 kg/m<sup>3</sup>  
 Maximum Moisture          17.5 %

Tested by, Bill Motty Reviewed by, R. Collins



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 9B-TP-079</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5628142	E 511125 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 1.3	COBBLES with some gravel, some sand, some angular boulders, moist, compact, dark brown.	DC1051-LOT 2-PI 9B-TP-079	0.5 – 1.0	Grab
1.3	Test pit terminated at 1.3 m on BEDROCK.			
Estimated Cobbles (%) 60		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.5
Start Time: 3:45 pm		End Time: 4:20 pm		

**General Notes**

1. Test pit terminated at 1.3 m on Bedrock.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 11B-TP-084				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5620745	E 505255 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SAND AND SILT with some gravel, moist, loose to compact, rusty brown.	N/A	N/A	N/A
0.5 – 1.5	COBBLES AND GRAVEL with some angular boulders, some sand, trace silt, wet, dense, dark grey to brown.	DC1051-LOT 2-PI 11B-TP-084	0.5	Grab
1.5 – 1.7	Refusal on a large boulder or probable bedrock.			
Estimated Cobbles (%) 45		Estimated Boulders (%) 25 - 30		Estimated Max Diameter (m) 0.7
Start Time: 4:15 pm		End Time: 5:00 pm		

**General Notes**

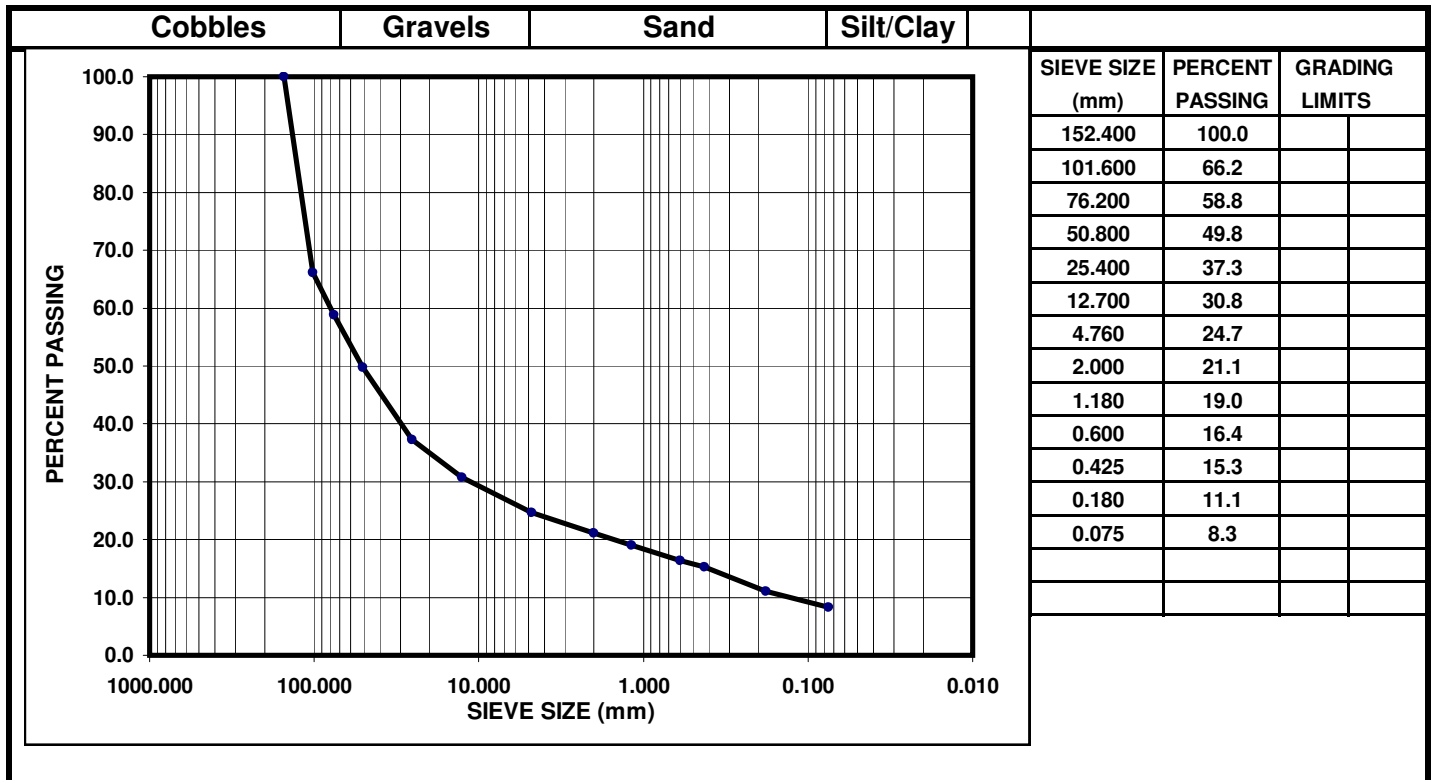
1. Test pit excavated to 0.9 m with backhoe and probed from 0.9 m to 1.7 m using pionjar drill.
2. Groundwater observed at 0.5 m flowing at an approximate rate of 1.0 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458  
**Project:** Geotechnical Investigation:  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro  
**Sampled By:** Brad Walsh of AMEC  
**Location:** TP-084

**Sample No.:** DC1051-LOT 2-PI 11B-TP-084  
**Sample Type:** Gravel, some sand, trace silt/clay  
 with cobbles  
**Date Sampled:** 12-Oct-08  
**Date Tested:** 20-Dec-08  
**Sample Depth:** 0.5 m



**Comments:**    %Cobbles 41.2            %Gravel 34.1            %Sand 16.4            %Silt/Clay 8.3  
 Natural Moisture content of 28.5%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

AMEC Earth & Environmental  
 133 Crosbie Road  
 P.O. Box 13216, St John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-7023  
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Construction Materials Laboratory  
 36 Pippy Place  
 P.O. Box 13216, St. John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-5062  
 Fax. (709) 722-5025



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 12B-TP-083				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5617298	E 501577 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 1.7	BOULDERS WITH GRAVEL AND SAND, some silt, some sub-angular cobbles, moist, loose to compact, dark brown to black.	DC1051-LOT 2-PI 12B-TP-083	0.5	Grab
1.7 – 1.8	Refusal on a large boulder or probable bedrock.			
Estimated Cobbles (%) 20	Estimated Boulders (%) 50	Estimated Max Diameter (m) 0.7		
Start Time: 2:45 pm	End Time: 3:30 pm			

**General Notes**

1. Test pit excavated to 0.7 m with backhoe and probed from 0.7 m to 1.8 m using pionjar drill.
2. Water seepage observed at the base of the pit flowing at an approximate rate of <1 L/min.
3. A second excavation was performed approximately 30 m to the south of this location in an attempt to advance below the boulder layer. Similar results were found.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 13B-TP-082</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5614874 E 499493	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	SAND AND GRAVEL with some silt, some angular cobbles, some angular boulders, wet, dense, dark brown to black.	N/A	N/A	N/A
0.5 – 3.0	SANDY GRAVEL with some silt, some sub-angular cobbles, some sub-angular boulders, wet, dense, greyish-brown.	DC1051-LOT 2-PI 13B-TP-082	1.5	Grab
3.0	No refusal to a depth of 3.0 m.			
Estimated Cobbles (%) 25		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.7
Start Time: 1:00 pm		End Time: 1:55 pm		

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 3.0 m using pionjar drill.
2. Water seepage observed at 0.5 m flowing at an approximate rate of <1 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



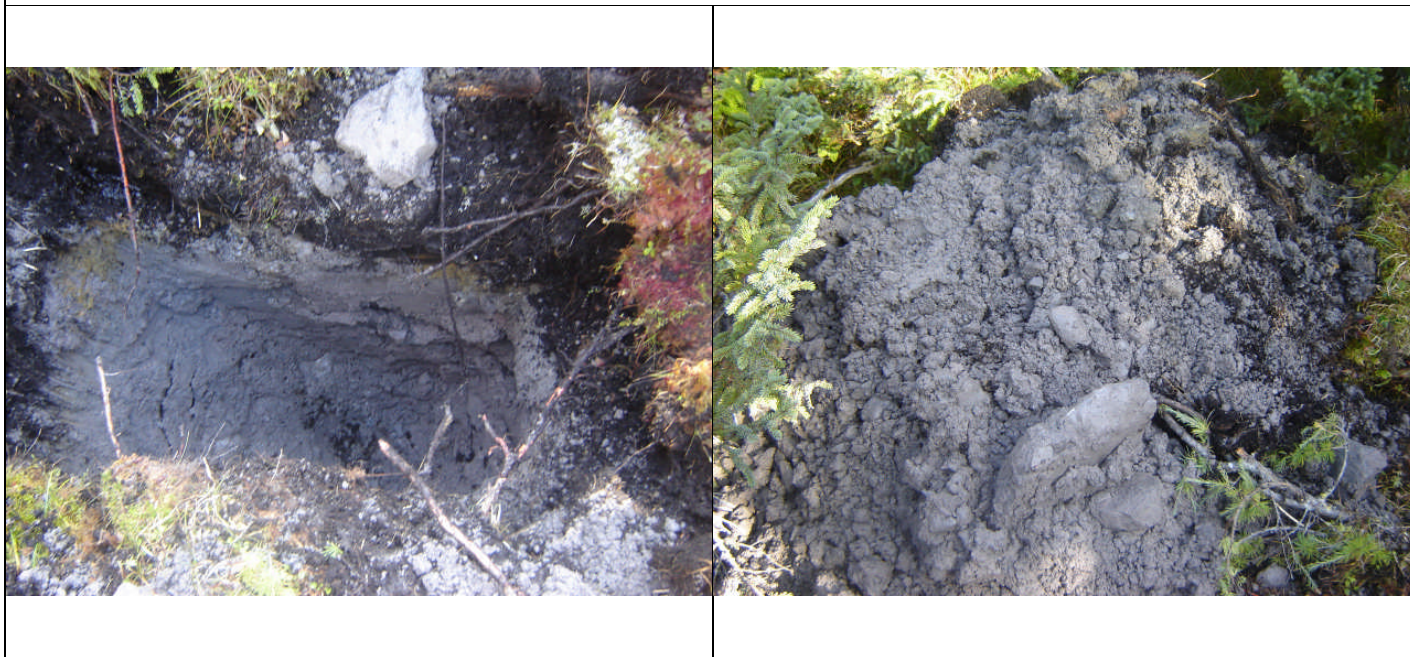




**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 14B-TP-081</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5609315 E 499425	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 3.0	SAND AND GRAVEL with some silt, some sub-angular cobbles, wet, compact to dense, light to medium grey.	DC1051-LOT 2-PI 14B-TP-081	1.0	Grab
3.0	No refusal to a depth of 3.0 m.			
Estimated Cobbles (%) 15	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.3		
Start Time: 11:35 am	End Time: 12:20 pm			

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 3.0 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**MOISTURE DENSITY RELATIONSHIP**

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT 2-PI 14B-TP-081  
Test pit

Date Sampled: October 12, 2008 Sampled By B. Walsh of AMEC

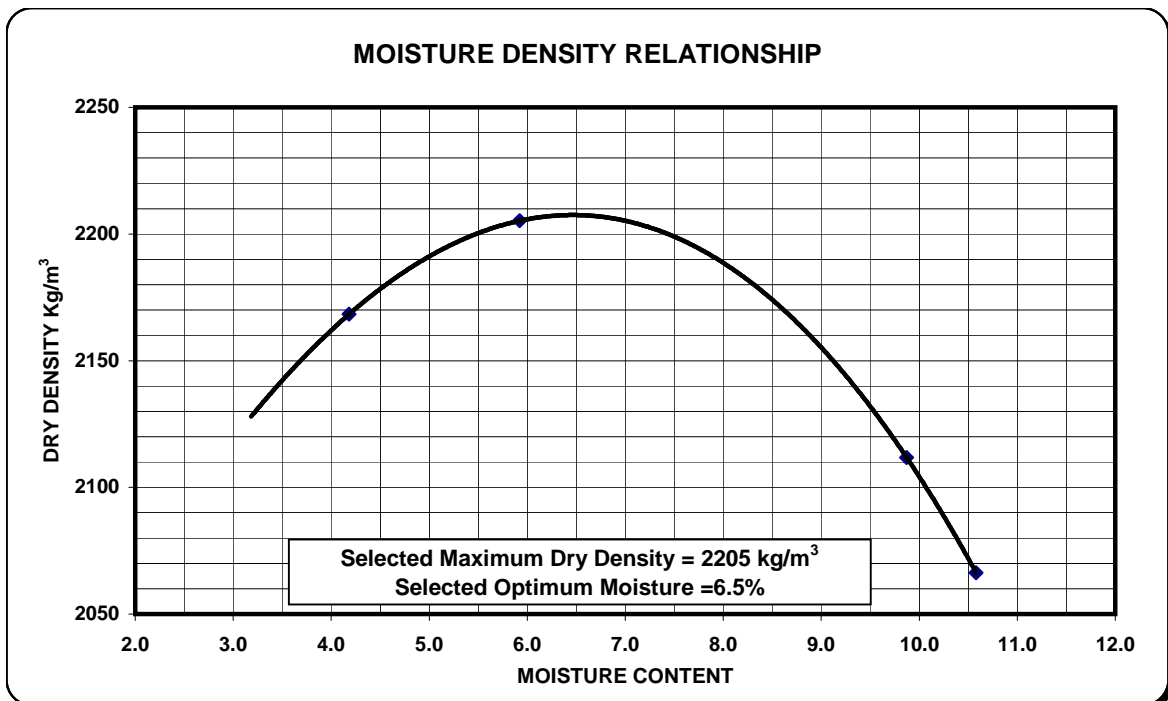
Date Received: November 12, 2008 Preparation 

DRY	
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Percent Retained:		Percent Retained:	20mm	24.6%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content		4.2	5.9	9.9	10.6	
Dry Density kg/m <sup>3</sup>		2168	2205	2112	2066	



Note : Oversized Material Correction = 24.6%  
 Maximum Dry Density 2256 kg/m<sup>3</sup>  
 Maximum Moisture 6.5 %

Tested by, Bill Motty Reviewed by, R. Collins



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 11A-TP-080</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5606572	E 500309 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 2.75	PEAT – organic soil, rootlets, wet, loose, dark brown to black.	DC1051-LOT 2-PI 11A-TP-080	1.0	Grab
2.75	No refusal to a depth of 2.75 m.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 9:45 am	End Time: 10:30 am			

**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 2.75 m using pionjar drill.
2. Water seepage observed at 0.4 m flowing at an approximate rate of 1 – 2 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 12A-TP-085</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 13 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5597900 E 497588	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, trace silt, dry, loose, dark grey to black.	N/A	N/A	N/A
0.5 – 2.1	SAND AND GRAVEL with some angular boulders, trace silt, some angular cobbles, moist, compact, dark brown.	DC1051-LOT 2-PI 12A-TP-085	1.5	Grab
2.1 – 2.4	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 40 - 50		Estimated Max Diameter (m) 0.6
Start Time: 10:10 am		End Time: 11:30 am		

**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.4 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 13A-TP-069				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5596806 E 495407	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.6	GRAVELLY SAND with some fines, some angular cobbles, some angular boulders, dry, compact, light brown.	N/A	N/A	N/A
0.6 – 2.0	GRAVELLY, SANDY SILT AND BOULDERS, some angular cobbles, dry to moist, compact, medium to dark grey.	DC1051-LOT 2-PI 13A-TP-069	0.7 – 1.2	Grab
2.0 – 2.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20 - 25		Estimated Boulders (%) 40		Estimated Max Diameter (m) 0.8
Start Time: 3:30 pm		End Time: 4:20 pm		

**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.0 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 14A-TP-068				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5595127 E 492854	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SANDY GRAVEL with some silt, some angular cobbles, some angular boulders, dry to moist, compact, medium to dark brown.	N/A	N/A	N/A
0.5 – 1.2	SANDY GRAVEL WITH ANGULAR BOULDERS AND COBBLES (Probable Fractured Bedrock) some silt, dry to moist, loose to compact, dark brown to grey.	DC1051-LOT 2-PI 14A-TP-068	1.0	Grab
1.2	Test pit terminated at 1.2 m on BEDROCK.			
Estimated Cobbles (%) 35 – 40		Estimated Boulders (%) 35	Estimated Max Diameter (m) 0.7	
Start Time: 1:15 pm		End Time: 2:00 pm		

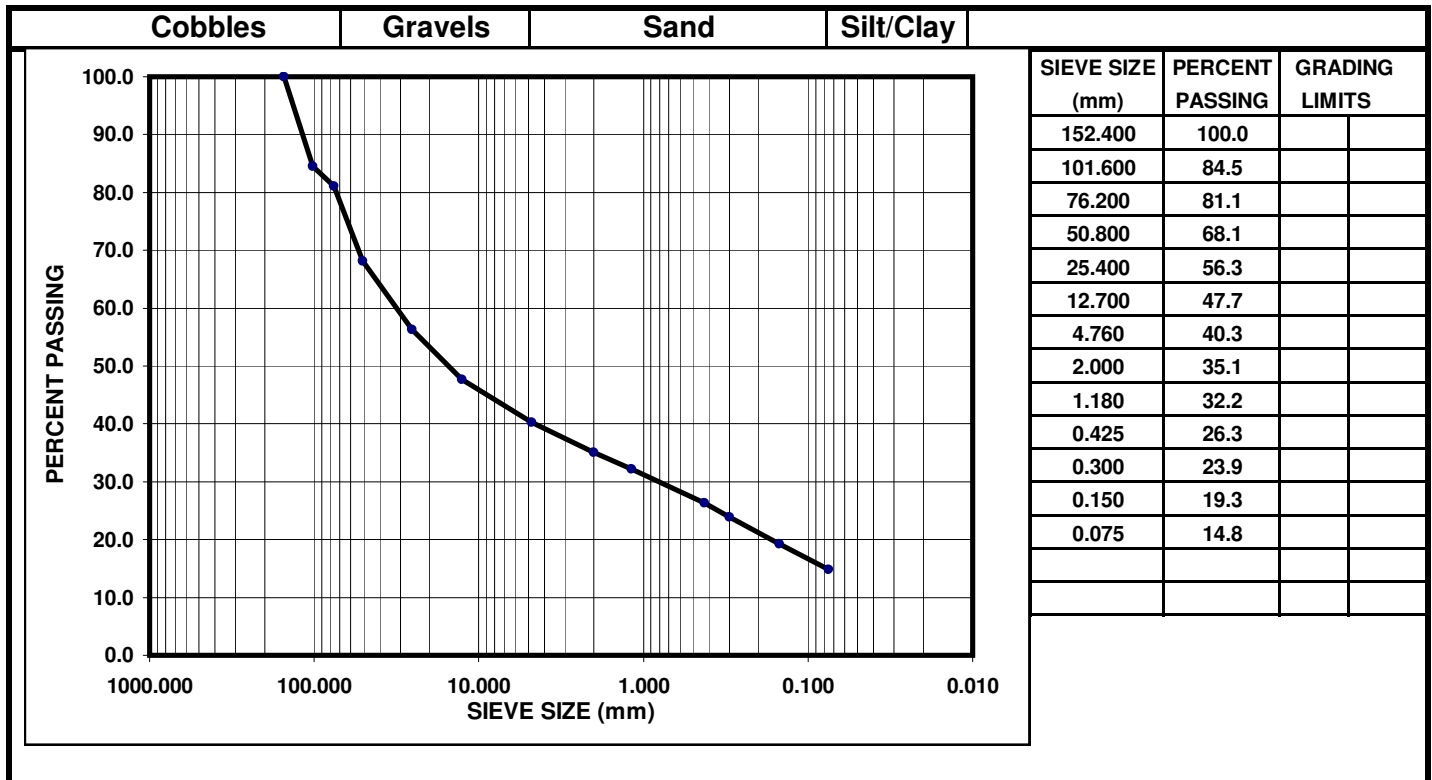
**General Notes**

1. Test pit terminated at 1.2 m on Bedrock.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 2-PI 14A-TP-068
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sandy gravel, some silt/clay with cobbles
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	9-Oct-08
<b>Sampled By:</b>	Brian Walsh of AMEC	<b>Date Tested:</b>	8-Jan-09
<b>Location:</b>	TP-068	<b>Sample Depth:</b>	1.0 m



**Comments:**    %Cobbles 18.9                      %Gravel 40.8                      %Sand 25.5                      %Silt/Clay 14.8  
 Natural Moisture content of 17.8%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 15A-TP-070				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5591214	E 490367
				Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.4	GRAVELLY SAND with some silt, some angular cobbles, trace angular boulders, dry, loose to compact, light to medium brown.	N/A	N/A	N/A
0.4 – 1.9	SANDY GRAVEL with some silt, some angular cobbles, trace angular boulders, dry, loose to compact, dark grey.	DC1051-LOT 2-PI 15A-TP-070	0.7 – 1.0	Grab
1.9 – 2.0	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10		Estimated Boulders (%) 5 - 10		Estimated Max Diameter (m) 0.4
Start Time: 5:30 pm		End Time: 6:20 pm		

**General Notes**

1. Test pit excavated to 1.2 m with backhoe and probed from 1.9 m to 2.0 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 16-TP-086</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 13 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5589030 E 486604	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.8	SAND AND SILT with some gravel, trace to some sub-rounded cobbles, moist, compact, dark brown.	DC1051-LOT 2-PI 16-TP-086	0.5	Grab
0.8	Test pit terminated at 0.8 m on BEDROCK.			
Estimated Cobbles (%) 10 - 15	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.3		
Start Time: 12:15 pm	End Time: 1:00 pm			

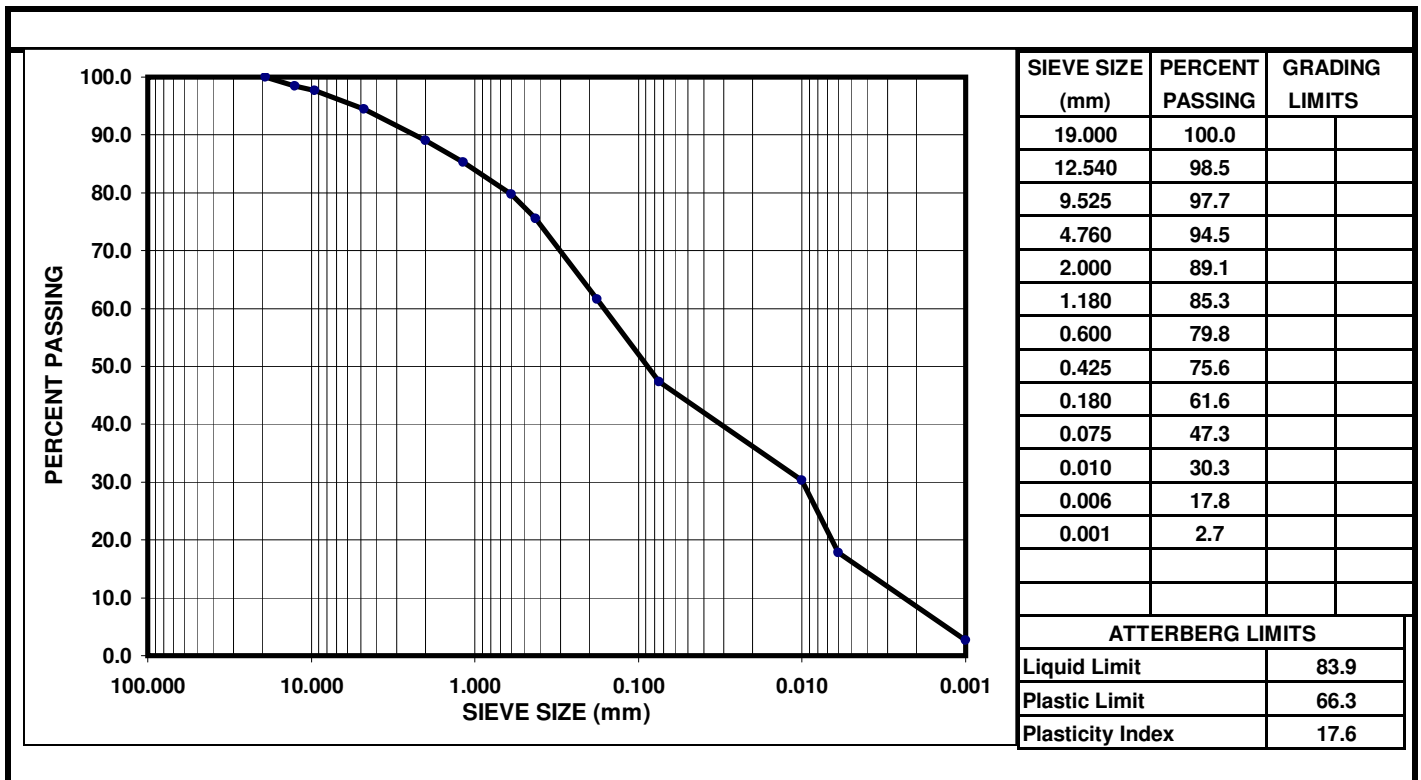
**General Notes**

1. Test pit terminated at 0.8 m on Bedrock.
2. A series of soil probes were executed surrounding the location. Bedrock refusal depths were similar and ranged from 0.6 – 1.0 m.
3. Test pit dry upon completion.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-Lot2-PI 16-TP086
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Silty SAND, some Clay, trace Gravel
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	13-Oct-08
<b>Sampled By:</b>	Brad Walsh of AMEC	<b>Date Tested:</b>	27-May-09
<b>Location:</b>	TP086	<b>Sample Depth:</b>	0.5m



**Comments:** %Cobbles=0.0 %Gravel=5.5 %Sand=47.2 %Silt=30.5 %Clay=14.1 %Colloids=2.7  
 Natural Moisture content of 93.0%.  
 Organics present in sample.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per: *[Signature]*

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 19-TP-087</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 13 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5572571 E 475734	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.7	SANDY GRAVEL with some silt, some sub-rounded cobbles, some sub-angular boulders, moist, poorly graded, loose to compact, reddish-brown.	N/A	N/A	N/A
0.7 – 2.6	SAND AND GRAVEL with some sub-rounded to sub-angular boulders, some silt, sub-rounded cobbles, moist, compact, dark brown to grey.	DC1051-LOT 2-PI 19-TP-087	1.5	Grab
2.6 – 2.8	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 - 15	Estimated Boulders (%) 20 – 25	Estimated Max Diameter (m) 0.4		
Start Time: 3:50 pm	End Time: 5:15 pm			

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.8 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 20-TP-088				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5569723	E 471431 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.2	SAND with some gravel, trace silt, oxidized, moist, loose to compact, reddish-rusty brown.	N/A	N/A	N/A
0.2 – 2.4	GRAVELLY SAND AND ANGULAR COBBLES (Probable Fractured Bedrock) with some silt, some angular boulders, wet, compact to dense, dark grey to brown.	DC1051-LOT 2-PI 20-TP-088	1.0	Grab
2.4	Refusal on probable bedrock.			
Estimated Cobbles (%) 25 - 30		Estimated Boulders (%) 10 - 15		Estimated Max Diameter (m) 0.4
Start Time: 9:00 am		End Time: 10:00 am		

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.4 m using pionjar drill.
2. Broken pieces of apparent bedrock are evident from 1.3 m – 1.7 m. Pieces range from 5 cm – 20 cm in size and are angular in shape.
3. Water seepage observed at the base of the pit flowing at an approximate rate of 1 – 2 L/min.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 21-TP-089</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5567340 E 470406	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	PEAT – organic soil, rootlets, wet, loose to compact, dark brown to black.	N/A	N/A	N/A
0.3 – 0.7	SILTY SAND with some gravel, moist, compact to dense, dark grey.	DC1051-LOT 2-PI 21-TP-089	0.5 – 0.7	Grab
0.7	Test pit terminated at 0.7 m on BEDROCK.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 10:50 am	End Time: 11:35 am			

**General Notes**

1. Test pit terminated at 0.7 m on Bedrock.
2. A series of soil probes were executed surrounding the location. Bedrock refusal depths were similar and ranged from 0.5 m – 0.7 m.
3. Water seepage observed at 0.3 m flowing at an approximate rate of 1 – 2 L/min.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 22-TP-090</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5566108 E 467892	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.4	Test Pit terminated at 0.4 m on BEDROCK.			
Estimated Cobbles (%) 10	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.2		
Start Time: 2:00 pm	End Time: 2:45 pm			

**General Notes**

1. Test pit terminated at 0.4 m on Bedrock.
2. A series of soil probes were executed surrounding the location. Bedrock refusal depths were similar and ranged from 0.4 m – 0.8 m.
3. Test pit dry upon completion.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 23-TP-091</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5557796 E 467554	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.7	SAND with trace silt and trace gravel, weathered, moist to wet, poorly graded, loose, greyish-brown.	N/A	N/A	N/A
0.7 – 3.1	SAND with trace silt and trace gravel, dry to moist, poorly graded, loose to compact, light brown.	DC1051-LOT 2-PI 23-TP-091	1.5	Grab
3.1	No refusal to a depth of 3.1 m.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 3:00 pm	End Time: 3:45 pm			

**General Notes**

1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 3.1 m using pionjar drill.
2. Water seepage observed at 0.7 m flowing at an approximate rate of 1 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.







# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT 2-PI 23-TP-091  
Test pit

Date Sampled: October 14, 2008 Sampled By B. Walsh of AMEC

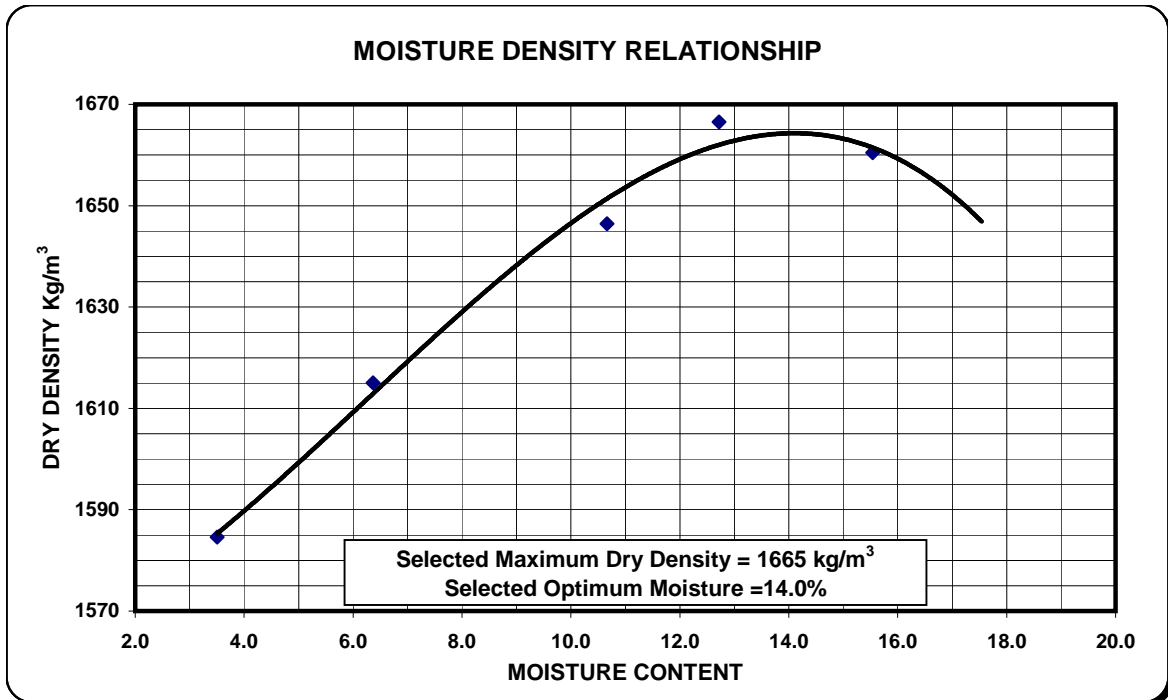
Date Received: November 12, 2008 Preparation 

DRY	
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Percent Retained:		Percent Retained:	20mm	0.0%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content		3.5	6.4	10.7	12.7	15.5
Dry Density kg/m <sup>3</sup>		1585	1615	1646	1667	1660



Note : Oversized Material Correction = 0.0%  
 Maximum Dry Density 1665 kg/m<sup>3</sup>  
 Maximum Moisture 14.0 %

Tested by, Bill Motty Reviewed by, R. Collins



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 24-TP-092				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5556530 E 465784	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.4	SAND AND GRAVEL with trace silt, some sub-rounded cobbles, dry to moist, loose, dark grey.	N/A	N/A	N/A
0.4 – 1.9	SAND AND GRAVEL with trace silt, some sub-rounded cobbles, some sub-rounded boulders, dry to moist, compact, rusty brown.	DC1051-LOT 2-PI 24-TP-092	1.3	Grab
1.9 – 2.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 – 15	Estimated Boulders (%) 10 – 15	Estimated Max Diameter (m) 0.3		
Start Time: 4:15 pm	End Time: 5:00 pm			

**General Notes**

1. Test pit excavated to 1.3 m with backhoe and probed from 1.3 m to 2.2 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 26-TP-093				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 18 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5551913 E 466578	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 2.3	SANDY GRAVEL AND ANGULAR COBBLES (Probable Fractured Bedrock) with trace silt, some angular boulders, wet, compact to dense, dark grey to brown.	DC1051-LOT 2-PI 26-TP-093	0.5 – 1.0	Grab
2.3 – 2.5	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 35 – 40		Estimated Boulders (%) 15		Estimated Max Diameter (m) 0.6
Start Time: 1:00 pm		End Time: 2:00 pm		

**General Notes**

1. Test pit excavated to 1.0 m with backhoe and probed from 1.0 m to 2.5 m using pionjar drill.
2. Water seepage observed at the base of the pit flowing at an approximate rate of 2 – 3 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 27-TP-094				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 19 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5550346 E 469016	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.5	SANDY GRAVEL with some silt, some sub-rounded cobbles, some sub-rounded boulders, wet, compact, dark brown.	N/A	N/A	N/A
0.5 – 2.6	SAND AND GRAVEL WITH BOULDERS, trace silt, some sub-rounded cobbles, moist to wet, rusty-brown.	DC1051-LOT 2-PI 27-TP-094	0.5 – 1.0	Grab
2.6 – 2.8	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 – 15		Estimated Boulders (%) 40		Estimated Max Diameter (m) 0.7
Start Time: 9:00 am		End Time: 10:00 am		

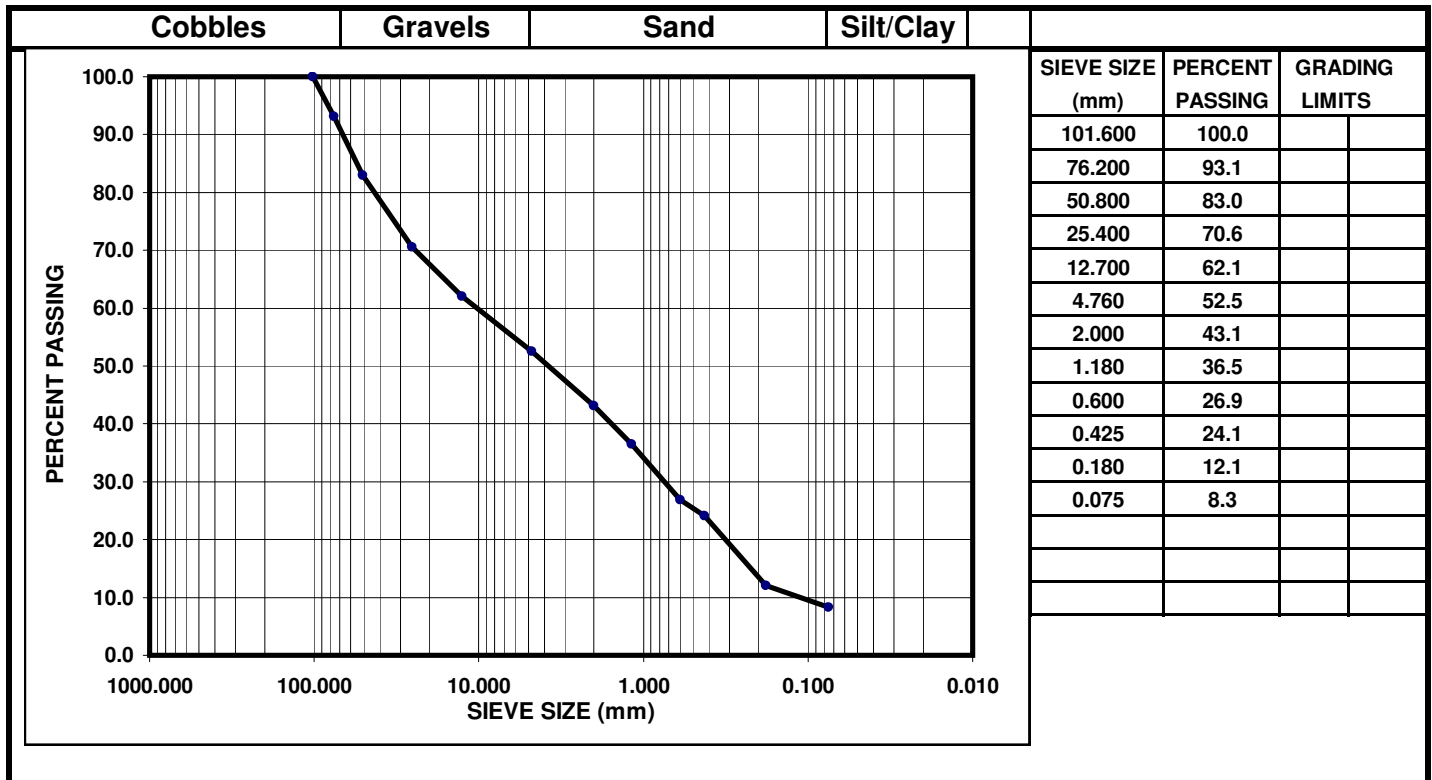
**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.8 m using pionjar drill.
2. Water seepage observed at 0.50 flowing at an approximate rate of 2 – 3 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 2-PI 27-TP-094
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sand and gravel, trace silt with cobbles
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 19-Oct-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 15-Nov-08
<b>Location:</b> TP-094	<b>Sample Depth:</b> 0.5 - 1.0 m



**Comments:**    %Cobbles 6.9                      %Gravel 40.6                      %Sand 44.2                      %Silt/Clay 8.3  
                          Natural Moisture content of 24.5%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 28-TP-095</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 19 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5547211 E 470435	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.6	SANDY GRAVEL with trace silt, some sub-angular cobbles, some sub-angular boulders, dry to moist, loose to compact, reddish-brown.	N/A	N/A	N/A
0.6 – 2.9	GRAVELLY SAND with some silt, some sub-angular cobbles, some sub-angular to angular boulders, moist, loose to compact, grey to brown.	DC1051-LOT 2-PI 28-TP-095	1.0	Grab
2.9 – 3.0	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 - 15		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.6
Start Time: 11:15 am		End Time: 12:10 pm		

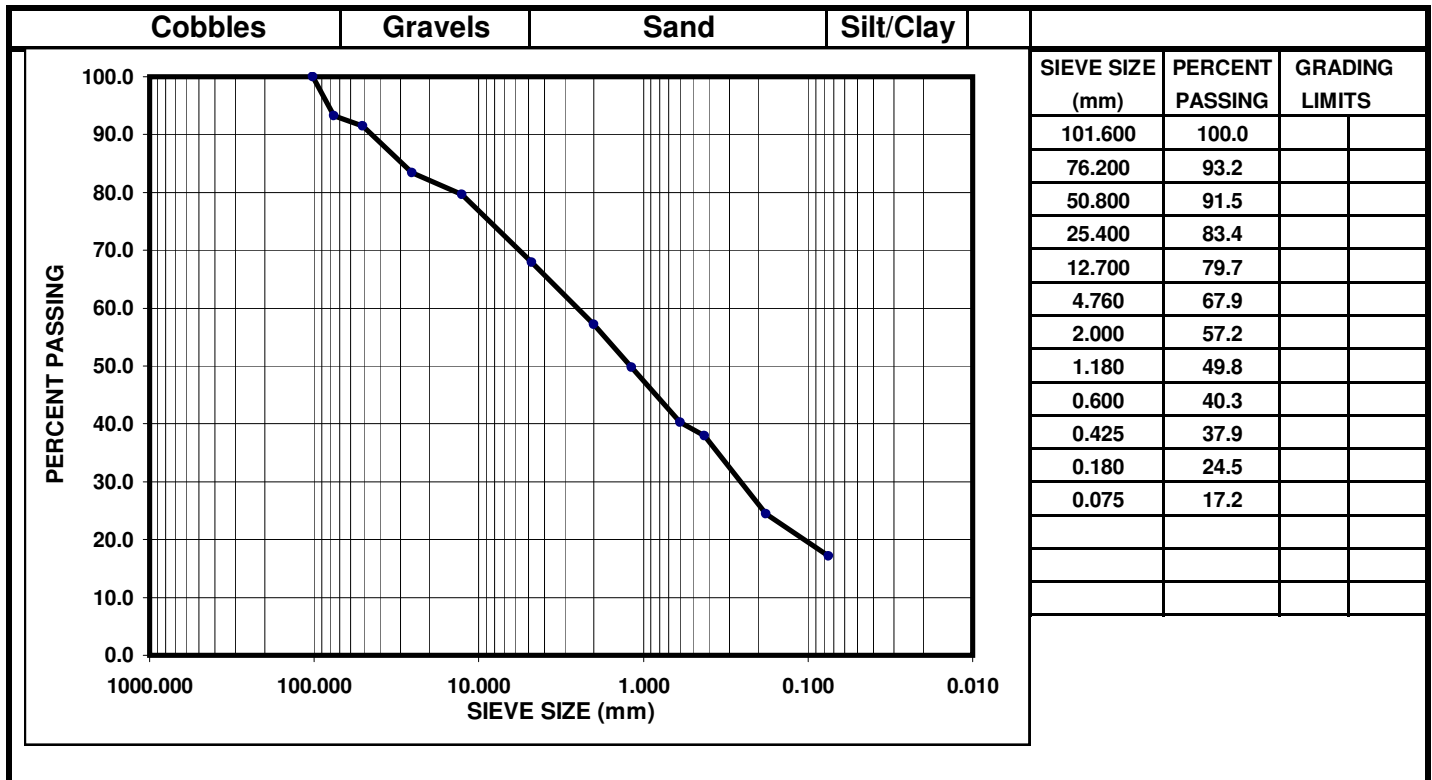
**General Notes**

1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 3.0 m using pionjar drill.
3. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 2-PI 28-TP-095
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Gravelly sand, some silt/clay with cobbles
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 19-Oct-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 19-Nov-08
<b>Location:</b> TP-095	<b>Sample Depth:</b> 1.0 m



**Comments:** %Cobbles 6.8      %Gravel 25.3      %Sand 50.7      %Silt/Clay 17.2  
 Natural Moisture content of 10.6%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

AMEC Earth & Environmental  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 29-TP-096				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 19 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5545732	E 472399 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.6	PEAT – organic soil, rootlets, wet, loose to compact, dark brown to black.	N/A	N/A	N/A
0.6 – 0.8	SAND with some silt, some gravel, dry to moist, loose to compact, dark grey to brown.	N/A	N/A	N/A
0.8 – 2.8	SAND AND GRAVEL with some silt, some sub-rounded cobbles, trace sub-rounded boulders, wet, compact, dark brown.	DC1051-LOT 2-PI 29-TP-096	1.0	Grab
2.8 – 2.9	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 5 - 10		Estimated Max Diameter (m) 0.4
Start Time: 1:45 am		End Time: 2:35 pm		

**General Notes**

1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 2.9 m using pionjar drill.
2. Groundwater observed at 0.6 m and 0.8 m flowing at an approximate rate of 2 - 4 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 2-REP-PI 30 to PI 31-TP-097**

Client:	Nalcor Energy - Lower Churchill Project	Date:	October 21 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5538815 E 472628 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.7	PEAT – organic soil, rootlets, wet, compact, dark brown to black.	N/A	N/A	N/A
0.7 – 2.2	COBBLY, GRAVELLY SAND with trace silt, trace to some angular cobbles, wet, compact, dark grey.	DC1051-LOT 2-REP-PI 30 to PI 31-TP-097	0.5 – 1.0	Grab
2.2 – 2.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20 - 25		Estimated Boulders (%) 10 – 15		Estimated Max Diameter (m) 0.6
Start Time: 12:15 pm		End Time: 1:00 pm		

**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.3 m using pionjar drill.
2. Water seepage observed at 0.70 flowing at an approximate rate of 0.5 – 1.0 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Representative test location between PI30 and PI31.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 31-TP-098</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 21 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5535869 E 473430	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	PEAT – organic soil, rootlets, wet, loose to compact, dark brown to black.	N/A	N/A	N/A
0.5 – 0.7	SANDY GRAVEL with some silt, some angular cobbles, moist, poorly graded, loose to compact, light to medium grey.	N/A	N/A	N/A
0.7 – 2.2	SANDY GRAVEL with some some sub-angular cobbles, trace silt, trace sub-angular boulders, moist to wet, compact, dark brown.	DC1051-LOT 2-PI 31-TP-098	0.5 – 1.0	Grab
2.2 – 2.4	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 5 - 10		Estimated Max Diameter (m) 0.4
Start Time: 1:10 pm		End Time: 1:45 pm		

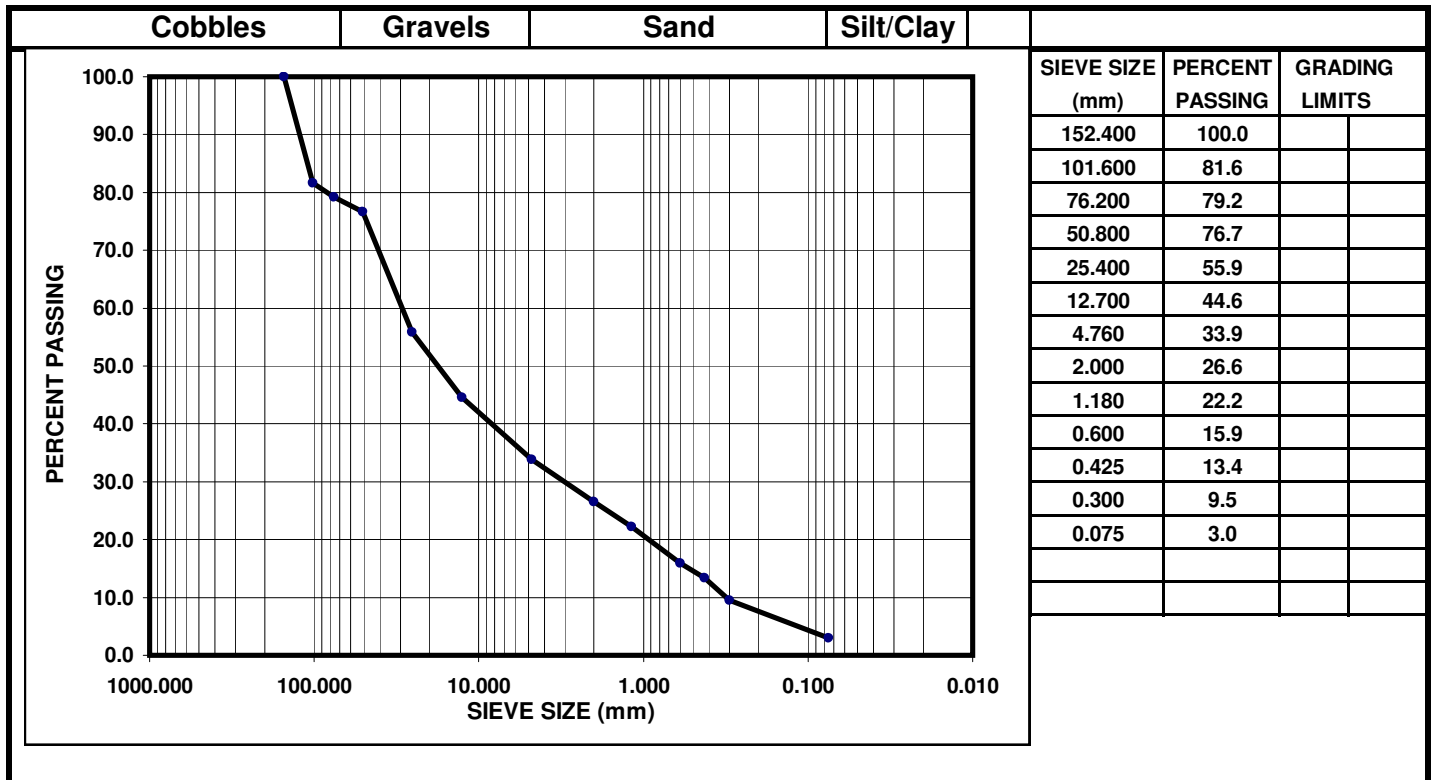
**General Notes**

1. Test pit excavated to 1.4 m with backhoe and probed from 1.4 m to 2.4 m using pionjar drill.
2. Water seepage observed at 0.60 flowing at an approximate rate of 2.0 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 2-PI 31-TP-098
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sandy gravel, trace silt/clay with cobbles
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	21-Oct-08
<b>Sampled By:</b>	Brad Walsh of AMEC	<b>Date Tested:</b>	20-Nov-08
<b>Location:</b>	TP-098	<b>Sample Depth:</b>	0.75m



