



Newfoundland and Labrador Hydro Lower Churchill Project Pre-Feed Engineering Services

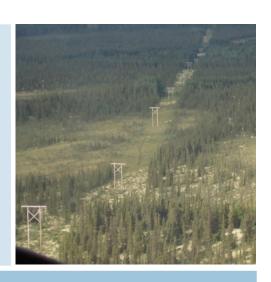
AC1030 - Field Investigation & Construction Requirements

735 kV Transmission Line Gull Island to Churchill Falls



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Newfoundland & Labrador Hydro

LOWER CHURCHILL PROJECT

TECHNICAL REPORT

AC1030 – Field Investigation & Construction Requirements
735 kV Transmission Line
Gull Island to Churchill Falls

Document No: 722850-AC1030-40ER-0001-00

FINAL February 2008

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EXECUTIVE SUMMARY

This report presents the findings with respect to the location, number of camps, marshalling yards, access routes, and tote roads associated with the proposed construction of a 735 kV transmission line from Gull Island to Churchill Falls, approximately 203 km. Also presented are the results of a geotechnical investigation program along the route which included test pit excavation, anchor pull out tests, hand augering, bog probes and percolation tests at the proposed campsites.

Line Routing

The 735 kV line from Gull Island to Churchill Falls will parallel (approximately 85 m to the south) the existing 138 kV line running between Happy Valley-Goose Bay and Churchill Falls. As a result of other investigative work for the Lower Churchill Project, the converter station and switchyard were relocated from the south side of Churchill River to the north side. With the change in switchyard location and the fact the new 735 kV line will follow the existing 138 kV line corridor, it is recommended that the 735 kV line be routed from the switchyard in a generally north westerly direction up over the hill to adjoin the existing line, a distance of approximately 8.8 km. This routing is reflected on the report drawings, see Drawing # 722850-AC1030-43DD-0003.

Access Roads and Tote Roads

Throughout the proposed route of the 735 kV transmission line there is excellent access from the Trans Labrador Highway (TLH). In a number of instances, the proposed 735 kV line will cross the highway. The line is also adjacent to the existing 138 kV wood pole transmission line running between Churchill Falls and Happy Valley-Goose Bay.

Tote roads or access trails from the TLH suitable for the proposed transmission line were established as part of the original construction of the existing 138 kV transmission line. A total of five (5) existing access trails were identified and added to Hydro's fording location maps. Two (2) new access trails will be required and the locations are identified on the maps. Between West Wilson and East Metchin Rivers the old highway alignment is completely washed out at two (2) locations with less severe erosion in other locations. The old highway is no longer maintained and continues to deteriorate. The old highway will have to be repaired or new access trails will have to be established from the new highway alignment. It is anticipated that

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heavier equipment will be used to construct the new 735 kV line versus the equipment used for construction of the existing 138 kV line. The decision as to the extent of upgrading/improvement required should be left to the transmission line contractor(s) to decide as part of the competitive bidding process. The best season for transmission line construction is winter when the ground is sufficiently hard to allow movement of heavy equipment, resulting in less environmental disturbance.

Camps

During construction of the Gull Island Hydroelectric Development, it is assumed that a main camp will be operational at the Gull Island site and some space may be available in that camp to accommodate transmission line construction personnel, depending on the schedule for constructing the transmission line. Since scheduling is critical for the transmission line, it is recommended that two (2) separate camps be provided in order to avoid any possible delays due to unavailability of accommodations at the Gull Island main camp. A two (2) camp set up is recommended with one (1) camp located approximately 49 km west of Gull Island switchyard and the second camp approximately 54 km east of Churchill Falls. The two (2) recommended campsites were used formerly as temporary construction campsites by the contractors engaged in upgrading the TLH and as such environmental permitting is not anticipated to be an issue provided that similar type facilities and camp layouts are utilized.

The scenario presented lends itself to owner or contractor supplied camps. For this particular transmission line, the most economic approach may be to have the contractor supply his own camps.

Marshalling Yards

The most likely scenario for delivery of materials and equipment would be by marine transport to Happy Valley-Goose Bay and then by road to Gull Island. An area of approximately 6.0 hectares would be required to marshall materials. It is proposed that the marshalling yard be located on a burnt over area near the intersection of the TLH and the access road to Gull Island. It is assumed a security gate for the Gull Island project would be located nearby and the marshalling yard be located just inside the gate.

Based on the assumption that Hydro will procure materials, it is recommended that Hydro provide a fully prepared marshalling yard, where materials can be received, sorted, and checked, prior to being turned over to the contractor at the start of construction.

Geotechnical

The geotechnical program included:

- Air photo interpretation combined with base map preparation and fieldwork preparation;
- Two (2) site reconnaissance trips: the first to assess the general outline of the route and the second to examine the ground in some of the remote areas;
- Site investigations: A total of fifty-nine (59) test pits, five (5) boreholes, twelve (12) percolation tests, seven (7) Standard Proctor Density tests, several hundred bog probes and twelve (12) anchor pull out tests were used to inventory the soil and rock conditions along the route;
- Laboratory testing: Index testing was performed on representative samples from along the route.