**Comments:**    %Cobbles 20.8                      %Gravel 45.3                      %Sand 30.9                      %Silt/Clay 3.0  
                          Natural Moisture content of 38.5%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

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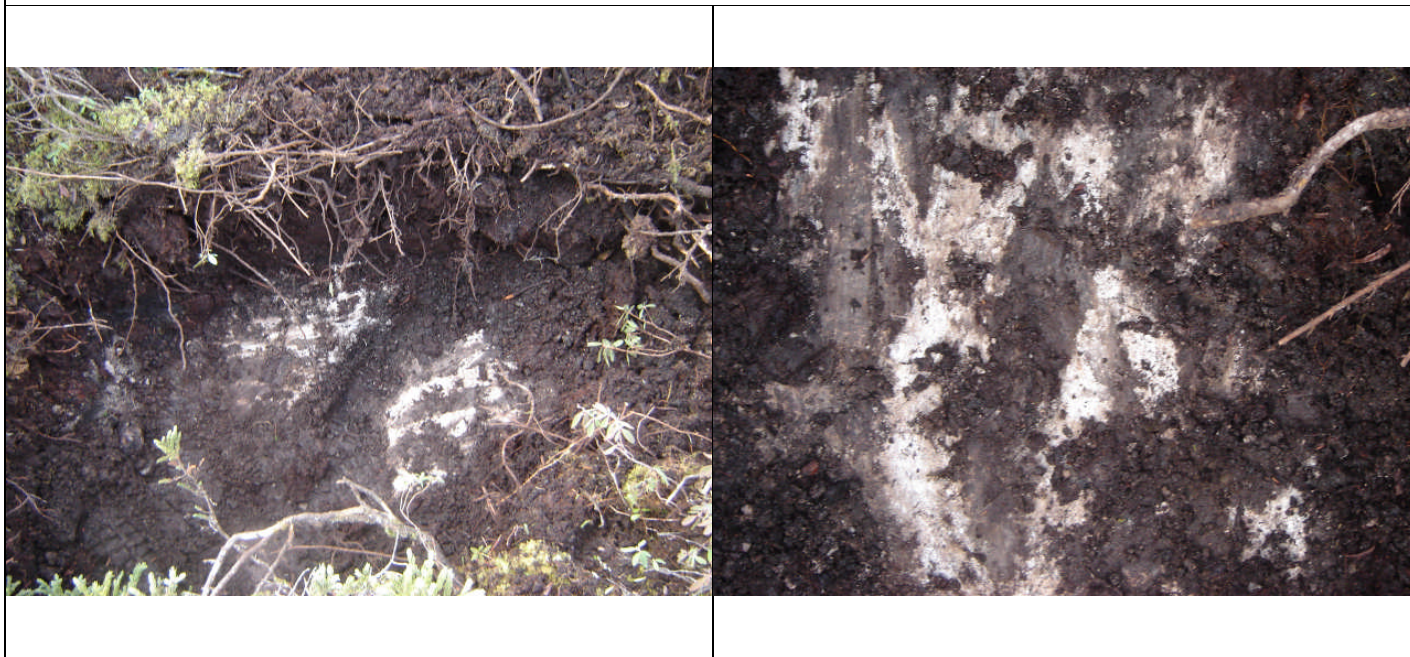




**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 33C-TP-099</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 22 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5530827 E 470261	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	DC1051-LOT 2-PI 33C-TP-099	0.2 – 0.5	Grab
0.5	Test Pit terminated at 0.5 m on BEDROCK.	N/A	N/A	N/A
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 8:30 am	End Time: 9:00 pm			

**General Notes**

1. Test pit terminated at 0.5 m on Bedrock.
2. A series of soil probes were executed surrounding the location. Bedrock refusal depths were similar and ranged from 0.4 m – 0.8 m.
3. Test pit dry upon completion.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 34C-TP-100				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 22 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5529727	E 470622 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	PEAT – organic soil, rootlets, wet, loose to compact, medium brown to dark brown.	N/A	N/A	N/A
0.5 – 0.9	SILTY SAND with some gravel, some sub-rounded cobbles, moist, loose to compact, dark brown.	N/A	N/A	N/A
0.9	Test Pit terminated at 0.9 m on BEDROCK.	N/A	N/A	N/A
Estimated Cobbles (%) 10 -15	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.2		
Start Time: 11:30 am	End Time: 12:00 pm			

**General Notes**

1. Test pit terminated at 0.9 m on Bedrock.
2. A series of soil probes were executed surrounding the location. Bedrock refusal depths were similar and ranged from 0.3 m – 1.5 m.
3. Test pit dry upon completion.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-PI 36C-TP-101				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 22 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5525011	E 471968
				Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.5	GRAVEL with some sand, some silt, some angular cobbles, some angular boulders, moist to wet, loose to compact, reddish - brown.	N/A	N/A	N/A
0.5 – 2.0	SANDY GRAVEL AND BOULDERS with some silt, some sub-angular cobbles, moist to wet, compact, dark grey to brown.	DC1051-LOT 2-PI 36C-TP-101	1.0 – 1.2	Grab
2.0 – 2.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 -15		Estimated Boulders (%) 25 – 30		Estimated Max Diameter (m) 0.8
Start Time: 1:00 pm		End Time: 2:00 pm		

**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.2 m using pionjar drill.
2. Water seepage observed at the base of the pit flowing at an approximate rate of 2.0 – 4.0 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 37C-TP-102</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 22 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5523868 E 477005	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.4	SANDY GRAVEL with some silt, trace sub-rounded cobbles, moist, loose to compact, dark brown.	N/A	N/A	N/A
0.4 – 1.3	SAND AND GRAVEL with SILT, some sub-rounded boulders, trace sub-rounded cobbles, moist to wet, compact to dense, dark grey.	DC1051-LOT 2-PI 37C-TP-102	0.8	Grab
1.3 – 1.4	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 5		Estimated Boulders (%) 20		Estimated Max Diameter (m) 0.4
Start Time: 3:45 pm		End Time: 4:30 pm		

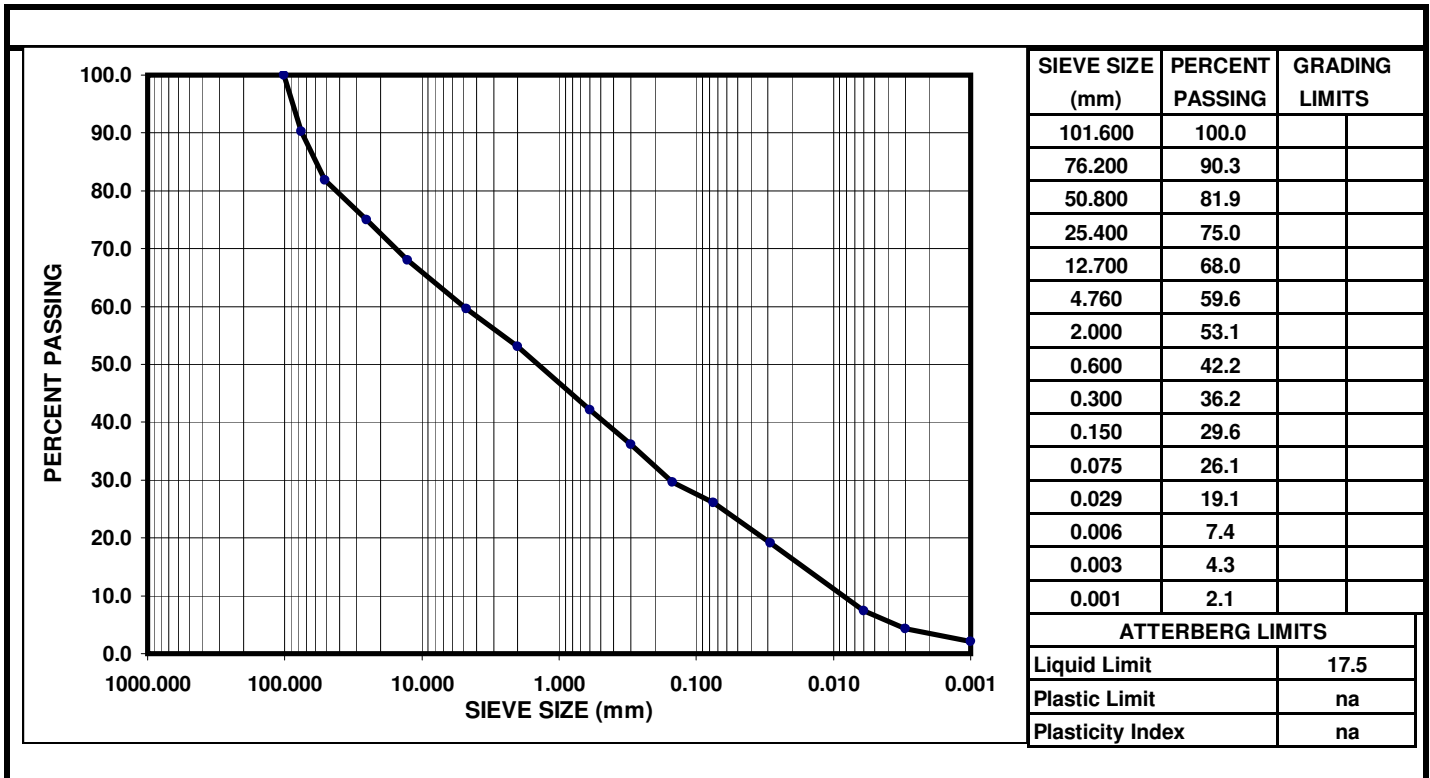
**General Notes**

1. Test pit excavated to 1.1 m with backhoe and probed from 1.1 m to 1.4 m using pionjar drill.
2. Water observed at the base of the pit. Location of water inflow could not be observed in soil horizon.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-Lot2-PI 37C-TP102
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Gravelly SAND, some Silt trace Cobbles / Clay
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	22-Oct-08
<b>Sampled By:</b>	Brad Walsh of AMEC	<b>Date Tested:</b>	27-May-09
<b>Location:</b>	TP105	<b>Sample Depth:</b>	0.75m



**Comments:** %Cobbles=9.7 %Gravel=30.7 %Sand=33.5 %Silt=20.2 %Clay=3.8 %Colloids=2.1  
 Natural Moisture content of 17.7%.  
 Organics present in sample.  
 Sample was determined to be non plastic with Liquid limit derived from forecasting graph.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per: *[Signature]*

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# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT 2-PI 37C-TP-102  
Test pit

Date Sampled: October 22, 2008 Sampled By B. Walsh of AMEC

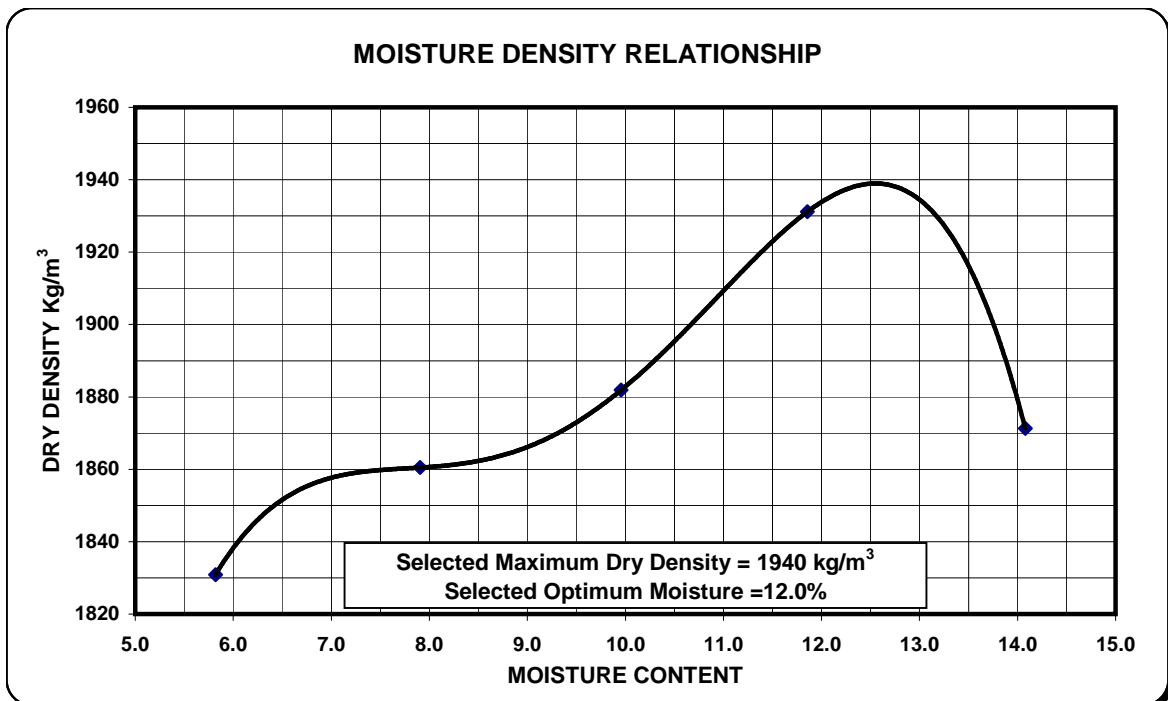
Date Received: November 12, 2008 Preparation 

Dry	
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Percent Retained:		Percent Retained:	20mm	28.8%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content	5.8	7.9	10.0	11.9	14.1
Dry Density kg/m <sup>3</sup>	1831	1860	1882	1931	1871



Note : Oversized Material Correction = 28.8%  
 Maximum Dry Density      2075 kg/m<sup>3</sup>  
 Maximum Moisture          12.0 %

Tested by, Bill Motty Reviewed by, R. Collins





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 37-TP-103</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5519578	E 479434 Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Soil and Groundwater Conditions</b>				
Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.3	SILTY SAND with some gravel, trace rounded cobbles, moist to wet, compact to dense, dark brown to grey.	N/A	N/A	N/A
0.3 – 0.6	GRAVELLY SAND with some silt, some rounded cobbles, some sub-rounded boulders, dry to moist, loose to compact, reddish-brown.	N/A	N/A	N/A
0.6 – 2.3	BOULDERS AND GRAVELLY SAND with some silt, some sub-rounded cobbles, moist, compact, greyish-brown.	DC1051-LOT 2-PI 37-TP-103	1.0 – 1.5	Grab
2.3 – 2.5	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10		Estimated Boulders (%) 25 – 35	Estimated Max Diameter (m) 1.2	
Start Time: 8:45 am		End Time: 9:30 am		

<b>General Notes</b>
1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 2.5 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 38-TP-104</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5517164 E 480450	Inspector: Brad Walsh
<b>PHOTOGRAPHS</b>				
Photo Not Available		Photo Not Available		
<b>Soil and Groundwater Conditions</b>				
Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, dry to moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 1.7	BOULDERS AND SANDY GRAVEL with trace silt, some angular cobbles, moist, compact, brown.	DC1051-LOT 2-PI 38-TP-104	0.2 – 0.5	Grab
1.7	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 15 – 20	Estimated Boulders (%) 55 – 60	Estimated Max Diameter (m) 1.0		
Start Time: 10:30 am	End Time: 11:20 am			
<b>General Notes</b>				
1. Test pit excavated to 0.5 m with backhoe and probed from 0.5 m to 1.7 m using pionjar drill.				
2. Test pit dry upon completion.				
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.				
4. Test pit excavated with a BX24 Kabota.				





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 39-TP-105</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5513348	E 483198 Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Soil and Groundwater Conditions</b>				
Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 3.3	PEAT – organic soil, rootlets, wet, loose to compact, dark brown.	DC1051-LOT 2-PI 39-TP-105	1.2 – 1.5	Grab
3.3 – 3.4	Refusal on probable bedrock or large boulder.	N/A	N/A	N/A
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 12:45 pm	End Time: 1:15 pm			

<b>General Notes</b>
1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 3.4 m using pionjar drill.
2. Water observed at the base of the pit. Location of water inflow was observed throughout the peat layer at an approximate rate of 2 – 4 L/min.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-PI 41-TP-106</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 25 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5493871	E 496536 Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Soil and Groundwater Conditions</b>				
Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.5	SANDY GRAVEL with some silt, some sub-rounded cobbles, some sub-rounded boulders, dry to moist, loose to compact, dark grey to brown.	DC1051-LOT2-PI41-TP106	0.2 – 0.5	Grab
0.5 – 0.7	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 – 15		Estimated Boulders (%) 10 – 15		Estimated Max Diameter (m) 0.5
Start Time: 12:00 pm		End Time: 12:55 pm		

<b>General Notes</b>
1. Test pit excavated to 0.5 m with backhoe and probed from 0.5 m to 0.7 m using pionjar drill.
2. A series of soil probes were executed surrounding the location. Refusal depths were similar and ranged from 0.5 m – 0.9 m.
3. Test pit dry upon completion.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
5. Test pit excavated with a BX24 Kabota.





**Appendix C2**

**Rock Anchor Pull-Out Test Logs**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 2-PI 10B-APT-04</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5621541	<b>Easting</b>	506969
<b>Start Time</b>	9:30	<b>Finish Time</b>	13:00
<ul style="list-style-type: none"> <li>Location marked with a hand-held Lowrance Expedition GPS.</li> <li>Test conducted on rock outcrop approximately 80 m west of the coordinates given for PI 10B.</li> </ul>			

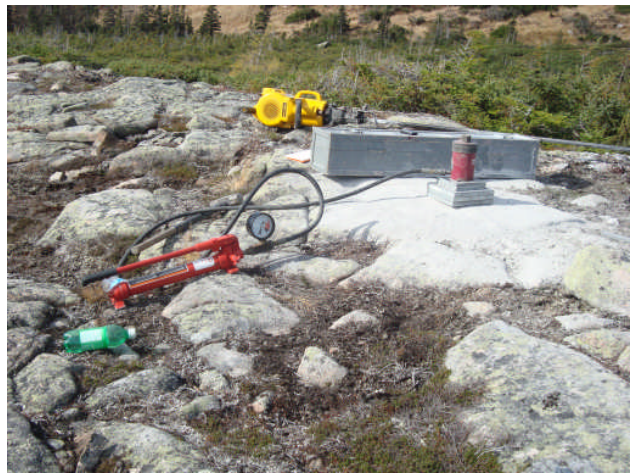
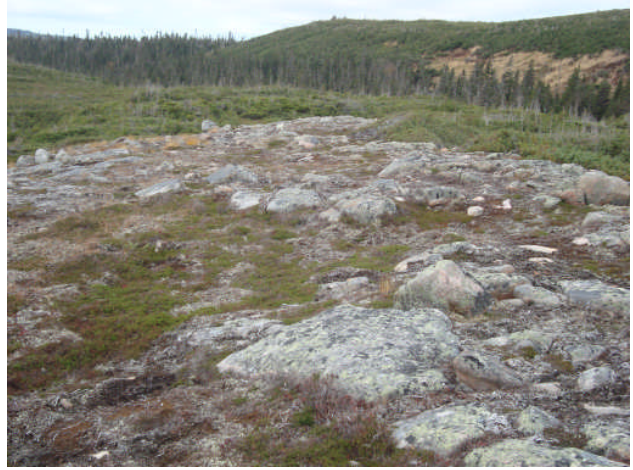
<b>ROCK CONDITION OBSERVATIONS</b>	
<ul style="list-style-type: none"> <li>Rock outcrop predominated by pink, feldspar – quartz rich, medium-to-coarse grained granite with moderately-close joint spacing.</li> </ul>	
<ul style="list-style-type: none"> <li>No observable evidence of water in borehole during drilling.</li> </ul>	
<ul style="list-style-type: none"> <li>Drilling rate was constant for the duration of borehole advancement (i.e. from 0 m to 1.8 m).</li> </ul>	

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
				<ul style="list-style-type: none"> <li>Start Test</li> </ul>
12:23	12:25	0 – 2.5	0	<ul style="list-style-type: none"> <li>Held at 2.5 tons</li> </ul>
12:25	12:27	4	1.5	<ul style="list-style-type: none"> <li>1.5 mm rise at 4.5 tons. Jack &amp; rod settling into rock.</li> </ul>
12:27	12:29	6	1	<ul style="list-style-type: none"> <li>Anchor holding steady at 6 tons. Slight movement of jack.</li> </ul>
12:29	12:31	8	3	<ul style="list-style-type: none"> <li>Increased load to 8.5 tons.</li> <li>Anchor began to slip in rock.</li> </ul>
12:31	12:33	10	1	<ul style="list-style-type: none"> <li>Held at 10 tons.</li> </ul>
12:33	12:34	12.5	4.5	<ul style="list-style-type: none"> <li>Anchor slipped at 12.5 tons; lost pressure on jack.</li> <li>Stopped test to re-tighten anchor @ 12:34 pm.</li> </ul>
12:46	12:48	0 – 12.5	2.5	<ul style="list-style-type: none"> <li>Re-start test @ 12:46; increase load to 12.5 tons.</li> <li>Held at 12.5 tons.</li> </ul>
12:48	12:50	14	1.5	<ul style="list-style-type: none"> <li>Increased load to 14 tons with 9 pumps of jack.</li> <li>Held at 14 tons.</li> </ul>
12:50	12:52	16	2.5	<ul style="list-style-type: none"> <li>2.5 mm rise in jack.</li> <li>Held at 16 tons.</li> </ul>
12:52	12:54	18	2.5	<ul style="list-style-type: none"> <li>Increased load to 18 tons (overload for jack).</li> <li>Held at 18 tons; End of test.</li> </ul>



LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS

DC1051-LOT 2-PI 10B-APT-04 PHOTOS





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 2-PI 17-APT-05</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5582931	<b>Easting</b>	479553
<b>Start Time</b>	9:30	<b>Finish Time</b>	12:05
<ul style="list-style-type: none"> <li>• Location marked with a hand-held Lowrance Expedition GPS.</li> <li>• Test conducted on rock outcrop approximately 10 m east of the coordinates given for PI 17.</li> </ul>			

<b>ROCK CONDITION OBSERVATIONS</b>	
<ul style="list-style-type: none"> <li>• Rock outcrop predominated by dark grey limestone (with visible interlocking crystals) with moderately-close joint spacing.</li> <li>• Outcrop is approximately 10 m x 5 m in size and trending to the 050° azimuth. Accurate dip direction could not be determined.</li> <li>• No observable evidence of water in borehole during drilling.</li> <li>• Difficult drilling from 0 m to 1.5 m due to hardness of the rock.</li> <li>• At 1.5 m depth the drill rod dropped through the bedrock due to suspected exfoliating jointing. The rod became lodged upon underlying rock beds and could not be retrieved from the borehole.</li> </ul>	

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (cm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
10:20				<ul style="list-style-type: none"> <li>• Drill rod became stuck at 1.5 m and could not be retrieved.</li> </ul>
11:45				<ul style="list-style-type: none"> <li>• Abandoned test.</li> </ul>





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

TEST ID: DC1051-LOT 2-PI 35C-APT-06		
Client:	Nalcor Energy - Lower Churchill Project	October 21 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

TEST LOCATION			
<b>Northing</b>	5527904	<b>Easting</b>	470068
<b>Start Time</b>	8:50	<b>Finish Time</b>	11:00
<ul style="list-style-type: none"> <li>Location marked with a hand-held Lowrance Expedition GPS.</li> <li>Test conducted on rock outcrop approximately 15 m west of coordinates given for PI35C.</li> </ul>			

ROCK CONDITION OBSERVATIONS	
<ul style="list-style-type: none"> <li>Rock outcrop predominated by granitoid gneiss with wide joint spacing.</li> <li>No observable evidence of water in borehole during drilling.</li> <li>Difficult drilling from 0 m to 1.4 m.</li> <li>Hardest drilling from 1.4 m to 1.8 m.</li> </ul>	

PULL-OUT TEST RESULTS				
TIME		Applied Load (Tons)	Jack Rise (mm)	Notes
From	To			
10:44	10:46	0 – 2	2	<ul style="list-style-type: none"> <li>Anchor setting into rock.</li> </ul>
10:46	10:48	4	0	<ul style="list-style-type: none"> <li>Held at 4 tons.</li> </ul>
10:48	10:50	6	2	<ul style="list-style-type: none"> <li>Increased load to 6 tons with 4 pumps of jack.</li> <li>Held at 6 tons.</li> </ul>
10:50	10:52	8	3	<ul style="list-style-type: none"> <li>Increased load to 8 tons with 2.5 pumps of jack.</li> <li>Held at 8 tons.</li> </ul>
10:52	10:54	10	5	<ul style="list-style-type: none"> <li>Increased load to 10 tons.</li> <li>Held at 10 tons.</li> </ul>
10:54	10:56	12	4	<ul style="list-style-type: none"> <li>Increased load to 12 tons with 3 pumps of jack.</li> <li>Held at 12 tons.</li> </ul>
10:56	10:58	15	12	<ul style="list-style-type: none"> <li>Attempted to increase load to 15 tons.</li> <li>Anchor slipped at approximately 15 tones @10:57 am; lost pressure on the jack.</li> <li>End of test.</li> </ul>





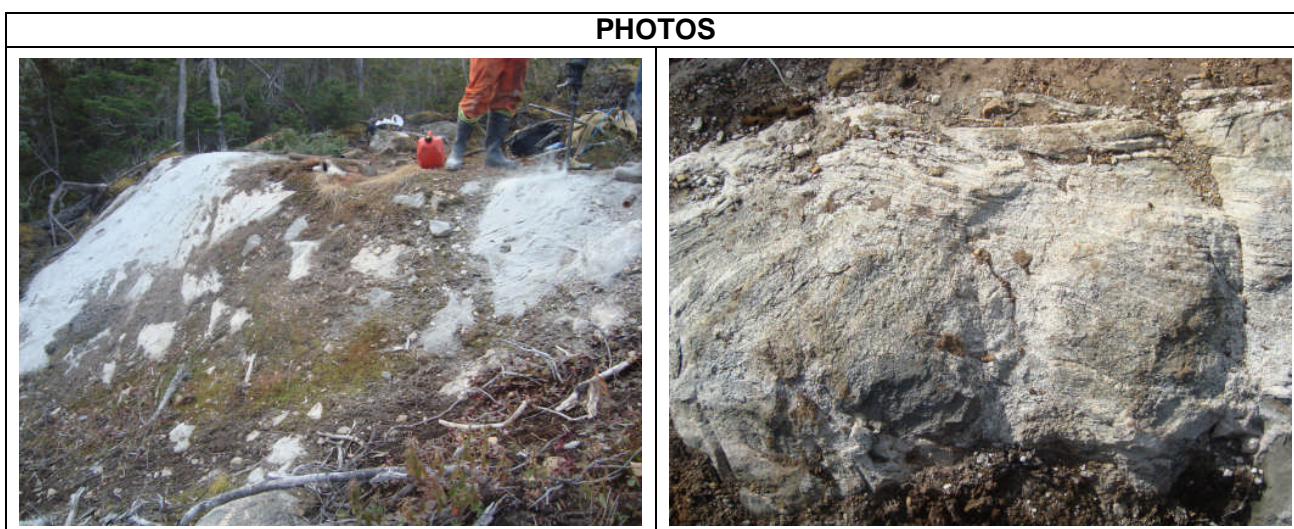
**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 2-PI 40-APT-07</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5511739	<b>Easting</b>	490738
<b>Start Time</b>	13:05	<b>Finish Time</b>	15:00
<ul style="list-style-type: none"> <li>Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>Test conducted on rock outcrop adjacent to a pre-existing skidder trail located approximately 130 m north-northeast of the coordinates given for PI 40.</li> </ul>			

<b>ROCK CONDITION OBSERVATIONS</b>	
<ul style="list-style-type: none"> <li>Rock out-crop predominated by anorthositic gneiss with wide joint spacing.</li> <li>No observable evidence of water in borehole during drilling.</li> <li>Hardest drilling from 0.9 m to 1.2 m.</li> </ul>	

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
14:42	14:44	0 – 2	4	<ul style="list-style-type: none"> <li>Anchor setting into rock.</li> </ul>
14:44	14:46	4	2	<ul style="list-style-type: none"> <li>Held at 4 tons.</li> </ul>
14:46	14:48	6	2	<ul style="list-style-type: none"> <li>Increased load to 6 tons with 5 pumps of jack.</li> <li>Held at 6 tons.</li> </ul>
14:48	14:50	8	3	<ul style="list-style-type: none"> <li>Increased load to 8 tons with 7 pumps of jack.</li> <li>Held at 8 tons.</li> </ul>
14:50	14:52	10	0	<ul style="list-style-type: none"> <li>Increased load to 10 tons with 6 pumps of jack.</li> <li>Held at 10 tons.</li> </ul>
14:52	14:54	12	3	<ul style="list-style-type: none"> <li>Increased load to 12 tons.</li> <li>Held at 12 tons.</li> </ul>
14:54	14:56	15	>15	<ul style="list-style-type: none"> <li>Attempted to increase load to 17 tons.</li> <li>Anchor slipped at approximately 15 tones @ 2:55 pm; lost pressure on the jack.</li> <li>End of test.</li> </ul>



**Appendix C3**  
**Percussion Drilling Logs**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 16-PD-11</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 13 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 16	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5589046	486604	0.6	Encountered a layer of soil before refusal on probable bedrock.
2	5589030	486619	0.8	Encountered a layer of soil before refusal on bedrock.
3	5589025	486589	0.9	Encountered a layer of soil and cobbles before refusal on bedrock.
4	5589018	486604	1.0	Encountered a layer of soil and cobbles before refusal on bedrock.

<b>Generalized Observations</b>
Wooded area with a thin veneer of vegetative growth and soil. No observable exposed bedrock or large boulders in the immediate area of PI 16.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 17-PD-12</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: October 13 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 17 Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5582932	479569	0.4	Encountered a thin layer of soil before refusal on bedrock.
2	5582930	479576	0.3	Encountered a thin layer of soil before refusal on bedrock.

<b>Generalized Observations</b>
Thin veneer of vegetative growth (previously cut-over) with areas of exposed bedrock composed of dark grey, jointed / fractured limestone.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 2-REP-PI 17 to PI 19-PD-13**

Client:	Nalcor Energy - Lower Churchill Project	Date:	October 13 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 17 and PI 19
		Inspector:	Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5577254	477491	0.4	Encountered a thin layer of soil before refusal on bedrock.
2	5577204	477498	0.2	Encountered a thin layer of soil before refusal on bedrock.
3	5577226	477604	0.3	Encountered a thin layer of soil before refusal on bedrock.

**Generalized Observations**

Thin veneer of vegetative growth with some wooded areas. Bedrock is poorly exposed and appears to be composed of dark grey limestone.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 21-PD-14</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 21	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5567338	470393	0.6	Encountered a thin layer of soil before refusal on bedrock.
2	5567353	470405	0.7	Encountered a thin layer of soil and cobbles before refusal on bedrock.
3	5567345	470415	0.5	Encountered a thin layer of soil before refusal on bedrock.

<b>Generalized Observations</b>
Wooded area with a thin veneer of vegetative growth and soil. No observable exposed bedrock or large boulders in the immediate area of PI 21.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 22-PD-15</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 14 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 22	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5566095	467883	0.8	Encountered a thin layer of soil before refusal on bedrock.
2	5566116	467904	0.6	Encountered a thin layer of soil before refusal on bedrock.
3	5566113	467918	0.6	Encountered a thin layer of soil before refusal on bedrock.

**Generalized Observations**

Wooded area with a thin veneer of vegetative growth and soil. No observable exposed bedrock or large boulders in the immediate area of PI22.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 25-PD-16</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: October 18 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 25 Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5555040	466727	0.7	Encountered a layer of soil cobbles / boulders before refusal on probable bedrock or very large boulder(s).
2	5555009	466691	0.8	Encountered a layer of soil cobbles / boulders before refusal on probable bedrock or very large boulder(s).

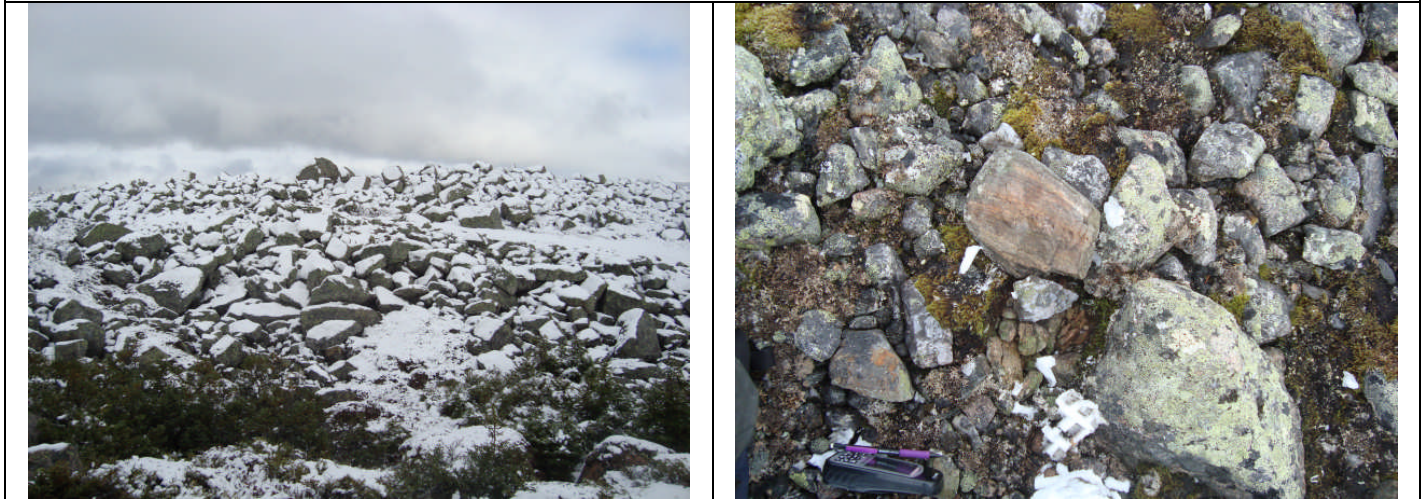
<b>Generalized Observations</b>
Wooded area located on a steep incline to the south of Portland Creek Pond. Large boulders (ranging from 0.5 m - 4 m in diameter) and areas of exposed bedrock composed of pink (weathered surfaces appear grey) fine- to-medium grained granite were observed.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 30-PD-17</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 19 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 30	Inspector: Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5542138	471749	1.8	Encountered a layer of soil with cobbles / boulders. Drilled to a total depth 1.8 m with no refusal.

<b>Generalized Observations</b>
Area dominated by deposits of angular boulders (interpreted as ablation drift deposits) that range from 0.4 m – 3.0 m in diameter and are generally granitic in composition.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-REP-PI 30 to PI 31-PD-18</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: October 20 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 30 and PI 31 Inspector: Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5538812	472629	1.5	Encountered a layer of peat and soil with some cobbles before refusal on probable bedrock.
2	5538812	472640	1.5	Encountered a layer of peat and soil with some cobbles before refusal on probable bedrock.
3	5538812	472614	1.6	Encountered a layer of peat and soil with some cobbles before refusal on probable bedrock.

<b>Generalized Observations</b>
Marshy area with some vegetation and bog. Exposed bedrock was observed approximately 500 m – 600 m to the southeast. No observable deposits of large boulders in the immediate area.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 32C-PD-19</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 21 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 32C	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5533059	470631	0.25	Encountered a thin layer of soil before refusal on probable bedrock.
2	5533064	470624	0.3	Encountered a thin layer of soil before refusal on probable bedrock.
3	5533059	470604	0.5	Encountered a layer of soil and before refusal on probable bedrock.
4	5533049	470625	0.6	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock.

<b>Generalized Observations</b>
Wooded area with a thin veneer of vegetative growth and soil. Large granitic boulders ranging from 0.5 m – 2.0 m in diameter were observed in the area.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 33C-PD-20</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: October 22 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 33C Inspector: Brad Walsh

**PHOTOGRAPHS**



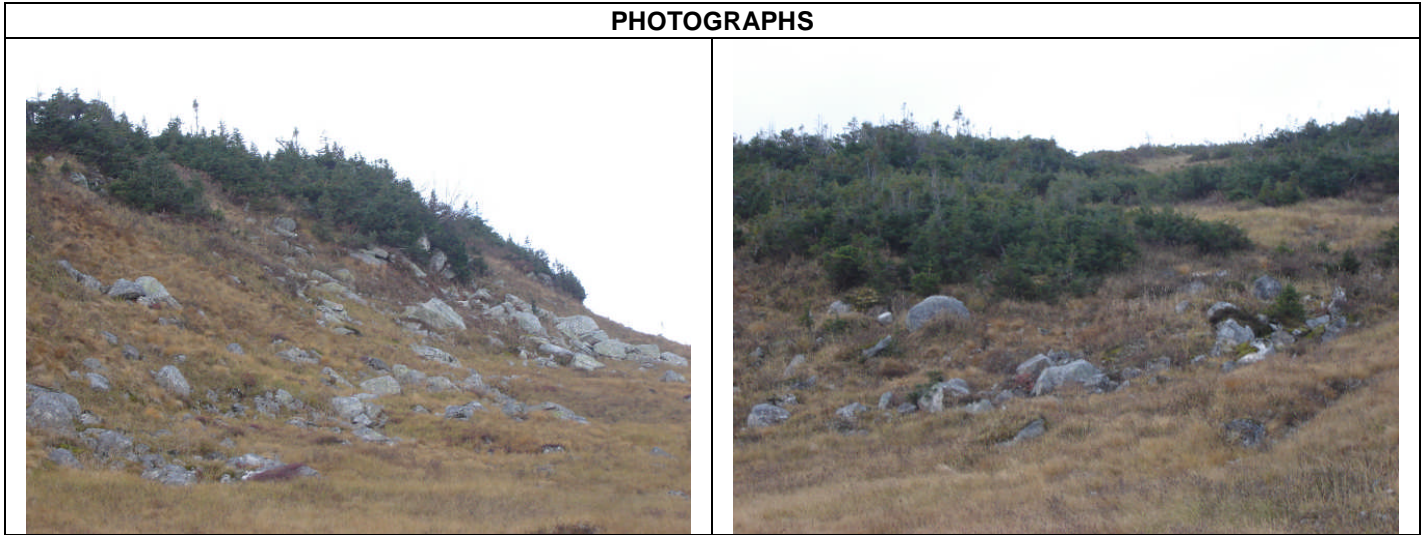
Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5530820	470264	0.6	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock.
2	5530813	470273	0.4	Encountered a thin layer of soil before refusal on probable bedrock.
3	5530792	470273	0.7	Encountered a thin layer of soil and cobbles / boulders before refusal on probable bedrock.
4	5530819	470305	0.2	Encountered a thin layer of soil before refusal on probable bedrock.
5	5530823	470287	0.8	Encountered a thin layer of soil and cobbles / boulders before refusal on probable bedrock.

<b>Generalized Observations</b>
Sparsely wooded area with a thin veneer of vegetative growth and soil with areas of exposed bedrock composed of pink (weathered surfaces appear grey) granitoid gneiss.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 34C-PD-21</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 22 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 34C	Inspector: Brad Walsh



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5529727	470621	1.5	Encountered a layer of peat and soil with some cobbles before refusal on probable bedrock or large boulder(s).
2	5529739	470621	0.6	Encountered a layer of peat and soil with some cobbles before refusal on probable bedrock or large boulder(s).
3	5529753	470615	0.8	Encountered a layer of peat and soil with some cobbles before refusal on probable bedrock or large boulder(s).
4	5529753	470583	0.3	Encountered a thin layer of peat and soil with before refusal on probable bedrock or large boulder(s).

<b>Generalized Observations</b>
Sparsely wooded, marshy area with some vegetation and bog with areas of exposed bedrock composed of pink (weathered surfaces appear grey) granitoid gneiss. Large boulders ranging from 0.5 m – 2.5 m in diameter were also observed near PI34C.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 2-REP-PI 38 to PI 39-PD-22**

Client:	Nalcor Energy - Lower Churchill Project	Date:	October 23 <sup>rd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 38 and PI 39
		Inspector:	Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5515082	481938	1.5	Encountered a layer of soil and cobbles before refusal on very large boulder(s).
2	5515072	481938	1.2	Encountered a layer of soil and cobbles before refusal on very large boulder(s).
3	5515117	481911	1.2	Encountered a layer of soil and cobbles before refusal on large boulder(s).

**Generalized Observations**

Sparsely wooded area with a high concentration of large sub-angular boulders that range from 0.4 m – 2.5 m in diameter. No observable exposed bedrock was encountered in the immediate area.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-REP-PI 40 to PI 41-PD-23</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 25 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Representative Test Between PI 40 and PI 41	Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Probe Number</b>	<b>Northing UTM NAD 83 Zone 21</b>	<b>Easting UTM NAD 83 Zone 21</b>	<b>Refusal Depth (m)</b>	<b>Notes</b>
1	5504123	493157	1.3	Encountered a layer of soil and cobbles before refusal on bedrock.
2	5504102	493133	0.2	Encountered a thin layer of soil before refusal on bedrock.
3	5504107	493129	0.4	Encountered a thin layer of soil before refusal on bedrock.
4	5504098	493124	0.3	Encountered a thin layer of soil before refusal on bedrock.

<b>Generalized Observations</b>
Sparsely wooded area with a thin veneer of vegetative growth and soil with areas of poorly exposed bedrock composed of pink (weathered surfaces appear grey) granitoid gneiss.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 2-PI 41-PD-24</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: October 25 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 41 Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Probe Number</b>	<b>Northing UTM NAD 83 Zone 21</b>	<b>Easting UTM NAD 83 Zone 21</b>	<b>Refusal Depth (m)</b>	<b>Notes</b>
1	5493856	496536	0.5	Encountered a thin layer of soil before refusal on bedrock or large boulder(s)
2	5493871	496550	0.9	Encountered layer of soil and cobbles / boulders before refusal on bedrock or a large boulder(s)
3	5493853	496544	0.8	Encountered layer of soil and cobbles / boulders before refusal on bedrock or a large boulder(s)

<b>Generalized Observations</b>
Sparsely wooded area with a thin veneer of vegetative growth and soil with areas of poorly exposed bedrock composed of buff (weathered surfaces appear grey) anorthositic gneiss.

**Appendix C4**  
**Bog Probing Logs**

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 25A – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between Cable Landing Site and PI 1
		Inspector: Justin Ingram	

Probe No.:	Easting	Northing	Depth Penetrated (m)			BOG 25A
			Left Line	Center Line	Right Line	
1	521866	5680949	1.00	0.75	2.50	
2	521857	5680967	1.20	0.75	0.60	
3	521846	5680986	1.00	0.75	1.60	
4	521834	5681016	1.00	1.00	Water	
5	521761	5681156	1.10	1.00	Water	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 25B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between Cable Landing Site and PI 1	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 25B
			Left Line	Center Line	Right Line	
1	521986	5680706	1.00	1.00	6.00	
2	521996	5680683	0.50	0.50	1.30	
3	522006	5680665	0.60	1.10	1.00	
4	522011	5680643	1.50	1.30	0.50	
5	522021	5680623	0.50	1.75	1.00	
6	522033	5680587	0.50	0.50	1.00	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 26A – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 1 and PI 2	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 26A
			Left Line	Center Line	Right Line	
1	522958	5679031	1.00	1.10	0.60	
2	522941	5679049	1.50	1.60	0.60	
3	522924	5679072	1.50	2.00	0.50	
4	522914	5679104	1.25	1.75	1.00	
5	522909	5679126	1.25	1.25	1.00	
6	522890	5679146	1.00	1.50	1.30	
7	522881	5679166	1.50	1.60	0.90	
8	522868	5679184	1.50	1.75	0.70	
9	522855	5679202	Water	1.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 26B – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 1 and PI 2
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 26B
			Left Line	Center Line	Right Line	
1	523627	5677994	0.70	1.00	0.50	
2	523614	5678010	0.80	0.80	1.50	
3	523600	5678029	1.30	1.50	1.00	
4	523581	5678041	1.20	1.25	Water	
5	523571	5678080	1.25	1.75	1.75	
6	523555	5678097	1.80	2.00	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 27A – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 2 and PI 3
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 27A
			Left Line	Center Line	Right Line	
1	526668	5674492	1.60	1.75	1.50	
2	526647	5674496	1.50	2.00	1.00	
3	526626	5674507	0.75	1.50	1.40	
4	526598	5674514	1.00	1.50	1.60	
5	526575	5674523	1.20	1.60	2.20	
6	526555	5674535	2.00	2.20	1.00	
7	526533	5674543	2.00	2.50	2.50	
8	526511	5674554	1.50	2.10	2.00	
9	526488	5674561	1.60	1.75	0.70	
10	526463	5674564	1.75	1.50	0.20	
11	526439	5674572	2.25	1.75	2.50	
12	526421	5674584	2.00	2.25	2.40	
13	526394	5674594	Water	2.00	Water	
16	526333	5674620	1.90	2.00	2.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 27B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 2 and PI 3	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 27B
			Left Line	Center Line	Right Line	
1	527903	5674010	1.75	1.50	1.50	Photo Not Available
2	527881	5674014	1.75	0.60	0.60	
3	527861	5674024	1.20	1.50	2.00	
4	527843	5674027	1.25	0.50	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 27C – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 2 and PI 3	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 27C
			Left Line	Center Line	Right Line	
1	528520	5673770	2.00	2.00	1.00	
2	528499	5673776	2.00	2.50	2.50	
3	528479	5673787	2.00	2.25	2.5+	
4	528459	5673795	1.50	2.20	2.5+	
5	528440	5673803	1.80	1.60	2.5+	
6	528418	5673812	1.50	1.80	2.00	
7	528398	5673823	1.50	1.00	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 28A – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 3 and PI 4	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 28A
			Left Line	Center Line	Right Line	
1	530533	5671435	1.25	2.00	1.00	
2	530524	5671455	1.25	1.50	2.50	
3	530517	5671474	1.25	1.25	1.70	
4	530508	5671493	1.60	1.75	2.20	
5	530499	5671513	1.60	2.00	2.00	
6	530493	5671535	2.00	2.00	2.00	
7	530486	5671555	1.30	2.5+	2.5+	
8	530479	5671578	0.50	0.50	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 28B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 3 and PI 4	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 28B
			Left Line	Center Line	Right Line	
1	531140	5670008	2.5+	1.50	1.50	
2	531134	5670030	1.90	1.75	1.50	
3	531127	5670050	2.5+	1.50	2.00	
4	531120	5670071	1.50	1.50	1.50	
5	531109	5670090	1.50	1.50	1.50	
6	531100	5670108	1.50	2.10	2.20	
7	531095	5670134	2.00	1.25	2.5+	
8	531080	5670155	1.80	1.25	2.40	
9	531071	5670176	1.25	1.60	2.30	
10	531065	5670196	2.00	2.25	2.5+	
11	531056	5670216	1.75	2.5+	2.50	
12	531046	5670237	1.80	2.5+	0.50	
13	531044	5670258	1.60	2.5+	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 28C – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 3 and PI 4	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 28C
			Left Line	Center Line	Right Line	
1	531496	5668703	1.00	1.10	1.00	
2	531508	5668728	1.50	1.00	0.50	
3	531511	5668747	0.50	0.50	0.20	
4	531522	5668765	1.00	0.50	0.60	
5	531532	5668790	1.20	0.75	0.50	
6	531540	5668812	1.30	0.75	1.00	
7	531549	5668830	1.30	1.25	1.00	
8	531555	5668849	1.75	2.00	2.50	
9	531565	5668870	1.60	1.50	1.80	
10	531571	5668891	2.00	2.00	1.80	
11	531583	5668914	2.5+	2.5+	2.5+	
12	531592	5668934	2.5+	2.5+	2.5+	
13	531586	5668955	2.5+	2.5+	2.5+	
14	531572	5668980	2.20	2.5+	2.50	
15	531559	5668998	1.90	2.5+	2.20	
16	531548	5669015	1.25	1.00	1.00	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 29A – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 4 and PI 5	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 29A
			Left Line	Center Line	Right Line	
1	530530	5666393	2.00	2.00	2.00	
2	530533	5666413	2.50	2.5+	2.00	
3	530547	5666431	1.50	1.50	2.5+	
4	530558	5666449	1.50	2.5+	1.50	
5	530567	5666468	1.50	1.50	1.00	
6	530576	5666492	Trees	1.00	0.60	
7	530581	5666506	0.50	0.75	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 29B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 4 and PI 5	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 29B
			Left Line	Center Line	Right Line	
1	530053	5665257	1.25	1.00	1.50	
2	530068	5665272	1.00	1.00	2.10	
3	530078	5665288	1.00	0.75	2.50	
4	530087	5665307	Water	0.60	0.70	
5	530095	5665326	Water	1.00	1.50	
6	530098	5665346	Water	0.75	Water	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 30A – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 5 and PI 6	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 30A
			Left Line	Center Line	Right Line	
1	529145	5662704	2.00	2.25	2.00	
2	529151	5662728	1.75	1.00	2.50	
3	529149	5662749	1.60	2.50	2.5+	
4	529156	5662771	1.80	2.5+	1.50	
5	529163	5662790	2.5+	2.5+	2.5+	
6	529171	5662811	2.5+	2.5+	2.5+	
7	529179	5662833	1.25	2.10	2.5+	
8	529185	5662854	1.25	1.75	2.5+	
9	529195	5662874	1.00	0.75	1.10	
10	529203	5662896	1.60	1.00	0.60	
11	529210	5662918	2.00	1.75	2.20	
12	529215	5662940	2.00	2.50	2.50	
13	529220	5662961	2.5+	2.5+	1.00	
14	529227	5662982	2.00	2.5+	2.10	
15	529237	5663000	1.75	2.5+	2.00	
16	529241	5663022	2.00	2.5+	2.50	
17	529249	5663045	2.5+	2.25	2.5+	
18	529259	5663066	2.5+	2.5+	2.5+	
19	529262	5663089	2.5+	2.5+	2.5+	
20	529270	5663108	2.5+	2.5+	2.00	
21	529277	5663130	2.5+	2.5+	2.50	
22	529288	5663150	2.20	2.5+	2.50	
23	529302	5663174	2.20	2.50	1.50	
24	529303	5663195	2.5+	2.50	2.5+	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 30B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 5 and PI 6	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 30B
			Left Line	Center Line	Right Line	
1	528640	5661208	0.50	2.5+	2.10	
2	528631	5661188	1.50	2.5+	2.5+	
3	528631	5661160	1.50	2.5+	2.5+	
4	528620	5661142	1.90	2.5+	2.30	
5	528612	5661121	1.90	2.5+	2.00	
6	528606	5661097	1.50	2.00	2.10	
7	528598	5661077	1.00	2.5+	2.5+	
8	528592	5661058	1.40	1.50	1.80	
9	528583	5661038	1.00	1.50	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 31A – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 6 and PI 7	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 31A
			Left Line	Center Line	Right Line	
1	523373	5647557	1.25	1.25	1.50	
2	523390	5647564	0.50	0.20	2.5+	
3	523407	5647582	1.75	1.50	1.50	
4	523420	5647601	2.00	2.5+	1.00	
5	523438	5647618	1.90	2.5+	1.50	
6	523451	5647637	2.00	1.50	1.50	
7	523466	5647656	1.00	0.70	2.00	
8	523483	5647672	1.50	1.50	2.5+	
9	523504	5647690	Water	1.25	2.00	
10	523525	5647710	1.75	1.50	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 31B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 6 and PI 7	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 31B
			Left Line	Center Line	Right Line	
1	522991	5647139	2.5+	2.5+	2.5+	No picture available
2	523009	5647160	2.5+	2.5+	1.00	
3	523026	5647173	2.00	1.75	2.00	
4	523040	5647190	2.00	2.5+	1.50	
5	523053	5647209	2.5+	2.5+	2.00	
6	523069	5647223	2.5+	2.5+	2.00	
7	523085	5647239	2.5+	2.5+	2.00	
8	523100	5647254	2.5+	2.5+	2.00	
9	523116	5647274	2.5+	2.5+	2.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 31C – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 6 and PI 7
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 31C
			Left Line	Center Line	Right Line	
1	521408	5645375	2.5+	2.50	1.40	
2	521422	5645391	1.50	2.5+	1.50	
3	521438	5645404	1.25	2.5+	1.00	
4	521455	5645420	1.75	1.00	0.50	
5	521469	5645438	2.00	1.00	0.20	
6	521490	5645454	1.10	1.00	0.50	
7	521505	5645472	1.25	1.10	0.60	
8	521519	5645489	1.50	1.75	2.00	
9	521535	5645507	1.10	1.25	1.00	
10	521547	5645523	0.50	1.00	0.80	
11	521565	5645536	1.50	0.50	1.00	
12	521577	5645552	1.50	1.00	0.30	
13	521592	5645572	1.50	2.00	0.70	
14	521607	5645590	1.25	1.60	1.50	
15	521619	5645608	0.50	0.75	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 32 – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 8B and PI 9B	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 32
			Left Line	Center Line	Right Line	
1	512141	5629904	0.50	0.75	0.60	
2	512152	5629921	0.70	1.00	1.20	
3	512163	5629941	1.00	1.40	1.40	
4	512174	5629960	1.00	2.00	2.5+	
5	512181	5629972	1.50	2.20	1.60	
6	512202	5630027	1.30	1.50	1.40	
7	512215	5630045	1.25	1.50	1.30	
8	512234	5630060	1.00	1.00	2.00	
9	512243	5630079	1.00	1.25	2.25	
10	512255	5630097	1.10	1.25	2.5+	
11	512268	5630120	1.25	1.25	1.80	
12	512280	5630138	0.90	1.00	1.50	
13	512289	5630157	1.10	1.00	1.20	
14	512301	5630177	0.50	0.50	1.00	
15	512312	5630197	0.90	0.75	0.60	
16	512324	5630217	1.00	1.10	0.80	
17	512338	5630239	1.00	1.00	0.50	
18	512351	5630257	1.25	0.80	0.90	
19	512358	5630277	1.25	0.75	0.90	
20	512370	5630295	1.10	1.00	1.10	
21	512382	5630315	1.00	0.60	1.30	
22	512393	5630334	0.25	0.50	0.70	
23	512404	5630353	0.50	0.60	1.50	
24	512415	5630376	0.50	0.80	0.50	
25	512423	5630395	0.50	0.60	0.60	
26	512436	5630417	0.60	0.60	0.70	
27	512447	5630436	0.40	1.00	0.60	
28	512460	5630459	1.50	0.60	0.70	
29	512470	5630480	1.25	0.75	0.50	
30	512482	5630500	0.50	0.50	0.60	
31	512497	5630519	1.50	0.60	1.00	
32	512511	5630539	1.50	1.25	0.80	
33	512526	5630563	0.80	1.00	1.00	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 33 – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 11B and PI 12B	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 33
			Left Line	Center Line	Right Line	
1	504508	5620037	1.50	2.00	1.30	
2	504523	5620053	2.00	2.00	2.00	
3	504544	5620071	1.80	2.00	1.80	
4	504559	5620086	1.50	1.60	2.00	
5	504576	5620102	1.70	1.50	1.90	
6	504592	5620115	1.40	2.00	2.5+	
7	504609	5620128	2.20	2.20	2.5+	
8	504624	5620145	1.70	2.00	2.00	
9	504642	5620158	1.50	1.50	1.90	
10	504657	5620175	1.25	0.75	1.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 34 – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 10, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 12A and PI 13A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 34
			Left Line	Center Line	Right Line	
1	495830	5597020	2.5+	2.5+	2.5+	
2	495855	5597030	2.5+	2.5+	2.5+	
3	495874	5597036	2.5+	2.5+	2.5+	
4	495895	5597050	2.5+	2.5+	2.5+	
5	495917	5597061	2.5+	2.5+	2.5+	
6	495937	5597068	2.5+	2.5+	2.5+	
7	495955	5597076	2.5+	2.5+	2.5+	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 35 – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 10, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 14A and PI 15A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 35
			Left Line	Center Line	Right Line	
1	490542	5591521	2.5+	2.20	2.20	
2	490555	5591540	2.5+	2.5+	2.5+	
3	490568	5591558	2.5+	2.5+	2.5+	
4	490583	5591576	2.5+	2.5+	2.5+	
5	490598	5591594	2.5+	2.5+	2.5+	
6	490614	5591613	2.5+	2.5+	2.5+	
7	490630	5591636	2.5+	2.5+	2.5+	
8	490644	5591655	2.5+	2.5+	2.5+	
9	490657	5591680	1.50	1.00	0.75	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 36 – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 10, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 19 and PI 20
			Inspector: Justin Ingram


Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 36
			Left Line	Center Line	Right Line	
1	473587	5571147	2.5+	2.5+	2.5+	
2	473611	5571156	2.25	2.25	2.5+	
3	473629	5571171	2.5+	2.5+	2.5+	
4	473640	5571188	2.5+	2.5+	2.5+	
5	473659	5571198	2.5+	2.5+	2.5+	
6	473679	5571213	2.5+	2.5+	2.5+	
7	473699	5571223	2.5+	2.5+	2.00	
8	473716	5571236	2.5+	2.5+	2.5+	
9	473737	5571239	2.5+	2.5+	2.5+	
10	473757	5571251	2.5+	2.5+	2.5+	
11	473779	5571269	2.5+	2.5+	2.5+	
12	473795	5571291	2.5+	1.80	2.5+	
13	473817	5571298	2.5+	2.00	2.5+	
14	473836	5571307	2.5+	2.50	2.5+	
15	473855	5571320	2.00	2.5+	2.5+	
16	473873	5571334	2.5+	2.5+	2.5+	
17	473891	5571347	2.5+	2.5+	2.5+	
18	473913	5571358	2.5+	2.5+	2.5+	
19	473933	5571376	2.5+	2.5+	2.5+	
20	473953	5571396	2.5+	2.00	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 37 – LOT 2**


Client:	Nalcor Energy - Lower Churchill Project		Date: August 10, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 21 and PI 22
		Inspector: Justin Ingram	

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 37
			Left Line	Center Line	Right Line	
1	468383	5566347	1.00	1.25	1.00	
2	468404	5566355	0.90	1.25	0.80	
3	468424	5566364	2.00	1.50	1.50	
4	468447	5566370	1.75	1.10	1.50	
5	468466	5566381	1.30	1.50	2.00	
6	468486	5566389	1.00	1.30	2.00	
7	468508	5566402	1.10	1.50	2.25	
8	468528	5566414	1.30	1.30	2.5+	
9	468552	5566417	1.80	2.5+	2.5+	
10	468566	5566433	1.20	2.5+	2.5+	
11	468584	5566446	0.90	1.30	2.5+	
12	468606	5566451	2.5+	2.5+	1.50	
13	468633	5566468	2.5+	Water	Water	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 38 – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 10, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 22 and PI 23
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 38
			Left Line	Center Line	Right Line	
1	467800	5563682	0.25	2.5+	2.5+	
2	467803	5563702	2.5+	2.5+	2.5+	
3	467807	5563726	2.5+	2.5+	2.5+	
4	467806	5563745	2.5+	2.5+	2.5+	
5	467809	5563768	2.5+	2.5+	2.5+	
6	467809	5563794	2.5+	2.5+	2.5+	
7	467810	5563811	2.5+	2.5+	2.5+	
8	467809	5563833	2.5+	2.25	2.5+	
9	467813	5563850	1.20	2.25	2.00	
10	467819	5563876	2.5+	2.10	2.5+	
11	467816	5563901	2.5+	2.5+	2.5+	
12	467816	5563923	2.00	2.5+	2.5+	
13	467812	5563948	2.5+	2.5+	2.5+	
14	467813	5563966	1.50	1.25	2.5+	
15	467802	5563984	0.25	2.5+	2.5+	
16	467800	5564006	0.90	1.50	1.25	
17	467800	5564025	1.00	0.50	1.25	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 39 – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 29 and PI 30
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 39
			Left Line	Center Line	Right Line	
1	472270	5544995	0.50	0.52	1.50	
2	472276	5544974	0.50	0.50	1.50	
3	472259	5544959	0.50	0.50	1.50	
4	472266	5544938	0.25	0.10	0.20	
5	472253	5544891	0.75	0.60	0.60	
6	472254	5544867	1.25	0.75	0.70	
7	472245	5544849	1.50	0.60	0.20	
8	472228	5544832	water	0.75	0.80	
9	472216	5544810	1.00	0.60	0.80	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 40A – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 30 and PI 31
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 40A
			Left Line	Center Line	Right Line	
1	472172	5540518	1.20	2.00	2.00	
2	472169	5540505	1.25	1.10	0.60	
3	472175	5540480	1.50	1.25	1.00	
4	472182	5540456	1.50	0.50	0.40	
5	472191	5540434	1.50	1.10	0.50	
6	472195	5540414	1.25	1.00	0.50	
7	472195	5540393	1.25	0.60	0.50	
8	472206	5540371	1.00	1.00	0.50	
9	472214	5540349	1.00	0.75	0.60	
10	472218	5540331	0.75	0.60	0.40	
11	472223	5540310	0.75	0.60	0.70	
12	472223	5540289	0.75	0.90	0.70	
13	472230	5540269	0.60	0.60	0.50	
14	472237	5540249	0.40	0.60	0.60	
15	472245	5540226	0.40	0.60	0.60	
16	472249	5540200	0.50	0.50	0.50	
17	472256	5540177	0.50	0.10	2.00	
18	472264	5540155	0.50	0.60	0.60	
19	472270	5540133	0.60	0.60	0.70	
20	472279	5540109	0.60	0.90	0.50	
21	472278	5540084	0.50	1.00	1.50	
22	472288	5540059	0.50	1.00	2.00	
23	472299	5540040	0.10	0.60	1.50	
24	472306	5540020	0.25	0.20	0.20	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 40B – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 30 and PI 31	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 40B
			Left Line	Center Line	Right Line	
1	472840	5538047	0.10	0.25	0.50	
2	472854	5538032	0.50	1.00	0.70	
3	472847	5538016	0.50	1.00	0.50	
4	472853	5537994	0.50	0.60	0.50	
5	472854	5537976	0.50	Rock	0.20	
6	472874	5537940	0.50	0.40	0.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 41 – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 34C and PI 35C	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 41
			Left Line	Center Line	Right Line	
1	470315	5528699	2.00	0.60	2.20	
2	470308	5528679	2.5+	2.20	2.5+	
3	470297	5528664	0.50	0.50	0.30	
4	470296	5528641	0.60	0.70	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 42 – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 37C and PI 37
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 42
			Left Line	Center Line	Right Line	
1	478287	5521601	0.80	0.50	1.50	
2	478273	5521617	1.00	0.80	1.00	
3	478258	5521641	0.60	0.70	0.60	
4	478245	5521658	1.25	0.80	2.00	
5	478236	5521676	1.50	1.25	2.00	
6	478227	5521696	1.10	1.50	2.20	
7	478219	5521717	2.5+	1.80	2.5+	
8	478209	5521735	1.50	0.50	Trees	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 43A – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 39 and PI 40	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 43A
			Left Line	Center Line	Right Line	
1	488618	5512090	1.50	2.5+	1.50	
2	488639	5512084	0.90	2.5+	1.50	
3	488666	5512084	2.00	2.00	1.60	
4	488689	5512085	1.25	1.80	1.50	
5	488712	5512079	2.5+	2.5+	Trees	
6	488734	5512071	2.5+	1.70	Trees	
7	488753	5512073	0.80	2.00	Trees	
8	488769	5512075	1.50	1.40	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 43B – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 39 and PI 40
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 43B
			Left Line	Center Line	Right Line	
1	489077	5511988	2.5+	1.00	1.00	
2	489094	5511987	1.75	1.00	2.5+	
3	489116	5511981	1.50	1.25	2.10	
4	489138	5511971	2.5+	2.5+	2.5+	
5	489157	5511965	2.00	1.50	0.50	
6	489180	5511962	1.60	1.25	2.5+	
7	489199	5511955	2.5+	2.5+	1.40	
8	489221	5511951	1.40	1.50	2.5+	
9	489244	5511947	1.10	1.50	1.50	
10	489262	5511945	1.50	1.25	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 43C – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 39 and PI 40	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 43C
			Left Line	Center Line	Right Line	
1	489955	5511785	2.5+	1.00	1.00	
2	489978	5511781	2.5+	2.5+	1.50	
3	489997	5511770	1.30	1.00	1.50	
4	490016	5511770	1.00	1.50	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 44A – LOT 2</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 40 and PI 41
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 44A
			Left Line	Center Line	Right Line	
1	490873	5511092	2.00	2.10	2.20	
2	490889	5511072	2.25	2.10	1.30	
3	490897	5511053	2.5+	2.5+	1.50	
4	490906	5511028	1.75	1.30	0.80	
5	490910	5511007	2.00	1.10	1.50	
6	490917	5510983	1.25	1.50	Trees	







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 44C – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 40 and PI 41	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 44C
			Left Line	Center Line	Right Line	
1	491803	5508249	1.50	0.50	2.30	No picture available
2	491800	5508272	1.25	0.60	2.40	
3	491794	5508292	0.25	0.75	0.70	
4	491786	5508313	0.25	1.00	0.90	
5	491778	5508334	0.50	0.60	0.70	
6	491770	5508354	1.50	0.80	2.50	
7	491766	5508372	2.00	2.5+	2.5+	
8	491762	5508392	1.50	2.5+	2.5+	
9	491753	5508414	2.5+	2.5+	2.5+	
10	491744	5508438	2.5+	2.5+	Water	
11	491734	5508457	1.10	0.50	Water	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 2 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 44D – LOT 2</b>				
Client:	Nalcor Energy - Lower Churchill Project	Date:	August 3, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 40 and PI 41	
		Inspector: Justin Ingram		

Probe No.	Easting	Northing	Depth Penetrated (m)			<b>BOG 44D</b>
			Left Line	Center Line	Right Line	
1	492212	5507003	1.75	2.10	2.5+	
2	492206	5507024	2.5+	2.5+	2.5+	
3	492200	5507043	2.50	2.5+	2.5+	
4	492197	5507064	1.00	1.50	1.00	
5	492190	5507087	0.70	0.75	1.00	

**Appendix C5**  
**Bedrock Mapping Records**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 2-PI 17-STN-08</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5582932	E 479569	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	5 x 5	
<b>Lithology</b>	Weathered, jointed, dark grey limestone.	
<b>Structure</b>	Bedding orientation:	Jointing:
	Outcrop striking towards 050° azimuth. Dip direction was not determined.	Dominant joint set trending 340°/95° and spaced 1.25 m apart. Secondary joint set trending 050°/90° and spaced 0.5 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 2-PI 17-STN-09</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5582930	E 479576	Inspector: Brad Walsh	

**PHOTOGRAPHS**

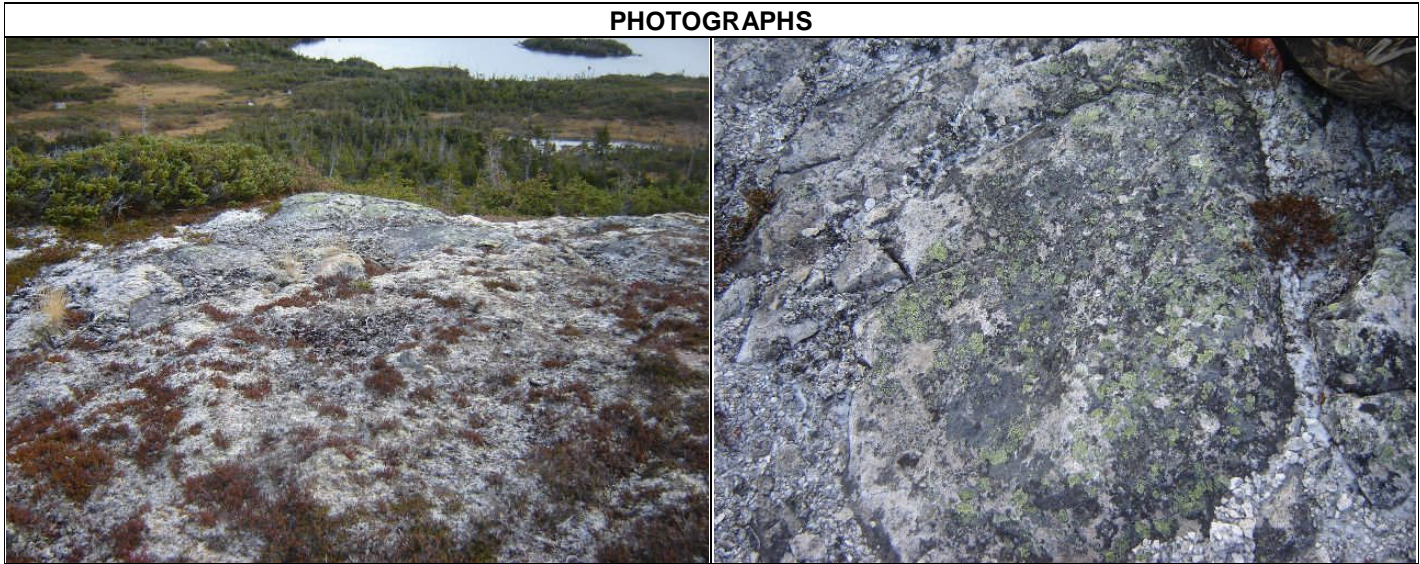


<b>Description</b>		
<b>Outcrop dimensions (m)</b>	2 x 5	
<b>Lithology</b>	Weathered, jointed, dark grey limestone.	
<b>Structure</b>	Bedding orientation:	Jointing:
	005°/15°E	Dominant joint set trending 180°/80° and spaced 0.5 m apart. Secondary joint set trending 090°/85° and spaced 0.5 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 2-PI 33C-STN-10</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5530898	E 470251	Inspector:	Brad Walsh



<b>Description</b>	
<b>Outcrop dimensions (m)</b>	3 x 5
<b>Lithology</b>	Weathered, coarse grained, pinkish-grey granitoid gneiss.
<b>Structure</b>	Bedding orientation:
	204°/45°E 200°/40°E
	Jointing:
	Dominant joint set trending 210°/80° and spaced 0.4 m apart. Secondary joint set trending 320°/85° and spaced 0.25 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 2-PI 34C-STN-11</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5529780	E 470555	Inspector:	Brad Walsh

**PHOTOGRAPHS**



<b>Description</b>	
<b>Outcrop dimensions (m)</b>	N/A
<b>Lithology</b>	Coarse grained, pinkish-grey granitoid gneiss.
<b>Structure</b>	Bedding orientation: 180°/?
	Poorly exposed outcrop, dip direction could not be determined.
	Jointing:  None observed.

**Appendix C6**  
**River Crossing Data**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 33</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5671623	E 530414
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>  Located between PI 3 and PI 4
<b>Estimated Width (m)</b>	10 – 30	
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Mud, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 34</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5666549	E 530647
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>  Located between PI 4 and PI 5 River crossing between Ten Mile Lake and Round Lake
<b>Estimated Width (m)</b>	10 – 30	
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Mud, organic debris, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 35</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5643314	E 519543
				Inspector: Brian Walsh

**PHOTOGRAPH**



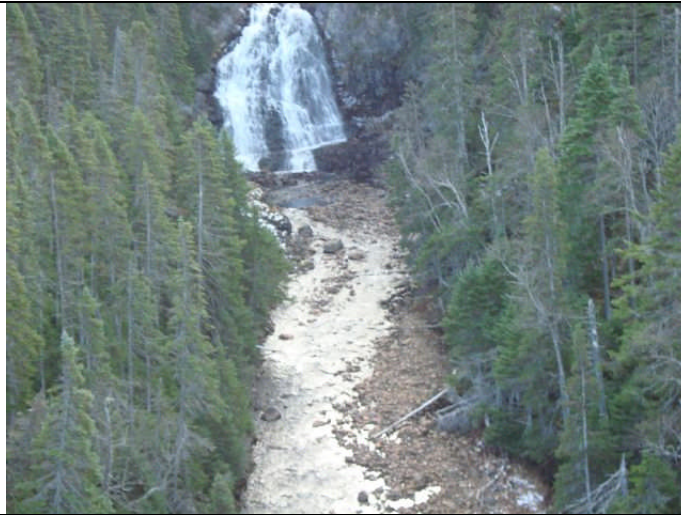
<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.5 (or deeper)	<b>Notes</b>
<b>Estimated Width (m)</b>	10 – 15	350 m northeast of PI 7 Appears deep in places
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 36</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5639219	E 517378
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 (approx)	<b>Notes</b>  Located between PI 7 and PI 8B Shallow with low banks
<b>Estimated Width (m)</b>	5 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 37</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5636894	E 516125
		Inspector: Brian Walsh		

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>  Located between PI 7 and PI 8B Bridge (see picture) located approximately 300 m from where the corridor is proposed to cross the river.
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 38 (East River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5621751	E 506859
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.2	<b>Notes</b>  200 m north of PI 10B River banks gently sloping
<b>Estimated Width (m)</b>	5 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 39</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5619874	E 504386 Inspector: Brian Walsh

<b>PHOTOGRAPH</b>	
Photo Not Available	

<b>Observations From Air</b>		
Estimated Depth (m)	0.6 – 1.0	Notes
Estimated Width (m)	15 (approx)	Located between PI 10B and PI 11A
Estimated Velocity (fast or slow)	Slow	
Estimated Substrate Composition	Cobbles, boulders, sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 40</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5613899	E 503634
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	10 – 15	Located between PI 10B and PI 11A Rivers runs through a gorge with steep bedrock banks.
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 41 (Indian Steady River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5609853	E 499498
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>  Located between PI 10B and PI 11A
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles, boulders, sand	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 42 (Torrent River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 4, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5608238	E 501059
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	5 (approx)	Located between PI 10B and PI 11A
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 43</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5601932	E 498859
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	0.3 – 0.6	Located between PI 11A and PI 14B
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 44</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5587834	E 485207
		Inspector: Brian Walsh		

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	1.0 (approx)	<b>Notes</b>
<b>Estimated Width (m)</b>	25 – 50	Located between PI 16 and PI 17
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 45</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5585944	E 483035
		Inspector: Brian Walsh		

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	1.0 (approx)	<b>Notes</b>
<b>Estimated Width (m)</b>	25 – 50	Located between PI 16 and PI 17
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 46</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5573110	E 475889
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located near Brian's Pond between PI 18 and PI9
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Bedrock, cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



RIVER 47				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond – Gull Island			
Contract No.	WTO DC 1051	Location:	N 5571983	E 474754
		Inspector: Brian Walsh		

**PHOTOGRAPH**



Observations		
Estimated Depth (m)	0.3 – 1.2	Notes
Estimated Width (m)	5 – 10	Located near Brian's Pond
Estimated Velocity (fast or slow)	Slow	
Estimated Substrate Composition	Cobbles, sand and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 48</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond – Gull Island			
Contract No.	WTO DC 1051	Location:	N 5568352	E 470850
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.2	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located near Brian's Pond between PI 20 and PI 22
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 49</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5560154	E 467610
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	30 (approx)	Located near Brian's Pond between PI 22 and PI 23
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 50</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond – Gull Island			
Contract No.	WTO DC 1051	Location:	N 5557227	E 466418
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	30 (approx)	Located near Brian's Pond between PI 23 and PI 24
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 51</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5524417	E 474363
				Inspector: Brian Walsh

<b>PHOTOGRAPH</b>	
Photo Not Available	

<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>  Located between PI 36 and PI 37C
<b>Estimated Width (m)</b>	10 – 15	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles, boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 52 (Eagle Mountain River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5519615	E 479311
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>  Located adjacent to PI 37 Remnants of old bridge at this location
<b>Estimated Width (m)</b>	10 – 15	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles, boulders	

**Appendix C7**  
**Campsite Data**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of Campsite E located approximately 8 km east - northeast of Hawke's Bay and 4 km southwest of PI 13B.**



**Photo 2 – View of Campsite E looking east.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – PHOTOGRAPHIC JOURNAL**



**Photo 3 – View of Campsite E looking west.**



**Photo 4 – View of Campsite E looking south.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-CSE-TP-01</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 15 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5612017	E 496876 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.4	Test pit terminated at 0.4 m on BEDROCK.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 4:15 pm	End Time: 4:30 pm			

**General Notes**

1. Test pit terminated at 0.4 m on Bedrock.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.
5. Campsite E is located approximately 8 km east - northeast of Hawke's Bay and 4 km southwest of PI 13B.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-CSE-TP-02				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5611920 E 496877	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 1.7	BOULDERS (Probable Fractured Bedrock) with some sand, some gravel, trace to some silt, some angular cobbles, moist, loose to compact, dark brown to reddish brown.	DC1051-LOT 2-CSE-TP-02	1.0	Grab
1.7 – 1.8	Refusal on a probable bedrock or large boulder.			
Estimated Cobbles (%) 10 – 15		Estimated Boulders (%) 60		Estimated Max Diameter (m) 1.0
Start Time: 8:45 am		End Time: 9:00 am		

**General Notes**

1. Test pit excavated to 1.1 m with backhoe and probed from 1.1 m to 1.8 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.
5. Campsite E is located approximately 8 km east - northeast of Hawke's Bay and 4 km southwest of PI 13B.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-CSE-TP-03				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5611785 E 496742	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type	
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A	
0.1 – 1.0	BOULDERS AND COBBLES (Probable Fractured Bedrock) with some sand, some gravel, trace to some silt, moist, compact to dense, dark brown.	N/A	N/A	N/A	
1.0 – 1.3	Refusal on probable bedrock or large boulder.				
Estimated Cobbles (%)	25 – 30	Estimated Boulders (%)	75	Estimated Max Diameter (m)	0.7
Start Time:	11:00 am	End Time:	1:00 pm		

**General Notes**

1. Test pit excavated to 1.0 m with backhoe and probed from 1.0 m to 1.3 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.
5. Campsite E is located approximately 8 km east - northeast of Hawke's Bay and 4 km southwest of PI 13B.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-CSE-TP-04</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5611695 E 496857	Inspector: BradWalsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.15	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.15 – 0.3	SAND AND GRAVEL with some silt, some angular cobbles, moist, loose to compact, grey to brown.	N/A	N/A	N/A
0.3 – 1.4	GRAVELLY SAND AND BOULDERS (Probable Fractured Bedrock) with some silt, some sub-angular to angular cobbles, moist, compact to dense, reddish-brown.	DC1051-LOT 2-CSE-TP-04	1.0	Grab
1.4 – 1.6	Refusal on probable bedrock.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 60		Estimated Max Diameter (m) 1.0 m
Start Time: 3:00 pm		End Time: 4:15 pm		

**General Notes**

1. Test pit excavated to 1.4 m with backhoe and probed from 1.4 m to 1.6 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.
5. Campsite E is located approximately 8 km east - northeast of Hawke's Bay and 4 km southwest of PI 13B.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE E – PERCOLATION TEST RECORD**

<b>PERCOLATION TEST: DC1051-LOT 2-CSE-PERC-01</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: October 16, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract:	WTO DC 1051	Location	N 5611791	E 496716	Inspector: Brian Walsh

**TEST LOCATION & DEPTH  
LOT 2 – POTENTIAL CAMPSITE E**

- Camp Site E – Located adjacent to a woods road located approximately 8 km east - northeast of Hawke’s Bay and 4 km southwest of PI 13B.
- Coordinates are UTM; NAD83; Zone 21.
- Percolation Test conducted from 0.3 m to 0.4 m below ground surface.

**STRATIGRAPHY & TEST DETAILS**

- **STATIGRAPHY:** 0 m – 0.4 m: GRAVELLY SAND
- **SOIL DESCRIPTION AT TEST DEPTH:** Performed in Gravelly Sand.
- **TEST HOLE DIMENSIONS:** 255 mm (diameter) x 380 mm (depth).
- **TEST HOLE PREPERATION:** Small cobbles and gravel loosely placed at bottom of test hole. Tap water used.

**PERCOLATION TEST RESULTS**

<b>TIME</b>	<b>REFERENCE MEASUREMENT (mm)</b>	<b>WATER LEVEL DROP (mm)</b>	<b>Notes</b>
2:43:00	89	-	• Start Test
2:45:00	83	6	
2:47:00	83	0	
2:49:00	76	7	
2:51:00	71	5	
2:53:00	66	5	
2:56:00	64	2	• Time (t) achieved; End Test
	<b>Time (t) =</b>	<b>13 minutes</b>	

**Note: The Time (t) is expressed as the time required for the water level to drop 2.5 cm.**

**PHOTOS**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of Campsite F located in a pre-existing mine site approximately 9 km northeast of Daniel's Harbour and 3.5 km west of PI 20. Note that much of the site is underlain by remnant tailing deposits from previous mining operations.**



**Photo 2 – Aerial view of Campsite F looking east.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – PHOTOGRAPHIC JOURNAL**



**Photo 3 – Aerial view of Campsite F looking northwest.**



**Photo 4 – View of Campsite F and remnant tailing deposits looking southwest.**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – PHOTOGRAPHIC JOURNAL**



**Photo 5 – View of Campsite F and remnant tailing deposits looking southeast.**



**Photo 6 – View of Campsite F and remnant tailing deposits looking southeast.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-CSF-TP-01</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 17 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5569326 E 467387	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 1.8	SANDY GRAVEL WITH ANGULAR BOULDERS AND COBBLES, trace silt, moist, loose to compact, dark brown to grey.	DC1051-Lot2-CampF-TP01	0.6	Grab
1.8	Refusal on a large boulder or probable bedrock.			
Estimated Cobbles (%) 40	Estimated Boulders (%) 40	Estimated Max Diameter (m) 0.6		
Start Time: 1:30 pm	End Time: 2:00 pm			

**General Notes**

1. Test pit excavated to 0.6 m with backhoe and probed from 0.6 m to 1.8 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.
5. Campsite F is located in a pre-existing mine site located approximately 8.5 km northeast of Daniel's Harbour and 4 km west of PI 20.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – TEST PIT LOGS**

TEST PIT: DC1051-LOT 2-CSF-TP-02				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 17 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5569373 E 467600	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0. – 0.3	SAND with some silt, some gravel, moist, loose to compact, grey-brown.	N/A	N/A	N/A
0.3 – 3.3	SAND ( <b>Tailings from pre-existing mine site</b> ) with some silt, trace gravel, poorly graded, moist, loose to compact, grey.	DC1051-Lot2-CampF-TP02	1.0	Grab
3.3	No refusal to a depth of 3.3 m.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		
Start Time: 2:30 pm	End Time: 3:00 pm			

**General Notes**

- Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 3.3 m using pionjar drill.
- Groundwater observed at 1.8 m flowing at an approximate rate of 1 L/min.
- North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
- Test pit excavated with a BX24 Kabota.
- Campsite F is located in a pre-existing mine site located approximately 8.5 km northeast of Daniel's Harbour and 4 km west of PI 20.
- The material encountered at this test location is interpreted as tailing remnants from the pre-existing mine site.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-CSF-TP-03</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 17 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5569579 E 467729	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	SAND with some silt, some gravel, moist, loose, grey to brown.	N/A	N/A	N/A
0.5 – 3.2	SAND ( <b>Tailings from pre-existing mine site</b> ) with some silt, trace to some gravel, poorly graded, moist, loose to compact, grey.	N/A	N/A	N/A
3.2	No refusal to a depth of 3.3 m.			
Estimated Cobbles (%) None Observed	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) N/A		

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 3.2 m using pionjar drill.
2. Test pit dry upon completion.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.
4. Test pit excavated with a BX24 Kabota.
5. Campsite F is located in a pre-existing mine site located approximately 8.5 km northeast of Daniel's Harbour and 4 km west of PI 20.
6. The material encountered at this test location is interpreted as tailing remnants from the pre-existing mine site.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE F – PERCOLATION TEST RECORD**

<b>PERCOLATION TEST: DC1051-LOT 2-CSF-PERC-01</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: October 17, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract:	WTO DC 1051	Location	N 5569376	E 467591	Inspector: Brian Walsh

**TEST LOCATION & DEPTH  
LOT 2 – POTENTIAL CAMPSITE F**

- Camp Site F – Located in a pre-existing mine site located approximately 8.5 km northeast of Daniel’s Harbour and 4 km west of PI 20.
- Coordinates are UTM; NAD83; Zone 21.
- Percolation Test conducted from 0.15 m to 0.4 m below ground surface.

**STRATIGRAPHY & TEST DETAILS**

- **STATIGRAPHY:** 0 m – 0.4 m: SAND (Tailings from pre-existing mine site).
- **SOIL DESCRIPTION AT TEST DEPTH:** Performed in sand with some gravel and trace silt.
- **TEST HOLE DIMENSIONS:** 330 mm (diameter) x 375mm (depth).
- **TEST HOLE PREPERATION:** Small cobbles and gravel loosely placed at bottom of test hole. Tap water used.

**PERCOLATION TEST RESULTS**

TIME	REFERENCE MEASUREMENT (mm)	WATER LEVEL DROP (mm)	Notes
2:29:00	223	-	• Start Test.
2:31:00	212	11	•
2:35:00	198	14	• Time (t) achieved
2:35:00	179	19	•
2:37:00	160	19	• End Test
	<b>Time (t) =</b>	<b>6 minutes</b>	

**Note: The Time (t) is expressed as the time required for the water level to drop 2.5 cm.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE G – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of the first location selected for Campsite G situated on the north side of an unnamed lake approximately 1.5 km southwest of PI 38.**



**Photo 2 – South-eastern view of the first location selected for Campsite G situated on the north side of the lake.**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE G – PHOTOGRAPHIC JOURNAL**



**Photo 3 – Northern view of the second location selected for Campsite G situated on the south side of the lake.**



**Photo 4 – Eastern view of the second location selected for Campsite G situated on the south side of the lake.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE G – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-CSG-TP-01</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 24, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5515781 E 480044	Inspector: Brad Walsh
<b>PHOTOGRAPHS</b>				
Photo Not Available		Photo Not Available		
<b>Soil and Groundwater Conditions</b>				
Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 1.2	SANDY GRAVEL AND BOULDERS with trace silt, some sub-angular to angular cobbles, dark brown, moist, loose to compact.	DC1051-Lot2-CAMPG(North)-TP01	0 – 0.3	Grab
1.2 – 1.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 30	Estimated Max Diameter (m) 0.5	
Start Time: 1:00 pm		End Time: 1:30 pm		
<b>General Notes</b>				
1. Test pit excavated to 0.3 m with backhoe and probed from 0.3 m to 1.3 m using pionjar drill.				
2. Test pit dry upon completion.				
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.				
4. Test pit excavated with a BX24 Kabota.				
5. Campsite G is located approximately 1.5 km southwest of PI 38.				





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE G – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 2-CSG-TP-02</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 24, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5512936	E 479527 Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Soil and Groundwater Conditions</b>				
Depth (m) From – To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.5	SANDY GRAVEL with trace to some silt, some sub-angular cobbles, moist, loose to compact, grey to reddish brown.	N/A	N/A	N/A
0.5 – 2.2	SANDY GRAVEL AND COBBLES with some silt, some sub-angular boulders, moist, loose to compact, dark brown to grey.	DC1051-Lot2-CampG(South)-TP02	0.75	grab
2.2 – 2.3	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 35		Estimated Boulders (%) 20	Estimated Max Diameter (m) 0.5	
Start Time: 2:30 pm		End Time: 3:00 pm		

<b>General Notes</b>	
1. Test pit excavated to 1.4 m with backhoe and probed from 1.4 m to 2.3 m using pionjar drill.	
2. Test pit dry upon completion.	
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM; Zone 21; NAD 83.	
4. Test pit excavated with a BX24 Kabota.	
5. Campsite G is located approximately 1.5 km southwest of PI 38.	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL CAMPSITE G – PERCOLATION TEST RECORD**

<b>PERCOLATION TEST: DC1051-LOT 2-CSG-PERC-01</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: October 24, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract:	WTO DC 1051	Location	N 5512936	E 479527	Inspector: Brad Walsh

<b>TEST LOCATION &amp; DEPTH</b>
<b>LOT 2 – POTENTIAL CAMPSITE G</b>

- Camp Site G – Located adjacent to an unnamed lake approximately 1.5 km southwest of PI 38
- Coordinates are UTM; NAD83; Zone 21.
- Percolation Test conducted from 0.5 m to 0.7 m below ground surface.

<b>STRATIGRAPHY &amp; TEST DETAILS</b>
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- **STATIGRAPHY:**
  - 0.0 – 0.1 m: TOPSOIL / ROOTMAT
  - 0.1 – 0.5 m: SANDY GRAVEL
  - 0.5 – 2.2 m: COBBLY SAND AND GRAVEL
- **SOIL DESCRIPTION AT TEST DEPTH:** Performed test in sandy gravel with some silt.
- **TEST HOLE DIMENSIONS:** 400 mm (diameter) x 600 mm (depth).
- **TEST HOLE PREPERATION:** 2 to 3 cm of gravel loosely placed at bottom of hole. Tap water used.

<b>PERCOLATION TEST RESULTS</b>			
<b>TIME</b>	<b>REFERENCE MEASUREMENT (mm)</b>	<b>WATER LEVEL DROP (mm)</b>	<b>Notes</b>

4:00:00	75	-	• Start Test.
4:02:00	65	10	•
4:04:00	50	15	• Time (t) achieved
4:06:00	40	10	•
4:08:00	15	25	• End Test
	<b>Time (t) =</b>	<b>4 minutes</b>	

**Note: The Time (t) is expressed as the time required for the water level to drop 2.5 cm.**

<b>PHOTOS</b>	
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Photo Not Available	Photo Not Available
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**Appendix C8**

**Marshalling Yard Data**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL MARSHALLING YARD SITE C – PHOTOGRAPHIC JOURNAL**



**Photo 1 – Aerial view of Marshalling Yard Site C located near Plum Point adjacent to a woods road approximately 3.5 km from Route 432.**



**Photo 2 – View of Marshalling Yard Site C from ground level looking west.**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL MARSHALLING YARD SITE C – PHOTOGRAPHIC JOURNAL**



**Photo 3 – Typical ground conditions at the site.**



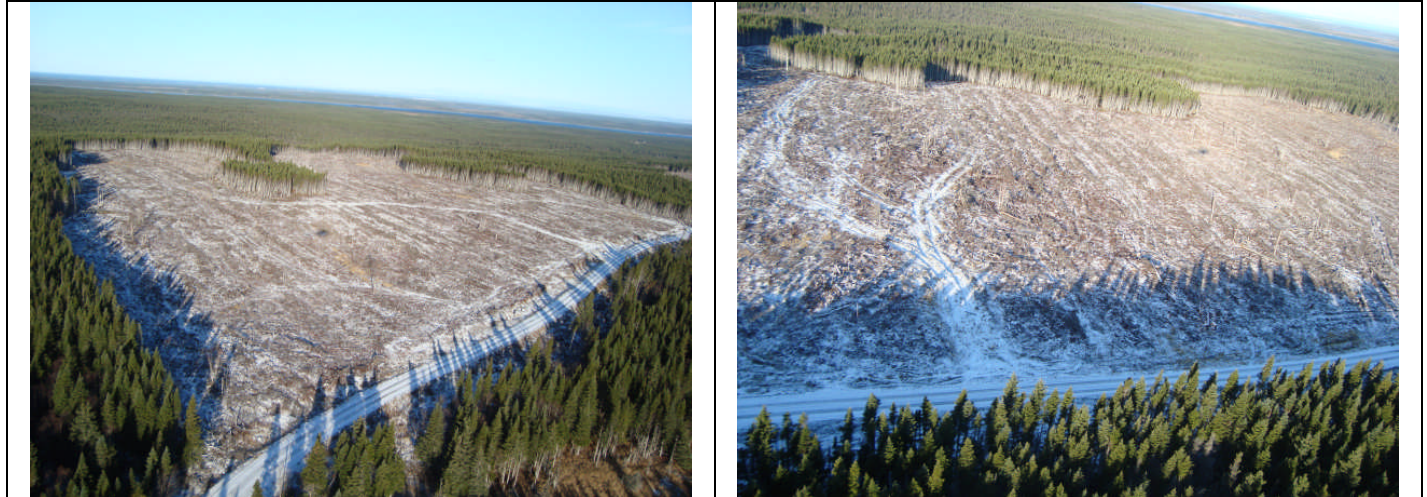
**Photo 4 – View of Marshalling Yard C looking east.**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL MARSHALLING YARD SITE C - PERCUSSION DRILLING LOG**

<b>PROBE ID: DC1051-LOT 2-MYC-PD-01</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 15 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of Marshalling Yard Site C (located approximately 3.5 km from Route 432)	Inspector: Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Depth (m)	Notes
1	5659376	526528	1.50	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
2	5659308	526637	0.80	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
3	5659274	526775	1.00	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
4	5659214	526948	1.00	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
5	5659341	526988	1.00	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
6	5659389	526897	0.95	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
7	5659585	526856	0.50	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
8	5659573	526919	0.50	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
9	5659546	527011	0.75	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.
10	5659009	526823	1.00	Encountered a layer of soil and cobbles before refusal on probable bedrock or a large boulder.

**Generalized Observations**

The potential site for Marshalling Yard C is located adjacent to a woods road approximately 3.5 km from Route 432. A layer of soil and cobbles was encountered before refusal on probable bedrock or large boulder(s). Approximately 3 ha in size.

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL MARSHALLING YARD SITE D – PHOTOGRAPHIC JOURNAL**



**Photo 1 – View of Marshalling Yard Site D from ground level looking west. Located east of the Deer Lake Airport in the former Department of Highways Depot.**



**Photo 2 – View of the depot looking south. Note: scrap metal to the right.**

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL MARSHALLING YARD SITE D – PHOTOGRAPHIC JOURNAL**



**Photo 3 – View of Marshalling Yard Site D looking northeast. Note: Presence of scrap metal and asphalt.**



**Photo 4 – View of Marshalling Yard Site D looking east.**

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 2 – POTENTIAL MARSHALLING YARD SITE D – PHOTOGRAPHIC JOURNAL**



**Photo 5 – View of Marshalling Yard Site D looking north.**

**APPENDIX D**  
**TRANSMISSION LINE DATA – LOT 3**

**Appendix D1**

**Test Pit Logs & Laboratory Results**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 45-TP-025</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 7, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5458249 E 516789	Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 1.9	SAND AND GRAVEL with trace cobbles, trace fines, some rootlets, brown, moist, loose to compact.	DC1051-LOT 3-PI 45-TP-025	1.0	Grab
1.9	Test pit terminated at 1.9 m.			
Estimated Cobbles (%) 5		Estimated Boulders (%) 0	Estimated Max Diameter (m) N/A	
Start Time: 1:00 p.m.		End Time: 2:15 p.m.		