Transmission Line

The transmission line route begins at the switchyard in the Churchill River lowlands. For approximately the first kilometre, the soil comprises a mixed terrain of mostly glaciofluvial sand with some sand and gravel, overlying fine-grained, lacustrine silt and clay. The remainder of the route climbs up into a lowlands terrain dominated by glacial landforms comprising gently rolling hills with thin glacial till soils covering much of the countryside. Eskers are common in the area, often associated with the larger river valleys such as Cache, Wilson and Metchin.

The allowable bearing capacity is 250 kPa in the glaciofluvial sand and the sand and gravel deposits, 300 kPa in glacial till, 150 kPa in marine sediments, and 100 kPa in submerged high quality fill in bogs or other wet areas. Unit weights for properly compacted site soils ranged from 16 kN/m³ for the sand to over 22 kN/m³ for the glacial till.

Bedrock outcrops are abundant in the higher elevations, especially near Churchill Falls and on most hilltops along the route. The bedrock comprises crystalline metamorphic rocks composed of granite orthogneiss with some dark mafic material and numerous pegmatite stringers. The rock had excellent holding strength at all twelve (12) anchor pull out test locations along the route.

Marshalling Yard

The proposed marshalling yard is located near the intersection of the TLH and the entrance to the Gull Island site. Ten (10) test pits were excavated at the marshalling yard. This area is dominated by glaciofluvial sand with trace amounts of gravel and fines. An allowable bearing capacity of 250 kPa is recommended for any footing designs in the yard.

Campsites

Two (2) proposed campsite locations were investigated during the field program. Ten (10) test pits, one (1) borehole and six (6) percolation tests were performed at each site.

The first campsite is located south of the TLH in close proximity to the highway at coordinates 574300 E, 5882900 N (UTM NAD 83). The site comprises a glaciofluvial soil that is made up of mostly poorly graded sand and gravel with some fines. Other areas of the site may also contain glacial till and silty sands. The allowable bearing capacity is 250 kPa in the glaciofluvial soil deposits and 300 kPa in the glacial till soils.

The second campsite is also located in close proximity to the TLH near East Metchin River at coordinates 484350 E, 5920600 N (UTM NAD 83), south of the TLH. The site comprises glacial till consisting of well-graded sand and gravel with some silt to silty sand and gravel. Some areas of the site also contained silt and sand with trace gravel. The allowable bearing capacity in the glacial till soil deposits is 300 kPa.

Percolation tests conducted at the campsites, with the exception of one (1) test at the second campsite, indicate that the soils are suitable for construction of septic disposal fields with an application rate of approximately 0.1 m³/m²/day.

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Drainage is not expected to be a problem at either site. Perimeter drainage ditches along with proper grading away from trailers will be required.

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1 INTRODUCTION

1.1 TERMS OF REFERENCE

The Scope of Work included in this report was outlined by Work Task Order (WTO) No. AC1030 - Field Investigation and Construction Requirements - 735 kV Transmission Line – Gull Island to Churchill Falls.

In brief, the work includes the following:

- Assess the requirements for camps, marshalling yards, access routes, and tote roads necessary for the construction of the 735 kV transmission line from Gull Island to Churchill Falls;
- Recommend locations for camps, marshalling yards, and typical layout drawings for each:
- Conduct a field investigation program to confirm the geotechnical conditions along the transmission line route and in the area of the proposed supporting infrastructure;
- From the field investigation, establish the availability of construction materials along the route;
- Present data collected in an ArcGIS compatible format covering the entire line route, associated access routes and other related areas.

1.2 PREVIOUS STUDIES

Information and data for this report were obtained from a review of the 1999 Feasibility Study on Development of EHV Transmission Lines in Labrador¹ and from site visits carried out during the periods of July 24 to July 26, 2007 and September

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¹ Feasibility Study on Development of EHV Transmission Lines in Labrador, RSW-EDM, February, 1999.

18 to September 21. Hydro's TL 240 fording location maps provided valuable information for assessing constructability issues.

1.3 CONTENT OF REPORT

The 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 boreholes, test pit excavation, anchor pull out tests, hand augering, bog probes, and percolation tests at the campsites.

Hard copies of drawings are included in Appendix A of the report and an electronic version of pertinent drawings, ArcGIS compatible, are being provided under separate cover.

2 LINE ROUTING

2.1 **GENERAL**

A comprehensive feasibility study on the development of EHV Transmission Lines in Labrador for the Lower Churchill Project (Gull Island and Muskrat Falls) was completed in February 1999¹. The report included a proposed routing of the 735 kV line between Gull Island and Churchill Falls. Hydro has subsequently decided the 735 kV line routing would parallel (approximately 85 m to the south) the existing 138 kV line running between Happy Valley-Goose Bay and Churchill Falls. See Drawing #'s 722850-AC1030-43DD-0001 to 0011.

2.2 LINE ROUTING ADJUSTMENT

Originally the converter station and switchyard for the Gull Island Project were located on the south side of the Churchill River. As a result of other investigative work for the Lower Churchill Project, the converter station and switchyard were relocated from the south side of Churchill River to the north side. The 735 kV line will now be slightly shorter by about four (4) km. With the change in switchyard location and the fact the new 735 kV line will follow the existing 138 kV line, it is recommended that the 735 kV line be routed from the switchyard in a generally north westerly direction up over the hill to adjoin the existing 138 kV line as shown on Drawing # 722850-AC1030-43DD-0002.