**General Notes**

1. Test pit terminated at 1.9 m in Sand and Gravel due to limits of Kabota.
2. No groundwater encountered.
3. Test pit excavated into existing embankment.
4. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS - UTM, NAD 83, Zone 21
5. Test pit excavated with a BX24 Kabota.

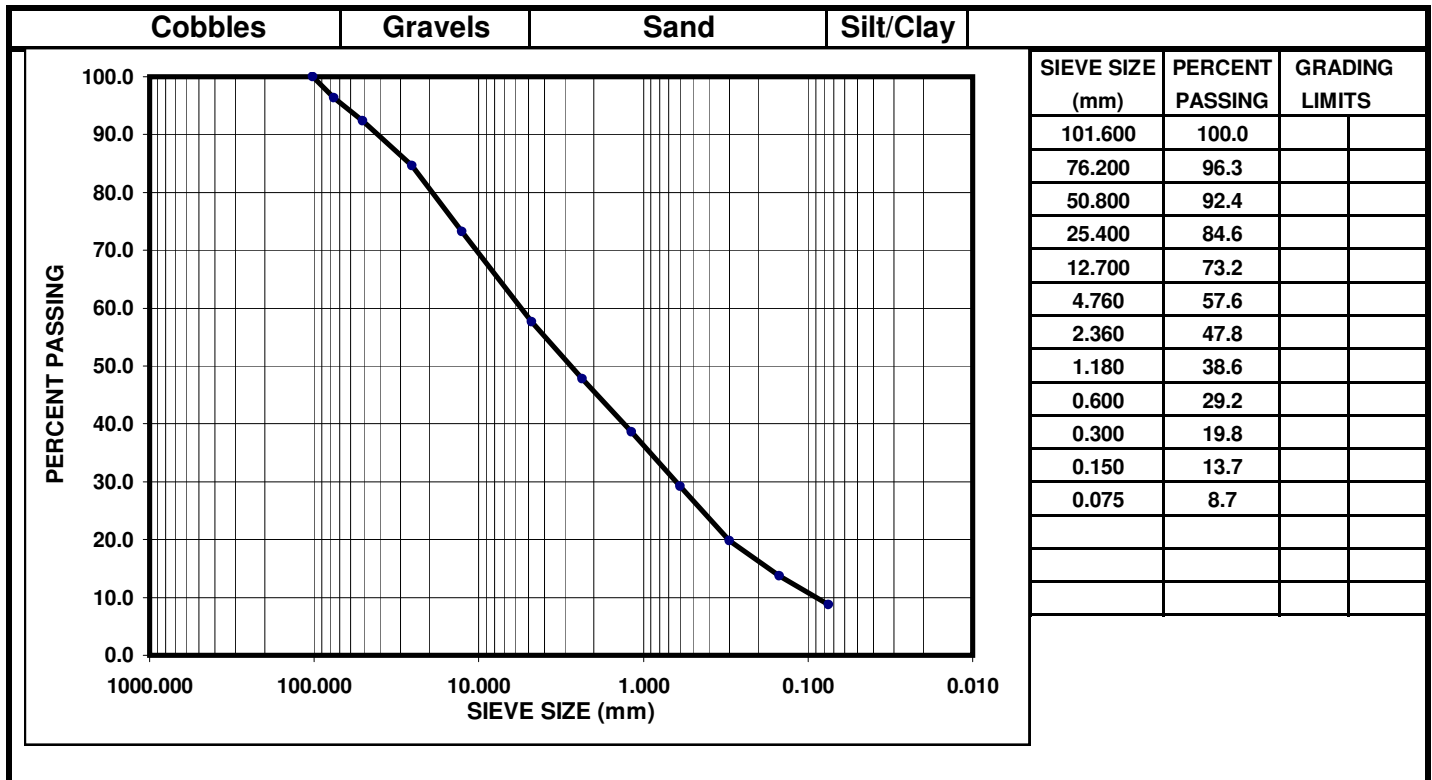




**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458  
**Project:** Geotechnical Investigation:  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro  
**Sampled By:** Brad Walsh of AMEC  
**Location:** TP-025

**Sample No.:** DC1051-LOT 3-PI 45-TP-025  
**Sample Type:** Sand and gravel, trace silt/clay  
 with cobbles  
**Date Sampled:** 7-Aug-08  
**Date Tested:** 25-Nov-08  
**Sample Depth:** 1 m



**Comments:**    %Cobbles 3.7                      %Gravel 38.7                      %Sand 48.9                      %Silt/Clay 8.7  
 Natural Moisture content of 6.6%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

Per:

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 133 Crosbie Road  
 P.O. Box 13216, St John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-7023  
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Construction Materials Laboratory  
 36 Pippy Place  
 P.O. Box 13216, St. John's NL  
 Canada, A1B 4A5  
 Tel. (709) 722-5062  
 Fax. (709) 722-5025



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 46-TP-024</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 7, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5458977 E 518980	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type	
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A	
0.2 – 0.6	SANDY SILT AND GRAVEL with some sub-rounded to angular shaped cobbles and boulders, red- brown, wet, compact.	N/A	N/A	N/A	
0.6 – 3.2	GRAVELLY SAND with some fines, some sub-rounded to angular cobbles and boulders, dark brown to grey, wet, compact.	DC1051-LOT 3-PI 46-TP-024	1.3	Grab	
3.2	Reached extent of pionjar drill with no refusal on bedrock or boulders.				
Estimated Cobbles (%)	20	Estimated Boulders (%)	15	Estimated Max Diameter (m)	0.6
Start Time:	10:00 am	End Time:	11:55 am		

**General Notes**

1. Test pit excavated to 1.4 m with backhoe and probed from 1.4 to m to 3.2 m using pionjar drill.
2. Groundwater encountered at 0.4 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 48-TP-107</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5456478	E 526148 Inspector: Brad Walsh

<b>PHOTOGRAPHS</b>	
Photo Not Available	Photo Not Available

<b>Soil and Groundwater Conditions</b>				
Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SAND with some gravel and silt, grey-brown to red-brown, moist, compact, weathered.	N/A	N/A	N/A
0.5 – 2.5	SAND AND GRAVEL, trace sub-rounded to sub-angular cobbles, trace fines, trace boulders, well graded and rounded, medium brown, moist, compact.	DC1051-LOT 3-PI 48-TP-107	1.1	Grab
2.5 – 2.6	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 15 - 20		Estimated Boulders (%) 5		Estimated Max Diameter (m) 0.7
Start Time: 2:45 pm		End Time: 3:30 pm		

<b>General Notes</b>
1. Test pit excavated to 1.5 with backhoe and probed from 1.5 to 2.6 with pionjar drill.
3. No groundwater encountered.
4. Some surficial boulders observed in area.
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM, NAD 83, Zone 21.
6. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 49-TP-026</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 8 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5460103 E 539212	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type	
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A	
0.2 – 3.8	GRAVELLY SAND with some sub-angular to sub-rounded cobbles, some fines, trace boulders, medium to fine grained, moist, brown, loose to compact.	DC1051-LOT 3-PI 49-TP-026	1.7	Grab	
3.8	Reached extent of pionjar drill with no refusal on bedrock or boulders.				
Estimated Cobbles (%)	10	Estimated Boulders (%)	10	Estimated Max Diameter (m)	0.3
Start Time:	11:21 a.m.	End Time:	2:00 p.m.		

**General Notes**

1. Test pit excavated to 1.9 m with backhoe and probed from 1.9 m to 3.8 m using pionjar drill. Did not encounter bedrock or boulders.
2. No groundwater encountered.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS – UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 50-TP-108</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5450673 E 552549	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.6	SAND with trace sub-angular to sub-rounded cobbles and boulders, moist, compact, weathered.	N/A	N/A	N/A
0.6 – 1.4	SAND AND GRAVEL with some fines, some cobbles, trace boulders, particles sub-angular to sub-rounded, medium grained, dark brown, moist, compact.	DC1051-LOT 3-PI 50-TP-108	1.2	Grab
1.4	Test pit terminated at 1.4 m on PROBABLE BEDROCK.			

Estimated Cobbles (%) 20	Estimated Boulders (%) 5	Estimated Max Diameter (m) 0.4
Start Time: 11:45 am	End Time: 1:10 Pm	

**General Notes**

1. Test pit terminated at 1.4 m on probable bedrock.
2. Water seepage at 0.8 m.
3. Some sloughing of pit.
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-REP-PI 50 to PI 51-TP-109</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5443103 E 554873	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.6	SILTY SAND with intermittent layers of sand and angular to sub-angular cobbles, moist to wet, compact.	N/A	N/A	N/A
0.6 – 2.1	GRAVELLY, SILTY SAND with some angular to sub-angular cobbles, dark grey to black, moist to wet, compact.	DC1051-LOT 3-REP-PI 50 to PI 51-TP-109	1.5	Grab
2.1 – 2.2	Refusal on probable bedrock or large boulder.			

Estimated Cobbles (%) 35	Estimated Boulders (%)	Estimated Max Diameter (m) 0.4
Start Time: 11:45 am	End Time: 1:10 pm	

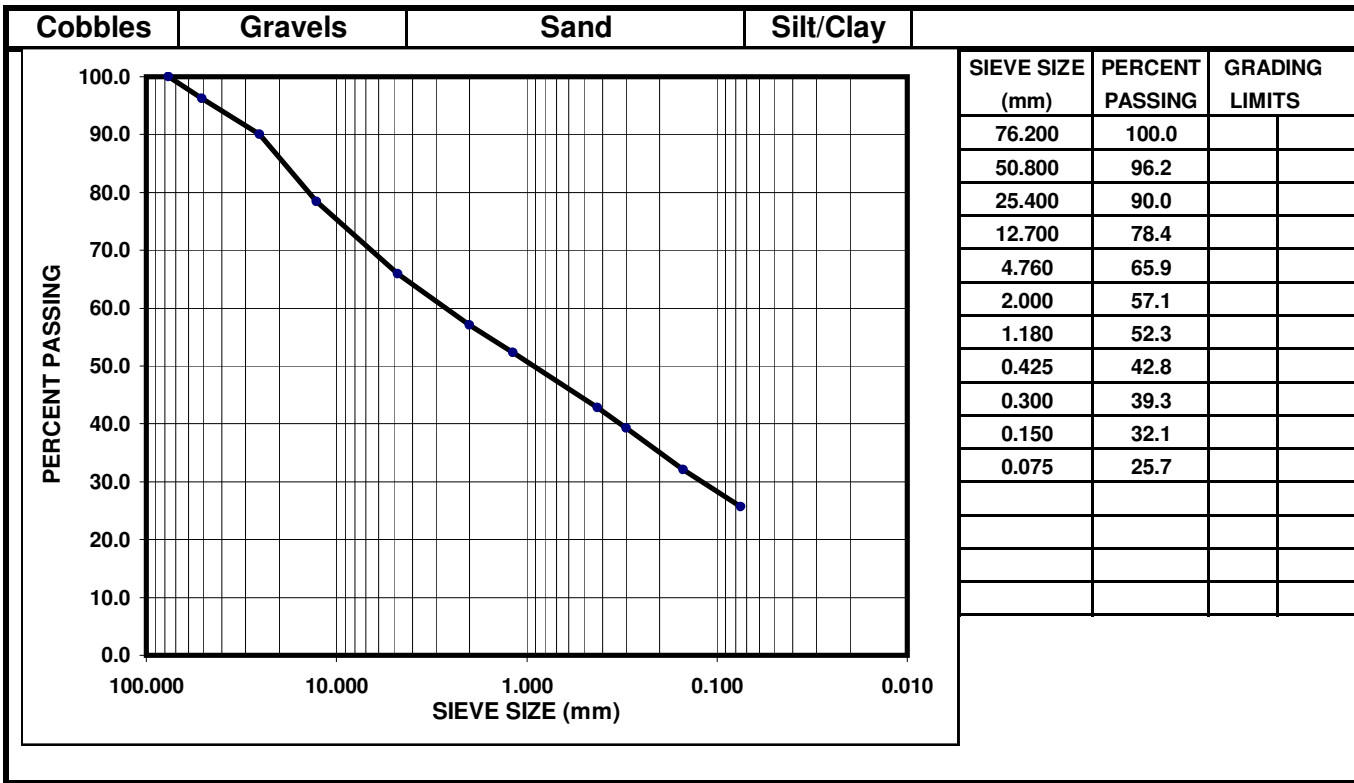
**General Notes**

1. Test pit excavated to 1.6 m with backhoe and probed from 1.6 m to 2.2 m with pionjar drill.
2. Water seepage observed at 0.6m.
3. Some sloughing of pit.
4. Test pit excavated with a BX24 Kabota.
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
6. Representative test between PI 50 and PI 51.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 3-REP-PI 50 to PI 51-TP-109  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly, silty/clayey sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 26-Oct-08  
**Sampled By:** Brad Walsh of AMEC      **Date Tested:** 8-Jan-09  
**Location:** TP-109      **Sample Depth:** 1.5 m



**Comments:**    %Cobbles 0.0                    %Gravel 34.1                    %Sand 40.2                    %Silt/Clay 25.7  
 Natural Moisture content of 13.9%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 51-TP-027</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5435857 E 557145	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, light brown.	N/A	N/A	N/A
0.1 – 1.7	SILTY, GRAVELLY SAND with trace cobbles, medium to fine grained, light brown to grey, moist, loose to compact.	DC1051-LOT 3-PI 51-TP-027	1.1	Grab
1.7	Test pit terminated at 1.7 m on probable bedrock or large boulder(s).			
Estimated Cobbles (%) 10	Estimated Boulders (%) 10	Estimated Max Diameter (m) 0.4		
Start Time: 11:45 a.m.	End Time: 1:05 p.m.			

**General Notes**

1. Test pit terminated at 1.7 m on probable bedrock or a large boulder(s).
2. Very easy digging through upper layers of the test pit.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 51 to PI 52-TP-110**

Client:	Nalcor Energy - Lower Churchill Project		Date: October 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5433736 E 560662 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.9	SAND with some angular cobbles, trace to some fines, medium grained, medium dark brown, moist, dense.	N/A	N/A	N/A
0.9 – 2.0	SILTY SAND with some gravel, some angular to sub-angular cobbles and boulders, some thin clay layers, medium dark grey, wet, compact.	DC1051-LOT 3-REP-PI 51 to PI 52-TP-110	1.5	Grab
2.0 – 2.2	Refusal on probable bedrock or large boulders.			
Estimated Cobbles (%) 30		Estimated Boulders (%) 15		Estimated Max Diameter (m) 0.4
Start Time: 11:45 a.m.		End Time: 1:05 p.m.		

**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 2.2 m with pionjar drill.
2. Groundwater encountered at 0.8 m.
3. Some sloughing of pit.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
5. Test pit excavated with a BX24 Kabota.
6. Representative test between PI 51 and PI52.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 52-TP-111</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5430226	E 565838 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.6	SILTY SAND with trace clay, trace angular cobbles and boulders, moist, compact, weathered.	N/A	N/A	N/A
0.6 – 3.4	SILTY SAND with some gravel, some cobbles, trace angular boulders, moist to wet, compact.	DC1051-LOT 3-PI 52-TP-111	1.5	Grab
3.4	Reached extent of pionjar drill with no refusal on bedrock or boulders.			
Estimated Cobbles (%) 1 - 10		Estimated Boulders (%) 25		Estimated Max Diameter (m) 0.4
Start Time: 12:30 p.m.		End Time: 1:20 p.m.		

**General Notes**

1. Test pit excavated to 1.9 m with backhoe and probed from 1.9 m to 3.4 m with pionjar drill.
2. Groundwater encountered at 0.8 m.
3. Some sloughing of pit.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
5. Test pit excavated with a BX24 Kabota.







# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT3-PI 52-TP111  
Test pit

Date Sampled: NA Sampled By B. Walsh of AMEC

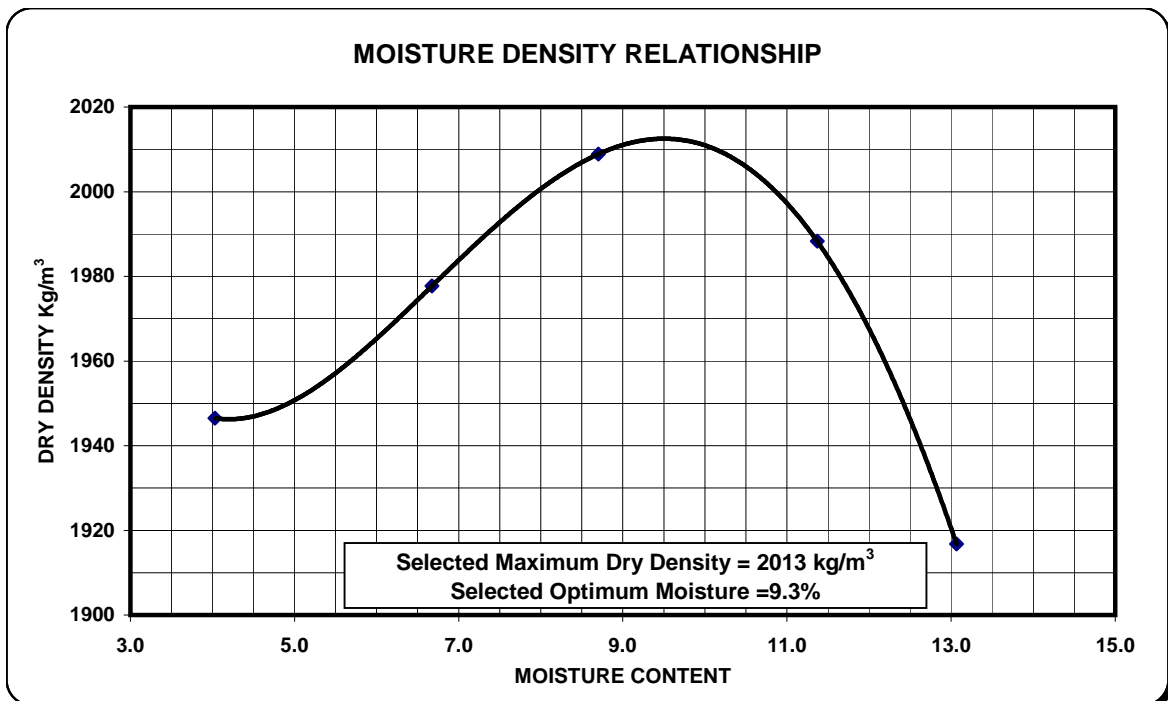
Date Received: December 1, 2008 Preparation 

Dry	
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Percent Retained:		Percent Retained:	20mm	3.0%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content	4.0	6.7	8.7	11.4	13.1
Dry Density kg/m <sup>3</sup>	1946	1978	2009	1988	1917



Note : Oversized Material Correction = 3.0%  
 Maximum Dry Density      2025 kg/m<sup>3</sup>  
 Maximum Moisture          9.3 %

Tested by, S. Adey Reviewed by, B. Motty



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 55 to PI 56-TP-028**

Client:	Nalcor Energy - Lower Churchill Project	Date:	September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5419047 E 597251 Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 1.2	SILTY SAND with trace gravel, trace cobbles and boulders, fine to medium grained, poorly graded, red-brown, moist, loose, weathered.	N/A	N/A	N/A
1.2 – 3.7	GRAVELLY SAND with some cobbles and trace large boulders, medium to coarse grained, well graded, light brown, moist, compact.	DC1051-LOT 3-REP-PI 55 to PI 56-TP-028	3.5	Grab
3.7	Test pit terminated at 3.7 m on large boulders.			
Estimated Cobbles (%) 10 - 20		Estimated Boulders (%) 1 -10		Estimated Max Diameter (m) 1.0
Start Time: 2:30 p.m.		End Time: 3:45 p.m.		

**General Notes**

1. Test pit terminated at 3.7 m due to large boulders.
2. Groundwater at 2.3 m.
3. Located west of PI 56.
4. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS - UTM, NAD 83, Zone 21 .
5. Test pit excavated with a John Deere 200 LC track-mounted excavator.
6. Representative test between PI 55 and PI 56.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 3-PI 56-TP-029				
Client:	Nalcor Energy - Lower Churchill Project			Date: September 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5418704	E 597996 Inspector: Aisha Hyde

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.6	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.6 – 0.9	SANDY SILT, fine to medium grained, poorly graded, red-brown, moist, loose, weathered.	N/A	N/A	N/A
0.9 – 3.1	SAND and GRAVEL with trace to some cobbles, trace fines, fine to medium grained, well graded, light brown, moist, loose to compact.	N/A	N/A	N/A
3.1 – 4.4	GRAVELLY SAND with some fines, some cobbles and trace to some boulders, medium to coarse grained, well graded, grey, moist to saturated, compact to dense.	DC1051-LOT 3-PI 56-TP-029	4.3	Grab
4.4	Test pit terminated at 4.4 m.			
Estimated Cobbles (%) 10 - 20		Estimated Boulders (%) 1 - 10		Estimated Max Diameter (m) 0.4
Start Time: 1:00 p.m.		End Time: 1:45 p.m.		

**General Notes**

1. Test pit terminated at 4.4 m due to limits of excavator.
2. Groundwater at 2.6 m.
3. Located southeast of PI56.
4. North and East coordinates obtained using a hand-held Garmin Etrex Legend Cx GPS - UTM, NAD 83, Zone 21.
5. Test pit excavated with a John Deere 200 LC track-mounted excavator.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 56 to PI 57-TP-112**

Client:	Nalcor Energy - Lower Churchill Project		Date: October 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5412963 E 605035 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SILTY SAND with trace angular cobbles and boulders, light medium brown, moist, loose to compact.	N/A	N/A	N/A
0.5 – 3.0	SANDY GRAVEL with some shale cobbles and boulders, trace fines, brown, moist, compact.	DC1051-LOT 3-REP-PI 56 to PI 57-TP-112	1.3	Grab
3.0	Reached extent of pionjar drill with no refusal on bedrock or boulders.			
Estimated Cobbles (%) 1 - 10		Estimated Boulders (%) 1 - 10		Estimated Max Diameter (m) 0.5
Start Time: 12:30 p.m.		End Time: 1:20 p.m.		

**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 3.0 m with pionjar drill.
2. Groundwater encountered at 1.2 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.
5. Representative test between PI 56 and PI 57.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 57 to PI 58-TP-113**

Client:	Nalcor Energy - Lower Churchill Project	Date:	October 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5402794 E 621358 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.7	SAND with some angular cobbles and boulders, medium dark brown, moist, loose to compact.	N/A	N/A	N/A
0.7 – 1.6	SAND AND GRAVEL with some sub-angular to sub-rounded cobbles and boulders, some fines, dark brown to grey, wet, compact.	DC1051-LOT 3-REP-PI 57 to PI 58-TP-113	1.5	Grab
1.6	Test pit terminated at 1.6 m on BEDROCK.			

Estimated Cobbles (%) 25	Estimated Boulders (%) 10 - 20	Estimated Max Diameter (m) 0.5
Start Time: 4:30 p.m.	End Time: 5:35 p.m.	

**General Notes**

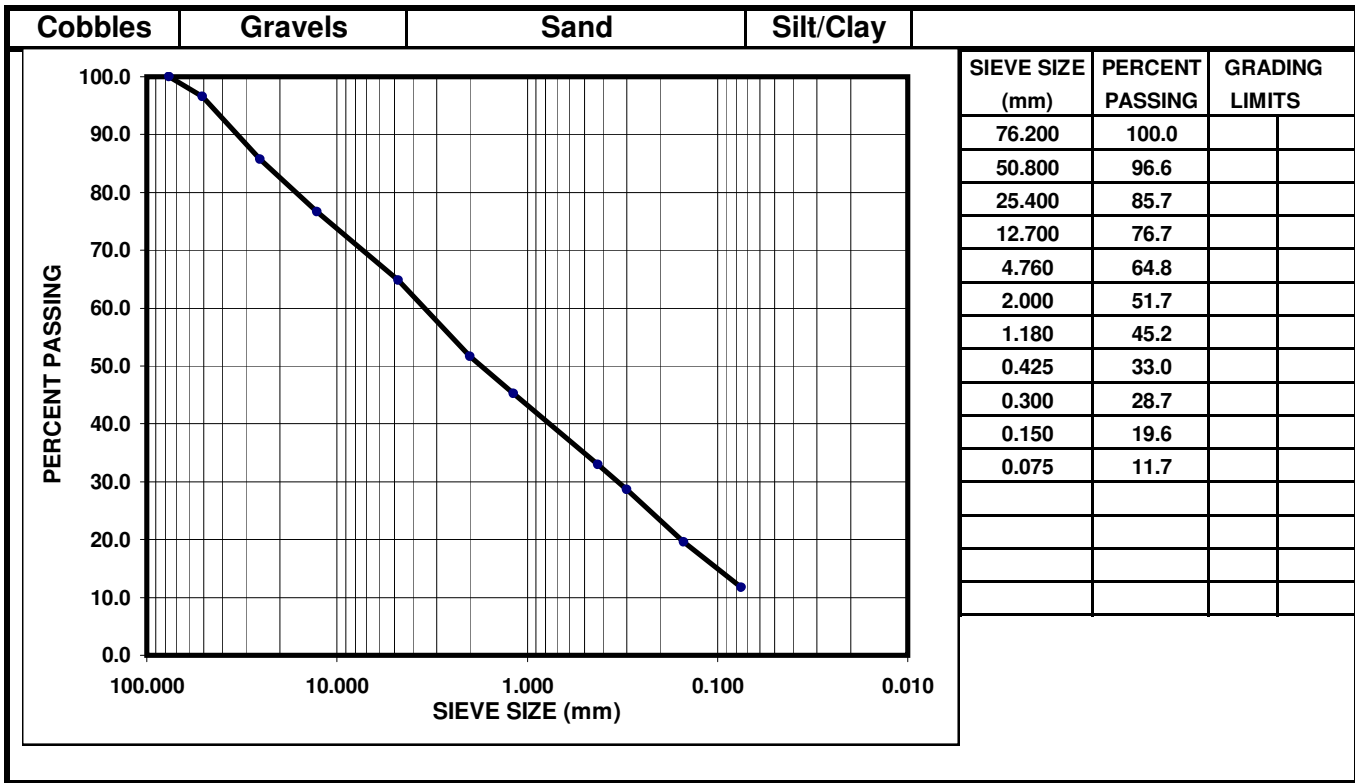
1. Test pit terminated at 1.6 m on bedrock.
2. Groundwater encountered at 0.8 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.
5. Representative test between PI 57 and PI 58.





**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 3-REP-PI 57 to PI 58-TP-113  
**Project:** Geotechnical Investigation:      **Sample Type:** Sand and gravel, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 27-Oct-08  
**Sampled By:** Brad Walsh of AMEC      **Date Tested:** 8-Jan-09  
**Location:** TP-113      **Sample Depth:** 1.5 m



**Comments:**    %Cobbles 0.0                      %Gravel 35.2                      %Sand 53.1                      %Silt/Clay 11.7  
 Natural Moisture content of 25.6%.

Reporting of these test results constitutes a testing service only.  
 Engineering interpretation or evaluation of the test results is provided only on written request.

**AMEC Earth & Environmental**

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 58 to PI 59-TP-023**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5397728 E 634262 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, light brown.	N/A	N/A	N/A
0.2 – 0.8	SAND with trace silt and gravel, some sub-angular cobbles, red-brown, loose to compact, moist, weathered.	N/A	N/A	N/A
0.8 – 4.3	GRAVELLY SAND with some silt, some sub-angular cobbles and boulders, dark brown, moist, loose to compact.	DC1051-LOT 3-REP-PI 58 to PI 59-TP-023	3.0	Grab
4.3	Test pit terminated at 4.3 m.			

Estimated Cobbles (%) 15	Estimated Boulders (%) 10	Estimated Max Diameter (m) 0.9
Start Time: 11:45 am	End Time: 12:30 pm	

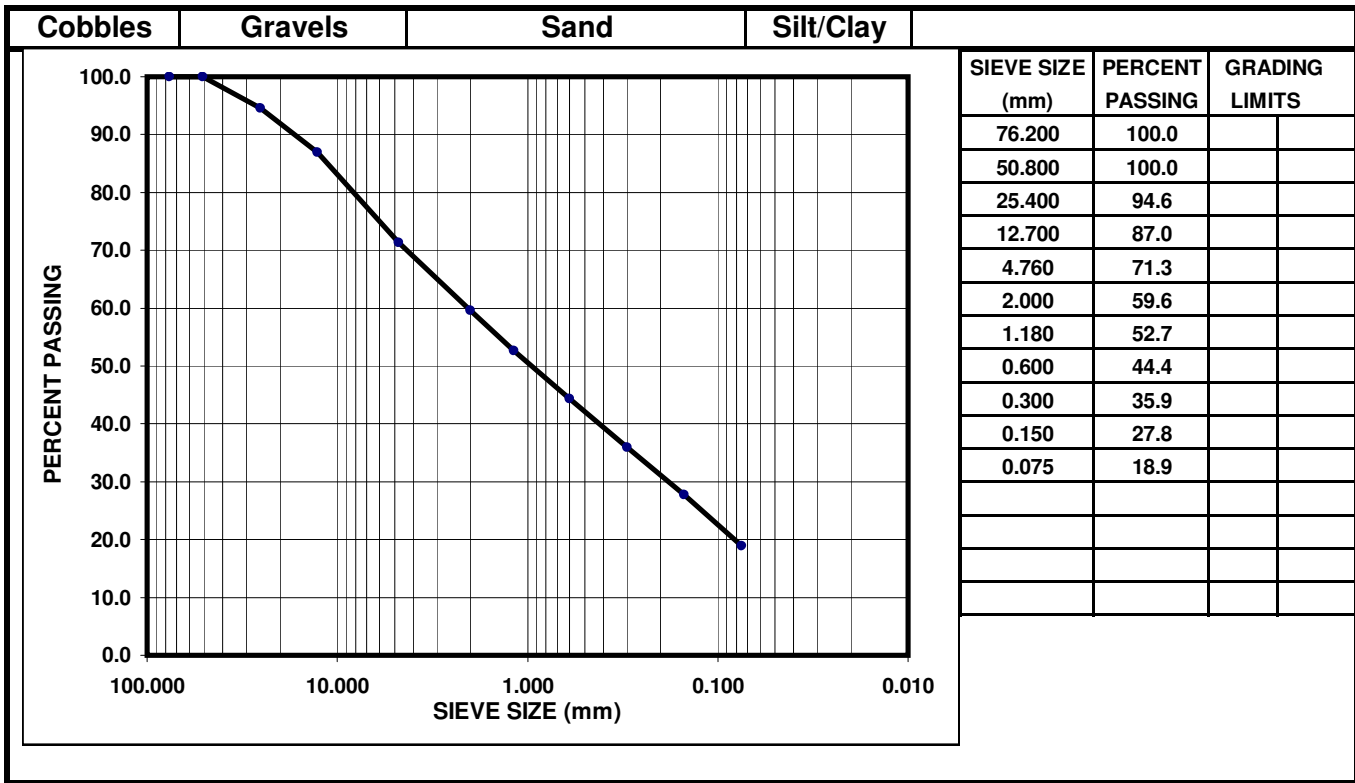
**General Notes**

1. Test pit terminated at 4.3 m in Gravelly Sand due to limits of excavator.
2. Slight water seepage at 3.8 m.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.
6. Representative test located near PI 58.



**GRADATION ANALYSIS REPORT**

**Project No.:** TF8310458      **Sample No.:** DC1051-LOT 3-REP-PI 58 to PI 59-TP-023  
**Project:** Geotechnical Investigation:      **Sample Type:** Gravelly sand, some silt/clay  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 31-Jul-08  
**Sampled By:** Brad Walsh of AMEC      **Date Tested:** 8-Feb-09  
**Location:** TP-023      **Sample Depth:** 3.0 m



**Comments:**    %Cobbles 0.0                      %Gravel 28.7                      %Sand 52.4                      %Silt/Clay 18.9  
 Moisture content of 4.3%.

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**AMEC Earth & Environmental**

Per:

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 59 to PI 60-TP-022**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5388146 E 664515 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 1.0	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
1.0 – 1.3	SAND with some silt and rounded pebbles, light grey, moist, loose to compact, weathered.	N/A	N/A	N/A
1.3 – 3.7	SAND AND GRAVEL with some silt, some angular cobbles, some sub-angular boulders, dark grey, moist, loose to compact.	DC1051-LOT 3-REP-PI 59 to PI 60-TP-022	1.3 – 1.5	Grab
3.7	Test pit terminated at 3.7 m on PROBABLE BEDROCK.			

Estimated Cobbles (%) 10 - 15	Estimated Boulders (%) 10 - 15	Estimated Max Diameter (m) 1.0
Start Time: 2:40 pm	End Time: 3:10 pm	

**General Notes**

1. Test pit terminated at 3.7 m on probable bedrock.
2. Water seepage at 1.0 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.
5. Representative test located between PI 59 and PI 60.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 60-TP-114</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5381768	E 675678 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.4 – 3.5	SILTY SAND in a clay/mud matrix, some rounded gravel, trace boulders, well graded, medium grey, wet, compact.	DC1051-LOT 3-PI 60-TP-114	0.6	Grab
3.5	Reached extent of pionjar drill with no refusal bedrock or boulders.			
Estimated Cobbles (%)	Estimated Boulders (%) 5 - 10	Estimated Max Diameter (m) 1.0		
Start Time: 8:45 am	End Time: 9:30 am			

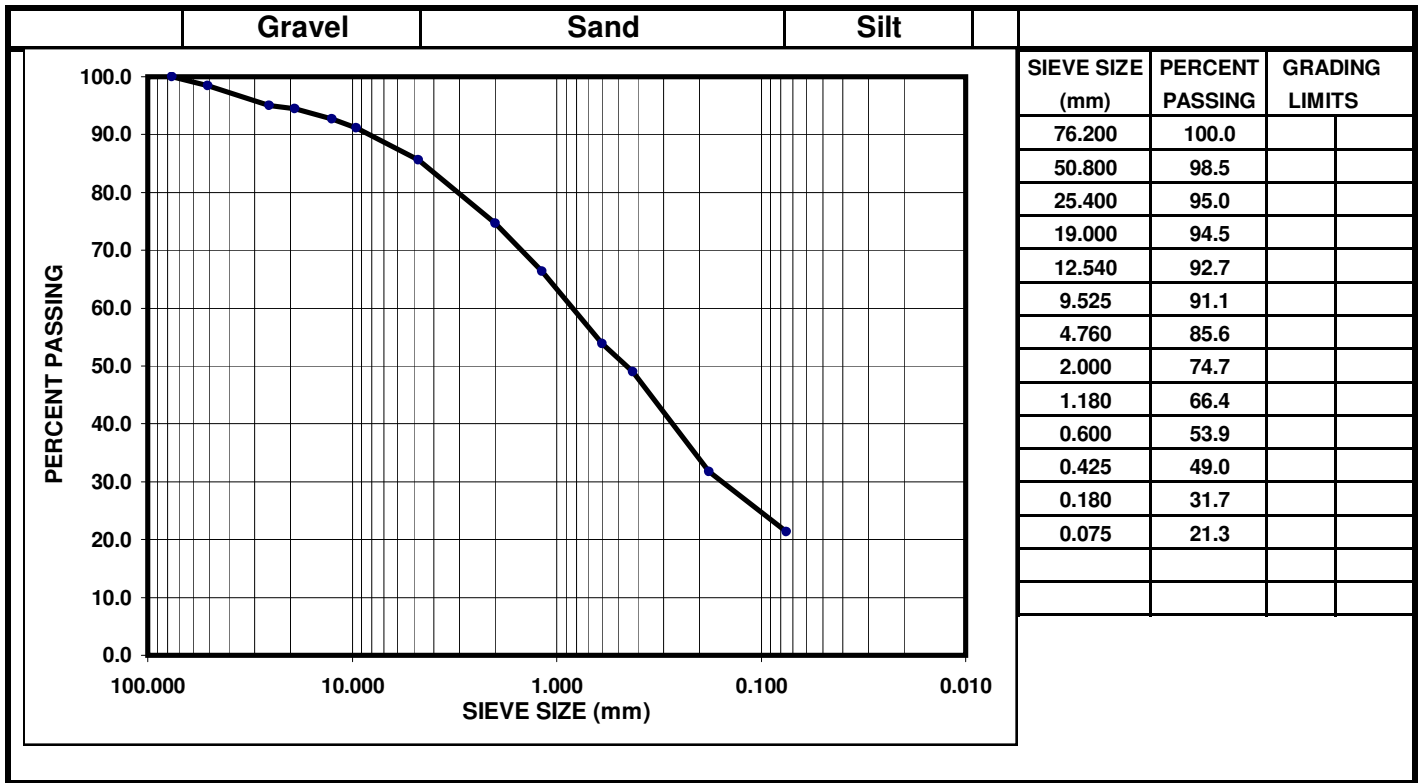
**General Notes**

1. Test pit excavated to 1.7 m with backhoe and probed from 1.7 m to 3.5 m with pionjar drill.
2. Groundwater encountered at 0.4 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b>	TF8310458	<b>Sample No.:</b>	DC1051-LOT 3-PI 60-TP-114
<b>Project:</b>	Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b>	Sand, some silt/clay, trace gravel
<b>Client:</b>	NL Hydro	<b>Date Sampled:</b>	30-Oct-08
<b>Sampled By:</b>	Brad Walsh of AMEC	<b>Date Tested:</b>	1-Dec-08
<b>Location:</b>	TP-114	<b>Sample Depth:</b>	0.6 m



**Comments:**            %Cobbles 0.0            %Gravel 14.4            %Sand 64.3            %Silt/Clay 21.3  
 Natural Moisture content of 19.1%.

Reporting of these test results constitutes a testing service only.  
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 61-TP-115</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5376388	E 678953
				Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.5	SAND AND GRAVEL with some silt, sand is medium grained, gravel is rounded, brown to grey, moist, compact.	N/A	N/A	N/A
0.5 – 1.3	GRAVELLY, SILTY SAND with trace cobbles and boulders, sand is fine grained, gravel is rounded, brown-grey, well graded, moist, compact.	DC1051-LOT 3-PI 61-TP-115	0.8	Grab
1.3 – 3.5	SILTY SAND with trace sand, trace gravel, moist, firm.			
3.5	Reached extent of pionjar drill with no refusal bedrock or boulders.			
Estimated Cobbles (%) 5 - 10		Estimated Boulders (%) 5 - 10		Estimated Max Diameter (m) 0.8
Start Time: 11:30 am		End Time: 12:30 pm		

**General Notes**

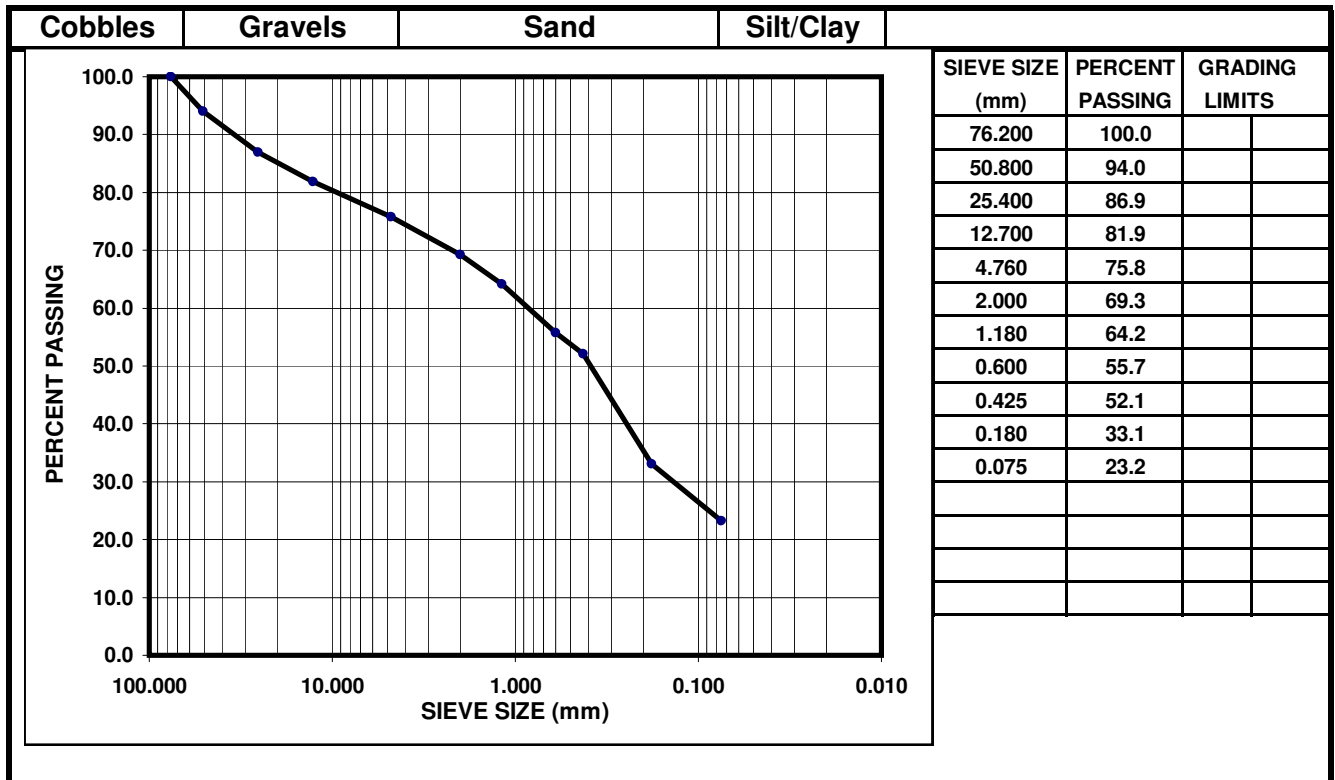
1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 3.5 m with pionjar drill.
2. Slight water seepage at 0.8 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM NAD 83, Zone 21.
4. Test pit excavated with a BX24 Kabota.





**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-LOT 3-PI 61-TP-115  
**Project:** Geotechnical Investigator      **Sample Type:** Gravelly, silty/clayey sand  
 HVDC Gull Island to Soldiers Pond  
**Client:** NL Hydro      **Date Sampled:** 30-Oct-08  
**Sampled By:** Brad Walsh of AMEC      **Date Tested:** 1-Dec-08  
**Location:** TP-115      **Sample Depth:** 0.8 m



**Comments:**    %Cobbles 0.0                      %Gravel 24.2                      %Sand 52.6                      %Silt/Clay 23.2  
 Natural Moisture content of 10.5%.

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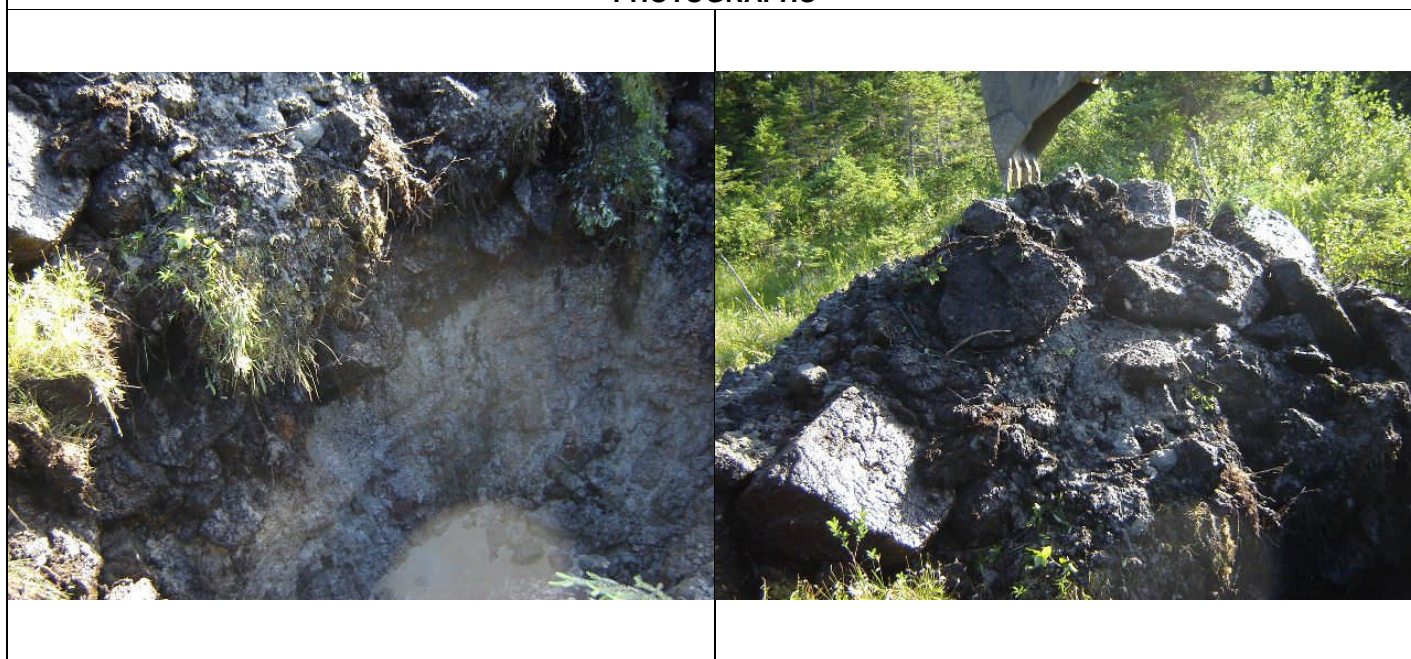


**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP- PI 62 to PI 63-TP-021**

Client:	Nalcor Energy - Lower Churchill Project	Date:	July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5367056 E 690795 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.8	SAND AND GRAVEL with large angular cobbles and boulders, some organics and rootlets mixed throughout, dark brown, compact, wet.	N/A	N/A	N/A
0.8 – 3.2	SANDY GRAVEL with some silt and angular boulders, some angular cobbles mixed throughout, grey, compact, wet.	DC1051-LOT 3-REP- PI 62 to PI 63-TP-021	1.8	Grab
3.2	Test pit terminated at 3.2 m probable bedrock or large boulder.			
Estimated Cobbles (%) 15 - 25	Estimated Boulders (%) 25 - 35	Estimated Max Diameter (m) 0.8		
Start Time: 5:20 pm	End Time: 6:12 pm			

**General Notes**

- Test pit terminated at 3.2 m on probable bedrock or large boulder(s).
- Groundwater encountered at 1.2 m.
- North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
- Test pit excavated with a John Deere 160 LC track-mounted excavator.
- Representative test located between PI 62 and PI 63.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 64-TP-020</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5349404 E 709472	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 1.0	SILT with some sand and rounded pebbles, trace organics, red- brown, loose, moist.	N/A	N/A	N/A
1.0 – 2.5	SILTY SAND with some gravel, some angular cobbles, trace angular boulders, dark grey, compact, moist.	DC1051-LOT 3-PI 64-TP-020	1.8	Grab
2.5	Test pit terminated at 2.5 m on BEDROCK.			
Estimated Cobbles (%) 15 - 20		Estimated Boulders (%) 5 -10		Estimated Max Diameter (m) 0.3
Start Time: 1:15 pm		End Time: 1:57 pm		

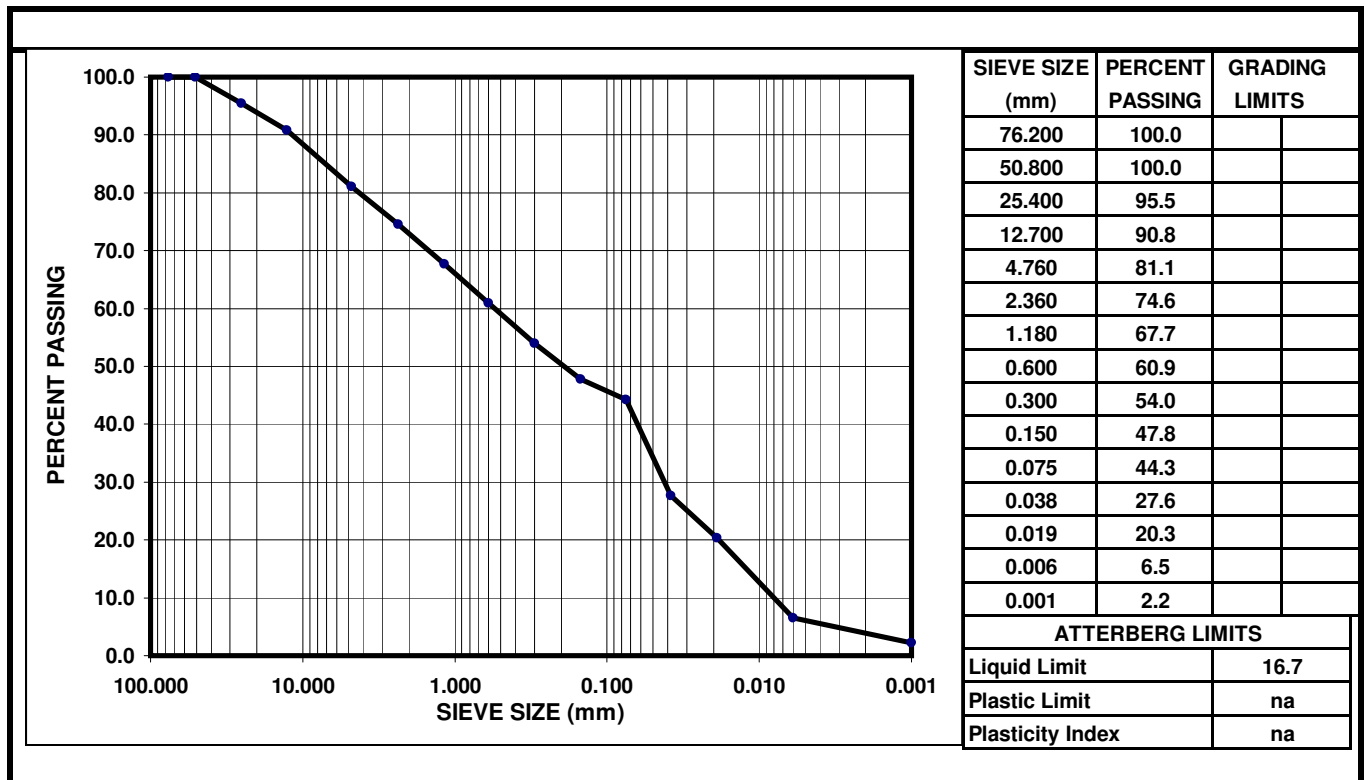
**General Notes**

1. Test pit terminated at 2.5 m on Bedrock.
2. No groundwater encountered.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 3-PI 64-TP-020
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> SILT and SAND, some Gravel, trace Clay
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 26-Jul-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 27-May-09
<b>Location:</b> TP-020	<b>Sample Depth:</b> 1.8 m



**Comments:** %Cobbles=0.0 %Gravel=18.9 %Sand=36.8 %Silt=38.3 %Clay=3.8 %Colloids=2.2  
 Natural Moisture content of 11.9%.  
 Sample determined to be non plastic with liquid limit derived from forecasting graph.