¹ Ibid.

3 ACCESS ROUTES AND TOTE ROADS

3.1 ACCESS ROADS

Access to the proposed 735 kV transmission line is excellent, as the line is adjacent to the Trans Labrador Highway (TLH) throughout its length. In a number of instances, the proposed 735 kV line will cross the highway. It is also adjacent to the existing 138 kV wood pole transmission line running between Churchill Falls and Happy Valley-Goose Bay, see Drawing #'s 722850-AC1030-43DD-0002 to 0011.

3.2 TOTE ROADS

Access trails from the TLH to the proposed transmission line were established as part of the original construction of the existing 138 kV transmission line. The location of these access points together with information on fording locations were identified on Hydro's fording location maps. A site reconnaissance was used to look at the access points to determine their adequacy to construct the new 735 kV transmission line.

The maps were relatively accurate except for a few access points that were not identified. Existing access trails from the TLH to the transmission line were identified between approved fording locations #'s 15 & 16, 16 & 17, 18 & 19, and have been added to the maps, see Drawing # 722850-AC1030-43DD-0006.

There are access trails from the old highway alignment to the 138 kV transmission line between West Wilson and East Metchin Rivers, however, the old highway is completely washed out at two locations with less severe erosion in other locations. The old highway, shown as an existing road on Drawing No's 722850-AC1030-43DD-0008 and 0009, is no longer maintained and continues to deteriorate each season. The transmission line contractor will have to repair the washouts or establish access points from the new highway or some combination of both. It is possible to establish access trails from the new highway without having stream crossings. With time, the old highway may deteriorate to the point where it is not practical or economical to repair. Also, throughout this area the terrain is very rough

and it may be desirable to reroute the new 735 kV line to generally follow the existing 138 kV line but not necessarily parallel it. This should be a design detail when better contour mapping of the area is available.

Between approved fording locations #36 and #39, two (2) new existing access roads from the new highway to the transmission line have been added, see Drawing #722850-AC1030-43DD-0009. These roads were established from the old highway to the new highway alignment during construction of the highway.

New access trails are required to be constructed just west of approved fording location #60 and east of fording location #62. These new access points are identified on Drawing # 722850-AC1030-43DD-0011. An existing access trail between stream crossings #63 and #64 has been added.

Between Gull Island switchyard and Churchill Falls, a total of sixteen (16) stream/river crossings were identified on the fording location maps as "no fording" locations. Five (5) of these crossings are the major rivers; namely, Bob's Brook, Cache River, West Wilson, East Metchin and West Metchin, and four (4) crossings are on a meandering section of East Wilson. Access points exist on either side of these river crossings so bridges will not be required at these crossings in order to construct the transmission line. Of the remaining seven (7) smaller streams, sufficient access points are available to avoid temporary crossings.

It is anticipated that heavier vehicles will be used to construct the new 735 kV line than the equipment used for construction of the existing 138 kV line. The existing access points will be upgraded, extended, or improved to handle the heavier traffic. The decision as to the extent of upgrading/improvement should be left to the transmission line contractor as part of the competitive bidding process. The contract specification should describe and define the environmental guidelines and restrictions the contractor has to follow. The contractor should choose the type and size of equipment he wants to use to construct the line. The best season for transmission line construction is winter when the ground is sufficiently hard to allow movement of heavy equipment resulting in less environmental disturbance.

4 CAMPS AND MARSHALLING YARDS

4.1 CAMP(S)

4.1.1 General

During the construction of the Gull Island Hydroelectric Development, it is assumed that a main camp will be operational at Gull Island to accommodate powerstation construction personnel and that some space may be available in that camp to accommodate transmission line construction personnel, depending on the scheduling for constructing the transmission line. No other accommodations would be available over the entire length between Gull Island and Churchill Falls. CFLCo officials have confirmed that they will not be able to accommodate any of the transmission line contractor's personnel in their staff facilities at Churchill Falls. There is a hotel in Churchill Falls with limited rooms and, other than short-term visits, no rooms would be available for construction workers.

Since scheduling is critical for the transmission line, it is recommended that separate camp(s) be provided in order to avoid any possible delays due to unavailability of accommodations at the Gull Island main camp.

4.1.2 Number of Camps

The preferred routing of the proposed 735 kV TL is parallel and adjacent to the existing 138 kV wood pole transmission line between Happy Valley-Goose Bay and Churchill Falls, as well as to the all weather TLH, hence, access to the line is excellent. In a number of instances, the proposed 735 kV line will cross the highway.

Considering that the length of highway between the Gull Island switchyard and Churchill Falls is approximately 211 km, a two (2) camp setup would appear reasonable. Camp 1 would be located approximately 49 km west of Gull Island at coordinates 574300 E, 5882900 N (UTM NAD83). See Drawing #'s 722850-AC1030-43DD-0004 and 0012. Camp 2 would be located approximately 54 km east of Churchill Falls at coordinates 484350 E, 5920600 N (UTM NAD83). See Drawing #'s 722850-AC1030-43DD-0009 and 0012. Photos of the two (2) campsites follow.