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Per: *[Signature]*

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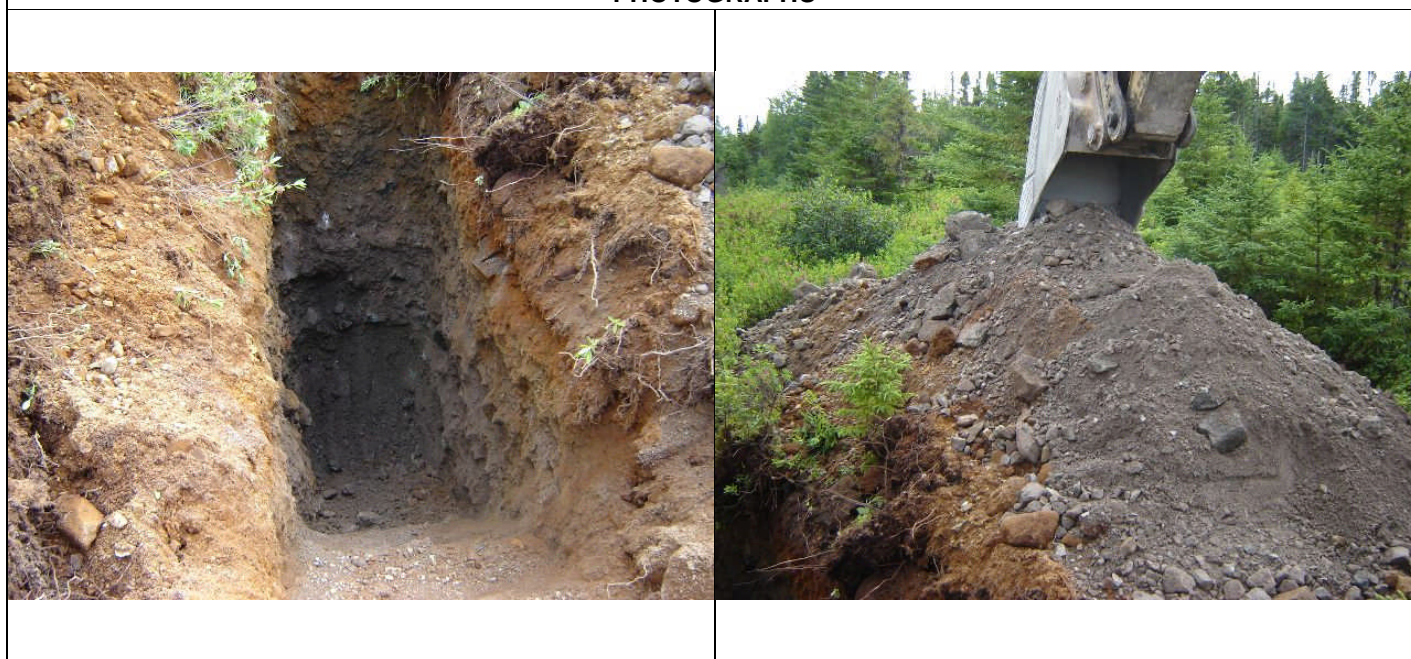
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-REP-PI 64 to PI 65-TP-019</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5348556 E 711115	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.9	SAND with some silt and angular cobbles, red-brown, compact, moist.	N/A	N/A	N/A
0.9 – 4.0	SANDY GRAVEL AND COBBLES with some angular boulders, trace fines, dark grey, loose to compact, moist.	DC1051-LOT 3-REP-PI 64 to PI 65-TP-019	2.0	Grab
4.0	Test pit terminated at 4.0 m on BEDROCK.			

Estimated Cobbles (%) 35	Estimated Boulders (%) 20 – 25	Estimated Max Diameter (m) 0.7
Start Time: 3:45 pm	End Time: 4:18 pm	

**General Notes**

1. Test pit terminated at 4.0 m on Bedrock.
2. No groundwater encountered.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 21.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.
5. Representative test located between PI 64 and PI 65.





# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT 3-REP-PI 64 to PI 65-TP-019  
Test pit

Date Sampled: August 18, 2008 Sampled By B. Walsh of AMEC

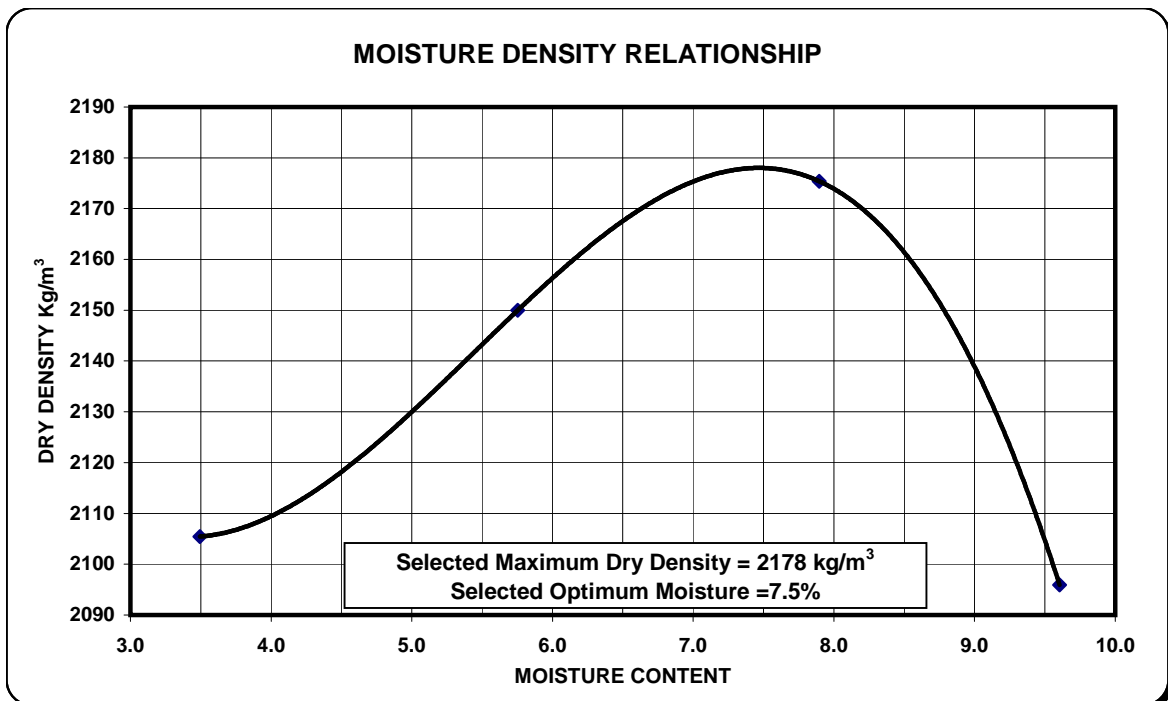
Date Received: August 24, 2008 Preparation 

Dry	
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Percent Retained:		Percent Retained:	20mm	19.8%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content		3.5	5.8	7.9	9.6	
Dry Density kg/m <sup>3</sup>		2105	2150	2175	2096	



Note : Oversized Material Correction = 19.8%  
 Maximum Dry Density      2224 kg/m<sup>3</sup>  
 Maximum Moisture          7.5 %

Tested by, Bill Motty Reviewed by, R. Collins





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 65 to PI 66-TP-017**

Client:	Nalcor Energy - Lower Churchill Project			Date:	July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5344685	E 716927	Inspector: Brad Walsh

**PHOTOGRAPH**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.1	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.1 – 0.4	SAND with trace silt and cobbles, dark brown, wet, dense, compact.	N/A	N/A	N/A
0.4	Test pit terminated at 0.4 m on BEDROCK.			
Estimated Cobbles (%) <5	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.2		
Start Time: 8:40 am	End Time: 8:45 am			

**General Notes**

1. Test pit terminated at 0.4 m on Bedrock.
2. Slight water seepage at 0.4 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.
5. Representative test located between PI 65 and PI 66.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-REP-PI 65 to PI 66-TP-018</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5344589 E 717010	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 1.0	SAND AND BOULDERS with some fines, some gravel, trace cobbles, dark grey to brown, wet, compact.	N/A	N/A	N/A
1.0	Test pit terminated at 1.0 m on BEDROCK.			
Estimated Cobbles (%) <5		Estimated Boulders (%) 40		Estimated Max Diameter (m) 0.8
Start Time: 9:00 am		End Time: 9:15 am		

**General Notes**

1. Test pit terminated at 1.0 m on Bedrock.
2. Groundwater at 1.0 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.
5. Representative test located between PI 65 and PI 66.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-PI 66-TP-016**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 24, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5334939 E 278195 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SAND AND GRAVEL with some silt, dark grey to brown, loose, moist, weathered.	N/A	N/A	N/A
0.5 – 2.6	SILTY, SANDY GRAVEL with trace angular cobbles, dark red- brown, wet, compact.	DC1051-LOT 3-PI 66-TP-016	1.8 – 2.0	Grab
2.6	Test pit terminated at 2.6 m on PROBABLE BEDROCK.			
Estimated Cobbles (%) 5	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.3		
Start Time: 1:55 pm	End Time: 2:30 pm			

**General Notes**

1. Test pit terminated at 2.6 m on Probable Bedrock.
2. Groundwater encountered at 2.6 m.
3. Test Pit exhibited sloughing during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 67 to PI 68-TP-014**

Client:	Nalcor Energy - Lower Churchill Project		Date:	July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5325096	E 277712
Inspector: Brian Walsh				

**PHOTOGRAPH**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.7	SAND AND GRAVEL with trace organics, trace sub-angular cobbles, red-brown, moist, weathered.	N/A	N/A	N/A
0.7 – 4.0	GRAVELLY SAND with some silt, trace cobbles and boulders, dark brown to grey, loose to compact, moist.	DC1051-LOT 3-REP-PI 67 to PI 68-TP-014	3.0	Grab
4.0	Test pit terminated at 4.0 m.			
Estimated Cobbles (%) 10		Estimated Boulders (%) 5		Estimated Max Diameter (m) 0.4
Start Time: 2:45 p.m.		End Time: 3:30 p.m.		

**General Notes**

1. Test pit terminated at 4.0 m in Gravelly Sand.
2. No groundwater encountered.
3. Representative test between PI 67 & PI 68.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 3-PI 68-TP-015				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 24, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5323895 E 277535	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	PEAT – brown, some organics mixed throughout, loose, moist to wet.	N/A	N/A	N/A
0.4 – 4.0	SAND AND SILT with some gravel, trace sub-rounded cobbles, dark-reddish brown, wet, compact.	DC1051-LOT 3-PI 68-TP-015	2.5	Grab
4.0	Test pit terminated at 4.0 m.			
Estimated Cobbles (%) <5	Estimated Boulders (%) None Observed	Estimated Max Diameter (m) 0.2		
Start Time: 9:00 am	End Time: 9:30 am			

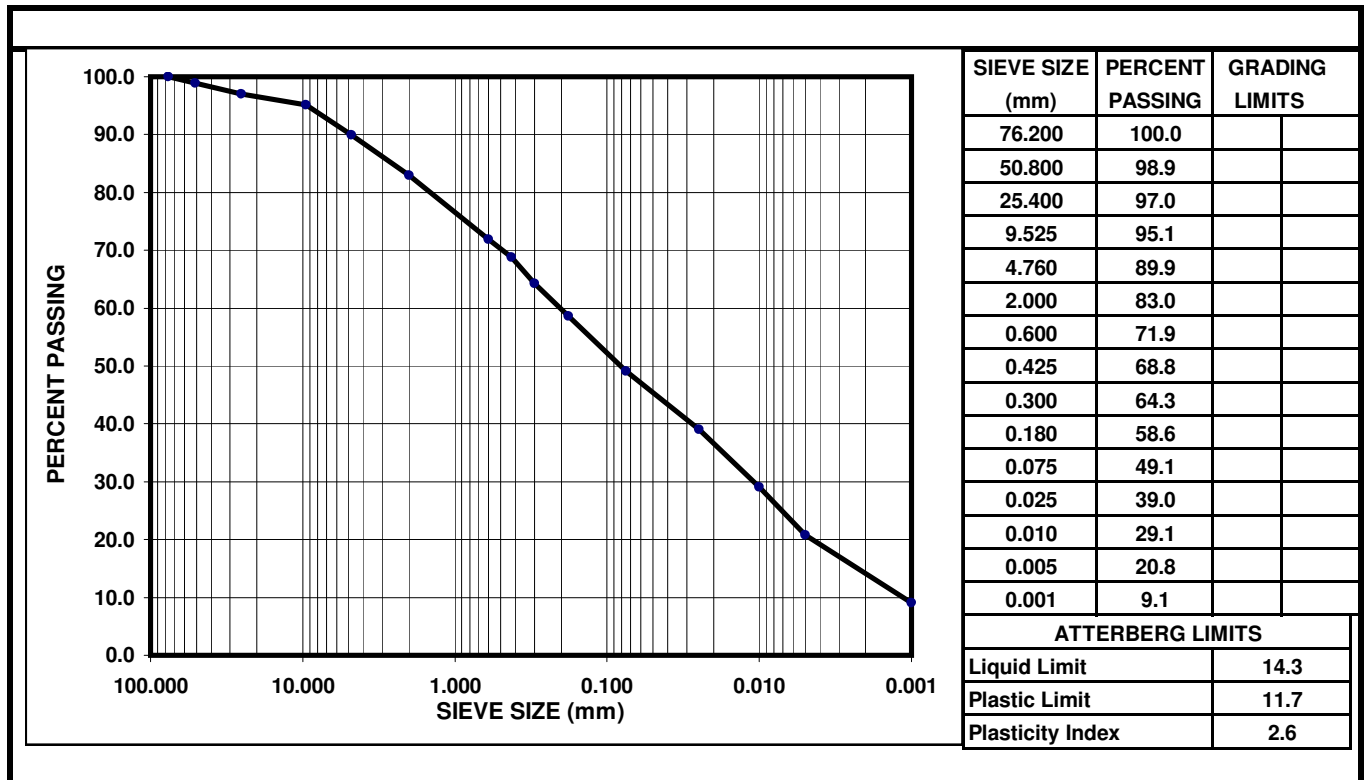
**General Notes**

1. Test pit terminated at 4.0 in Sand and Silt.
2. Water seepage at 0.4 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

**Project No:** TF8310458      **Sample No.:** DC1051-Lot 3-PI 68-TP015  
**Project:** Geotechnical Investigation:      **Sample Type:** Silty SAND with some Clay and  
 HVDC Gull Island to Soldiers Pond      Gravel  
**Client:** NL Hydro      **Date Sampled:** 24-Jul-08  
**Sampled By:** Brad Walsh of AMEC      **Date Tested:** 27-May-09  
**Location:** TP015      **Sample Depth:** 2.5m



**Comments:** %Cobbles=0.0 %Gravel=10.1 %Sand=40.8 %Silt=28.3 %Clay=11.7 %Colloids=9.1  
 Natural Moisture content of 11.3 %

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**AMEC Earth & Environmental**

Per: *[Signature]*

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 70-TP-116</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5318849 E 280070	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.4	SAND with some gravel, trace fines, poorly graded, some sub-angular cobbles, red-brown, moist, loose to compact, weathered.	N/A	N/A	N/A
0.4 – 2.0	GRAVELLY SAND with trace fines, some sub-angular cobbles, trace boulders, sand is fine grained and rounded, grey-brown, moist, compact.	DC1051-LOT 3-PI 70-TP-116	0.9	Grab
2.0 – 2.2	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) 10 -15		Estimated Boulders (%) 5	Estimated Max Diameter (m) 0.4	
Start Time: 1:45 pm		End Time: 2:30 pm		

**General Notes**

1. Test pit excavated to 1.5 m with backhoe and probed from 1.5 m to 2.2 m using pionjar drill.
2. Gropndwater encountered at 1.5 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 71-TP-117</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5312345 E 280329	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.20	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, light brown to black.	N/A	N/A	N/A
0.2 – 2.6	GRAVELLY SAND and SILT with trace cobbles, trace boulders, grey-brown, moist to wet, compact to dense.	DC1051-LOT 3-PI 71-TP-117	0.7	Grab
2.6 – 2.7	Refusal on probable bedrock or large boulder.			
Estimated Cobbles (%) <5		Estimated Boulders (%) 5		Estimated Max Diameter (m) 0.4
Start Time: 3:30 pm		End Time: 4:15 pm		

**General Notes**

1. Test pit excavated to 1.8 m with backhoe and probed from 1.8 m to 2.7 m using pionjar drill.
2. Water seepage at 0.2 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a BX24 Kabota.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

TEST PIT: DC1051-LOT 3-PI 74-TP-011				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 22, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5303715 E 278931	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.6	ROOTMAT / TOPSOIL – rootlets, dark brown, wet, loose.	N/A	N/A	N/A
0.6 – 1.5	SANDY GRAVEL with trace fines, trace sub-angular cobbles, dark grey to medium brown, compact, wet.	DC1051-LOT 3-PI 74-TP-011	1.3	Grab
1.5	Test pit terminated at 1.5 m on BEDROCK.			
Estimated Cobbles (%) 10		Estimated Boulders (%) <5		Estimated Max Diameter (m) 0.7
Start Time: 11:45 a.m.		End Time: 12:45 p.m.		

**General Notes**

1. Test pit terminated at 1.5 m on Bedrock.
2. Groundwater encountered at 1.5 m.
3. Sloughing at the bottom of pit.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 75-TP-012</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 22, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5303223 E 279178	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, light brown to black.	N/A	N/A	N/A
0.3 – 0.6	SILTY SAND, light brown, loose, moist, trace organics.	N/A	N/A	N/A
0.6 – 3.9	SILTY GRAVELLY SAND with trace sub-rounded to round cobbles and boulders, medium grained, well graded, brown, moist, compact.	DC1051-LOT 3-PI 75-TP-012	3.0 - 3.5	Grab
3.9	Test pit terminated at 3.9 m.			

Estimated Cobbles (%) 10	Estimated Boulders (%) 5	Estimated Max Diameter (m) 0.4
Start Time: 3:15 p.m.	End Time: 4:10 p.m.	

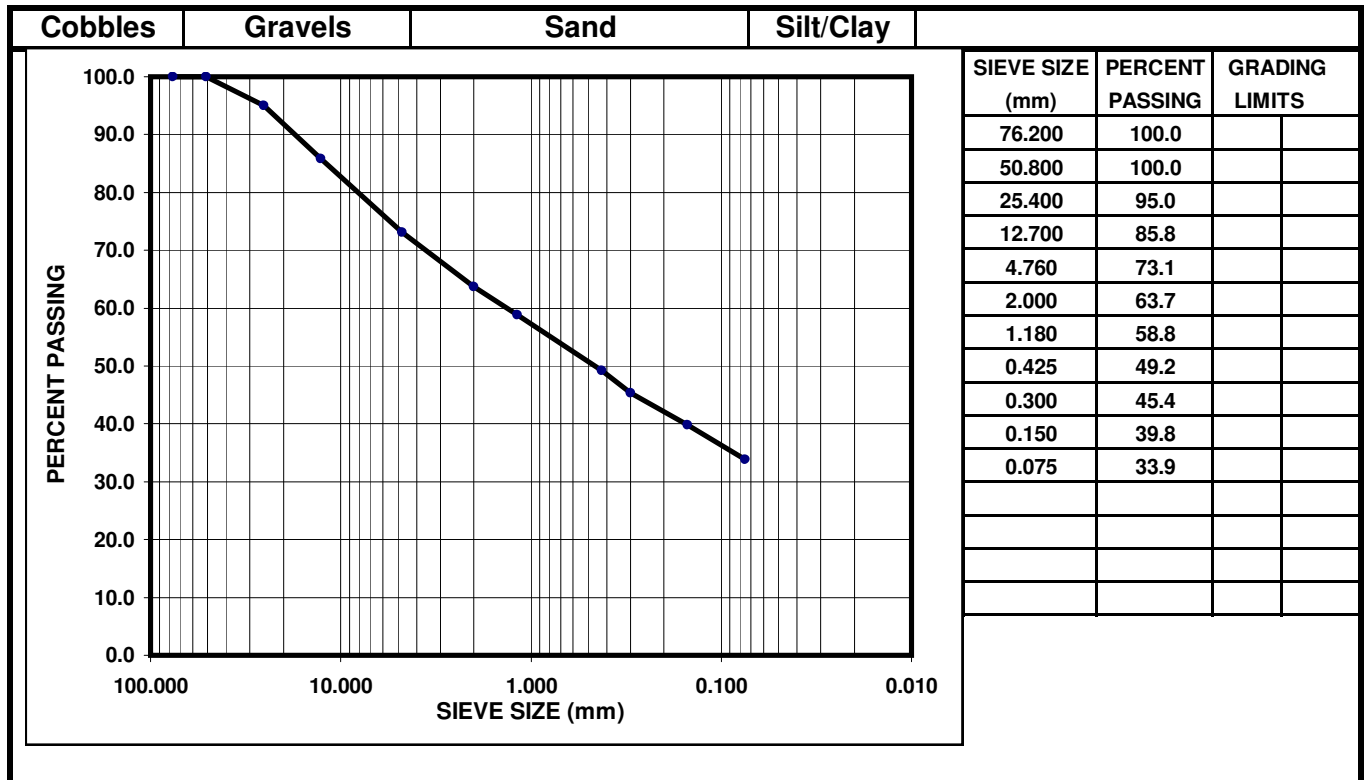
**General Notes**

1. Test pit terminated at 3.9 m in Silty Gravelly Sand.
2. Water seepage at 0.3 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 3-PI 75-TP-012
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Silty/clayey, gravelly sand
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 22-Jul-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 8-Feb-09
<b>Location:</b> TP-012	<b>Sample Depth:</b> 3.0 - 3.5 m



**Comments:** %Cobbles 0.0      %Gravel 26.9      %Sand 39.2      %Silt/Clay 33.9  
 Moisture content of 1.2%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 76-TP-013</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 22, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5300590 E 278915	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 - 4.1	SILTY GRAVELLY SAND with trace cobbles and boulders, dark brown to grey, compact, moist.	DC1051-LOT 3-PI 76-TP-013	2.5 - 4.0	Grab
4.1	Test pit terminated at 4.1 m.			
Estimated Cobbles (%) 10		Estimated Boulders (%) 10		Estimated Max Diameter (m) 1.0
Start Time: 6:07 p.m.		End Time: 7:15 p.m.		

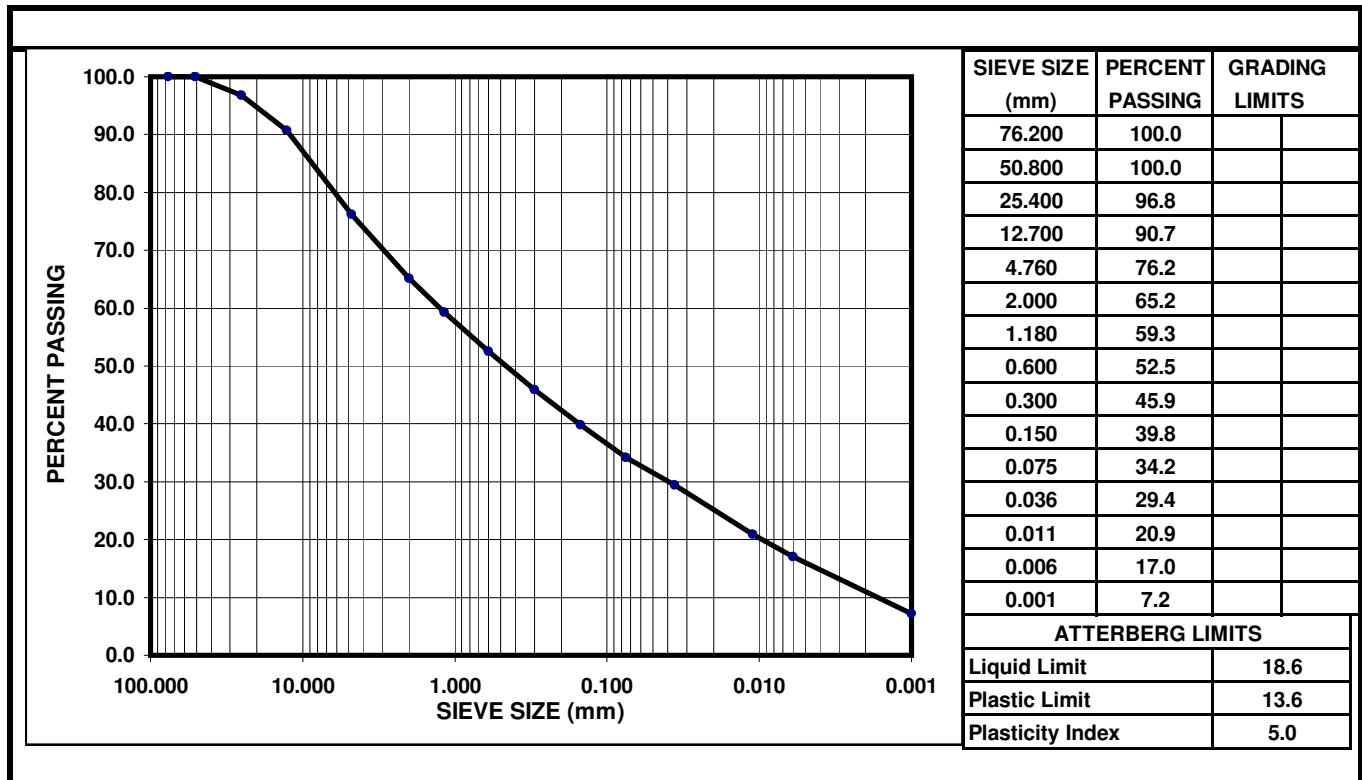
**General Notes**

1. Test pit terminated at 4.1 m in Silty Gravelly Sand.
2. Water seepage at 0.3 m.
3. Large boulders 1 m in size located after 2 m depth.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-Lot 3-PI 76-TP013
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Gravelly SAND, some Silt, trace Clay.
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 22-Jul-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 27-May-09
<b>Location:</b> TP013	<b>Sample Depth:</b> 2.5 m - 4.0 m



**Comments:** %Cobbles=0.0 %Gravel=23.8 %Sand=42.0 %Silt=18.2 %Clay=8.8 %Colloids=7.2  
 Moisture content of 7.3%.  
 Trace organics present in sample.

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Per: *[Signature]*

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

**TEST PIT: DC1051-LOT 3-REP-PI 76 to PI 77-TP-010**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location	N 5291468 E 280576 Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.9	SILTY SAND with trace cobbles, light brown to medium brown, silty sand, loose, moist.	N/A	N/A	N/A
0.9 – 2.0	SAND AND GRAVEL with some boulders and cobbles, some fines, light grey, moist, compact.	DC1051-LOT 3-REP-PI 76 to PI 77-TP-010	1.5	Grab
2.0	Test pit terminated at 2.0 m on LARGE BOULDERS.			
Estimated Cobbles (%) 15		Estimated Boulders (%) 15		Estimated Max Diameter (m) 3.0 m
Start Time: 12:15 p.m.		End Time: 1:15 p.m.		

**General Notes**

1. Test pit terminated at 2.0 m due to large boulders.
2. Groundwater encountered at 1.4 m.
3. Some sloughing at the bottom of pit.
4. Area dominated by numerous boulder outcrops and bedrock
5. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22
6. Test pit excavated with a John Deere 160 LC track-mounted excavator.
7. Representative sample between PI 76 and PI 77.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 85-TP-009</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5268262 E 295713	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.5	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.5 – 1.5	SILTY SAND with trace organics, trace angular gravel, medium brown to dark brown, wet, compact.	N/A	N/A	N/A
1.5 – 3.1	SAND AND GRAVEL with some fines, trace cobbles, dark grey to brown, wet, compact.	DC1051-LOT 3-PI 85-TP-009	2.4	Grab
3.1	Test pit terminated at 3.1 m.			
Estimated Cobbles (%) 15		Estimated Boulders (%) 5		Estimated Max Diameter (m) 0.8
Start Time: 12:05 p.m.		End Time: 1:35 p.m.		

**General Notes**

1. Test pit terminated at 3.1 m.
2. Groundwater encountered at 3.1 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Some sloughing at the bottom of pit.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 86-TP-008</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5266413 E 297550	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, light brown.	N/A	N/A	N/A
0.3 – 0.8	SILTY SAND with trace organics, red-brown to brown, moist, loose.	N/A	N/A	N/A
0.8 – 4.0	SAND AND GRAVEL with trace fines, trace cobbles and boulders, dark grey, moist, compact.	DC1051-LOT 3-PI 86-TP-008	2.8	Grab
4.0	Test pit terminated at 4.0 m.			
Estimated Cobbles (%) 10	Estimated Boulders (%) <5	Estimated Max Diameter (m) 0.3		
Start Time: 9:25 a.m.	End Time: 10:35 a.m.			

**General Notes**

1. Test pit terminated at 4.0 m.
2. Groundwater encountered at 4.0 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 87-TP-007</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5265912 E 297671	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.4	SILTY SAND with some gravel, trace cobbles, reddish-brown, moist and loose to compact.	N/A	N/A	N/A
0.4 – 3.9	SAND AND GRAVEL with some fines, some angular cobbles, dark grey, very moist and compact.	DC1051-LOT 3-PI 87-TP-007	2.9	Grab
3.9	Test pit terminated at 3.9 m on PROBABLE BEDROCK.			
Estimated Cobbles (%) 5 - 10		Estimated Boulders (%) >5		Estimated Max Diameter (m) 0.4
Start Time: 5:10 p.m.		End Time: 5:40 p.m.		

**General Notes**

1. Test pit terminated at 3.9 m on probable bedrock.
2. Groundwater observed at 1.3 m.
3. Severe sloughing throughout entire pit during excavation.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.





# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT3-PI 087-TP007  
Test pit

Date Sampled: July 16, 2008 Sampled By B. Walsh of AMEC

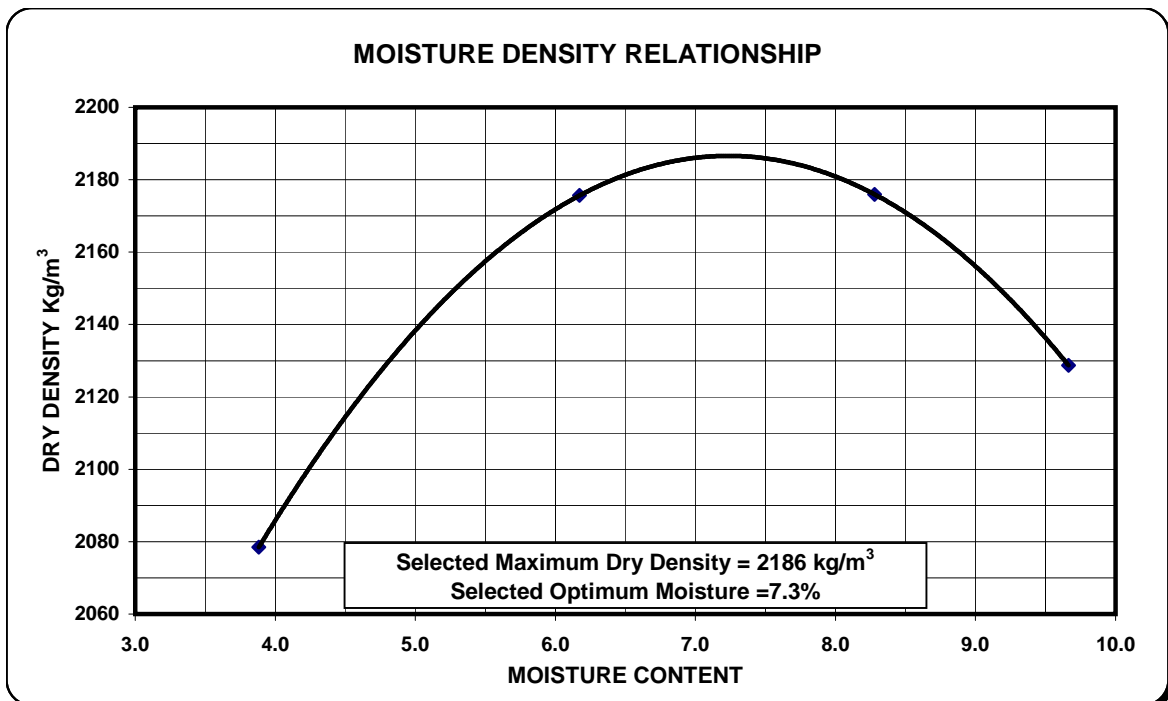
Date Received: July 31, 2008 Preparation 

Dry	
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Percent Retained:		Percent Retained:	20mm	22.3%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content		3.9	6.2	8.3	9.7	
Dry Density kg/m <sup>3</sup>		2078	2176	2176	2129	



Note : Oversized Material Correction = 22.3%  
 Maximum Dry Density      2237 kg/m<sup>3</sup>  
 Maximum Moisture          7.3 %

Tested by, Bill Motty Reviewed by, R. Collins



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 92-TP-006</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5255580 E 318988	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, light brown.	N/A	N/A	N/A
0.2 – 0.4	SILTY SAND with some gravel, trace to some large boulders, trace organics, reddish-brown, moist, loose to compact.	N/A	N/A	N/A
0.4 – 4.0	SAND AND GRAVEL with some fines, some angular cobbles and boulders, dark grey to medium grey, moist, loose to compact.	DC1051-LOT 3-PI 92-TP-006	3.5	Grab
4.0	Test pit terminated at 4.0 m due to limits of excavator.			
Estimated Cobbles (%) 15	Estimated Boulders (%) 25	Estimated Max Diameter (m) 0.8		
Start Time: 10:30 a.m.	End Time: 11:35 a.m.			

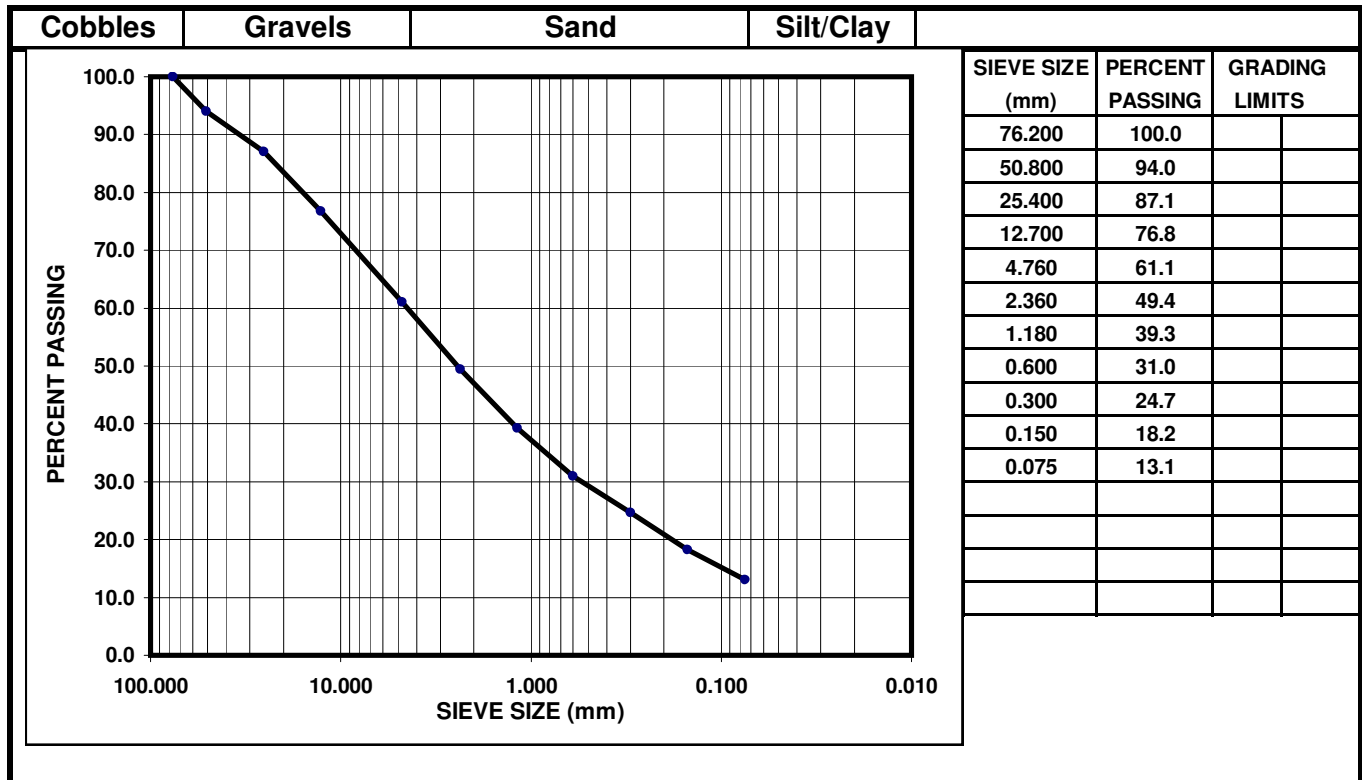
**General Notes**

1. Test pit terminated at 4.0 m due to limits of excavator.
2. Water seepage at 4.0 m.
3. Due to accessibility, test pit was excavated 300 m west of PI 92 and 100 m south of proposed transmission line route.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 3-PI 92-TP-006
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sand and gravel, some silt/clay
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 15-Jul-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 5-Aug-08
<b>Location:</b> TP-006	<b>Sample Depth:</b> 3.5 m



**Comments:** %Cobbles 0.0      %Gravel 38.9      %Sand 48.0      %Silt/Clay 13.1  
 Natural Moisture content of 8.6%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 93-TP-005</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5250117	E 326639 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, rusty brown.	N/A	N/A	N/A
0.2 – 1.2	SANDY GRAVEL with trace fines, reddish-brown, moist, loose to compact, weathered.	N/A	N/A	N/A
1.2 – 3.5	SAND AND GRAVEL with some fines, trace to some angular cobbles, dark grey, moist, dense, compact.	DC1051-LOT 3-PI 93-TP-005	2.9	Grab
3.5	Test pit terminated at 3.5 m.			
Estimated Cobbles (%) 5 - 10		Estimated Boulders (%) > 5		Estimated Max Diameter (m) 0.5
Start Time: 12:00 p.m.		End Time: 12:46 p.m.		

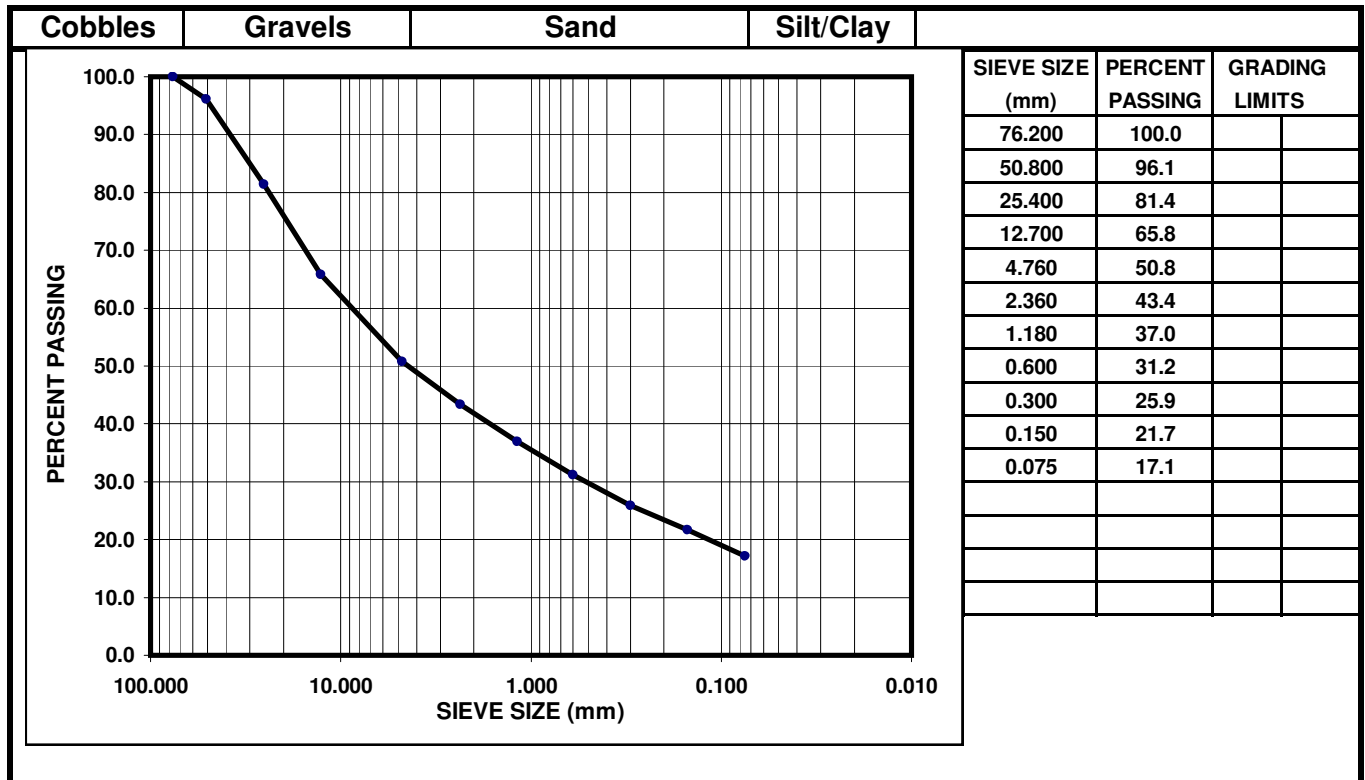
**General Notes**

1. Test pit terminated at 3.5 m,
2. Water seepage at 1.5 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**GRADATION ANALYSIS REPORT**

<b>Project No:</b> TF8310458	<b>Sample No.:</b> DC1051-LOT 3-PI 93-TP-005
<b>Project:</b> Geotechnical Investigation: HVDC Gull Island to Soldiers Pond	<b>Sample Type:</b> Sandy gravel, some silt/clay
<b>Client:</b> NL Hydro	<b>Date Sampled:</b> 14-Jul-08
<b>Sampled By:</b> Brad Walsh of AMEC	<b>Date Tested:</b> 23-Aug-08
<b>Location:</b> TP-005	<b>Sample Depth:</b> 2.9 m



**Comments:** %Cobbles 0.0      %Gravel 49.2      %Sand 33.1      %Silt/Clay 17.1  
 Natural Moisture content of 8.8%.

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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 99-TP-004</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5243205 E 338011	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.7	PEAT – brown, some organics mixed throughout, loose, moist to wet.	N/A	N/A	N/A
0.7 – 3.1	SAND AND GRAVEL with some silt, some angular cobbles and boulders, dark grey, moist, compact.	DC1051-LOT 3-PI 99-TP-004	2.8	Grab
3.1	Test pit terminated at 3.1 m.			
Estimated Cobbles (%) 20		Estimated Boulders (%) 25		Estimated Max Diameter (m) 1.0
Start Time: 12:45		End Time: 1:15		

**General Notes**

1. Test pit terminated at 3.1 m.
2. Small trickle of groundwater observed at 0.7 m.
4. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
5. Test pit excavated with a John Deere 160 LC track-mounted excavator.







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI99-TP-004A</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5243210	E 338027
				Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 2.1	PEAT – brown, some organics mixed throughout, loose, moist to wet.	N/A	N/A	N/A
2.1 – 3.1	SAND AND GRAVEL with some angular cobbles, trace boulders, trace fines, dark grey, moist, compact.	DC1051-LOT 3-PI99-TP-004A	2.8	Grab
3.1	Test pit terminated at 3.1 m.			
Estimated Cobbles (%) 10		Estimated Boulders (%) >5		Estimated Max Diameter (m) 1.3
Start Time: 12:10 p.m.		End Time: 12:35 p.m.		

**General Notes**

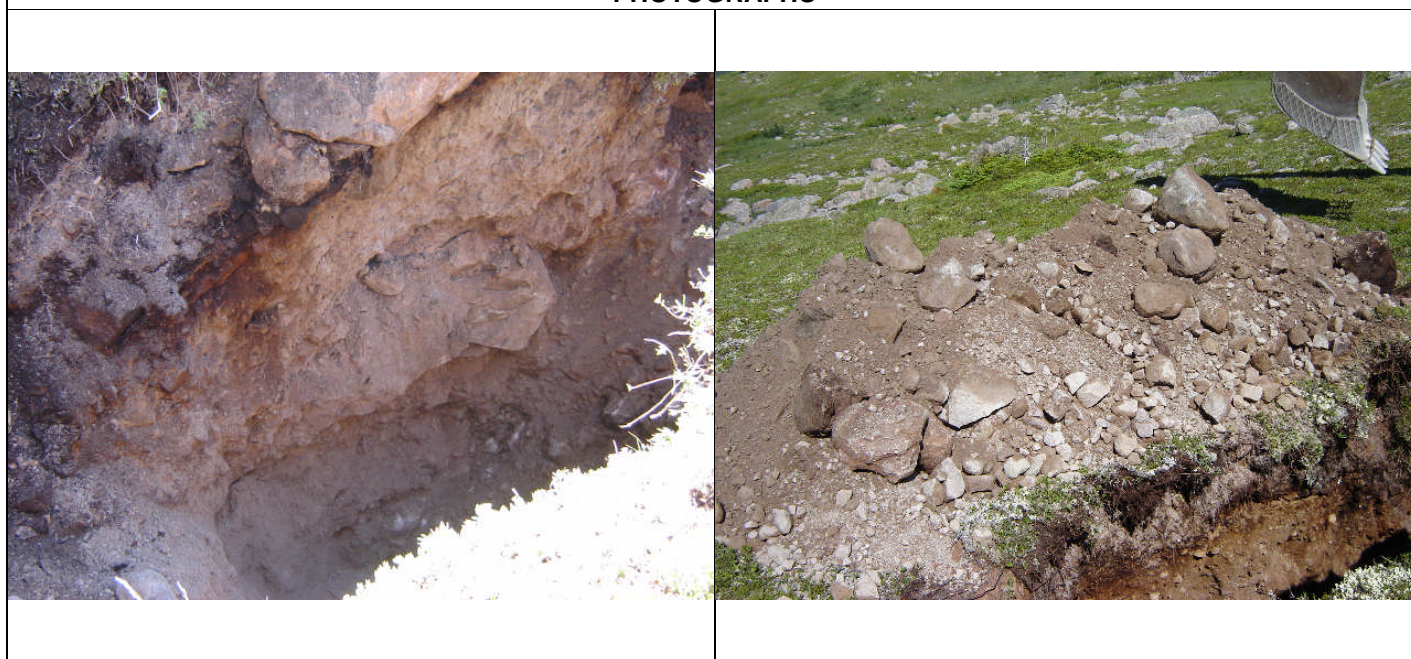
1. Test pit terminated at 3.1 m.
2. Water seepage observed at 2.5 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-REP-PI 99 to PI 100-TP-003</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5243365 E 339403	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.2	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.2 – 0.5	SILTY SAND AND GRAVEL with some cobbles and boulders, red-brown, moist, loose to compact, weathered.	N/A	N/A	N/A
0.5 – 3.3	SAND AND GRAVEL with sub-rounded cobbles and boulders, some silt, dark grey, moist, compact.	DC1051-LOT 3-REP-PI 99 to PI 100-TP-003	2.0	Grab
3.3	Test pit terminated at 3.3 m.			
Estimated Cobbles (%) 35	Estimated Boulders (%) 40	Estimated Max Diameter (m) 0.8		
Start Time: 9:56 a.m.	End Time: 10:35 a.m.			

**General Notes**

1. Test pit terminated at 3.3 m,
2. Water seepage observed at 1.8 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.
5. Representative test location between PI 99 and PI 100.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 100-TP-002</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5243862	E 344175 Inspector: Brad Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.3	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.3 – 0.9	SANDY SILT with some gravel, trace organics, dark brown, moist, loose	N/A	N/A	N/A
0.9 – 3.3	SAND AND GRAVEL with trace fines, some angular cobbles and boulders, dark grey, moist, compact.	DC1051-LOT 3-PI 100-TP-002	2.5	Grab
3.3	Test pit terminated at 3.3 m.			
Estimated Cobbles (%) 15 - 25		Estimated Boulders (%) 10 - 15		Estimated Max Diameter (m) 0.7
Start Time: 11:05 a.m.		End Time: 11:50 a.m.		

**General Notes**

1. Test pit terminated at 3.3 m.
2. Water seepage observed at 2.7 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22.
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – TEST PIT LOGS**

<b>TEST PIT: DC1051-LOT 3-PI 102-TP-001</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 11 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location	N 5252302 E 350474	Inspector: Brian Walsh

**PHOTOGRAPHS**



**Soil and Groundwater Conditions**

Depth (m) From - To	Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 0.4	ROOTMAT / TOPSOIL – rootlets, organic material, moist, loose, dark brown to black.	N/A	N/A	N/A
0.4 – 1.0	SILTY SAND with some gravel, trace organics, trace to some sub-angular cobbles and boulders, dark brown to grey, moist, loose to compact.	N/A	N/A	N/A
1.0 – 3.0	SAND AND GRAVEL with trace to some angular cobbles and boulders, trace fines, dark grey, moist, compact.	DC1051-LOT 3-PI 102-TP-001	2.3	Grab
3.0	Test pit terminated at 3.0 m on PROBABLE BEDROCK.			
Estimated Cobbles (%) 10 - 15	Estimated Boulders (%) 10 - 15	Estimated Max Diameter (m) 0.4		
Start Time: 2:45 p.m.	End Time: 3:15 p.m.			

**General Notes**

1. Test pit terminated at 3.0 m on Probable Bedrock.
2. Groundwater observed at 0.9 m.
3. North and East coordinates obtained using a hand-held Lowrance Finder Expedition GPS - UTM, NAD 83, Zone 22
4. Test pit excavated with a John Deere 160 LC track-mounted excavator.







# MOISTURE DENSITY RELATIONSHIP

Client: NL Hydro Date: February 8, 2009  
 AMEC Project No: TF8310458  
 Project: Geotechnical investigation: HVDC Gull Island to Soldiers Pond

Sample Type / Source: DC1051-LOT3-PI 102-TP001  
Test pit

Date Sampled: July 11, 2008 Sampled By B. Walsh of AMEC

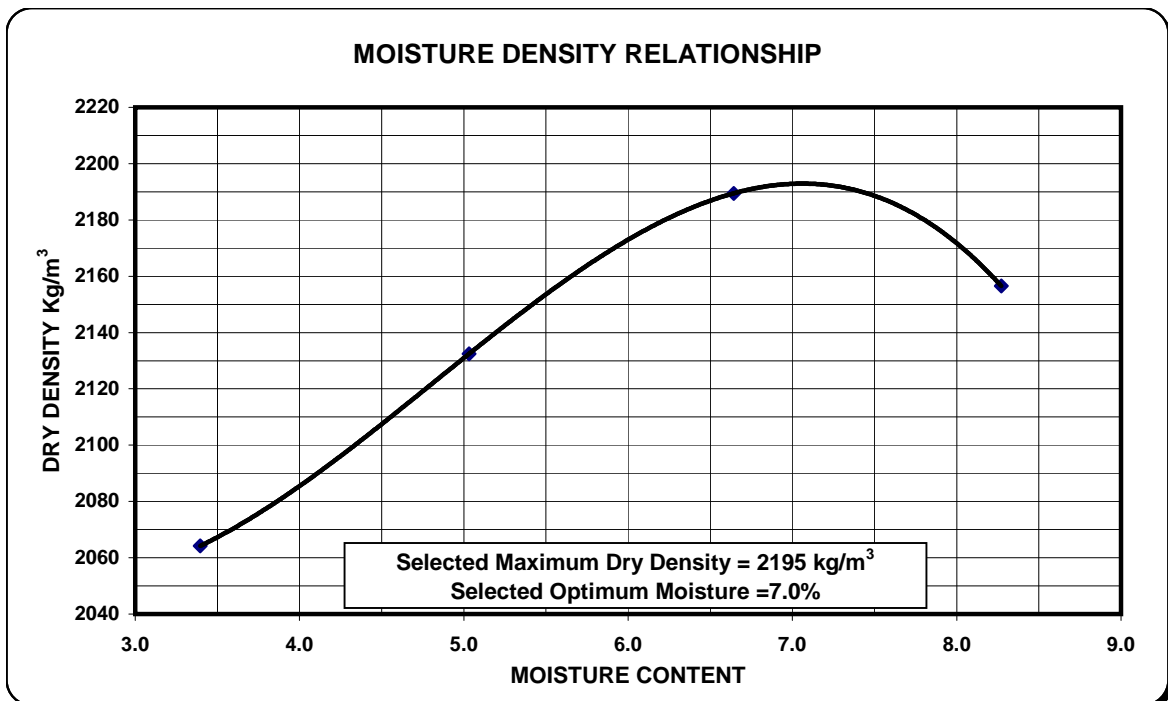
Date Received: July 31, 2008 Preparation 

Moist	
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Percent Retained:		Percent Retained:	20mm	30.0%
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Compaction Std.	ASTM D698	Method	C
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Moisture Content	3.4	5.0	6.6	8.3
Dry Density kg/m <sup>3</sup>	2064	2132	2189	2157



Note : Oversized Material Correction = 30.0%  
 Maximum Dry Density 2260 kg/m<sup>3</sup>  
 Maximum Moisture 7.0 %

Tested by, Bill Motty Reviewed by, R. Collins

**Appendix D2**

**Rock Anchor Pull-Out Test Logs**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-REP-PI 49 to PI 50-APT-08</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 26 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5452573	<b>Easting</b>	549919
<b>Start Time</b>	15:00	<b>Finish Time</b>	16:25
<ul style="list-style-type: none"> <li>• Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>• Representative test performed between PI 49 and PI 50. Test conducted on rock outcrop approximately 30 m northeast of the proposed transmission line corridor.</li> </ul>			
<b>ROCK CONDITION OBSERVATIONS</b>			
<ul style="list-style-type: none"> <li>• Rock outcrop predominated by weathered, crystalline mafic tuff with wide joint spacing.</li> <li>• No observable evidence of water in borehole during drilling.</li> <li>• Difficult drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).</li> </ul>			

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
15:40	15:42	0 – 2	0	<ul style="list-style-type: none"> <li>• Anchor setting into rock.</li> </ul>
15:42	15:44	4	3	<ul style="list-style-type: none"> <li>• Increased load to 4 tons with 6 pumps of jack.</li> <li>• Held at 4 tons.</li> </ul>
15:44	15:46	7	3	<ul style="list-style-type: none"> <li>• Increased load to 7 tons with 5 pumps of jack.</li> <li>• Held at 6 tons.</li> </ul>
15:46	15:48	9	6	<ul style="list-style-type: none"> <li>• Increased load to 9 tons.</li> <li>• Held at 9 tons.</li> </ul>
15:48	15:50	11	2	<ul style="list-style-type: none"> <li>• Increased load to 11 tons with 4 pumps of jack.</li> <li>• Held at 11 tons.</li> </ul>
15:52	15:54	13	2	<ul style="list-style-type: none"> <li>• Increased load to 13 tons with 3 pumps of jack.</li> <li>• Held at 13 tons.</li> </ul>
15:54	15:56	14	14	<ul style="list-style-type: none"> <li>• Attempted to increase load to 16 tons.</li> <li>• Anchor slipped at approximately 14 tones @3:56; lost all pressure on the jack.</li> <li>• End of test.</li> </ul>

**PHOTOS**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 54-APT-09</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 27 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5418078	<b>Easting</b>	577891
<b>Start Time</b>	14:30	<b>Finish Time</b>	17:00

- Location marked with a hand-held Lowrance Finder Expedition GPS.
- Test conducted on rock outcrop located on the existing transmission line approximately 95 m north-northeast of the coordinates given for PI 54.

**ROCK CONDITION OBSERVATIONS**

- Rock out-crop predominated by fractured, dark grey, siliceous siltstone with close joint spacing.
- Some evidence of water in borehole during drilling; accurate depth was not determined.
- Relatively easy drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).
- No slippage during anchor pull.

**PULL-OUT TEST RESULTS**

<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
16:18	16:20	0 – 2	2	<ul style="list-style-type: none"> <li>• Anchor setting into rock.</li> </ul>
16:20	16:22	4	2	<ul style="list-style-type: none"> <li>• Increased load to 4 tons with 7 pumps of jack.</li> <li>• Held at 4 tons.</li> </ul>
16:22	16:24	6	2	<ul style="list-style-type: none"> <li>• Increased load to 6 tons.</li> <li>• Held at 6 tons.</li> </ul>
16:24	16:26	8	1	<ul style="list-style-type: none"> <li>• Increased load to 8 tons with 5 pumps of jack.</li> <li>• Held at 8 tons.</li> </ul>
16:26	16:28	10	2	<ul style="list-style-type: none"> <li>• Increased load to 10 tons with 3.5 pumps of jack.</li> <li>• Held at 10 tons.</li> </ul>
16:28	16:30	12	3	<ul style="list-style-type: none"> <li>• Increased load to 12 tons.</li> <li>• Held at 12 tons.</li> </ul>
16:30	16:32	15	3	<ul style="list-style-type: none"> <li>• Increased load to 15 tons with 4 pumps of jack.</li> <li>• Held at 15 tons.</li> </ul>
16:32	16:34	18	4	<ul style="list-style-type: none"> <li>• Increased load to 18 tons (overload for jack).</li> <li>• Held at 18 tons; End of test.</li> </ul>

**PHOTOS**

No Photo Available	No Photo Available
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**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 58-APT-10</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 29 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5398298	<b>Easting</b>	630499
<b>Start Time</b>	9:30	<b>Finish Time</b>	11:00

- Location marked with a hand-held Lowrance Finder Expedition GPS.
- Test conducted on rock outcrop approximately 300 m southwest of the coordinates given for PI 58.

<b>ROCK CONDITION OBSERVATIONS</b>	
•	Rock outcrop predominated by weathered, monzo-granite with close joint spacing.
•	No observable evidence of water in borehole during drilling.
•	Hardest drilling from 0 m – 0.9 m.
•	Difficult drilling from 0.9 m – 1.2 m.

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
10:24	10:26	0 – 2	2	• Anchor setting into rock.
10:26	10:28	4	2	• Increased load to 4 tons with 6 pumps of jack. • Held at 4 tons.
10:28	10:30	6	3	• Increased load to 6 tons with 3.5 pumps of jack. • Held at 6 tons.
10:30	10:32	8	3	• Increased load to 8 tons. • Held at 8 tons.
10:32	10:34	12	4	• Increased load to 12 tons with 4 pumps of jack. • Held at 12 tons.
10:34	10:36	15	6	• Increased load to 15 tons with 3.5 pumps of jack. • Held at 15 tons.
10:36	10:38	17	>10	• Attempted to increase load to 17 tons. • Anchor slipped at approximately 16 tones @10:37 am; lost all pressure on the jack. • End of test.

**PHOTOS**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 59-APT-11</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 29 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brian Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5392187	<b>Easting</b>	656094
<b>Start Time</b>	11:30	<b>Finish Time</b>	13:00

- Location marked with a hand-held Lowrance Finder Expedition GPS.
- Test conducted on rock outcrop approximately 400 m west of the coordinates given for PI58.

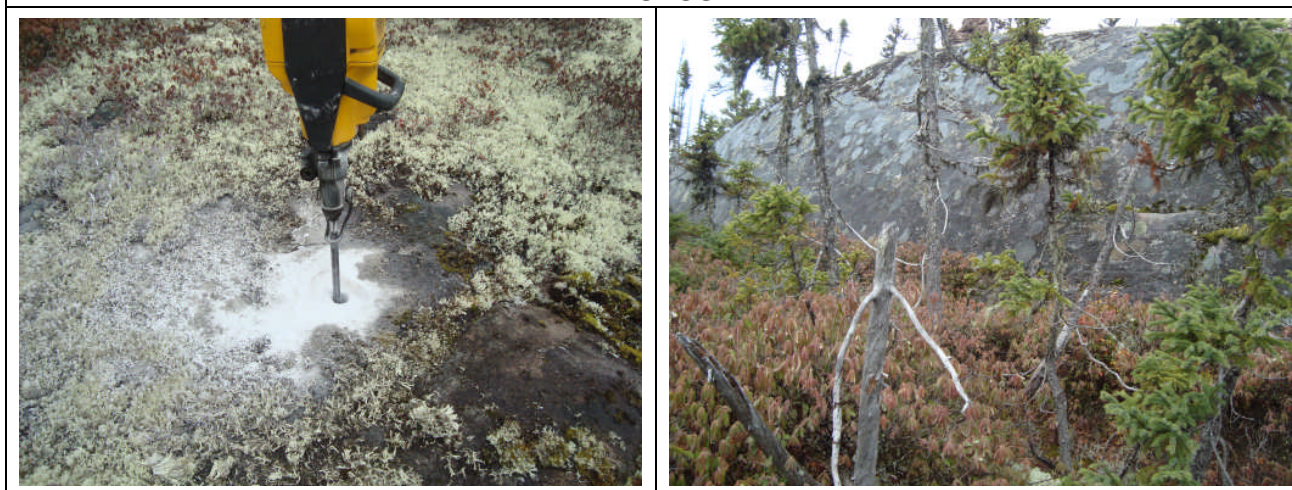
**ROCK CONDITION OBSERVATIONS**

- Rock outcrop predominated by weathered, mica - rich monzonite with moderately close joint spacing.
- No observable evidence of water in borehole during drilling.
- Difficult drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).
- No slippage during anchor pull.

**PULL-OUT TEST RESULTS**

<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
12:18	12:20	0 – 2	0	• Anchor setting into rock.
12:20	12:22	4	0	• Increased load to 4 tons with 5 pumps of jack. • Held at 4 tons.
12:22	12:24	6	1	• Increased load to 6 tons with 4.5 pumps of jack. • Held at 6 tons.
12:24	12:26	8.5	2	• Increased load to 8.5 tons. • Held at 8.5 tons.
12:26	12:28	10.5	0	• Increased load to 10.5 tons with 4 pumps of jack. • Held at 10.5 tons.
12:28	12:30	12	1	• Increased load to 12 tons. • Held at 12 tons.
12:30	12:32	15	3	• Increased load to 15 tons with 4 pumps of jack. • Held at 15 tons.
12:32	12:34	18	6	• Increased load to 18 tons (overload for jack). • Held at 18 tons; End of test.

**PHOTOS**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 62-APT-12</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 30 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5372035	<b>Easting</b>	681516
<b>Start Time</b>	16:10	<b>Finish Time</b>	17:45

- Location marked with a hand-held Lowrance Finder Expedition GPS.
- Test conducted on rock outcrop approximately 500 m northeast of the coordinates given for PI62. Extensive outcrop exists in the general area of PI 62.

<b>ROCK CONDITION OBSERVATIONS</b>	
•	Rock outcrop predominated by weathered, mica – quartz schist with wide joint spacing.
•	No observable evidence of water in borehole during drilling.
•	Difficult drilling from 0 m – 0.7 m.
•	Hardest drilling from 0.7 m – 1.2 m.

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
17:02	17:04	0 – 2	2	• Anchor setting into rock.
17:04	17:06	4	3	• Increased load to 4 tons with 6 pumps of jack. • Held at 4 tons.
17:06	17:08	6	3	• Increased load to 6 tons with 5 pumps of jack. • Held at 6 tons.
17:08	17:10	8	4	• Increased load to 8 tons with 4 pumps of jack. • Held at 8 tons.
17:10	17:12	10	3	• Increased load to 10 tons. • Held at 10 tons.
17:12	17:14	13	4	• Increased load to 13 tons. • Held at 13 tons.
17:14	17:20	16	4	• Increased load to 16 tons. • Anchor slipped back to 11 tons. • Re-tightened anchor and increased load to 16 tons. • Anchor slipped at approximately 15.5 tones @5:18 pm; lost all pressure on the jack. End of test.

**PHOTOS**





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 63-APT-13</b>		
Client:	Nalcor Energy - Lower Churchill Project	October 31 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5360734	<b>Easting</b>	705548
<b>Start Time</b>	13:00	<b>Finish Time</b>	14:45

- Location marked with a hand-held Lowrance Finder Expedition GPS.
- Test conducted on rock outcrop approximately 70 m northeast of the coordinates given for PI 63.

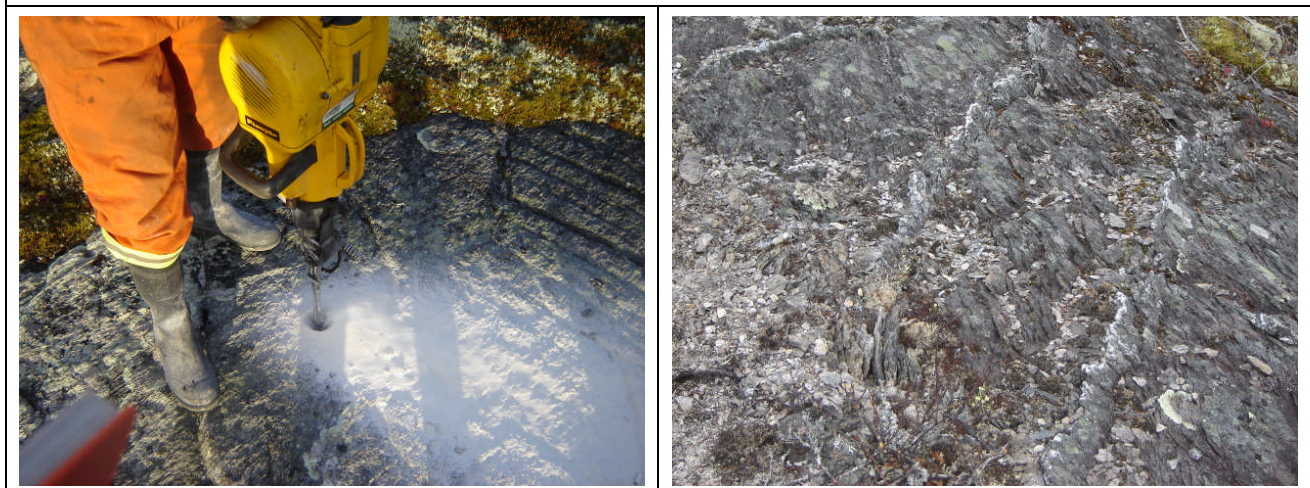
**ROCK CONDITION OBSERVATIONS**

- Rock outcrop predominated by fractured, grey to buff white siliceous siltstone with close joint spacing. Evidence of cleavage planes trending parallel to the strike of the outcrop.
- No observable evidence of water in borehole during drilling.
- Relatively easy drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).

**PULL-OUT TEST RESULTS**

<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
14:03	14:05	0 – 2	2	• Anchor setting into rock.
14:05	14:07	4	2	• Increased load to 4 tons with 4 pumps of jack. • Held at 4 tons.
14:07	14:09	6	2	• Increased load to 6 tons with 5 pumps of jack. • Held at 6 tons.
14:09	14:11	8	3	• Increased load to 8 tons. • Held at 8 tons.
14:11	14:13	10	1	• Increased load to 10 tons with 4 pumps of jack. • Held at 10 tons.
14:13	14:15	12	5	• Increased load to 13 tons with 3.5 pumps of jack. • Held at 12 tons.
14:15	14:17	15	6	• Increased load to 15 tons. • Held at 15 tons.
14:17	14:18	16.5	7	• Increased load to 16.5 tons with 5 pumps of jack. • Held at 16.5 tons for 7 seconds until anchor slipped. • Lost all pressure on jack. End of test

**PHOTOS**







**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 65-APT-14</b>		
Client:	Nalcor Energy - Lower Churchill Project	November 1 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5346048	<b>Easting</b>	715499
<b>Start Time</b>	8:30	<b>Finish Time</b>	10:20

- Location marked with a hand-held Lowrance Finder Expedition GPS.
- Test conducted on rock outcrop approximately 120 m southwest of the coordinates given for PI 65.

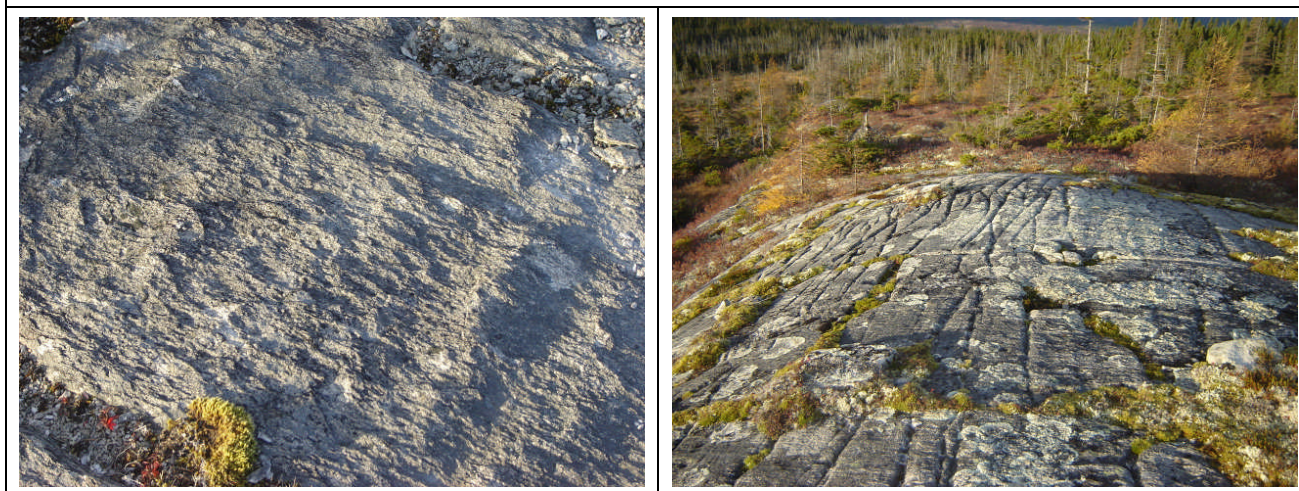
**ROCK CONDITION OBSERVATIONS**

- Rock outcrop predominated by pink to buff (weathered surfaces appear as medium grey), fine-to-medium grained granite with close joint spacing.
- No observable evidence of water in borehole during drilling.
- Difficult drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).
- No slippage during anchor pull.

**PULL-OUT TEST RESULTS**

<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
9:34	9:36	0 – 2	0	• Anchor setting into rock.
9:36	9:38	4	0	• Increased load to 4 tons with 6 pumps of jack. • Held at 4 tons.
9:38	9:40	6	2	• Increased load to 6 tons. • Held at 6 tons.
9:40	9:42	8	2	• Increased load to 8.5 tons with 5 pumps of jack. • Held at 8.5 tons.
9:42	9:44	10	4	• Increased load to 10 tons with 6 pumps of jack. • Anchor slipped back to 8.5 tons.
9:44	9:46	12.5	3.5	• Increased load to 12.5 tons. • Held at 12.5 tons.
9:46	9:48	15.5	5	• Increased load to 15.5 tons with 6 pumps of jack. • Held at 15.5 tons.
9:48	9:50	18	5.5	• Increased load to 18 tons (overload for jack). • Held at 18 tons; End of test.

**PHOTOS**





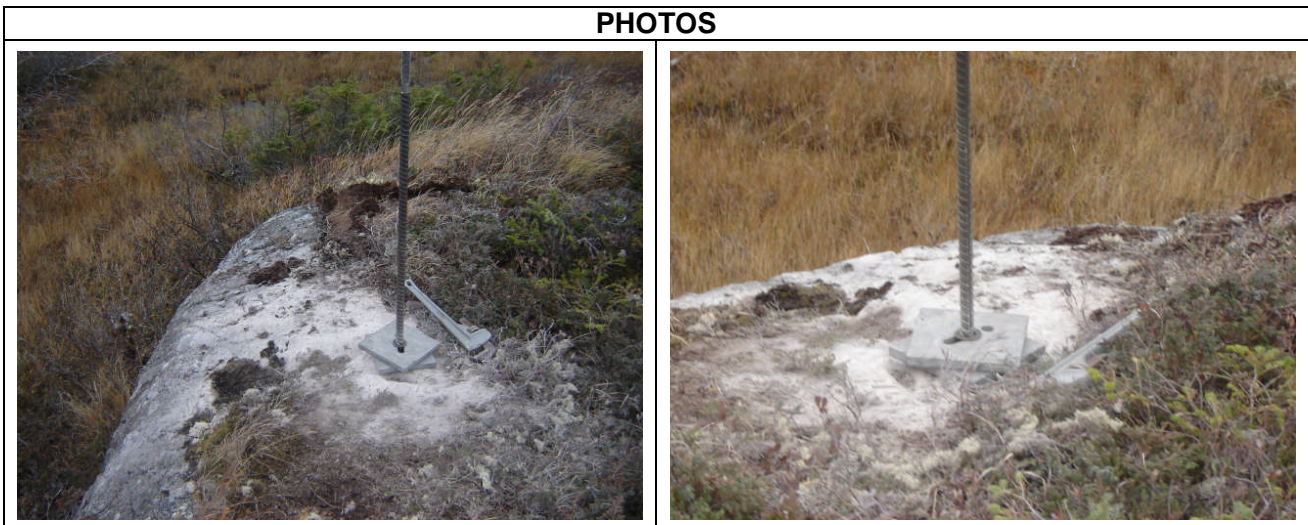
**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 67-APT-15</b>		
Client:	Nalcor Energy - Lower Churchill Project	November 1 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5329156	<b>Easting</b>	278348
<b>Start Time</b>	10:50	<b>Finish Time</b>	12:55
<ul style="list-style-type: none"> <li>Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>Test conducted on rock outcrop approximately 40 m southeast of the coordinates given for PI 67.</li> </ul>			

<b>ROCK CONDITION OBSERVATIONS</b>	
<ul style="list-style-type: none"> <li>Rock outcrop predominated by grey (sometimes observed as buff white on weathered surfaces) siltstone.</li> <li>No observable evidence of water in borehole during drilling.</li> <li>Relatively easy drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).</li> </ul>	

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
12:34	12:36	0 – 2	0	<ul style="list-style-type: none"> <li>Anchor setting into rock.</li> </ul>
12:36	12:38	4	4	<ul style="list-style-type: none"> <li>Increased load to 4 tons with 7 pumps of jack.</li> <li>Held at 4 tons.</li> </ul>
12:38	12:51	6	7.5	<ul style="list-style-type: none"> <li>Increased load to 6 tons.</li> <li>Anchor slipped at 5.5 tons; lost all pressure on the jack.</li> <li>Re-tightened anchor and attempted to increase load to 6 tons.</li> <li>Anchor slipped at 6 tons; lost all pressure on jack.</li> <li>End of test.</li> </ul>





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – ROCK ANCHOR PULL-OUT TEST LOGS**

<b>TEST ID: DC1051-LOT 3-PI 69-APT-16</b>		
Client:	Nalcor Energy - Lower Churchill Project	November 2 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island	
Contract No.	WTO DC 1051	Inspector: Brad Walsh

<b>TEST LOCATION</b>			
<b>Northing</b>	5321728	<b>Easting</b>	277724
<b>Start Time</b>	9:55	<b>Finish Time</b>	11:15
<ul style="list-style-type: none"> <li>• Location marked with a hand-held Lowrance Finder Expedition GPS.</li> <li>• Test conducted on rock outcrop approximately 15 m west of the coordinates given for PI 69.</li> </ul>			

<b>ROCK CONDITION OBSERVATIONS</b>	
<ul style="list-style-type: none"> <li>• Rock outcrop predominated by medium grained, quartz – feldspar rich granite with wide joint spacing.</li> <li>• No observable evidence of water in borehole during drilling.</li> <li>• Difficult drilling for the duration of borehole advancement (i.e. from 0 m – 1.2 m).</li> </ul>	

<b>PULL-OUT TEST RESULTS</b>				
<b>TIME</b>		<b>Applied Load (Tons)</b>	<b>Jack Rise (mm)</b>	<b>Notes</b>
<b>From</b>	<b>To</b>			
9:58	10:00	0 – 2	1	<ul style="list-style-type: none"> <li>• Anchor setting into rock.</li> </ul>
10:00	10:02	4	2	<ul style="list-style-type: none"> <li>• Increased load to 4 tons with 8 pumps of jack.</li> <li>• Held at 4 tons.</li> </ul>
10:02	10:04	6	2	<ul style="list-style-type: none"> <li>• Increased load to 6 tons.</li> <li>• Held at 6 tons.</li> </ul>
10:04	10:06	8	6.5	<ul style="list-style-type: none"> <li>• Increased load to 8 tons with 6 pumps of jack.</li> <li>• Anchor slipped back to 6.5 tons.</li> </ul>
10:06	10:08	10	3	<ul style="list-style-type: none"> <li>• Increased load to 10 tons with 5.5 pumps of jack.</li> <li>• Held at 10 tons.</li> </ul>
10:08	10:10	12	3.5	<ul style="list-style-type: none"> <li>• Increased load to 11 tons with 4.5 pumps of jack.</li> <li>• Anchor slipped back to 8.5 tons.</li> </ul>
10:10	10:12	15.5	2	<ul style="list-style-type: none"> <li>• Increased load to 15.5 tons.</li> <li>• Held at 15.5 tons.</li> </ul>
10:12	10:14	18	5.5	<ul style="list-style-type: none"> <li>• Increased load to 18 tons (overload for jack).</li> <li>• Anchor slipped back to 17.5 tons.</li> <li>• End of test</li> </ul>

**PHOTOS**



**Appendix D3**  
**Percussion Drilling Logs**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 3-PI 42-PD-25</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 42	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5475548	505246	1.8	Encountered a layer of soil with cobbles / boulders. Drilled to a total depth 1.8 m with no refusal.
2	5475677	505363	1.8	Encountered a layer of soil with cobbles / boulders. Drilled to a total depth 1.8 m with no refusal

<b>Generalized Observations</b>
Wooded area with no observable exposed bedrock or large boulders. Due to accessibility this test location was taken approximately 300 m northwest of the given coordinates of PI42. Deposits of till were observed approximately 100 m southeast of the proposed transmission line route close to this testing location (as seen in the photograph to the right).



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 3-PI 43-PD-26</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 9 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Area of PI 43 Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5468292	508063	0.9	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or large boulder(s).
2	5468319	508095	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or large boulder(s).
3	5468288	508029	1.8	Encountered a layer of soil with cobbles / boulders. Drilled to a total depth 1.8 m with no refusal.

<b>Generalized Observations</b>
Wooded area with large erratic boulders that range from 1 m – 2 m in diameter. No observable exposed bedrock in the immediate area of PI43.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

**PROBE ID: DC1051-LOT 3-REP-PI 43 to PI 44-PD-27**

Client:	Nalcor Energy - Lower Churchill Project	Date:	October 25 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Representative test between PI 43 and PI 44
		Inspector:	Brian Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5464057	511075	1.8	Encountered a layer of soil and peat. Drilled to a total depth 1.8 m with no refusal.
2	5464035	511092	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or large boulder(s).
3	5464004	511095	1.4	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or large boulder(s).

**Generalized Observations**

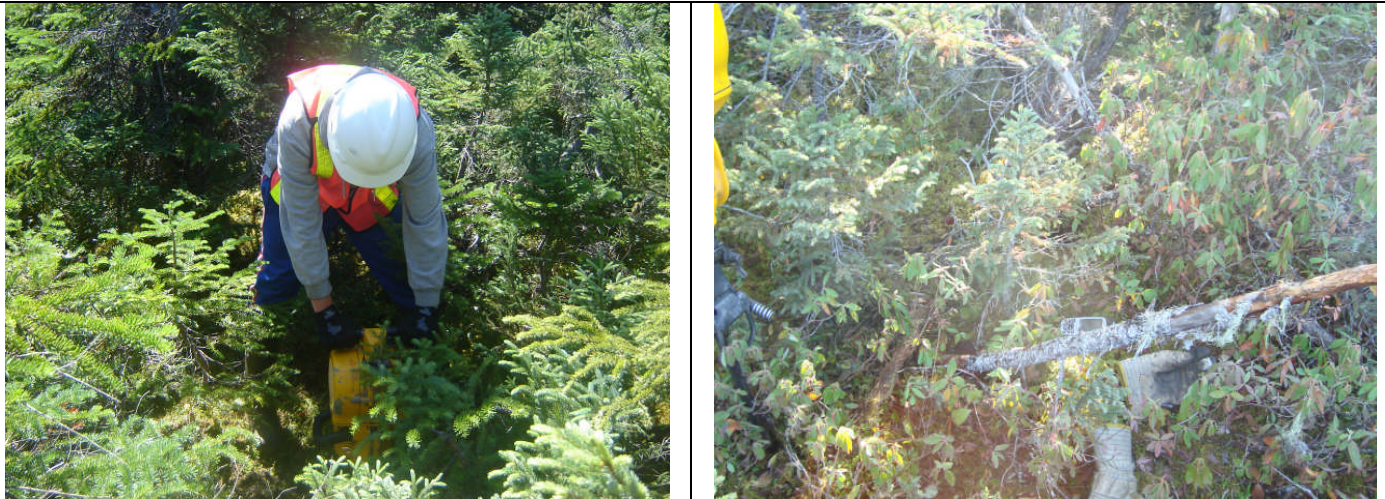
Wooded area coupled with some sections of marsh. No observable exposed bedrock or large boulders in the immediate area.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 3-PI 47-PD-28</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 8 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 47	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5458025	523640	1.8	Encountered a layer of soil and cobbles / boulders. Drilled to a total depth 1.8 m with no refusal.
2	5458013	523656	1.8	Encountered a layer of soil and cobbles / boulders. Drilled to a total depth 1.8 m with no refusal.

<b>Generalized Observations</b>
Wooded area with no observable exposed bedrock or large boulders.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – PERCUSSION DRILLING LOGS**

<b>PROBE ID: DC1051-LOT 3-PI 62-PD-29</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 30 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Area of PI 62	Inspector: Brad Walsh

**PHOTOGRAPHS**



Probe Number	Northing UTM NAD 83 Zone 21	Easting UTM NAD 83 Zone 21	Refusal Depth (m)	Notes
1	5371440	681252	1.7	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).
2	5371459	681231	1.5	Encountered a layer of soil and cobbles / boulders before refusal on probable bedrock or very large boulder(s).

<b>Generalized Observations</b>
Sparsely wooded area with sections of marsh and bog. Observable areas of exposed bedrock and large boulders that range from 0.5 m – 1.5 m in diameter.

**Appendix D4**  
**Bog Probing Logs**

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 45A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 41 and PI 42	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 45A
			Left Line	Center Line	Right Line	
1	499261	5488239	1.00	1.00	1.00	
2	499261	5488261	2.25	2.00	2.5+	
3	499249	5488278	2.10	2.5+	2.5+	
4	499238	5488299	2.10	2.5+	1..6	
5	499224	5488319	2.50	2.5+	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 45B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 41 and PI 42	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 45B
			Left Line	Center Line	Right Line	
1	499744	5487244	2.00	2.00	2.5+	
2	499739	5487265	2.5+	1.50	2.00	
3	499730	5487283	Water	2.5+	1.90	
4	499720	5487301	Water	2.5+	1.00	
5	499703	5487316	Water	2.50	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 45C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 41 and PI 42	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 45C
			Left Line	Center Line	Right Line	
1	500064	5486577	1.25	2.00	0.60	
2	500056	5486596	2.5+	2.5+	2.00	
3	500045	5486611	2.5+	2.5+	2.5+	
4	500032	5486630	2.5+	2.5+	2.20	
5	500030	5486649	2.5+	2.5+	2.5+	
6	500024	5486666	2.5+	2.5+	1.50	
7	500013	5486685	2.5+	2.5+	2.5+	
8	500007	5486706	2.5+	2.5+	1.60	
9	499998	5486718	2.5+	2.30	1.90	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 45D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 41 and PI 42
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 45D
			Left Line	Center Line	Right Line	
1	502501	5481569	1.75	1.10	1.00	
2	502481	5481594	2.00	1.80	0.90	
3	502480	5481616	1.80	2.5+	2.5+	
4	502470	5481638	2.5+	2.5+	1.00	
5	502460	5481654	2.5+	2.5+	2.5+	
6	502450	5481674	2.25	2.00	2.5+	
7	502442	5481692	2.25	2.00	1.50	
8	502431	5481710	2.5+	2.5+	2.5+	
9	502422	5481731	2.5+	2.5+	2.5+	
10	502408	5481751	2.00	2.5+	2.5+	
11	502406	5481778	Trees	Trees	Trees	
12	502389	5481790	0.75	1.00	2.00	
13	502381	5481810	0.50	1.00	1.00	
14	502373	5481830	0.50	0.20	0.20	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 45E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 41 and PI 42	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 45E
			Left Line	Center Line	Right Line	
1	504754	5476951	2.5+	2.00	1.50	
2	504740	5476969	2.5+	2.5+	1.80	
3	504731	5476992	2.5+	2.5+	1.70	
4	504707	5477011	1.75	1.60	0.40	
5	504698	5477024	0.50	0.60	1.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 46A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 42 and PI 43	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 46A
			Left Line	Center Line	Right Line	
1	505574	5475221	1.25	1.50	0.50	
2	505568	5475242	2.5+	1.90	1.70	
3	505565	5475267	2.00	1.50	1.00	
4	505556	5475286	0.75	0.50	0.80	
5	505548	5475308	0.50	1.00	2.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 46B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 42 and PI 43	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 46B
			Left Line	Center Line	Right Line	
1	506595	5472444	0.50	0.20	0.60	
2	506595	5472466	0.50	0.60	1.20	
3	506585	5472485	0.25	0.60	1.30	
4	506578	5472506	0.50	1.10	1.00	
5	506573	5472527	1.25	0.90	0.50	
6	506564	5472547	1.50	1.25	1.00	
7	506558	5472567	0.75	0.90	0.10	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 46C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 42 and PI 43	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 46C
			Left Line	Center Line	Right Line	
1	506808	5471888	1.00	0.50	0.50	
2	506814	5471869	0.50	0.60	0.20	
3	506818	5471854	0.50	0.20	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 47 – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 46 and PI 47	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 47
			Left Line	Center Line	Right Line	
1	523032	5458107	0.50	0.60	0.50	
2	523012	5458111	0.75	0.50	0.50	
3	522993	5458119	0.50	0.50	0.50	
4	522971	5458114	1.00	1.25	0.70	
5	522942	5458120	1.00	0.60	0.20	
6	522919	5458132	0.50	0.50	0.20	
7	522892	5458130	0.20	0.50	0.20	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 48A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 49 and PI 50	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 48A
			Left Line	Center Line	Right Line	
1	539788	5459540	0.25	0.50	0.60	
2	539772	5459544	0.60	0.70	0.50	
3	539760	5459560	1.00	0.90	0.60	
4	539741	5459573	0.80	0.75	0.50	
5	539721	5459589	0.20	0.25	0.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 48B – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 49 and PI 50
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 48B
			Left Line	Center Line	Right Line	
1	542783	5457458	0.50	0.75	0.40	
2	542767	5457472	2.5+	1.25	0.50	
3	542753	5457490	2.25	1.00	Trees	
4	542732	5457501	Water	Water	Rock	
5	542732	5457506	1.25	0.50	Trees	
6	542707	5457528	0.75	0.40	Rock	
7	542690	5457542	0.60	0.75	Trees	
8	542673	5457544	0.60	0.70	0.90	
9	542652	5457555	1.00	1.00	1.20	
10	542632	5457570	0.50	0.50	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 48C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 49 and PI 50	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 48C
			Left Line	Center Line	Right Line	
1	548394	5453577	0.25	0.60	0.50	
2	548378	5453585	0.50	0.50	0.60	
3	548359	5453596	0.75	0.50	0.30	
4	548342	5453615	0.25	0.20	0.10	
5	548321	5453623	0.25	0.25	0.20	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 48D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 49 and PI 50	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 48D
			Left Line	Center Line	Right Line	
1	549239	5452989	0.20	0.25	0.60	
2	549223	5453007	0.20	0.50	0.70	
3	549203	5453019	0.75	1.00	1.30	
4	549188	5453034	1.50	1.50	1.70	
5	549169	5453044	1.50	1.30	1.00	
6	549151	5453060	1.25	1.00	0.70	
7	549130	5453074	0.75	0.60	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 48E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 49 and PI 50	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 48E
			Left Line	Center Line	Right Line	
1	550381	5452204	0.50	0.50	0.20	
2	550359	5452216	0.75	0.60	0.40	
3	550334	5452232	0.75	0.60	0.50	
4	550322	5452246	1.00	0.60	0.50	
5	550301	5452251	1.50	1.25	0.50	
6	550281	5452262	1.50	1.70	0.60	
7	550264	5452278	1.50	1.60	1.50	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 48F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 49 and PI 50	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 48F
			Left Line	Center Line	Right Line	
1	551339	5451534	1.00	0.60	Trees	
2	551313	5451538	2.00	0.75	Trees	
3	551279	5451551	0.50	1.00	Trees	
4	551256	5451560	2.10	1.75	Trees	
5	551235	5451569	0.80	1.00	Trees	
6	551209	5451580	0.10	0.20	Trees	
7	551192	5451594	1.90	1.00	Trees	
8	551177	5451591	0.75	0.75	Trees	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 49A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49A
			Left Line	Center Line	Right Line	
1	552630	5450466	0.25	0.50	0.50	
2	552618	5450486	1.25	1.25	0.60	
3	552613	5450509	1.25	1.25	0.50	
4	552607	5450532	1.00	1.00	0.50	
5	552602	5450554	0.50	0.50	0.70	
6	552598	5450571	0.25	0.40	0.10	
7	552524	5450726	1.00	0.60	0.10	
8	552502	5450738	1.50	1.00	0.60	
19	552480	5450749	2.00	1.25	0.80	
10	552465	5450765	1.75	1.30	0.50	
11	552447	5450779	1.25	1.25	1.00	
12	552429	5450794	0.75	1.00	0.50	
13	552410	5450810	0.50	0.20	0.30	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49B
			Left Line	Center Line	Right Line	
1	553201	5448560	0.75	0.50	0.20	
2	553201	5448582	0.75	0.50	0.10	
3	553196	5448604	1.25	0.50	0.10	
4	553186	5448626	1.00	0.70	0.40	
5	553182	5448647	0.75	0.50	0.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49C
			Left Line	Center Line	Right Line	
1	553388	5447974	0.75	0.60	0.50	
2	553384	5447995	1.00	0.60	0.50	
3	553375	5448016	1.25	1.25	1.50	
4	553368	5448038	1.25	1.50	1.00	
5	553361	5448062	1.25	1.50	1.00	
6	553356	5448081	1.50	1.40	1.90	
7	553345	5448101	1.50	1.00	0.50	
8	553335	5448125	1.00	0.60	0.30	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 49D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49D
			Left Line	Center Line	Right Line	
1	553526	5447535	1.25	1.00	0.60	
2	553510	5447549	1.25	1.10	0.40	
3	553506	5447574	1.00	0.80	1.50	
4	553507	5447591	Water	1.00	0.50	
5	553493	5447632	Water	Water	1.50	
6	553473	5447685	1.50	1.25	1.00	
7	553470	5447706	1.50	1.50	1.20	
8	553465	5447720	1.50	1.90	1.70	
9	553462	5447745	1.50	1.50	1.60	
10	553455	5447769	1.50	1.25	0.50	
11	553451	5447796	1.25	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 49E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: August 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49E
			Left Line	Center Line	Right Line	
1	553886	5446344	0.10	0.20	0.80	
2	553879	5446368	0.50	0.25	0.20	
3	553866	5446389	1.00	0.50	0.50	
4	553854	5446406	0.50	0.50	0.10	
5	553841	5446423	0.50	0.40	0.20	
6	553847	5446445	1.00	Tree	0.10	
7	553845	5446470	0.20	Rock	Rock	
8	553835	5446488	0.20	0.40	0.20	
9	553829	5446510	1.00	0.20	Trees	
10	553823	5446530	rock	0.20	Trees	
11	553812	5446550	0.50	0.10	Rock	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49F
			Left Line	Center Line	Right Line	
1	554353	5444796	1.00	1.30	1.00	
2	554348	5444817	1.10	2.00	2.00	
3	554347	5444830	0.50	0.80	0.50	
4	554345	5444873	0.25	0.50	0.50	
5	554347	5444893	0.25	0.10	0.25	
6	554327	5444925	0.25	0.50	0.50	
7	554314	5444947	0.50	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49G – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49G
			Left Line	Center Line	Right Line	
1	554456	5444495	0.20	0.60	0.50	
2	554445	5444511	0.20	0.25	0.20	
3	554433	5444527	0.10	0.40	0.40	
4	554431	5444547	0.10	0.50	0.50	
5	554428	5444568	0.50	0.45	0.40	
6	554426	5444590	0.75	0.60	0.50	
7	554417	5444605	0.50	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49H – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49H
			Left Line	Center Line	Right Line	
1	554500	5444344	1.25	1.00	1.25	
2	554497	5444365	0.75	0.70	0.80	
3	554491	5444385	0.90	1.00	1.00	
4	554481	5444402	0.50	1.30	0.80	
5	554473	5444423	0.25	0.60	0.60	
6	554464	5444441	0.50	0.20	0.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49 I – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49 I
			Left Line	Center Line	Right Line	
1	554672	5443837	0.75	1.25	1.25	
2	554645	5443844	2.00	2.00	1.50	
3	554633	5443863	1.00	1.50	1.50	
4	554627	5443891	1.80	2.00	2.00	
5	554630	5443914	1.25	1.00	1.00	
6	554623	5443929	1.00	0.60	1.00	
7	554614	5443949	2.5+	2.5+	2.5+	
8	554608	5443972	2.00	1.10	1.00	
9	554606	5443992	1.25	1.60	1.50	
10	554603	5444016	0.50	0.50	0.50	
11	554595	5444034	0.60	0.80	0.50	
12	554589	5444053	0.60	0.60	0.50	
13	554582	5444075	0.50	1.00	0.75	
14	554570	5444091	0.40	0.60	0.80	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49J – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49J
			Left Line	Center Line	Right Line	
1	554705	5443553	0.50	0.20	0.20	
2	554693	5443570	0.50	1.00	1.00	
3	554688	5443589	1.00	1.25	1.00	
4	554688	5443609	1.00	0.70	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 49K – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49K
			Left Line	Center Line	Right Line	
1	554958	5442864	1.25	2.00	2.00	
2	554946	5442878	0.75	1.00	1.00	
3	554938	5442897	1.50	1.80	1.25	
4	554928	5442915	2.10	2.00	2.00	
5	554924	5442936	2.5+	2.5+	2.5+	
6	554924	5442955	2.5+	2.5+	2.5+	
7	554919	5442976	2.25	2.00	1.50	
8	554909	5442995	2.00	2.5+	1.50	
9	554905	5443016	2.00	2.5+	2.5+	
10	554899	5443038	2.00	2.00	2.00	
11	554896	5443059	1.75	2.00	1.50	
12	554887	5443080	1.25	1.30	1.25	
13	554879	5443101	0.50	1.00	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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<b>BOG AREA 49L – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49L
			Left Line	Center Line	Right Line	
1	555253	5441839	Trees	1.50	1.25	
2	555235	5441849	Trees	1.50	1.75	
3	555217	5441861	Trees	0.90	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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BOG AREA 49M – LOT 3				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49M
			Left Line	Center Line	Right Line	
1	555461	5441169	0.50	0.50	0.25	
2	555459	5441193	0.50	0.50	0.50	
3	555453	5441214	0.50	0.50	0.25	
4	555442	5441243	0.25	0.40	0.50	
5	555443	5441263	1.00	0.60	0.75	
6	555439	5441283	1.50	1.70	1.50	
7	555435	5441302	1.50	2.00	1.60	
8	555428	5441320	0.50	0.80	0.75	
9	555420	5441337	0.50	1.50	0.75	
10	555412	5441357	1.00	1.50	1.50	
11	555402	5441377	1.00	1.50	1.00	
12	555392	5441400	0.20	0.80	0.25	
13	555390	5441421	0.60	1.40	0.50	
14	555389	5441443	1.00	1.25	0.75	
15	555384	5441463	2.00	2.00	1.25	
16	555378	5441481	2.10	2.20	1.60	
17	555373	5441501	1.00	1.20	1.50	
18	555364	5441521	1.10	1.50	0.80	
19	555355	5441539	1.00	1.00	1.10	
20	555353	5441559	1.50	1.25	1.40	
21	555345	5441575	1.25	1.50	1.50	
22	555338	5441598	1.70	1.75	0.75	
23	555331	5441618	1.80	2.00	1.75	
24	555326	5441638	1.50	1.50	0.50	
25	555319	5441668	0.60	0.75	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 49N – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49N
			Left Line	Center Line	Right Line	
1	555620	5440691	0.50	Rock	Rock	
2	555605	5440709	0.25	0.20	0.20	
3	555595	5440729	0.50	0.30	0.20	
4	555578	5440744	Rock	Rock	0.50	
5	555567	5440756	0.50	0.25	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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<b>BOG AREA 49 O – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 50 and PI 51	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 49 O
			Left Line	Center Line	Right Line	
1	556286	5438526	0.50	0.60	0.50	
2	556279	5438544	0.50	0.50	0.50	
3	556267	5438562	0.50	0.50	0.50	
4	556258	5438571	0.25	1.00	0.40	