The average travel distance along the main road from each camp is 27 km. It is assumed some accommodations will be available at the main camp at Gull Island, however, with the first camp only 49 km from the switchyard, production will not be seriously impacted if only a few spaces are available at the main camp.

A number of scenarios were investigated with respect to camp location. If space could be guaranteed at the main camp at Gull Island, a camp halfway between Gull Island and Churchill Falls, and a camp at Churchill Falls would be reasonable. However, during discussions with CFLCo officials, wherein reluctance to a camp at Churchill Falls was expressed, the concept was dropped primarily because under any scenario a two (2) camp setup is required. It does not matter if a camp is at Churchill Falls or 54 km outside of Churchill Falls from a cost/efficiency perspective.

The two (2) campsites being recommended were formerly used as temporary construction campsites by the contractors engaged in upgrading the TLH and as such environmental permitting is not anticipated to be an issue provided similar type facilities and camp layouts are utilized.

Figures 4.1 and 4.2 depict the two (2) campsites.



Figure 4-1: Camp 1



Figure 4-2: Camp 2

4.1.3 Camp Layout

The number of construction workers will depend on the construction schedule. For a 735 kV TL in the terrain conditions encountered, an overall construction period of approximately twelve (12) calendar months plus clean-up time appears reasonable, allowing twelve (12) months for each of the three (3) overlapping major operations of foundation preparation, tower assembly and erection, and conductor installation.

Based on the schedule, a workforce of approximately 150 workers would be required to construct the line. A two (2) camp setup is recommended. There will be a requirement for lodging up to 150 workers for a relatively short period of time at

either one of the camps. Section 7.5, page 129 of the 1999 Feasibility Report¹; refers to 150 workers at each camp yet, on Plate 7-0, the camp layout shows a 96man camp. The actual scenario could be summarized as follows; Camp 1 would be established to house approximately 144 workers consisting of twelve (12) bunkhouse trailers. Camp 2 would initially be set up with four (4) bunkhouse trailers to house 48 workers and, as the advance teams are relocated forward from Camp 1 to Camp 2. their bunk trailers would be relocated forward from Camp 1 to Camp 2. Hence, the actual number of bunk trailer units required on setup would be sixteen (16), which would be comparable to the two (2) 96 worker camps.

The 96 person camp layout drawings contained in the 1999 Feasibility Report have been updated to show accommodations for 144 workers. The layout would be similar for both camps. See Drawing # 722850-AC1030-43DD-0013.

The scenario presented lends itself to owner or contractor supplied camps. For the construction of this particular transmission line the most economic approach may be to have the contractor supply his own camps. Under the marshalling yard scenario presented later in this report, the contractor may require some accommodations in the main camp at Gull Island for those personnel engaged to work in the marshalling yard, however, this should not be a deterrent to having the contractor supply his own camps.

4.1.4 **Water Supply**

For Camp 1, the selected site has a readily available water supply from an adjacent pond as shown on Figure 4-3. Camp 2 also has an available water supply from the East Metchin River as shown on Figure 4-4. Both of these water supplies were used by contractors engaged in reconstructing the TLH. Water can be supplied to both sites through an intake structure, which will deliver water to a constructed wetwell. Water will be pumped from the wetwell to a building where it can be treated and chlorinated to conform to the Canadian Drinking Water Quality Guidelines before distribution to the main camps. Water quality sampling was not undertaken for the purposes of this report but should be done prior to designing the treatment system.

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¹ Ibid.

Type and size of infrastructure required for the camp water system will be governed by fire flows required for each site. To handle firewater, the main distribution line can be sized large enough to handle the flows, or an onsite storage tank will need to be provided. A design detail will be to ensure that fire flows are not depleted by the domestic usage. It is envisaged that each building will be provided with a standpipe and hose system for fire suppression.



Figure 4-3: Camp 1 Water Supply - Pond Adjacent to Campsite



Figure 4-4: Camp 2 Water Supply - East Metchin River

4.1.5 Sewer Services

For both Camps 1 and 2, sewage wastewater shall be discharged to a sewage disposal system for treatment before discharge to the environment. It is envisaged that sewage wastewater be discharged to a disposal field or to a packaged plant for treatment. In a camp setup, concentrations of biological oxygen demand (BOD), total suspended solids (TSS), and coliforms are quite high during peak times of the day. A disposal field required to treat these high concentrations would be quite large and require a significant area for construction.

A packaged treatment plant could be more favourable. These plants can be delivered to site, ready for use. Inlet and outlet distribution piping for the plant would require installation by the main camp contractor. These plants can be setup for the

type of treatment required such that discharge concentrations to the environment comply with The Environmental Control Water and Sewage Regulations, Schedule A, as set out by the Department of Environment.

4.1.6 Waste Disposal

Solid waste at the campsite would be stored in bear proof containers. As all waste must be disposed at an approved waste disposal site, it is envisaged that waste at each campsite would be trucked to the nearest municipal waste disposal site. For Camp 1, the closest site is at Happy Valley-Goose Bay and for Camp 2 the closest site is at Churchill Falls. A regular schedule for the pickup of waste would be put in place to minimize the storage on site.