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<b>BOG AREA 50A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50A
			Left Line	Center Line	Right Line	
1	557985	5435367	0.50	0.50	0.60	
2	557972	5435385	0.75	0.95	0.70	
3	557952	5435388	0.50	0.60	0.75	
4	557929	5435392	0.50	0.75	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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<b>BOG AREA 50B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50B
			Left Line	Center Line	Right Line	
1	558764	5434807	0.50	0.50	0.60	
2	558751	5434820	1.20	1.25	0.50	
3	558733	5434822	1.10	1.00	0.20	
4	558714	5434827	1.00	0.50	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 50C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50C
			Left Line	Center Line	Right Line	
1	559096	5434573	0.60	0.50	0.50	
2	559084	5434591	0.50	0.50	0.50	
3	559068	5434601	0.50	0.15	0.30	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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<b>BOG AREA 50D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50D
			Left Line	Center Line	Right Line	
1	562987	5432074	0.50	0.30	0.50	
2	562971	5432085	0.50	0.60	0.50	
3	562948	5432093	0.50	0.60	0.50	
4	562934	5432108	0.10	0.40	0.50	
5	562916	5432120	0.50	0.45	0.50	
6	562895	5432129	1.25	0.70	0.60	
7	562877	5432142	1.25	2.00	1.50	
8	562861	5432155	2.00	2.5+	1.25	
9	562842	5432165	1.00	1.60	1.25	
10	562826	5432178	1.00	1.40	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 50E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50E
			Left Line	Center Line	Right Line	
1	563158	5431957	0.75	1.00	1.00	
2	563157	5431967	2.5+	2.5+	2.5+	
3	563136	5431974	2.5+	2.5+	2.5+	
4	563118	5431985	2.5+	1.70	1.25	
5	563100	5431997	2.5+	2.00	2.5+	
6	563085	5432009	1.00	1.40	1.50	
7	563066	5432021	1.50	0.50	0.50	
8	563051	5432034	1.00	0.40	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 50F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50F
			Left Line	Center Line	Right Line	
1	564453	5431123	0.50	0.50	0.75	
2	564440	5431141	0.40	0.40	0.25	
3	564427	5431152	0.40	0.60	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 50G – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 30, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 51 and PI 52
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 50G
			Left Line	Center Line	Right Line	
1	565057	5430740	0.50	0.50	0.40	
2	565032	5430747	0.50	1.00	1.00	
3	565010	5430764	0.25	0.10	0.50	
4	564997	5430778	0.25	0.20	0.40	
5	564978	5430787	0.50	0.20	0.40	
6	564950	5430801	0.25	0.20	0.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 51A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 52 and PI 53	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 51A
			Left Line	Center Line	Right Line	
1	566084	5428920	0.50	0.40	0.40	
2	566082	5428942	0.75	1.00	1.00	
3	566079	5428964	1.10	1.00	1.00	
4	566073	5428984	0.50	0.60	0.75	
5	566065	5428997	0.50	1.00	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 51B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 52 and PI 53	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 51B
			Left Line	Center Line	Right Line	
1	566230	5428060	0.50	0.20	0.20	
2	566220	5428079	1.25	1.00	1.50	
3	566211	5428097	1.25	1.00	1.50	
4	566200	5428118	1.00	0.50	0.50	
5	566186	5428135	0.75	0.60	0.50	
6	566171	5428149	0.50	0.80	0.30	
7	566163	5428165	0.50	0.80	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 51C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 52 and PI 53	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 51C
			Left Line	Center Line	Right Line	
1	566494	5427151	0.50	0.50	0.50	
2	566474	5427159	0.50	0.50	0.50	
3	566456	5427169	0.50	0.20	0.25	
4	566438	5427176	0.50	0.25	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 51D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 52 and PI 53	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 51D
			Left Line	Center Line	Right Line	
1	566682	5425436	1.50	0.50	1.50	
2	566689	5425457	1.00	1.50	1.50	
3	566690	5425481	1.00	1.25	1.25	
4	566685	5425502	1.25	1.00	1.00	
5	566681	5425523	1.25	1.00	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 52A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 53 and PI 54	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 52A
			Left Line	Center Line	Right Line	
1	568175	5422763	0.60	0.60	1.00	
2	568155	5422767	0.50	1.10	1.00	
3	568137	5422779	0.50	0.60	0.60	
4	568117	5422787	0.50	0.60	1.00	
5	568098	5422798	0.50	0.40	0.50	
6	568079	5422807	1.00	0.10	1.25	
7	568060	5422817	0.50	0.50	0.50	
8	568027	5422831	Rock	Rock	Rock	
9	568008	5422834	Rock	Rock	Rock	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 52B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 53 and PI 54	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 52B
			Left Line	Center Line	Right Line	
1	568526	5422589	0.25	0.75	0.25	
2	568503	5422598	1.10	1.25	1.20	
3	568482	5422607	0.80	0.30	0.70	
4	568460	5422617	1.30	1.90	1.25	
5	568443	5422628	2.00	2.5+	2.00	
6	568425	5422638	0.60	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 52C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 29, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 53 and PI 54	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 52C
			Left Line	Center Line	Right Line	
1	572150	5420811	0.40	0.50	1.00	
2	572131	5420820	0.50	0.50	0.80	
3	572112	5420828	0.50	0.75	0.50	
4	572095	5420841	0.50	0.75	1.50	
5	572071	5420846	1.00	1.25	1.00	
6	572054	5420861	0.50	0.75	1.00	
7	572034	5420870	0.70	1.00	0.50	
8	572012	5420879	0.50	0.50	0.50	
9	571992	5420893	1.00	0.75	1.00	
10	571971	5420901	0.60	1.00	0.75	
11	571953	5420912	0.50	0.50	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 52D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 53 and PI 54	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 52D
			Left Line	Center Line	Right Line	
1	574298	5419762	0.50	0.50	1.00	
2	574278	5419774	2.00	2.00	1.50	
3	574263	5419778	2.00	2.5+	2.5+	
4	574254	5419783	1.50	2.00	2.00	
5	574249	5419785	1.25	2.5+	2.00	
6	574242	5419789	1.00	2.25	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 53A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 54 and PI 55	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 53A
			Left Line	Center Line	Right Line	
1	581057	5418166	1.50	1.50	0.50	
2	581047	5418148	1.50	1.50	1.25	
3	581037	5418132	0.50	1.60	1.25	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 53B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 54 and PI 55	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 53B
			Left Line	Center Line	Right Line	
1	590584	5418887	0.50	0.50	1.25	
2	590566	5418893	1.20	1.30	0.75	
3	590545	5418897	1.50	1.50	1.50	
4	590524	5418901	1.00	1.25	1.30	
5	590507	5418901	1.50	1.00	1.00	
6	590489	5418902	0.60	0.60	0.50	
7	590465	5418898	0.80	0.50	0.75	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 53C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 54 and PI 55	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 53C
			Left Line	Center Line	Right Line	
1	591213	5418948	0.75	0.50	0.50	
2	591186	5418943	1.25	1.00	1.00	
3	591163	5418945	1.00	1.00	0.80	
4	591147	5418945	1.00	1.00	0.50	
5	591126	5418943	0.80	0.50	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 53D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 54 and PI 55
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 53D
			Left Line	Center Line	Right Line	
1	593359	5419077	0.50	0.50	Trees	
2	593339	5419072	0.25	0.50	Trees	
3	593316	5419072	0.25	0.50	Trees	
4	593296	5419083	0.50	Rock	Trees	
5	593280	5419082	0.40	Rock	Trees	
6	593258	5419076	0.25	0.50	Trees	
7	593235	5419065	0.75	0.20	Trees	
8	593212	5419060	1.00	0.10	Trees	
9	593190	5419058	0.75	0.50	Trees	
10	593175	5419051	0.50	0.10	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 53E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 54 and PI 55	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 53E
			Left Line	Center Line	Right Line	
1	594402	5419177	2.25	2.5+	2.5+	
2	594380	5419178	2.00	2.00	1.50	
3	594360	5419177	2.00	2.5+	2.5+	
4	594340	5419174	1.50	2.00	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 54A – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54A
			Left Line	Center Line	Right Line	
1	598228	5418499	0.50	0.50	0.50	
2	598222	5418518	0.25	Rock	0.90	
3	598211	5418533	0.20	0.25	0.10	
4	598196	5418544	0.50	0.50	1.00	
5	598178	5418550	0.25	0.10	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 54B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54B
			Left Line	Center Line	Right Line	
1	601711	5415689	1.25	1.40	1.25	
2	601697	5415710	2.5+	2.5+	2.5+	
3	601678	5415726	2.5+	2.5+	2.25	
4	601659	5415730	2.00	2.5+	2.5+	
5	601635	5415726	1.00	1.25	2.00	
6	601618	5415729	1.50	1.50	1.50	
7	601600	5415740	1.25	1.40	1.50	
8	601583	5415755	0.75	2.5+	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 54C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54C
			Left Line	Center Line	Right Line	
1	602487	5415017	0.25	0.50	0.50	
2	602477	5415034	0.10	0.60	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 54D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54D
			Left Line	Center Line	Right Line	
1	603366	5414315	0.50	0.50	0.80	
2	603351	5414328	0.50	0.50	1.00	
3	603339	5414337	0.50	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 54E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 28, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54E
			Left Line	Center Line	Right Line	
1	605573	5412506	1.25	1.25	1.25	
2	605556	5412519	1.00	1.00	1.25	
3	605539	5412531	1.00	1.00	1.30	
4	605521	5412543	1.20	1.40	1.00	
5	605502	5412556	1.70	1.70	0.75	
6	605484	5412572	2.5+	2.5+	2.5+	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 54F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54F
			Left Line	Center Line	Right Line	
1	605979	5412172	1.50	2.5+	2.5+	
2	605969	5412190	1.25	1.25	0.75	
3	605956	5412208	2.5+	2.5+	2.5+	
4	605941	5412225	1.00	1.25	2.5+	
5	605894	5412237	1.10	1.00	1.25	
6	605880	5412252	1.00	1.30	1.50	
7	605864	5412268	1.50	1.50	1.00	
8	605847	5412281	1.00	1.30	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 54G – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54G
			Left Line	Center Line	Right Line	
1	607901	5410581	0.50	0.50	0.80	
2	607900	5410596	0.50	0.50	0.80	
3	607891	5410615	0.50	0.50	0.50	
4	607878	5410636	0.60	0.50	0.50	
5	607843	5410657	0.60	0.50	0.50	
6	607830	5410674	0.75	1.25	0.80	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 54H – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 56 and PI 57	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 54H
			Left Line	Center Line	Right Line	
1	611099	5407989	0.75	0.75	1.25	
2	611085	5408006	1.00	0.50	0.50	
3	611066	5408019	0.75	0.50	0.50	
4	611045	5408033	0.80	1.00	1.00	
5	611031	5408053	0.50	1.00	1.00	
6	611010	5408064	1.50	1.50	1.00	
7	610994	5408076	1.50	1.45	1.50	
8	610979	5408089	1.50	1.48	1.50	
9	610966	5408103	1.50	1.25	1.10	
10	610949	5408113	1.00	1.00	1.00	
11	610931	5408128	0.75	0.80	0.80	
12	610915	5408142	0.50	0.50	0.60	
13	610898	5408158	0.50	0.45	0.40	
14	610879	5408173	0.50	0.50	0.50	
15	610862	5408189	0.60	0.50	0.30	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55A
			Left Line	Center Line	Right Line	
1	613354	5406408	0.75	0.75	0.75	
2	613333	5406415	1.00	1.00	1.00	
3	613315	5406425	1.75	1.00	1.50	
4	613296	5406435	2.5+	2.5+	2.5+	
5	613277	5406444	2.5+	2.5+	2.5+	
6	613256	5406452	2.5+	2.5+	2.5+	
7	613237	5406463	2.5+	2.5+	2.5+	
8	613216	5406467	2.5+	2.5+	2.5+	
9	613194	5406480	2.5+	2.5+	2.5+	
10	613176	5406489	2.5+	2.00	2.5+	
11	613155	5406499	2.5+	2.5+	2.5+	
12	613123	5406511	2.5+	2.5+	2.5+	
13	613103	5406521	2.5+	2.5+	2.5+	
14	613082	5406529	2.5+	2.5+	2.5+	
15	613063	5406542	2.5+	2.5+	2.5+	
16	613042	5406548	2.5+	2.5+	2.5+	
17	613027	5406554	2.5+	2.5+	2.5+	
18	613011	5406563	2.5+	2.5+	2.5+	
19	612990	5406571	2.5+	2.5+	2.5+	
20	612969	5406583	2.5+	2.5+	2.5+	
21	612947	5406597	2.00	1.25	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 55B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55B
			Left Line	Center Line	Right Line	
1	617691	5404443	2.00	2.00	2.00	
2	617668	5404450	2.5+	1.25	1.25	
3	617647	5404460	2.20	2.5+	2.00	
4	617626	5404468	2.5+	2.00	2.5+	
5	617605	5404477	2.00	2.5+	2.5+	
6	617585	5404488	1.00	2.5+	2.5+	
7	617565	5404493	2.5+	2.5+	2.5+	
8	617549	5404505	2.5+	2.5+	2.5+	
9	617529	5404513	2.5+	2.5+	2.5+	
10	617510	5404521	2.5+	2.5+	2.5+	
11	617492	5404531	2.5+	2.5+	2.5+	
12	617471	5404537	2.5+	2.00	2.00	
13	617452	5404548	2.5+	2.5+	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 55C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55C
			Left Line	Center Line	Right Line	
1	618909	5403897	1.50	1.50	1.50	
2	618875	5403910	1.25	1.25	1.50	
3	618853	5403919	1.00	1.25	1.25	
4	618829	5403927	1.00	1.25	1.40	
5	618805	5403937	1.50	1.50	1.40	
6	618782	5403943	1.20	1.40	1.25	
7	618756	5403956	1.00	2.5+	2.25	
8	618738	5403968	2.5+	2.5+	2.5+	
9	618720	5403978	1.00	2.5+	2.5+	
10	618703	5403982	1.20	2.00	2.00	
11	618682	5403988	2.5+	2.5+	2.5+	
12	618665	5403998	2.5+	2.5+	2.5+	
13	618647	5404011	1.50	1.25	1.25	
14	618629	5404019	1.50	1.25	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55D
			Left Line	Center Line	Right Line	
1	619635	5403562	1.25	1.40	0.50	
2	619616	5403570	1.00	1.65	0.60	
3	619597	5403578	1.50	1.75	1.00	
4	619575	5403585	1.25	1.25	0.75	
5	619557	5403597	0.80	1.30	0.75	
6	619538	5403606	0.50	0.50	0.50	
7	619466	5403636	0.50	0.50	0.50	
8	619447	5403645	0.80	0.50	0.75	
9	619362	5403684	1.25	0.75	1.25	
10	619340	5403690	1.50	0.50	1.50	
11	619319	5403701	1.50	0.45	2.00	
12	619302	5403713	1.60	1.50	1.50	
13	619282	5403721	1.25	1.50	2.00	
14	619263	5403729	1.25	1.60	2.5+	
15	619241	5403735	1.00	1.25	1.50	
16	619224	5403747	2.5+	2.5+	2.5+	
17	619203	5403756	2.00	1.30	1.50	
18	619182	5403765	1.00	0.40	2.00	
19	619162	5403775	1.00	0.50	0.75	
20	619138	5403786	0.60	0.25	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55E
			Left Line	Center Line	Right Line	
1	620432	5403195	0.50	0.50	0.50	
2	620415	5403209	0.50	0.50	0.60	
3	620393	5403218	0.25	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			Bog 55F
			Left Line	Center Line	Right Line	
1	623230	5401933	0.75	0.50	0.50	
2	623216	5401948	0.50	0.60	0.50	
3	623197	5401956	0.60	0.25	0.40	
4	623177	5401963	0.80	0.50	0.50	
5	623156	5401971	0.60	0.92	0.50	
6	623136	5401978	0.50	0.50	0.50	
7	623114	5401984	0.50	0.50	0.60	
8	623096	5401990	0.50	0.50	0.40	
9	623073	5402003	Trees	0.50	0.50	
10	623051	5402011	Trees	0.50	0.50	
11	623032	5402020	Trees	0.25	0.60	
12	623018	5402026	Trees	Trees	0.60	
13	623003	5402041	0.25	Rock	0.60	
14	622972	5402053	0.50	0.50	0.50	
15	622954	5402058	0.50	0.50	0.80	
16	622932	5402064	0.60	0.70	0.80	
17	622890	5402079	0.75	0.60	1.25	
18	622872	5402095	1.00	0.40	0.50	
19	622859	5402110	0.80	0.60	0.80	
20	622841	5402115	1.00	0.95	0.50	
21	622817	5402120	0.75	1.25	0.60	
22	622791	5402127	1.00	0.75	Trees	
23	622769	5402131	0.50	0.75	Trees	
24	622749	5402142	0.60	0.95	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55G – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55G
			Left Line	Center Line	Right Line	
1	624261	5401469	1.20	1.25	1.00	
2	624279	5401460	1.50	1.50	1.25	
3	624242	5401478	1.25	1.50	1.50	
4	624221	5401486	1.00	1.25	1.20	
5	624200	5401495	0.50	0.75	0.75	
6	624176	5401502	0.50	0.25	0.50	
7	624159	5401518	0.40	Rock	0.50	
8	624139	5401521	0.40	0.50	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55H – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 27, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55H
			Left Line	Center Line	Right Line	
1	624672	5401278	1.25	0.50	Trees	
2	624652	5401286	1.00	0.50	Trees	
3	624627	5401286	1.00	0.45	Trees	
4	624605	5401285	1.25	0.50	Trees	
5	624583	5401281	1.00	0.50	Trees	
6	624566	5401287	0.80	0.50	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55 I – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55 I
			Left Line	Center Line	Right Line	
1	626014	5400824	1.00	1.00	1.00	
2	625994	5400831	0.50	0.75	0.70	
3	625973	5400841	0.50	0.50	0.20	
4	625955	5400853	0.25	0.50	0.30	
5	625936	5400861	0.50	0.50	0.50	
6	625916	5400870	0.20	0.50	0.25	
7	625894	5400878	0.20	0.15	0.25	
8	625874	5400887	0.25	0.25	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 55J – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 57 and PI 58	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 55J
			Left Line	Center Line	Right Line	
1	628601	5399513	Trees	0.60	Trees	
2	628580	5399516	Trees	0.60	Trees	
3	628564	5399523	Trees	0.50	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 56A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 56A
			Left Line	Center Line	Right Line	
1	638992	5396570	0.50	0.50	1.00	
2	638975	5396578	0.75	1.70	0.90	
3	638956	5396580	0.75	1.00	0.50	
4	638931	5396582	0.80	0.45	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 56B – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			Bog 56B
			Left Line	Center Line	Right Line	
1	640058	5396315	0.50	0.75	0.75	
2	640037	5396315	0.60	0.75	1.00	
3	640018	5396326	0.60	1.00	0.50	
4	639996	5396330	0.50	1.00	0.75	
5	639977	5396335	0.30	0.75	0.75	
6	639956	5396341	0.50	0.75	0.75	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 56C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 56C
			Left Line	Center Line	Right Line	
1	640644	5396176	0.50	0.50	1.00	
2	640625	5396177	1.00	1.75	0.70	
3	640605	5396182	1.00	2.5+	2.5+	
4	640586	5396186	2.00	1.75	1.00	
5	640566	5396192	2.50	1.50	Trees	
6	640546	5396197	1.50	1.40	Trees	
7	640526	5396201	2.00	1.60	Trees	
8	640507	5396207	1.80	2.5+	Trees	
9	640486	5396212	2.00	1.50	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 56D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59
			Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 56D
			Left Line	Center Line	Right Line	
1	646102	5394895	Trees	1.25	Trees	
2	646088	5394910	Trees	1.50	Trees	
3	646073	5394922	Trees	0.60	Trees	
4	646052	5394929	Trees	1.25	Trees	
5	646034	5394937	Trees	1.00	Trees	
6	646014	5394943	Trees	0.50	Trees	
7	645994	5394944	Trees	0.60	Trees	
8	645978	5394946	Trees	0.60	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 56E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 56E
			Left Line	Center Line	Right Line	
1	646884	5394670	1.00	1.25	0.80	
2	646871	5394679	1.75	1.25	1.00	
3	646852	5394689	2.00	0.50	0.75	
4	646837	5394695	0.50	0.80	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 56F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 56F
			Left Line	Center Line	Right Line	
1	650651	5393800	Trees	0.50	0.75	
2	650629	5393797	Trees	0.60	0.80	
3	650608	5393799	Trees	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 56G – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 58 and PI 59	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 56G
			Left Line	Center Line	Right Line	
1	653426	5393129	0.50	0.80	1.00	
2	653406	5393135	0.75	0.75	0.60	
3	653386	5393141	1.00	0.95	0.80	
4	653355	5393148	0.25	1.40	1.50	
5	653335	5393156	1.00	1.60	0.50	
6	653314	5393157	1.00	1.75	1.00	
7	653293	5393163	1.25	0.60	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 57A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 59 and PI 60	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 57A
			Left Line	Center Line	Right Line	
1	658929	5391065	1.00	0.50	0.50	
2	658909	5391069	Trees	0.50	0.60	
3	658888	5391072	Trees	1.25	0.60	
4	658870	5391083	2.00	0.70	2.00	
5	658849	5391097	1.75	1.75	1.50	
6	658830	5391110	1.25	0.50	1.70	
7	658811	5391118	1.40	1.25	1.80	
8	658794	5391131	1.25	2.5+	2.00	
9	658775	5391141	1.50	1.50	1.00	
10	658755	5391150	2.00	1.70	2.10	
11	658738	5391165	2.50	1.25	2.5+	
12	658718	5391171	2.25	1.50	2.00	
13	658701	5391183	2.00	1.50	1.25	
14	658682	5391195	0.75	0.25	1.50	
15	658662	5391203	1.10	0.75	0.50	
16	658643	5391215	1.50	0.75	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 57B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 26, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 59 and PI 60	Inspector: Brian Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 57B
			Left Line	Center Line	Right Line	
1	661382	5389690	0.60	1.00	0.50	
2	661362	5389690	1.25	1.25	1.50	
3	661345	5389706	1.25	1.75	1.25	
4	661329	5389718	2.00	1.25	1.25	
5	661311	5389727	2.25	1.25	1.25	
6	661292	5389739	1.00	1.00	1.00	
7	661273	5389750	1.20	1.00	1.25	
8	661255	5389762	0.75	0.70	1.00	
9	661236	5389770	0.50	0.50	0.50	
10	661218	5389779	0.50	0.35	0.50	
11	661201	5389790	0.60	0.50	1.00	
12	661183	5389801	0.75	0.50	0.50	
13	661165	5389813	0.60	0.60	0.50	
14	661144	5389825	0.25	0.50	1.70	
15	661126	5389833	0.50	0.50	1.50	
16	661107	5389845	0.25	0.70	1.50	
17	661086	5389855	0.75	0.40	0.60	
18	661066	5389865	1.25	0.70	0.60	
19	661047	5389872	1.25	0.50	0.70	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 58A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 60 and PI 61	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 58A
			Left Line	Center Line	Right Line	
1			0.75	0.60	1.25	Photo Not Available
2			1.25	1.50	1.10	
3			1.25	1.00	1.50	
4			0.75	0.60	1.00	
5			1.25	1.50	1.00	
6			1.50	1.50	1.00	
7			1.00	1.25	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 58B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 60 and PI 61	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 58B
			Left Line	Center Line	Right Line	
1			1.00	1.20	1.10	
2			1.20	1.40	1.50	
3			1.50	1.10	1.40	
4			2.00	1.60	1.60	
5			1.50	1.20	1.25	
6			1.50	1.25	1.10	
7			1.50	1.50	1.40	
8			1.60	1.50	1.90	
9			2.00	2.40	1.80	
10			1.50	2.00	2.00	
11			1.60	1.30	1.60	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 58C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 60 and PI 61	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 58C
			Left Line	Center Line	Right Line	
1			1.25	1.25	1.50	Photo Not Available
2			0.75	1.00	1.50	
3			1.50	1.25	1.75	
4			1.50	1.50	1.60	
5			1.60	2.5+	1.75	
6			2.5+	2.5+	1.00	
7			2.5+	1.75	2.5+	
8			1.50	1.50	2.5+	
9			1.50	2.00	1.70	
10			1.50	1.25	1.50	
11			1.20	1.50	2.00	
12			0.70	2.25	2.5+	
13			1.25	2.5+	2.5+	
14			0.70	2.5+	2.5+	
15			0.50	1.00	1.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 59A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 61 and PI 62	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 59A
			Left Line	Center Line	Right Line	
1	679960	5374212	0.25	0.50	0.25	Photo Not Available
2	679947	5374228	0.50	0.40	0.25	
3	679935	5374244	0.60	0.50	0.50	
4	679928	5374264	0.40	0.70	0.50	
5	679922	5374284	0.50	0.40	0.25	
6	679916	5374304	0.50	0.50	0.25	
7	679910	5374324	0.60	0.25	0.25	
8	679898	5374342	0.60	0.50	0.50	
9	679888	5374359	0.60	0.60	0.60	
10	679878	5374378	0.70	0.50	0.60	
11	679870	5374397	0.60	0.50	0.50	
12	679860	5374418	0.60	0.25	0.20	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 59B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 61 and PI 62	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 59B
			Left Line	Center Line	Right Line	
1			0.75	1.25	0.60	Photo Not Available
2			1.10	Rock	0.50	
3			1.00	0.70	0.45	
4			1.00	0.75	1.00	
5			1.00	1.00	0.80	
6			0.75	0.80	0.55	
7			0.60	1.10	0.97	
8			1.30	1.10	0.97	
9			1.25	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 59C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 61 and PI 62	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 59C
			Left Line	Center Line	Right Line	
1			0.60	0.60	0.75	Photo Not Available
2			0.50	1.00	1.00	
3			0.50	1.00	1.15	
4			0.50	1.00	Rock	
5			0.60	0.20	Rock	
6			0.50	0.20	0.25	
7			0.25	Rock	0.25	
8			0.50	Rock	0.25	
9			1.00	Rock	0.30	
10			0.75	0.70	0.60	
11			0.50	0.25	0.50	
12			1.25	1.50	0.60	
13			0.50	0.25	0.75	
14			0.50	0.60	1.50	
15			0.50	0.25	1.00	
16			0.50	0.90	0.50	
17			1.00	0.90	0.50	
18			0.60	0.25	6.00	
19			0.75	N/A	0.60	
20			N/A	N/A	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60A
			Left Line	Center Line	Right Line	
1	683412	5370505	0.75	0.45	0.25	Photo Not Available
2	683391	5370510	0.60	0.50	0.40	
3	683372	5370519	0.75	0.40	0.60	
4	683354	5370527	0.50	0.50	0.75	
5	683334	5370534	0.50	0.20	0.75	
6	683316	5370544	0.25	0.70	0.60	
7	683296	5370552	0.75	0.60	0.50	
8	683276	5370556	0.90	1.25	0.80	
9	683256	5370573	1.50	1.25	0.80	
10	683231	5370580	1.50	1.25	1.20	
11	683213	5370593	1.50	1.00	0.60	
12	683192	5370599	1.25	1.50	1.50	
13	683171	5370605	1.00	1.50	1.60	
14	683155	5370618	1.00	1.00	1.25	
15	683134	5370628	1.00	1.00	1.10	
16	683110	5370638	1.25	1.00	1.10	
17	683091	5370647	1.00	1.00	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60B
			Left Line	Center Line	Right Line	
1	686927	5368936	0.25	0.70	0.70	Photo Not Available
2	686907	5368940	0.30	0.50	0.40	
3	686887	5368948	0.50	0.60	0.50	
4	686867	5368954	0.50	0.25	0.70	
5	686850	5368968	0.80	0.50	0.50	
6	686832	5368978	0.40	0.60	0.40	
7	686812	5368986	0.40	0.25	0.20	
8	686792	5368988	0.60	0.25	0.25	
9	686774	5368998	0.75	0.60	0.20	
10	686756	5369007	0.60	0.25	0.60	
11	686737	5369017	0.75	0.50	0.25	
12	686718	5369024	0.50	0.70	0.60	
13	686700	5369032	1.00	0.50	0.50	
14	686680	5369041	0.70	0.60	1.90	
15	686670	5369048	0.25	0.50	0.75	
16	686647	5369055	0.40	0.50	0.75	
17	686631	5369066	0.60	0.60	0.60	
18	686613	5369075	0.80	0.75	0.50	
19	686594	5369081	0.80	0.40	0.50	
20	686575	5369089	0.40	0.47	0.60	
21	686555	5369096	0.50	0.70	0.90	
22	686538	5369104	0.80	0.50	0.90	
23	686517	5369111	0.60	0.95	0.75	
24	686498	5369121	0.10	0.55	0.50	
25	686479	5369134	0.10	0.60	0.50	
26	686459	5369140	0.50	1.00	0.50	
27	686439	5369147	0.50	0.80	0.60	
28	686422	5369158	0.40	0.45	0.20	
29	686405	5369168	0.50	0.50	0.50	
30	686386	5369175	0.60	0.50	0.50	
31	686366	5369180	0.80	0.80	0.50	
32	686347	5369188	0.90	0.60	0.50	
33	686330	5369198	0.90	0.70	0.40	
34	686311	5369206	1.00	1.00	0.50	
35	686292	5369214	0.90	1.00	0.75	
36	686273	5369222	1.30	1.00	1.00	
37	686254	5369233	1.50	1.25	1.00	
38	686236	5369240	1.50	1.60	1.50	
39	686217	5369248	1.60	1.50	1.50	
40	686198	5369255	1.60	1.00	1.60	
41	686179	5369265	0.80	1.65	1.70	
42	686160	5369271	0.75	0.50	0.70	
43	686143	5369283	1.00	1.10	1.00	
44	686124	5369293	0.75	1.50	0.50	
45	686103	5369302	0.50	0.80	1.25	
46	686082	5369310	0.50	0.80	1.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 60C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 25, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60C
			Left Line	Center Line	Right Line	
1	688169	5368379	0.50	0.50	0.50	Photo Not Available
2	688151	5368387	0.25	0.15	0.15	
3	688132	5368396	0.60	0.50	0.50	
4	688114	5368404	Rock	Rock	Rock	
5	688094	5368414	Rock	Rock	Rock	
6	688074	5368420	0.25	0.50	0.50	
7	688052	5368429	0.50	0.25	0.25	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 60D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60D
			Left Line	Center Line	Right Line	
1	689422	5367838	0.50	0.50	0.60	
2	689401	5367849	0.50	0.50	0.60	
3	689385	5367866	0.60	0.75	0.60	
4	689368	5367878	0.80	0.80	1.25	
5	689348	5367893	0.75	0.90	1.00	
6	689328	5367907	0.75	1.25	1.00	
7	689314	5367916	0.90	1.10	0.70	
8	689291	5367928	0.60	1.00	1.00	
9	689270	5367936	0.50	0.50	1.00	
10	689256	5367938	0.50	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60E
			Left Line	Center Line	Right Line	
1	691388	5366947	0.75	0.50	0.50	
2	691369	5366959	1.10	0.50	1.00	
3	691351	5366976	1.00	2.00	2.00	
4	691325	5366972	1.00	2.00	2.10	
5	691309	5366987	1.00	2.00	2.00	
6	691293	5366988	2.5+	2.00	2.00	
7	691274	5367000	2.00	2.00	1.25	
8	691258	5367014	1.00	0.80	0.40	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60F
			Left Line	Center Line	Right Line	
1	694788	5365361	2.5+	2.50	1.50	
2	694762	5365380	2.5+	2.25	1.60	
3	694744	5365394	2.5+	2.5+	2.00	
4	694723	5365410	2.5+	2.5+	1.70	
5	694704	5365419	2.5+	2.10	1.25	
6	694687	5365435	2.00	2.25	1.25	
7	694670	5365447	2.5+	2.25	2.5+	
8	694654	5365460	2.50	2.10	2.5+	
9	694635	5365471	2.00	2.00	1.50	
10	694619	5365481	1.75	2.00	2.00	
11	694598	5365495	2.00	1.80	1.50	
12	694571	5365506	1.20	1.10	1.00	
13	694557	5365525	1.00	0.75	1.00	
14	694543	5365540	1.25	1.00	1.25	
15	694526	5365551	1.50	0.70	0.70	
16	694383	5365584	1.00	0.70	1.00	
17	694363	5365598	1.00	1.10	1.00	
18	694345	5365608	2.5+	1.90	1.50	
19	694324	5365620	2.5+	2.00	2.5+	
20	694308	5365632	2.5+	2.00	2.5+	
21	694271	5365634	2.5+	2.5+	2.5+	
22	694244	5365659	2.5+	2.5+	2.5+	
23	694215	5365714	2.5+	2.5+	2.5+	
24	694207	5365713	2.5+	2.5+	2.5+	
25	694188	5365722	2.5+	2.5+	2.5+	
26	694170	5365734	2.5+	2.5+	2.5+	
27	694148	5365745	2.5+	2.5+	2.5+	
28	694134	5365761	2.00	2.5+	2.00	
29	694122	5365769	1.50	2.5+	1.60	
30	694094	5365780	1.50	2.00	1.50	
31	694080	5365792	1.50	1.50	1.60	
32	694057	5365792	1.50	1.60	1.60	
33	694039	5365800	1.25	1.60	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 60G – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60G
			Left Line	Center Line	Right Line	
1	695606	5365110	0.50	0.60	0.50	
2	695587	5365125	1.00	1.00	0.60	
3	695568	5365137	1.00	1.25	0.70	
4	695548	5365147	0.80	1.10	0.80	
5	695525	5365156	1.00	1.00	1.20	
6	695500	5365166	1.50	1.50	2.00	
7	695485	5365175	1.50	1.60	1.50	
8	695460	5365185	1.10	1.00	1.00	
9	695444	5365201	0.50	0.90	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60H – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60H
			Left Line	Center Line	Right Line	
1	696250	5364837	0.50	1.00	0.60	
2	696265	5364822	2.5+	2.10	2.10	
3	696279	5364810	2.25	2.5+	1.80	
4	696297	5364790	1.00	2.00	1.80	
5	696314	5364777	1.00	1.00	1.80	
6	696331	5364765	2.5+	1.30	2.00	
7	696347	5364749	2.5+	2.10	2.00	
8	696365	5364739	1.50	1.30	1.50	
9	696386	5364726	1.75	1.50	1.40	
10	696400	5364713	1.25	1.00	1.50	
11	696417	5364697	1.00	1.10	1.00	
12	696440	5364680	0.50	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 60 I – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			Bog 60 I
			Left Line	Center Line	Right Line	
1	696818	5364531	1.50	1.50	1.25	
2	696786	5364539	0.50	2.5+	2.5+	
3	696769	5364545	0.50	2.5+	2.5+	
4	696752	5364554	0.50	1.00	1.25	
5	696729	5364559	0.50	0.50	0.50	
6	696702	5364563	Trees	0.50	0.40	
7	696684	5364560	Trees	0.60	1.40	
8	696661	5364562	Trees	0.80	1.40	
9	696635	5364570	Trees	1.00	0.80	
10	696620	5364583	Trees	0.80	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60J – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60J
			Left Line	Center Line	Right Line	
1	697771	5364100	2.00	1.50	2.00	
2	697756	5364118	1.20	1.25	1.00	
3	697741	5364135	1.50	1.60	1.00	
4	697724	5364151	2.00	1.70	1.00	
5	697704	5364167	2.00	1.40	1.20	
6	697685	5364182	1.00	1.25	1.30	
7	697666	5364198	1.00	0.50	0.60	
8	697649	5364203	1.25	0.60	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60K – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60K
			Left Line	Center Line	Right Line	
1	698120	5363935	1.75	2.5+	2.5+	
2	698102	5363952	2.5+	2.5+	2.5+	
3	698075	5363961	2.5+	2.5+	2.5+	
4	698057	5363973	2.5+	2.5+	2.5+	
5	698042	5363987	2.5+	2.00	2.50	
6	698030	5364001	2.00	2.00	1.25	
7	698015	5364020	2.00	1.10	0.60	
8	697995	5364030	1.50	1.00	1.00	
9	697977	5364040	0.50	1.00	0.50	
10	697957	5364056	0.50	0.20	0.25	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 60L – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 23, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60L
			Left Line	Center Line	Right Line	
1	699560	5363344	2.00	1.50	1.60	
2	699543	5363351	2.5+	1.60	2.5+	
3	699512	5363356	2.5+	2.50	2.5+	
4	699489	5363367	2.5+	2.5+	2.5+	
5	699465	5363373	1.75	1.25	1.25	
6	699443	5363380	1.50	0.60	0.50	
7	699424	5363388	1.50	1.25	0.50	
8	699401	5363397	1.25	1.20	1.00	
9	699373	5363406	1.60	1.50	1.25	
10	699353	5363417	0.50	0.60	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60M – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60M
			Left Line	Center Line	Right Line	
1	699681	5362978	0.75	0.50	0.50	
2	699705	5362962	1.00	1.25	1.25	
3	699726	5362954	0.50	0.90	1.00	
4	699745	5362946	1.50	1.30	1.25	
5	699765	5362933	1.25	1.60	1.50	
6	699789	5362928	1.60	0.50	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60N – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60N
			Left Line	Center Line	Right Line	
1	701592	5362542	0.50	0.50	0.50	
2	701570	5362553	0.50	0.30	0.50	
3	701551	5362564	0.50	0.40	0.40	
4	701530	5362571	0.30	0.90	0.80	
5	701511	5362585	0.50	1.25	1.50	
6	701492	5362594	0.50	1.50	1.50	
7	701473	5362610	0.75	1.50	2.20	
8	701461	5362622	0.60	1.80	2.5+	
9	701446	5362639	2.00	1.50	2.10	
10	701430	5362658	1.25	2.5+	2.5+	
11	701413	5362678	0.50	1.60	1.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 60 O – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 62 and PI 63
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 60 O
			Left Line	Center Line	Right Line	
1	703136	5361616	0.75	0.60	2.00	
2	703117	5361628	2.00	1.25	1.50	
3	703095	5361633	2.00	2.5+	2.5+	
4	703074	5361643	2.00	2.5+	2.00	
5	703055	5361651	2.00	2.00	2.10	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 61A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 63 and PI 64	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 61A
			Left Line	Center Line	Right Line	
1	706853	5357098	2.00	2.5+	2.5+	
2	706835	5357115	1.75	2.5+	2.5+	
3	706831	5357141	1.50	2.5+	2.5+	
4	706830	5357171	1.50	2.5+	1.50	
5	706820	5357191	2.5+	2.5+	1.25	
6	706815	5357216	1.50	1.25	1.50	
7	706804	5357239	2.00	1.60	1.40	
8	706798	5357260	2.20	2.20	2.5+	
9	706791	5357282	1.50	1.75	1.20	
10	706785	5357304	1.40	1.75	1.30	
11	706777	5357322	1.00	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 61B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 63 and PI 64	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 61B
			Left Line	Center Line	Right Line	
1	709402	5349551	1.00	0.80	1.00	
2	709399	5349570	2.25	1.60	1.50	
3	709392	5349594	2.50	2.5+	1.20	
4	709387	5349615	2.50	2.5+	1.50	
5	709379	5349639	2.25	2.5+	1.60	
6	709377	5349661	2.00	2.00	0.50	
7	709373	5349688	1.60	1.25	1.20	
8	709372	5349724	2.5+	2.20	1.50	
9	709368	5349740	2.5+	2.5+	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 62A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 64 and PI 65	Inspector: Justin Ingram


Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 62A
			Left Line	Center Line	Right Line	
1	712542	5347798	0.50	0.50	0.30	
2	712522	5347811	0.50	0.50	0.50	
3	712505	5347823	0.50	0.60	1.00	
4	712485	5347833	0.25	1.10	1.00	
5	712465	5347842	0.75	1.00	1.50	
6	712444	5347853	0.75	1.50	2.00	
7	712428	5347867	1.00	1.60	2.00	
8	712399	5347868	1.25	1.60	1.25	
9	712384	5347882	1.50	1.60	1.50	
10	712362	5347891	1.50	2.00	2.00	
11	712347	5347903	1.40	1.25	1.60	
12	712326	5347915	1.00	1.10	1.00	
13	712303	5347910	0.50	1.00	0.50	
14	712208	5348006	0.50	0.60	1.00	
15	712190	5348019	0.50	1.00	1.25	
16	712170	5348032	1.00	1.10	1.20	
17	712149	5348037	1.00	1.10	1.25	
18	712131	5348055	0.75	0.75	1.00	
19	712019	5348115	0.75	1.10	1.50	
20	712001	5348125	1.00	1.00	2.5+	
21	711973	5348125	1.00	1.50	2.5+	
22	711953	5348131	1.00	1.50	2.5+	
23	711931	5348158	2.00	2.5+	2.5+	
24	711894	5348158	1.00	1.25	1.50	
25	711877	5348161	1.00	0.75	1.00	
26	711856	5348164	1.00	1.50	1.00	
27	711832	5348165	1.00	1.60	2.5+	
28	711813	5348472	2.00	2.5+	1.25	
29	711792	5348182	1.50	2.5+	2.5+	
30	711773	5348191	2.50	2.5+	2.5+	
31	711749	5348191	1.50	1.00	1.20	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 62B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 64 and PI 65	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 62B
			Left Line	Center Line	Right Line	
1	713304	5347382	1.30	1.50	1.50	
2	713282	5347390	2.5+	2.10	2.5+	
3	713260	5347398	2.5+	2.5+	2.5+	
4	713240	5347412	2.5+	2.5+	2.5+	
5	713227	5347431	2.5+	2.5+	2.5+	
6	713201	5347441	2.5+	2.5+	2.00	
7	713187	5347460	2.5+	2.5+	2.5+	
8	713167	5347460	2.5+	2.5+	2.5+	
9	713136	5347466	2.50	2.5+	2.5+	
10	713120	5347486	2.50	2.00	2.5+	
11	713100	5347496	2.00	2.00	2.50	
12	713081	5347503	2.50	2.10	2.5+	
13	713059	5347512	2.00	1.90	1.50	
14	713038	5347524	2.50	1.60	1.70	
15	713014	5347528	1.75	1.10	1.50	
16	712993	5347543	0.50	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 62C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 64 and PI 65	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 62C
			Left Line	Center Line	Right Line	
1	714582	5346613	0.50	1.00	0.50	
2	714606	5346603	1.00	1.25	1.30	
3	714620	5346598	2.5+	2.5+	0.60	
4	714636	5346589	2.5+	1.10	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 63 – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 65 and PI 66	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 63
			Left Line	Center Line	Right Line	
1	719302	5341658	0.50	0.60	0.25	
2	719280	5341670	0.25	0.60	0.50	
3	719261	5341687	0.50	0.50	1.00	
4	719245	5341703	0.50	0.50	0.50	
5	719226	5341719	0.60	0.50	0.50	
6	719221	5341735	0.50	0.50	0.50	
7	719196	5341751	0.70	0.60	0.50	
8	719179	5341768	1.00	0.75	0.50	
9	719161	5341785	1.00	0.90	0.50	
10	719144	5341803	1.00	1.10	0.50	
11	719128	5341819	1.50	1.50	0.60	
12	719111	5341838	1.50	1.10	1.20	
13	719093	5341855	1.25	1.10	1.00	
14	719080	5341877	1.25	1.00	0.50	
15	719069	5341903	1.00	0.60	0.50	
16	719052	5341925	0.50	0.75	0.50	
17	719036	5341944	1.00	0.50	0.50	
18	719022	5341961	0.75	0.50	0.50	
19	719004	5341972	0.50	0.40	0.50	
20	718989	5341987	1.00	0.60	0.50	
21	718978	5342003	0.75	1.00	0.50	
22	718963	5342023	1.00	0.60	0.50	
23	718947	5342040	1.25	0.70	0.50	
24	718929	5342056	1.25	1.20	1.00	
25	718920	5342080	1.25	1.10	1.50	
26	718909	5342103	1.25	1.10	1.40	
27	718889	5342124	0.50	1.10	1.50	
28	718880	5342148	1.25	1.50	1.20	
29	718866	5342169	0.75	0.80	0.80	
30	718746	5342179	0.50	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 64A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 21, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 66 and PI 67	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 64A
			Left Line	Center Line	Right Line	
1	278215	5333968	0.50	0.60	0.80	
2	278215	5333985	1.00	0.60	1.00	
3	278220	5334009	1.00	0.80	0.50	
4	278225	5334031	0.50	0.90	1.00	
5	278225	5334053	0.50	0.90	1.20	
6	278225	5334075	0.60	0.50	1.30	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 64B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 66 and PI 67	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 64B
			Left Line	Center Line	Right Line	
1	278342	5330793	2.50	0.60	0.75	
2	278342	5330814	1.50	1.00	0.60	
3	278344	5330834	1.10	0.80	0.60	
4	278350	5330861	1.00	1.40	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 64C – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 66 and PI 67
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 64C
			Left Line	Center Line	Right Line	
1	278389	5329542	1.60	1.20	1.50	
2	278392	5329564	1.00	1.00	1.40	
3	278397	5329588	1.60	0.60	1.60	
4	278399	5329610	1.50	0.60	2.10	
5	278400	5329634	1.00	1.50	1.90	
6	278400	5329657	1.10	2.20	2.20	
7	278400	5329677	1.00	2.00	1.50	
8	278398	5329697	1.30	2.00	1.00	
9	278399	5329723	1.10	1.20	0.50	
10	278406	5329744	0.50	0.50	0.50	
11	278407	5329841	0.80	2.00	0.80	
12	278408	5329869	0.50	0.70	2.00	
13	278413	5329895	1.50	0.60	0.50	
14	278412	5329922	1.50	1.00	1.00	
15	278411	5329942	1.50	1.75	0.20	
16	278414	5329966	Trees	1.25	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 65A – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 67 and PI 68
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 65A
			Left Line	Center Line	Right Line	
1	278372	5328985	1.10	1.00	0.70	
2	278369	5329010	1.20	1.50	1.50	
3	278364	5329033	1.75	2.00	1.25	
4	278366	5329056	1.75	1.00	1.20	
5	278367	5329080	0.50	2.00	2.5+	
6	278372	5329102	1.10	1.50	2.5+	
7	278380	5329125	2.5+	0.50	1.20	
8	278400	5329180	1.75	1.10	Rock	
9	278409	5329206	1.00	1.50	1.00	
10	278411	5329229	0.50	1.20	0.25	
11	278412	5329252	1.25	0.60	0.50	
12	278411	5329280	1.10	0.80	1.75	
13	278413	5329302	0.70	1.00	1.50	
14	278414	5329324	1.20	1.60	1.00	
15	278415	5329346	1.00	1.00	Trees	
16	278407	5329367	0.60	0.50	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 65B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 67 and PI 68	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 65B
			Left Line	Center Line	Right Line	
1	278206	5327840	0.40	1.75	2.00	
2	278208	5327865	1.00	1.25	2.00	
3	278205	5327885	0.75	2.00	2.00	
4	278202	5327908	0.75	2.00	2.00	
5	278202	5327929	0.80	2.00	2.25	
6	278203	5327950	1.10	1.50	1.75	
7	278207	5327975	0.90	1.50	1.25	
8	278216	5328004	1.00	1.75	2.00	
9	278218	5328033	1.25	1.25	1.25	
10	278228	5328052	2.00	1.10	0.75	
11	278221	5328076	2.00	0.70	0.50	
12	278222	5328100	1.75	0.60	0.50	
13	278227	5328123	1.00	0.40	0.50	
14	278231	5328145	0.20	0.40	0.50	
15	278206	5328138	0.10	0.40	0.20	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
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LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 66A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 68 and PI 69	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 66A
			Left Line	Center Line	Right Line	
1	277581	5323771	0.50	0.50	0.50	
2	277584	5323794	0.60	0.60	0.50	
3	277582	5323823	0.50	0.60	0.75	
4	277581	5323842	0.75	0.60	0.50	
5	277582	8323866	0.80	0.50	0.50	
6	277586	5323887	0.50	0.50	0.50	
7	277581	5323909	0.50	0.50	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 66B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 68 and PI 69	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 66B
			Left Line	Center Line	Right Line	
1	277599	5322897	1.60	1.50	0.60	
2	277594	5322921	2.00	1.20	0.50	
3	277595	5322951	2.50	0.60	0.50	
4	277602	5322974	1.00	0.60	0.20	
5	277606	5322998	1.30	0.50	0.50	
6	277610	5323020	1.00	1.00	0.90	
7	277612	5323044	1.25	0.50	0.30	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 67A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71	Inspector: Brad Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67A
			Left Line	Center Line	Right Line	
1	280101	5318087	1.25	1.50	1.50	
2	280102	5318062	0.75	1.00	2.50	
3	280106	5318044	0.50	0.50	1.10	
4	280107	5318023	0.25	0.25	Rock	
5	280106	5318001	0.10	0.10	0.50	
6	280105	5317981	0.20	0.20	0.10	
7	280106	5317962	0.20	0.20	0.10	
8	280107	5317941	0.20	0.40	0.25	
9	280107	5317918	0.15	0.50	0.10	
10	280105	5317898	0.15	0.20	0.15	
11	280109	5317876	0.15	0.50	0.20	
12	280112	5317851	0.40	0.50	0.50	
13	280112	5317832	Water	1.00	1.00	
14	280112	5317811	0.75	1.00	0.50	
15	280114	5317790	0.50	0.50	0.50	
16	280113	5317770	0.70	0.10	0.50	
17	280113	5317751	1.25	1.25	0.90	
18	280115	5317730	1.25	1.25	1.25	
19	280117	5317709	1.60	1.50	1.50	
20	280118	5317687	1.50	1.25	0.50	
21	280122	5317667	1.10	0.60	1.00	
22	280118	5317643	0.50	0.60	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 67B – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: November 2, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71
			Inspector: Brad Walsh

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67B
			Left Line	Center Line	Right Line	
1	280123	5317534	1.00	1.00	1.00	
2	280084	5317499	1.50	1.50	1.75	
3	280124	5317491	1.75	2.00	1.50	
4	280125	5317469	1.75	1.50	1.80	
5	280125	5317446	1.90	1.80	1.50	
6	280127	5317424	1.70	1.50	1.30	
7	280128	5317401	1.70	1.40	1.30	
8	280128	5317378	1.00	1.00	1.00	
9	280128	5317359	1.10	1.00	0.75	
10	280131	5317338	1.00	1.00	1.00	
11	280132	5317315	1.00	0.70	1.00	
12	280133	5317286	1.00	0.90	0.90	
13	280134	5317249	1.40	1.40	1.10	
14	280134	5317225	1.40	1.50	1.00	
15	280135	5317204	0.50	0.50	0.50	
16	280135	5317181	0.50	0.50	0.50	
17	280138	5317161	0.40	6.00	0.50	
18	280137	5317139	0.90	0.70	1.00	
19	280140	5317117	0.70	0.60	0.80	
20	280141	5317089	1.50	1.40	1.25	
21	280150	5317063	1.40	1.60	1.50	
22	280143	5317040	1.50	1.90	1.60	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 67C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67C
			Left Line	Center Line	Right Line	
1	280193	5316537	0.50	0.50	0.50	
2	280194	5316561	2.5+	1.25	0.50	
3	280189	5316583	2.5+	1.25	1.25	
4	280192	5316604	2.00	1.60	1.00	
5	280194	5316628	2.00	1.80	1.50	
6	280195	5316651	0.20	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 67D – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67D
			Left Line	Center Line	Right Line	
1	280281	5314614	2.5+	0.50	0.50	
2	280281	5314636	2.5+	0.60	0.75	
3	280278	5314662	2.5+	1.60	1.00	
4	280279	5314686	2.5+	1.70	1.50	
5	280275	5314710	2.00	1.50	1.25	
6	280270	5314732	2.00	1.40	1.30	
7	280265	5314755	1.50	1.50	1.50	
8	280260	5314777	1.50	1.50	1.10	
9	280255	5314797	1.50	1.25	1.25	
10	280248	5314817	1.75	1.60	1.25	
11	280246	5314842	1.50	1.60	2.00	
12	280244	5314869	1.50	2.5+	2.00	
13	280241	5314894	1.40	2.5+	1.90	
14	280240	5314920	1.25	2.5+	2.5+	
15	280238	5314939	0.75	2.5+	2.5+	
16	280237	5314968	1.80	2.5+	2.5+	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 67E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67E
			Left Line	Center Line	Right Line	
1	280293	5314373	1.10	0.25	0.50	Photo Not Available
2	280299	5314399	1.25	0.75	1.00	
3	280298	5314420	1.00	0.75	0.50	
4	280299	5314444	0.60	1.00	0.75	
5	280298	5314461	0.50	1.25	1.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 67F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 20, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71	Inspector: Justin Ingram


Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67F
			Left Line	Center Line	Right Line	
1	280294	5314055	0.50	0.50	0.75	Photo Not Available
2	280295	5314078	0.50	0.50	0.50	
3	280293	5314103	0.75	0.60	0.50	
4	280294	5314128	0.60	0.75	0.75	
5	280299	5314154	0.70	1.10	1.00	
6	280300	5314180	0.60	0.60	0.50	
7	280301	5314200	0.50	0.50	0.50	
8	280297	5314221	0.70	0.60	0.25	
9	280282	5314237	0.40	0.25	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 67G – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67G
			Left Line	Center Line	Right Line	
1	280333	5312876	1.60	1.20	1.20	
2	280332	5312901	1.50	1.60	1.60	
3	280331	5312926	2.00	2.00	2.00	
4	280328	5312950	2.00	2.50	2.30	
5	280329	5312972	1.20	2.10	2.10	
6	280329	5312997	1.70	2.60	1.75	
7	280325	5313020	1.90	1.80	1.75	
8	280326	5313045	1.70	1.70	2.00	
9	280329	5313072	1.40	2.00	2.00	
10	280327	5313100	1.90	2.10	2.00	
11	280321	5313126	1.60	1.60	2.00	
12	280318	5313151	1.60	1.20	1.70	
13	280317	5313176	1.30	1.70	1.50	
14	280317	5313200	1.20	1.00		

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 67H – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 17, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 70 and PI 71	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 67H
			Left Line	Center Line	Right Line	
1	280363	5312399	1.00	1.20	1.10	
2	280363	5312423	1.20	1.40	1.50	
3	280366	5312450	1.50	1.10	1.40	
4	280365	5312474	2.00	1.60	1.60	
5	280366	5312499	1.50	1.20	1.25	
6	280367	5312526	1.50	1.25	1.10	
7	280368	5312550	1.50	1.50	1.40	
8	280369	5312576	1.60	1.50	1.90	
9	280362	5312600	2.00	2.40	1.80	
10	280357	5312623	1.50	2.00	2.00	
11	280349	5312679	1.60	1.30	1.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 68A – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 19, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 71 and PI 72
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 68A
			Left Line	Center Line	Right Line	
1	280296	5311682	1.25	1.50	1.50	
2	280296	5311707	1.75	1.50	1.50	
3	280301	5311733	0.50	1.60	2.00	
4	280304	5311746	1.60	1.50	1.50	
5	280307	5311777	1.50	1.75	1.50	
6	280312	5311802	1.20	1.90	1.50	
7	280314	5311827	1.00	2.00	1.25	
8	280319	5311850	1.00	2.00	1.50	
9	280318	5311873	1.25	1.00	1.50	
10	280320	5311896	0.80	1.25	1.25	
11	380321	5311921	1.25	1.50	1.25	
12	380326	5311941	1.25	1.00	1.00	
13	380330	5311967	1.60	0.75	1.00	
14	380332	5311992	1.70	1.10	1.20	
15	380343	5312009	1.50	1.10	1.25	
16	380344	5312040	1.50	1.50	1.50	
17	380340	5312064	1.00	1.75	2.00	
18	380345	5312090	1.50	2.00	2.00	
19	380347	5312113	1.00	1.75	1.50	
20	380351	5312136	N/A	1.70	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 68B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 19, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 71 and PI 72	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 68B
			Left Line	Center Line	Right Line	
1	279945	5309120	1.00	1.50	1.50	
2	279954	5309142	0.50	1.90	1.50	
3	279954	5309167	0.50	2.5+	2.00	
4	279969	5309186	0.60	2.20	2.5+	
5	279973	5309212	1.80	2.5+	2.00	
6	279968	5309239	2.5+	2.5+	2.5+	
7	279980	5309253	2.5+	2.5+	2.5+	
8	279986	5309278	1.80	1.60	1.25	
9	279987	5309303	2.5+	0.50	0.50	
10	279983	5309327	1.50	0.60	0.75	
11	279993	5309350	0.50	0.25	0.60	
12	279991	5309374	0.70	0.90	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 68C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 71 and PI 72	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 68C
			Left Line	Center Line	Right Line	
1	279852	5308347	2.50	1.75	2.75	
2	279857	5308367	2.00	1.75	1.25	
3	279855	5308394	2.5+	1.80	2.00	
4	279852	5308419	2.00	2.00	2.00	
5	279856	5308443	1.50	2.5+	2.5+	
6	279862	5308465	1.25	2.10	2.50	
7	279866	5308487	1.00	1.25	1.25	
8	279869	5308509	0.50	0.50	0.50	
9	279874	5308534	0.25	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 68D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 18, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 71 and PI 72	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 68D
			Left Line	Center Line	Right Line	
1	279796	5307959	1.00	2.00	2.00	Photo Not Available
2	279798	5307938	1.75	2.5+	1.00	
3	279789	5307913	2.00	2.50	1.00	
4	279784	5307891	1.75	2.10	1.50	
5	279781	5307865	2.5+	2.20	2.00	
6	279776	5307840	2.5+	1.20	2.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 69A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 75 and PI 76	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 69A
			Left Line	Center Line	Right Line	
1	278975	5301791	0.60	0.50	0.70	
2	278980	5301818	2.5+	1.25	1.10	
3	278986	5301841	2.50	1.10	2.10	
4	278987	5301866	2.5+	1.00	1.60	
5	278991	5301888	0.90	2.5+	1.00	
6	279001	5301913	0.50	2.20	0.75	
7	279001	5301943	1.20	1.60	2.5+	
8	279002	5301968	0.70	1.50	2.50	
9	279002	5301992	N/A	0.60	1.70	
10	279013	5302016	N/A	0.50	1.00	
11	279011	5302037	N/A	0.80	0.50	
12	279019	5302071	N/A	0.75	0.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 69B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 75 and PI 76	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 69B
			Left Line	Center Line	Right Line	
1	278872	5301154	0.25	0.25	0.50	
2	278874	5301134	1.25	0.60	1.25	
3	278866	5301114	1.25	1.00	1.00	
4	278858	5301093	0.75	0.60	1.75	
5	278852	5301069	0.50	0.50	1.25	
6	278848	5301048	1.25	0.50	1.50	
7	278842	5301027	1.50	1.25	1.50	
8	278838	5301003	1.00	1.30	1.75	
9	278839	5300980	1.50	1.25	1.50	
10	278834	5300957	1.75	1.50	1.00	
11	278827	5300932	1.50	1.60	1.50	
12	278826	5300909	1.50	1.50	1.25	
13	278822	5300889	1.25	1.50	0.50	
14	278816	5300866	1.75	1.60	0.75	
15	278815	5300840	1.00	1.25	1.25	
16	278812	5300818	1.25	1.10	1.25	
17	278796	5300797	0.50	1.00	0.25	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 70A – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 76 and PI 77
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 70A
			Left Line	Center Line	Right Line	
1	278944	5300178	0.75	0.75	1.25	
2	278934	5300196	1.00	1.50	1.00	
3	278927	5300219	1.25	1.25	1.25	
4	278917	5300239	0.75	1.50	Trees	
5	278908	5300260	0.50	0.70	Trees	
6	278901	5300284	0.25	0.60	Trees	
7	278895	5300295	0.50	0.70	0.80	
8	278883	5300312	1.50	0.90	0.75	
9	278874	5300335	1.70	1.50	0.70	
10	278863	5300359	1.25	1.40	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 70B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 16, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 76 and PI 77	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 70B
			Left Line	Center Line	Right Line	
1	279941	5294454	0.70	0.50	0.60	Photo Not Available
2	279938	5294477	0.60	0.50	0.50	
3	279936	5294499	0.30	0.75	0.50	
4	279933	5294523	0.50	0.80	1.00	
5	279927	5294545	0.30	0.75	1.00	
6	279924	5294574	0.50	0.60	0.75	
7	279921	5294599	0.70	0.70	0.75	
8	279923	5294634	0.50	0.50	0.75	
9	279917	5294662	0.50	0.20	0.30	
10	279914	5294685	0.80	0.75	0.80	
11	279911	5294708	1.20	0.60	1.00	
12	279896	5294728	1.50	0.60	0.75	
13	279891	5294750	0.75	0.75	0.75	
14	279886	5294774	0.60	0.60	0.75	
15	279882	5294798	0.50	1.10	0.60	
16	279884	5294821	1.00	1.20	1.00	
17	279883	5294844	0.70	0.60	0.70	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 71 – LOT 3**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 81 and PI 82
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 71
			Left Line	Center Line	Right Line	
1	286255	5277310	1.25	0.75	0.50	
2	286245	5277334	0.75	0.50	0.75	
3	286235	5277358	0.60	1.10	0.80	
4	286222	5277387	1.00	1.20	1.00	
5	286216	5277410	tree	1.40	1.25	
6	286203	5277437	tree	1.50	1.75	
7	286197	5277453	tree	1.30	1.40	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 72 – LOT 3**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 82 and PI 83
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 72
			Left Line	Center Line	Right Line	
1	288880	5276540	1.50	1.40	1.50	
2	288875	5276567	1.60	1.60	1.60	
3	288863	5276591	2.25	2.5+	2.25	
4	288852	5276614	2.00	1.60	2.00	
5	288840	5276634	1.25	1.40	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



**BOG AREA 73 – LOT 3**

Client:	Nalcor Energy - Lower Churchill Project		Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 84 and PI 85
		Inspector: Justin Ingram	

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 73
			Left Line	Center Line	Right Line	
1	293464	5271645	2.5+	1.50	1.40	
2	293463	5271673	1.75	2.00	1.10	
3	293461	5271702	1.2	1.50	2.5+	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 74A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 85 and PI 86	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 74A
			Left Line	Center Line	Right Line	
1	296412	5267526	1.60	1.60	1.10	
2	296391	5267541	1.20	1.40	1.20	
3	296371	5267561	1.00	1.00	1.60	
4	296361	5267585	Water	2.10	1.80	
5	296345	5267603	Water	1.10	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 74B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 85 and PI 86	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 74B
			Left Line	Center Line	Right Line	
1	296967	5266969	1.40	1.50	1.25	
2	296948	5266992	1.50	2.25	1.90	
3	296928	5267011	1.10	1.10	1.10	
4	296905	5267026	2.00	1.00	0.75	
5	296887	5267043	1.00	1.20	0.50	
6			Water	Water	1.10	
7			Water	Water	1.10	
8	296848	5267104	1.50	1.50	1.60	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 75A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 88 and PI 89	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 75A
			Left Line	Center Line	Right Line	
1	300362	5263638	1.50	1.50	1.50	
2	300347	5263656	2.5+	2.00	2.00	
3	300332	5263679	2.5+	2.20	2.00	
4	300317	5263698	2.5+	2.5+	2.50	
5	300300	5263716	1.60	2.5+	2.5+	
6	300285	5263702	water	2.20	2.00	
7	300265	5263715	water	1.30	1.75	
8	300246	5263735	water	1.70	2.00	
9	300230	5263756	1.60	2.00	1.75	
10	300215	5263775	1.10	1.20	1.00	
11	300202	5263794	1.00	1.20	1.50	
12	300191	5263814	1.00	0.90	1.00	
13	300177	5263830	1.60	0.50	1.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 75B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 88 and PI 89	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 75B
			Left Line	Center Line	Right Line	
1	302650	5261604	1.20	0.50	0.70	
2	302628	5261616	1.80	2.10	1.50	
3	302605	5261634	2.5+	2.5+	2.5+	
4	302587	5261653	0.80	2.00	2.00	
5	302571	5261669	1.00	1.60	1.50	
6	302569	5261703	water	0.40	2.20	
7	302535	5261707	1.00	0.75	2.00	
8	302519	5261724	0.75	1.00	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 75C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 88 and PI 89	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 75C
			Left Line	Center Line	Right Line	
1	304148	5260267	0.60	0.75	0.50	
2	304154	5260299	0.40	0.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 75D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 88 and PI 89	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 75D
			Left Line	Center Line	Right Line	
1	304748	5259360	0.75	0.75	1.00	Photo Not Available
2	304769	5259357	1.25	1.25	1.10	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 76A – LOT 3</b>			
Client:	Nalcor Energy - Lower Churchill Project		Date: July 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island		
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90
			Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76A
			Left Line	Center Line	Right Line	
1	305730	5258949	1.10	2.10	2.5+	
2	305707	5258957	1.60	1.50	2.5+	
3	305690	5258961	1.90	1.50	2.00	
4	305658	5258973	2.00	0.75	1.40	
5	305671	5258994	2.00	1.40	2.10	
6	305697	5258978	2.10	1.60	1.40	
7	305721	5258970	1.70	1.10	1.25	
8	305742	5258963	0.20	2.00	1.50	
9	305765	5258962	0.20	1.60	1.70	
10	305789	5258954	0.50	1.10	1.60	
11	305810	5258947	1.20	2.00	2.5+	
12	305831	5258942	1.25	2.00	2.00	
13	305852	5258934	1.75	2.10	2.50	
14	305872	5258925	1.90	1.80	1.90	
15	305895	5258921	2.50	1.50	0.60	
16	305915	5258912	1.10	1.10	1.00	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 76B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76B
			Left Line	Center Line	Right Line	
1	307247	5258555	2.25	2.5+	2.10	
2	307226	5258566	2.10	2.50	2.10	
3	307200	5258574	2.00	1.90	2.10	
4	307177	5258581	1.50	1.60	1.40	
5	307151	5258590	1.50	1.20	1.25	
6	307163	5258611	1.25	1.50	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 76C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 15, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76C
			Left Line	Center Line	Right Line	
1	309787	5257879	1.80	1.75	1.60	
2	309766	5257881	2.5+	2.5+	1.20	
3	309751	5257893	2.5+	2.5+	1.30	
4	309729	5257906	1.40	1.50	1.25	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**


<b>BOG AREA 76D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76D
			Left Line	Center Line	Right Line	
1	312498	5257130	2.00	2.5+	2.5+	
2	312476	5257140	2.5+	2.5+	2.5+	
3	312451	5257148	2.5+	2.5+	2.5+	
4	312430	5257131	2.5+	2.00	1.50	
5	312426	5257157	2.5+	2.5+	2.5+	
6	312404	5257168	2.5+	2.5+	2.5+	
7	312412	5257190	2.5+	2.5+	2.5+	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 76E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76E
			Left Line	Center Line	Right Line	
1	313663	5256859	2.00	1.20	1.90	
2	313677	5256842	1.50	1.70	1.25	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 76F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76F
			Left Line	Center Line	Right Line	
1	315324	5256367	0.50	1.60	2.00	
2	315318	5256397	1.00	1.40	1.60	
3	315293	5256412	1.20	1.60	1.80	
4	315270	5256423	1.60	1.30	1.60	
5	315247	5256436	2.00	1.10	1.20	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 76G – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76G
			Left Line	Center Line	Right Line	
1	315712	5256299	0.50	1.50	1.60	
2	315691	5256310	1.20	1.00	1.00	
3	315675	5256296	1.25	1.00	1.10	
4	315698	5256284	1.50	1.20	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 76H – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76H
			Left Line	Center Line	Right Line	
1	316263	5256118	0.50	1.00	0.50	
2	316240	5256127	0.75	1.00	0.50	
3	316218	5256134	0.50	0.60	0.50	
4	316196	5256142	0.75	1.00	0.50	
5	316172	5256149	0.75	0.75	1.00	
6	316151	5256157	1.10	0.75	0.60	
7	316130	5256163	0.25	0.75	1.20	
8	316106	5256170	0.50	0.60	1.60	
9	316049	5256182	1.30	1.00	1.50	
10	316027	5256194	0.90	1.50	0.75	
11	316006	5256203	1.25	1.20	1.00	
12	315983	5256211	2.00	1.00	0.75	
13	315954	5256215	2.5+	0.50	0.60	
14	315941	5256233	1.25	1.75	1.25	
15	315968	5256237	0.50	1.75	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**




<b>BOG AREA 76 I – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 89 and PI 90	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 76 I
			Left Line	Center Line	Right Line	
1	316401	5256078	1.60	1.00	1.00	
2	316423	5256070	1.50	0.60	2.5+	
3	316445	5256064	1.50	0.60	2.5+	
4	316469	5256063	2.00	2.00	2.5+	
5	316489	5256060	1.20	1.30	2.50	
6	316513	5256053	1.10	2.00	2.5+	
7	316521	5256034	1.50	2.00	2.20	
8	316551	5256032	2.00	2.20	2.5+	
9	316569	5256048	1.60	2.00	2.5+	
10	316586	5256046	1.10	2.25	2.50	
11	316606	5256042	1.60	2.10	2.20	
12	316629	5256037	2.00	2.5+	1.10	
13	316651	5256032	1.50	2.5+	0.75	
14	316677	5256031	1.60	2.30	2.10	
15	316701	5256023	1.60	2.40	2.5+	
16	316723	5256018	1.75	2.00	2.5+	
17	316751	5256043	1.50	1.00	2.10	
18	316777	5256040	1.50	2.20	2.5+	
19	316798	5256031	1.60	2.5+	2.5+	
20	316479	5256038	2.00	1.75	2.10	
21	316820	5256023	1.10	1.50	2.00	
22	316842	5256017	1.00	1.10	1.50	
23	316865	5256014	1.00	1.75	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 77A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 91 and PI 92	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 77A
			Left Line	Center Line	Right Line	
1	317802	5255934	1.40	2.5+	2.5+	
2	317827	5255928	1.10	2.5+	2.5+	
3	317847	5255919	1.50	2.5+	2.5+	
4	317868	5255909	1.60	2.5+	2.5+	
5	317896	5255896	2.5+	2.5+	2.00	
6	317919	5255896	1.90	2.5+	2.50	
7	317940	5255887	2.10	2.5+	2.10	
8	317961	5255880	2.50	1.50	1.60	
9	317982	5255875	0.50	1.00	1.40	
10	318005	5255867	2.00	1.20	0.75	
11	318043	5255880	2.10	1.60	0.75	
12	318012	5255887	2.00	0.60	1.50	
13	318102	5255886	2.5+	1.70	2.5+	
14	318126	5255890	2.5+	2.00	2.5+	
15	318149	5255888	2.10	2.25	1.80	
16	318173	5255886	2.25	1.50	1.75	
17	318195	5255875	1.50	1.50	2.5+	
18	318219	5255871	1.50	1.75	2.10	
19	318247	5255869	2.00	2.00	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 77B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 14, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 91 and PI 92	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 77B
			Left Line	Center Line	Right Line	
1	318122	5255842	1.60	1.00	1.80	Photo Not Available
2	318152	5255848	1.50	2.10	1.50	
3	318188	5255859	2.00	1.80	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 78A – LOT 3</b>					
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008	
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	Between PI 92 and PI 93	Inspector: Justin Ingram	

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 78A
			Left Line	Center Line	Right Line	
1	320177	5255093	1.00	1.00	1.60	
2	320186	5255036	2.5+	2.5+	2.5+	
3	320173	5255050	2.5+	2.5+	2.00	
4	320155	5255061	2.00	2.5+	2.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 78B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 92 and PI 93	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 78B
			Left Line	Center Line	Right Line	
1	321320	5254236		2.50		
<p>Notes: Swampy area approx. 75 m wide. Unable to probe</p>						



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 78C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 92 and PI 93	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 78C
			Left Line	Center Line	Right Line	
1	321794	5253935	1.25	1.75	2.00	Photo Not Available
2	321776	5253889	2.10	1.00	2.5+	
3	321791	5253877	2.50	2.50	1.40	
4	321811	5253860	2.00	2.00	1.00	
5	321827	5253847	1.30	1.50	0.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 79A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 93 and PI 94A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 79A
			Left Line	Center Line	Right Line	
1	330534	5249822	1.00	1.50	1.00	Photo Not Available
2	330546	5249843	1.00	1.00	1.00	
3	330567	5249830	0.50	1.00	1.00	
4	330546	5249788	0.50	1.00	1.00	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 79B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 93 and PI 94A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 79B
			Left Line	Center Line	Right Line	
1	330433	5249839	1.00	1.50	1.50	
2	330459	5249841	1.50	1.00	1.20	
3	330453	5249811	0.75	1.50	1.10	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 80 – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 94A and PI 95A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 80
			Left Line	Center Line	Right Line	
1	332911	5248544	0.75	2.25	Trees	
2	332952	5248562	0.50	1.60	Trees	
3	332941	5248580	2.50	1.50	Trees	
4	332922	5248526	1.30	1.30	Trees	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 81A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 95A and PI 96A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 81A
			Left Line	Center Line	Right Line	
1	334930	5246969	1.50	1.00	1.75	
2	334944	5246978	1.00	1.10	1.50	
3	334910	5246972	1.00	1.20	1.50	
4	334904	5247004	2.00	1.00	1.00	
5	334887	5247021	2.50	1.40	2.00	
6	334876	5247042	2.5 +	2.30	2.50	
7	334861	5247058	1.75	1.30	1.00	
8	334846	5247074	1.00	0.50	0.50	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 81B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 95A and PI 96A	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 81B
			Left Line	Center Line	Right Line	
1	335646	5246385	0.50	0.50	0.50	
2	335630	5246396	0.50	0.75	0.50	
3	335612	5246411	0.50	0.50	0.75	
4	335596	5246425	0.50	0.50	1.00	
5	335582	5246441	1.50	1.00	1.00	
6	335568	5246456	0.25	1.00	1.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 82A – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82A
			Left Line	Center Line	Right Line	
1	344326	5244149	1.00	0.50	1.00	
2	344310	5244133	0.50	0.60	0.50	
3	344297	5244118	2.00	1.50	1.75	
4	344284	5244105	1.30	0.50	0.25	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 82B – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 13, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82B
			Left Line	Center Line	Right Line	
1	344437	5244294	0.60	0.50	0.50	
2	344456	5244295	0.80	0.70	Trees	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 82C – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82C
			Left Line	Center Line	Right Line	
1	344598	5244525	1.50	1.50	1.25	
2	344612	5244519	1.50	1.50	1.25	
3	344629	5244529	1.60	2.25	1.70	
4	344646	5244543	1.50	1.80	1.50	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 82D – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82D
			Left Line	Center Line	Right Line	
1	344727	2544791	0.75	0.60		
2	344717	5244772	1.75	2.00		
3	344710	5244751	0.75	0.80		

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**



<b>BOG AREA 82E – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82E
			Left Line	Center Line	Right Line	
1	346328	5247435	0.50	1.00		
2	346308	5247428	1.60	1.00		
3	346293	5247415	1.50	0.50		



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 82F – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82F
			Left Line	Center Line	Right Line	
1	346653	5247978	0.75	1.00	Rock	
2	346654	5247956	1.50	0.25	Rock	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BOG PROBING RECORDS**

<b>BOG AREA 82G – LOT 3</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: July 12, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	Between PI 100 and PI 102	Inspector: Justin Ingram

Probe No.	Easting	Northing	Depth Penetrated (m)			BOG 82G
			Left Line	Center Line	Right Line	
1	347167	5248836	0.75	0.50	-	
2	347162	5248816	0.50	0.25	-	
3	347155	5248788	Rock	0.60	-	

**Appendix D5**  
**Bedrock Mapping Records**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 54-STN-12</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 27 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5418078	E 577891	Inspector:	Brad Walsh

<b>PHOTOGRAPHS</b>	
No Photo Available	No Photo Available

<b>Description</b>	
<b>Outcrop dimensions (m)</b>	3 x 25
<b>Lithology</b>	Ridge of grey, weathered siliceous siltstone with extensive quartz veining throughout.
<b>Structure</b>	Bedding orientation:
	028°/35°W 035°/28°W
	Jointing:
	Dominant joint set trending 050°/75°E and spaced 0.5 m apart. Secondary joint set trending 065°/90° and is spaced 0.4 m apart.

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**



**MAPPING STATION: DC1051-LOT 3-PI 62-STN-13**

Client:	Nalcor Energy - Lower Churchill Project			Date:	October 30 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location	N 5372035	E 681516	Inspector: Brad Walsh

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	10 x 25	
<b>Lithology</b>	Mica – quartz schist with extensive quartz veining throughout. Quartz veins range in thickness from 3 cm to 10 cm and trend parallel to the observed bedding.	
<b>Structure</b>	Bedding orientation:	Jointing:
	058°/75°NNW	Dominant joint set trending 320°/90° and spaced 1.0 m apart. Secondary joint set trending 216°/90° and spaced 0.4 m apart.





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 62-STN-14</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 30 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5371993	E 681479	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	10 x 15	
<b>Lithology</b>	Weathered, grey, mica – quartz schist.	
<b>Structure</b>	Bedding orientation:	Jointing:
	058°/80°NNW	Dominant joint set trending 285°/85° and spaced 1.0 m apart. Secondary joint set trending 195°/90° and spaced 0.2 m – 0.3 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 63-STN-15</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	October 31 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5360734	E 705548	Inspector: Brad Walsh	

**PHOTOGRAPHS**



<b>Description</b>		
<b>Outcrop dimensions (m)</b>	10 x 30	
<b>Lithology</b>	Elongated ridge of grey-pink siliceous siltstone. Quartz veins trend parallel to bedding and are 1 to 3 cm in width and spaced approximately 0.3 m apart.	
<b>Structure</b>	Bedding orientation:	Jointing:
	060°/75°NNW	Joints trending 080°/60°N and spaced 0.5 m apart. Several cleavage planes were observed to trend parallel to bedding.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 65-STN-16</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 1 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5346048	E 715499	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	15 x 50	
<b>Lithology</b>	Elongated ridge of fine-to-medium grained, weathered granite.	
<b>Structure</b>	Bedding orientation:	Jointing:
	80°/35°S	Dominant joint set trending parallel to the outcrop and spaced 0.15 m to 0.25 m apart. Secondary joint set trending perpendicular to the outcrop and spaced up to 2 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 67-STN-17</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 1 <sup>st</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5329156	E 278348	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	3 x 15	
<b>Lithology</b>	Grey, weathered siltstone. Poor exposure.	
<b>Structure</b>	Bedding orientation:	Jointing:
	Poorly exposed outcrop. Outcrop striking towards 100° azimuth.	None observed.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 69-STN-18</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	November 2 <sup>nd</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5321728	E 277724	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	15 x 35	
<b>Lithology</b>	Coarse grained, quartz and feldspar rich granite.	
<b>Structure</b>	Bedding orientation:	Jointing:
	120°/75°NE	Dominant joint set trending 150°/90° and spaced 2 m apart. Secondary joint set trending 330°/90° and spaced 0.25 m to 0.75 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 88-STN-19</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	July 16 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5265213	E 298696	Inspector: Brad Walsh	

**PHOTOGRAPHS**



<b>Description</b>		
<b>Outcrop dimensions (m)</b>	10 x 75	
<b>Lithology</b>	Dark grey to black, weathered siltstone with minor shale.	
<b>Structure</b>	Bedding orientation:	Jointing:
	012°/40°NW	Dominant joint set trending 060°/25°NW and spaced 1.5 m to 2.0 m apart.



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – BEDROCK MAPPING RECORDS**

<b>MAPPING STATION: DC1051-LOT 3-PI 101-STN-20</b>						
Client:	Nalcor Energy - Lower Churchill Project				Date:	July 12 <sup>th</sup> , 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island					
Contract No.	WTO DC 1051	Location	N 5249671	E 347740	Inspector: Brad Walsh	

**PHOTOGRAPHS**



**Description**

<b>Outcrop dimensions (m)</b>	40 x 300	
<b>Lithology</b>	Ridge of weathered, medium to coarse grained pink granite.	
<b>Structure</b>	Bedding orientation:	Jointing:
	320°/50°W 305°/45°W 355°/30°W	Dominant joint set trending 305°/80°W and spaced 0.5 m to 1.25 m apart. Secondary joint set trending 347°/75°W and spaced 2 m to 3 m apart.

**Appendix D6**  
**River Crossing Data**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 53</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5493282	E 496926
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>  Approximately 600 m southeast of PI 41
<b>Estimated Width (m)</b>	10	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



**RIVER 54 (Gales Brook)**

Client:	Nalcor Energy - Lower Churchill Project			Date:	November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond – Gull Island				
Contract No.	WTO DC 1051	Location:	N 5488120	E 499633	Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations from Air**

Estimated Depth (m)	0.5 (approx)	<b>Notes</b>  Located between PI 41 and PI 42
Estimated Width (m)	10 (approx)	
Estimated Velocity (fast or slow)	Medium to fast	
Estimated Substrate Composition	Sand, cobbles, pebbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 55 (Birchy Lake)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5459714	E 513930 Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>  Located adjacent to PI 44
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles, boulders, sand	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**

**RIVER 56 (Upper Sheffield Brook)**

Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5456816	E 525561
				Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations From Air**

Estimated Depth (m)	0.3 – 1.5	<b>Notes</b>  Located between PI 47 and PI 48 Steep bedrock banks in places
Estimated Width (m)	10 (approx)	
Estimated Velocity (fast or slow)	Fast	
Estimated Substrate Composition	Bedrock, cobbles, boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



**RIVER 57 (Upper Sheffield Brook)**

Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5456289	E 527258
				Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations From Air**

Estimated Depth (m)	0.6 – 1.0	Notes  Located between PI 48 and PI 49 Steep bedrock banks
Estimated Width (m)	10 – 15	
Estimated Velocity (fast or slow)	Fast	
Estimated Substrate Composition	Bedrock, cobbles, boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 58 (Barney's Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5453482	E 548491
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	15 (approx)	Located between PI 49 and PI 50
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Sand, mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



**RIVER 59 (South Brook)**

Client:	Nalcor Energy - Lower Churchill Project			Date:	November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 5443328	E 554597	Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations From Air**

Estimated Depth (m)	0.3 – 0.6	Notes  Located between PI 50 and PI 51 Shallow banks
Estimated Width (m)	30 – 40	
Estimated Velocity (fast or slow)	Slow	
Estimated Substrate Composition	Cobbles and pebbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 60 (Dawe's Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5434846	E 558782 Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.6 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	10 (approx)	Located between PI 51 and PI 52
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	





**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**

<b>RIVER 61</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5434575	E 559109
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	15 (approx)	Located between PI 51 and PI 52
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Bedrock, boulders, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



**RIVER 62 (Rocky Brook)**

Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5432325	E 562541
				Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations From Air**

Estimated Depth (m)	1.0 – 2.0	Notes  Located between PI 51 and PI 52 Shallow banks
Estimated Width (m)	20 – 30	
Estimated Velocity (fast or slow)	Medium to fast	
Estimated Substrate Composition	Mud, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 63 (Exploits River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond – Gull Island			
Contract No.	WTO DC 1051	Location:	N 5422946	E 568012
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	>100	Near PI 53
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Mud, cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 64 (Tom Joe Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5419197	E 5419197
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>  Located between PI 53 of PI 54
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Medium to fast	
<b>Estimated Substrate Composition</b>	Cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 65 (Sandy Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5418741	E 588322
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	30 (approx)	Located between PI 55 and PI 54
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



**RIVER 66 (Stony Brook)**

Client:	Nalcor Energy - Lower Churchill Project			Date:	November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island				
Contract No.	WTO DC 1051	Location:	N 5419311	E 596193	Inspector: Brian Walsh

**PHOTOGRAPH**



**Observations From Air**

Estimated Depth (m)	0.5 – 3.0	Notes
Estimated Width (m)	30 (approx)	
Estimated Velocity (fast or slow)	Slow	
Estimated Substrate Composition	Mud, cobbles and boulders	

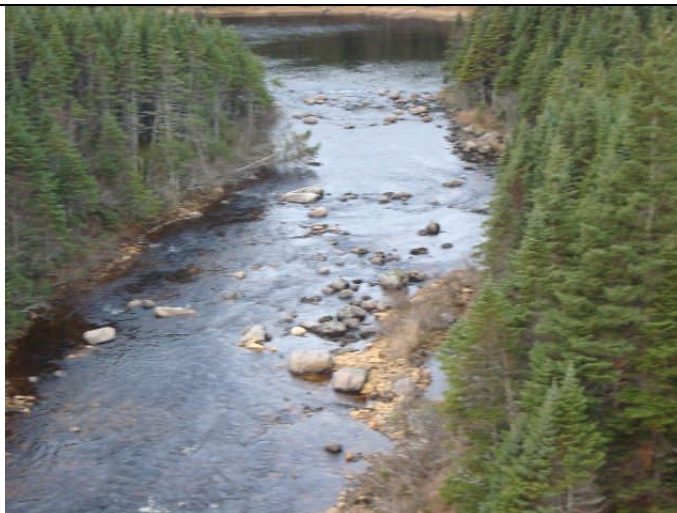
Approximately 100 m west of PI 55



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**

<b>RIVER 67 (Rattling Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5410416	E 608109
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.2 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 30	Located between PI 56 and PI 57
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Boulders, cobbles and mud	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 68</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5408750	E 610101
		Inspector: Brian Walsh		

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1	<b>Notes</b>
<b>Estimated Width (m)</b>	20 (approx)	Located between PI 56 and PI 57 Wide crossing
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Boulders, cobbles and mud	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 69 (Cooper Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5399246	E 629149
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5	<b>Notes</b>  Approximately 1.70 km northwest of PI 58 Rocky river bed
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Boulders and cobbles	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 70 (Gander River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5397462	E 635189
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	<b>&gt;1.5</b>	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 40	Located between PI 58 and PI 59
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Bottom not visible	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 71 (Southwest Gander River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5394701	E 646434
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.5	<b>Notes</b>  Located between PI 58 and PI 59 River narrows in places
<b>Estimated Width (m)</b>	15 – 30	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Bedrock, cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 72 (Dead Wolf Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 3, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5393590	E 651595
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>  Located between PI 58 and PI 59 Bedrock observed on river banks
<b>Estimated Width (m)</b>	10 (approx)	
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 73 (Riverhead Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5386712	E 666621
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>  Located between PI 59 and PI 60
<b>Estimated Width (m)</b>	Up to 30	
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Sandy	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 74 (Triton Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5384298	E 670966
		Inspector: Brian Walsh		

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.2 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 59 and PI 60
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 75 (Boggy River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5376770	E 678681
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1	<b>Notes</b>
<b>Estimated Width (m)</b>	Up to 30	Located between PI 60 and PI 61
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Bottom not visible	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 76 (Terra Nova North River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5371161	E 681721
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	10 – 15	Located between PI 61 and PI 62
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 77 (Terra Nova River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5366425	E 692205
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	<b>&gt; 1</b>	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 30	Located between PI 62 and PI 63
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Bottom not visible	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 78 (Northwest River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5364351	E 697147 Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	> 1	<b>Notes</b>
<b>Estimated Width (m)</b>	15 – 20	Located between PI 62 and PI 63
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Bottom not visible	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 79 (Salmon Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5361426	E 703874
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	<b>&gt; 1</b>	<b>Notes</b>
<b>Estimated Width (m)</b>	15 – 20	Located between PI 62 and PI 63
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Bottom not visible	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 80 (Middle Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: October 31, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5357718	E 706551 Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	<b>&gt; 1</b>	<b>Notes</b>
<b>Estimated Width (m)</b>	20 – 30	Located between PI 63 and PI 64
<b>Estimated Velocity (fast or slow)</b>	Slow	
<b>Estimated Substrate Composition</b>	Bottom not visible	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 81 (Southwest River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5350856	E 708996
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.5 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	15 – 20	Located between PI 63 and PI 64
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 82 (Shoal Harbour River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5346657	E 714485
		Inspector: Brian Walsh		

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	10 (approx)	Located between PI 64 and PI 65
<b>Estimated Velocity (fast or slow)</b>	fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 83 (Lower Shoal Harbour River)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5336083	E 277570
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 0.6	<b>Notes</b>
<b>Estimated Width (m)</b>	5 – 10	Located between PI 65 and PI 66
<b>Estimated Velocity (fast or slow)</b>	fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	

**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 PREFERRED CORRIDOR – RIVER CROSSINGS**



<b>RIVER 84 (Northwest Brook)</b>				
Client:	Nalcor Energy - Lower Churchill Project			Date: November 1, 2008
Project:	Lower Churchill Project – HVdc Transmission Line – Soldiers Pond to Gull Island			
Contract No.	WTO DC 1051	Location:	N 5325235	E 277755
				Inspector: Brian Walsh

**PHOTOGRAPH**



<b>Observations From Air</b>		
<b>Estimated Depth (m)</b>	0.3 – 1.0	<b>Notes</b>
<b>Estimated Width (m)</b>	15 – 20	Located between PI 67 and PI 68
<b>Estimated Velocity (fast or slow)</b>	Fast	
<b>Estimated Substrate Composition</b>	Cobbles and boulders	



**Appendix D7**

**Photographic Journal of Marshalling Yard E**



**LOWER CHURCHILL PROJECT – DC 1051 HVdc TRANSMISSION LINE  
2008 GEOTECHNICAL PROGRAM  
LOT 3 – POTENTIAL MARSHALLING YARD SITE E – PHOTOGRAPHIC JOURNAL**



**Photo 1 – View of Marshalling Yard Site E looking north. Located near Witless Bay Line off of Route 13.**



**Photo 2 – View of Marshalling Yard Site E looking south.**

**APPENDIX E**  
**LIMITATIONS**

### LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information at the test locations. The information contained herein in no way reflects on the over all viability of the project, unless otherwise stated and determined by a feasibility study. Furthermore, the information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test locations may differ from those encountered at the test locations, and conditions may become apparent during construction, which could not be detected or anticipated the time of the site investigation. It is recommended practice that a geotechnical consultant be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered at the test locations.

Except as otherwise maybe specified, AMEC disclaims any obligation to update this report for events taking place, or with respect to information that becomes available to AMEC after the time during which AMEC conducted the assessment.

The design recommendations given in this report are applicable only to the project described in the text, and the comments made in this report relating to potential of the site(s) are intended only for the guidance for the **final feasibility study**. The number of samples may not be sufficient to determine all the factors that may affect the viability of the project costs. This work has been undertaken in accordance with normally accepted geoscientific practices. No other warranty is expressed or implied.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMEC Americas Limited accepts no responsibility for losses of any kind whatsoever, including direct or consequential financial effects on transactions or property values, or requirements for follow-up actions and costs, or for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

AMEC makes no other representations whatsoever, including those concerning the legal significance of its findings, or as to other legal matters touched on in this report, including, but not limited to, ownership of any property, or the application of any law to the facts set forth herein. With respect to regulatory compliance issues, regulatory statutes are subject to interpretation and change. Such interpretations and regulatory changes should be reviewed with legal counsel.

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