4.2 MARSHALLING YARDS

4.2.1 Logistics

Both the Gull Island and Churchill Falls extremities of the line are situated along the all-weather TLH linking Baie Comeau, Quebec, to Happy Valley-Goose Bay, Labrador, hence all transmission line materials and equipment could be transported by road from points west. One (1) advantage of delivery by road would be just in time delivery that would reduce the requirement for marshalling areas.

The most likely scenario is that materials and equipment would be shipped via maritime transport to Goose Bay and then by road to Gull Island. Though it is generally more economical transporting by this method, it is limited to the period that the shipping channels are open, roughly between mid June and late November.

4.2.2 Yard Location

The proposed location for the marshalling yard is in the vicinity of coordinates N 5,904,100, E 648,226 and is as located on Drawing # 722850-AC1030-43DD-0002. The site was selected based on the following:

 The gateway to the project is Goose Bay, which is reached by road via the TLH, by air via major carriers, and by sea. Goose Bay is approximately 90 km by road from the Gull Island site.

 The marshalling yard is located on a burnt over area near the intersection of the TLH and the access road to the Gull Island site. It is assumed a security gate for the Gull Island project would be located nearby and the marshalling yard be located just inside the gate.

Based on a review of material requirements presented in the 1999 Feasibility Study¹, an area of approximately 6.0 hectares would be required to marshal materials. Drawing # 722850-AC1030-43DD-0014 shows a typical layout of the proposed marshalling area.

4.2.3 Preparation of the Site

It is recommended that Hydro provide a fully prepared, levelled, and fenced site to the transmission line contractor. The delivery schedule for Hydro supplied permanent line materials (i.e., foundation and tower steel, anchor rods, conductor insulators and accessories, etc.) will dictate whether Hydro or the transmission line contractor will undertake the receiving, sorting, checking, and storage of this material prior to the start of construction.

It is assumed that procurement will be done by Hydro, hence, it is preferable that the Owner receives, sorts, and checks all material at the marshalling yard and hands all materials over to the contractor prior to the start of construction.

¹ Ibid.

5 GEOTECHNICAL

5.1 GENERAL

The drawings in Appendix A show the specific test locations discussed in this report.

5.2 INVESTIGATION PROCEDURES

The geotechnical program was divided into several tasks.

5.2.1 Task 1 – Air Photo Interpretation/Base Map Preparation/Fieldwork Preparation

A series of stereo pairs, black and white air photos and colour air photo mosaics were obtained from Hydro. These were examined to obtain remote sensing data on the landforms and surficial geology along the route. Hydro also provided route strip maps that were prepared for their environmental studies. These maps contained the approved stream crossings and locations of access trails which aided in the planning for the work. During the study it was discovered that surficial geology and geomorphology mapping was being prepared by one of the environmental consultants, Jacques Whitford. Instead of producing a separate surficial geology map, it was decided to provide field information to Jacques Whitford so they could ground truth their air photo interpretation.

Published reports (see bibliography) of the area on surficial and bedrock geology were reviewed.

When the review of surficial and bedrock geology was completed, plans were finalized for the field investigation program. The program that was identified in the WTO Execution Plan was modified. A reduction was made in the intrusive investigations and more emphasis was placed on areas where varying conditions were expected including bogs and steep slopes.

5.2.2 Task 2 – Reconnaissance

Two (2) reconnaissance trips were made by helicopter. The first trip was made on July 25, 2007. The goal was to become more familiar with the route and to identify

any problems with access for the purpose of testing. The second trip was made on September 9, 2007 in order to examine the topographic features and soil conditions in remote locations. The route maps supplied by Hydro were used during this process to record the surficial geology of route. Soil/rock conditions in areas that represented a change in the surficial geology were examined more closely.

5.2.3 Task 3 – Permits

Hydro had in place permitted access trails and fording sites. Intrusive investigations were limited to those areas where permits were in place and in areas away from streams and water bodies where permits were not required.

5.2.4 Task 4 – Ground Truthing and Geotechnical Investigations

The fieldwork for this investigation was performed between July 25 and October 1, 2007 using helicopter support.

Areas of interest were examined on the ground and intrusive investigations were performed. Representative samples of the materials encountered were obtained and sent to the site laboratory for index testing. In total fifty-nine (59) test pits were excavated, five (5) boreholes were drilled, forty-two (42) areas of bog were probed and twelve (12) anchor pull out tests were performed. In addition, twelve (12) percolation tests were performed at the two (2) proposed campsites. Field logs are included in the corresponding appendices.

Test Pits

Fifty-nine (59) test pits were excavated in representative areas that provided coverage of the anticipated soil conditions along the route, two (2) potential campsite areas and the marshalling yard located near the entrance to the Gull Island site. Of these test pits, ten (10) were excavated in the proposed marshalling area to provide bearing capacity data for laydown of equipment and structures. A further twenty (20) test pits were excavated in the proposed campsite areas, ten (10) at each site. The remaining twenty-nine (29) test pits were excavated along the transmission line route from Gull Island to Churchill Falls. Samples were obtained from these areas and

transported to the project soils laboratory for further analysis. The test pit logs as well as laboratory results are presented in the corresponding appendices.

Boreholes

A total of five (5) boreholes were drilled, one (1) at each of the proposed campsites and three (3) at strategic points along the transmission line route. Samples from the boreholes were shipped to the project soils laboratory in Goose Bay for further testing. Borehole logs as well as laboratory testing results are presented in the appendices and are referenced to the corresponding site.

Bog Probes

Although bog probing was not specifically identified in the original WTO scope, forty-two (42) areas containing bog were identified during the reconnaissance trips that were close to the route and were probed to aid the designers in making decisions on the final routing. Some of the areas had more than one small bog and each bog was reported on individually. The probe results are included in Appendix B.

Anchor Pull Out Tests

Twelve (12) anchor pull out tests were performed along the proposed transmission line route where bedrock outcrops were visible at or just below the ground surface. The rock bolts were installed in bedrock (granite gneiss). The bolts were stressed to determine the ultimate holding capacity of the anchor rod only.

25 mm diameter utility pole rock bolt anchors with the cable eyes removed were used for testing.

The anchors were installed approximately 1.8 m into bedrock in 45 mm diameter drill holes. The anchor shells were 50 mm long and ribbed. The shell was anchored by torquing with a 0.6 m long pipe wrench to refusal. No grout was used as the holding resistance of the anchor in the rock was required.

The testing equipment was calibrated in imperial units and the results were reported in the same units. The anchor was then loaded to two (2) tons (short). Every two (2)

minutes a load of two (2) tons was added until either the anchor failed or the jack had reached its capacity. The test results are included in Appendix B.

5.2.5 Task 5 – Reporting

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

5.2.6 Laboratory Testing

Soil samples were collected from both the test pit and borehole excavations. All samples were stored in sealed plastic sample bags and transported via pickup truck to the project laboratory in Goose Bay for testing. Laboratory results are presented in the appendices, referenced to the corresponding test site.

In addition, further samples were obtained along the route where outcrops of possible construction materials were noted. Seven (7) samples were collected and sent to the project lab for analysis including gradation and Standard Proctor density.

5.3 GEOLOGY

5.3.1 Surficial Geology

The route starts at the proposed switchyard on the Churchill River lowlands. Soil in this area and for the first kilometre of transmission line terrain is expected to be glaciofluvial sediment comprising sand or sand with some gravel overlying fine grained, lacustrine silt and clay. The remainder of the route climbs up into a lowlands terrain dominated by glacial landforms. The terrain comprises gently rolling hills with thin glacial till soils covering much of the countryside.

Eskers are common in the area, often associated with the larger river valleys such as Cache, Wilson and Metchin Rivers.

Bedrock outcrops are abundant in the higher elevations, especially near Churchill Falls and on most hilltops along the route.

5.3.2 Bedrock Geology

The 203 km long transmission line traverses a late paleoproterozoic age geology dominated by crystalline metamorphic rocks composed of granite orthogneiss with some dark mafic material and numerous pegmatite stringers. Bedrock is at or near the surface on the proposed transmission line route at twelve (12) locations as noted in the anchor pull out test logs in Appendix B.

5.4 INVESTIGATION RESULTS

Upon completion of the Air Photo Interpretation (API) and terrain analysis, calculations were made for the type of soil, bog and rock expected along the route. This calculation was further upgraded upon completion of the fieldwork for the project. The quantities may be summarized as follows:

•	Bog lands	16.6%
•	Water	4.4%
•	Bare rock or rock concealed under thin organic soil	4.7%
•	Areas of thin glacially produced soil	62.7%
•	Colluvium	0.8%
•	Fluvial sand	3.1%
•	Fluvial sand and gravel	<u>7.7%</u>
		100.0%

5.4.1 Transmission Line

Twenty-nine (29) test pits, twelve (12) rock anchor pull out tests, three (3) boreholes and forty-two (42) bog probe areas were conducted on the 203 km long route of the proposed transmission line.

Glacial till was the dominant material encountered along the route with relatively thin layers from 0.5 m to > 4.5 m overlying bedrock. Glacial till may be as deep as 16 m as is evidenced in borehole TL-BH-04 located on Drawing # 722850-AC1030-43DD-0008 (Appendix A). This material generally ranges from a sandy gravel to a gravely sand with some cobbles. Bedrock was generally found underlying thin layers of glacial till and near the surface in boggy areas.

Twelve (12) rock anchor pull out tests were conducted along the route where bedrock outcrops were visible. All rock anchors were stressed to an axial load of 18 tons at which point the test was discontinued following overload of the jack. The tests required that each anchor hold without slipping at a load of twelve (12) tons. This requirement was met at all locations.

Fine to medium fluvial sands with trace gravel and trace fines were common near rivers and streams. Silty sands and sands containing some silt were encountered to a lesser degree.

Minor bog lands exist throughout the area; however, the route avoids most of the bogs.

Frost penetration in this area is expected to be 2.5 m based on data from the Canadian Foundation Engineering Manual, 3rd Edition. The susceptibility for frost action in glacial till and marine soil 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 route are presented in the following table:

Table 5-1: Summary of Geotechnical Design Parameters

Soil or Rock Type	Allowable Bearing Capacity kP _a	Ka	Kp	SG	γ kN/m³	γ kN/m ³ submerged	ф Su	Recommended Anchoring Procedure
Fluvial Sand	250	0.33	3.00	NA	18	8	30°	Gravity
Fluvial Sand and Gravel	250	0.31	3.26	NA	19	9	32°	Gravity
Clay/Silt	50*	0.39	2.56	NA	NA	10	25 kPa	Gravity
Glacial Till [undisturbed]	300	0.24	4.20	NA	22	12	38°	Gravity
Submerged Fill in Bogs or Other Wet Areas	100	0.36	2.77	NA	11	9	28°	Gravity
Granite Gneiss	3000	NA	NA	2.6	25	15	45°	Rock Bolts

 K_a , K_p – Rankine Assumptions; SG – Specific Gravity; γ - Unit Weight; ϕ - 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.

5.4.2 Marshalling Yard

The proposed marshalling yard is located near the intersection of the TLH and the entrance to the Gull Island site. The area is relatively flat and has recently been burnt over. Ten (10) test pits were excavated in the area of the marshalling yard. Test pit logs and laboratory results can be found in Appendix C. This area is dominated by glaciofluvial sand with trace amounts of gravel and fines.

A bearing capacity of 250 kPa is recommended for any footing designs in the yard.

5.4.3 Campsites

There are two (2) campsite locations proposed for the project. Ten (10) test pits, one (1) borehole and six (6) percolation tests were performed at each campsite.

Campsite 1

Campsite 1 is located near coordinates 574300 E, 5882900 N (UTM NAD 83) south of the TLH. Geotechnical investigations indicate that the site soil is made up of mostly poorly-graded sand and gravel with some fines. This material is generally made up of sub angular to sub rounded particles, indicating a glaciofluvial origin. Other areas of the site may also contain glacial till and silty sands.

Percolation tests performed at six (6) locations on the site resulted in time (T) less than seven (7) minutes per 25 mm. These results, according to Guidelines for the Design, Construction and Operation of Water and Sewerage Systems by the Department of Environment and Conservation, indicate design application rates for a septic disposal field to be in the order of 0.103 m³/m²/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 this site.

A bearing capacity of 250 kPa is recommended for any footing designs at the campsite.

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 channelled away from the trailers, particularly in areas of high foot traffic.

Should fine grained 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. Ideally, a combination of seeding and mulching should be used. This would depend on the design life of the campsite as vegetation will take a while to become effective.

Based on the test pit logs from the site, cut slopes at 2H:1V are required. If fine grained soils are encountered, cut slopes of 2.5H:1V will be required.

Campsite 2

Campsite 2 is located near coordinates 484350 E, 5920600 N (UTM NAD 83) south of the TLH. Geotechnical investigations indicate that the site soil is made up of mostly glacial till consisting of well graded sand and gravel with some silt to silty sand and gravel. Some areas of the site also contain silt and sand with trace to some gravel. This material is generally made up of sub angular particles, indicating a glaciolfluvial origin. Other areas of the site may also contain glaciofluvial materials.

Percolation tests performed at six (6) locations on the site resulted in a wide range of time (T) from three (3) hours and forty-seven (47) minutes to as low as three (3) minutes for a drop of 50 mm. According to Guidelines for the Design, Construction and Operation of Water and Sewerage Systems by the Department of Environment and Conservation, times of 30 minutes and greater for a fall of 25 mm indicate that the soil is of questionable suitability for a septic disposal field. The soil near percolation test AC1030-CS2-PERC-1 would be considered questionable. The

remaining five (5) percolation tests yielded results generally less than seven (7) minutes per 25 mm drop in water level, corresponding to an application rate of approximately $0.1 \text{m}^3/\text{m}^2/\text{day}$. A septic disposal field could be designed for this site as long as it is located within a region with acceptable percolation results; otherwise imported fill would be required. 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 this site.

A bearing capacity of 300 kPa is recommended for any footing designs at the campsite.

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 channelled away from the trailers, particularly in areas of high foot traffic.

Should fine grained 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. Ideally, a combination of seeding and mulching should be used. This would depend on the design life of the campsite as vegetation will take a while to become effective.

Based on the test pit logs from the site, cut slopes at 2H:1V are required. If fine grained soils are encountered, cut slopes of 2.5H:1V will be required.

5.5 CONSTRUCTION CONSIDERATIONS

5.5.1 Materials

Construction of the line and associated structures will require material for fill and aggregates.

Clean acceptable fill may be found over most of the line in the fluvial soils, near rivers, and thin veneers of glacial till that are abundant over most of the line. Several samples of possible fill sources were taken along the route for indexing. Gradations and proctor values obtained are included in Appendix B, Transmission Line.

5.5.2 Quality Specifications

The quality of construction must be assured. It is suggested that CSA A23.1-00 Concrete Materials and Methods of Construction/Methods of Test for Concrete be followed for any concrete design and the Newfoundland and Labrador Department of Transportation and Works Highways Specifications Book be followed for any road construction.

If grades are such that foundations are required on fill, the fill should be a high quality, well graded material, free from organics, with low fines content and placed at optimum moisture content. Granular B as specified by the Newfoundland Department of Transportation and Works would be acceptable. An alternative to Granular B may be used provided its quality is inspected and approved by qualified personnel 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 on soil which has been proof rolled. The fill must be compacted to 100% of its corrected maximum dry density (ASTM D 698-78). Foundations placed on well compacted, engineered fill, may be designed based on an allowable bearing pressure of 150 kPa, provided its placement is inspected by qualified personnel.

Bog is not suitable for bearing, anchoring or reuse as fill. The bearing capacity of fills submerged in water, such as bog areas, is limited to 100 kPa.

In the case of imported fill for a septic disposal field, high quality, medium grained sand, with a low to medium fines content would be acceptable, provided that percolation tests are also acceptable.

5.6 CLOSURE

This report was prepared for the exclusive use of Hydro for specific application to the project site. The field investigations and analyses were performed using generally accepted geological and engineering practices in accordance with the work plan developed and verbal requests from the client. No other warranty expressed or implied is made. The limitations of this report are attached in Appendix E.

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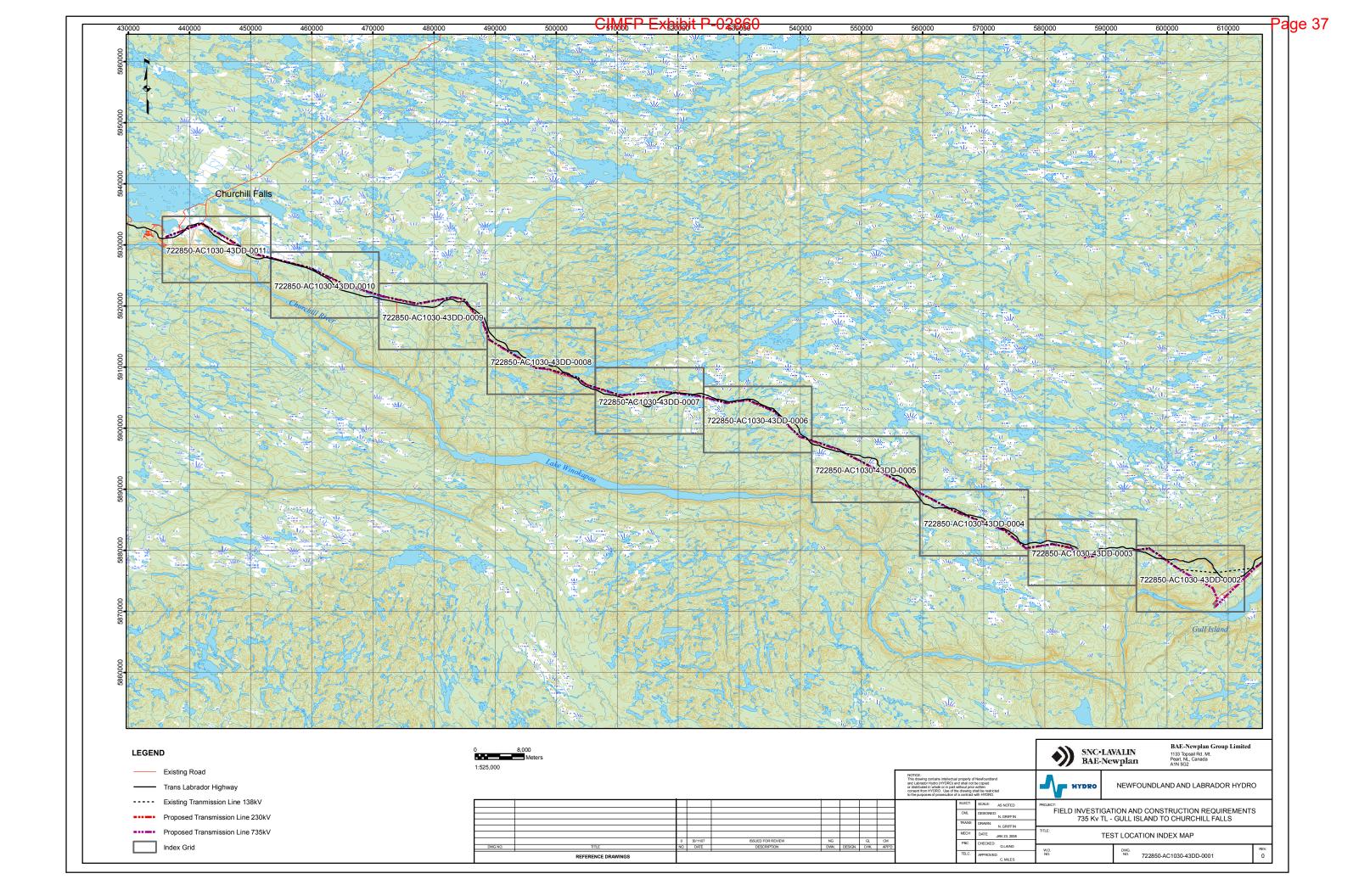
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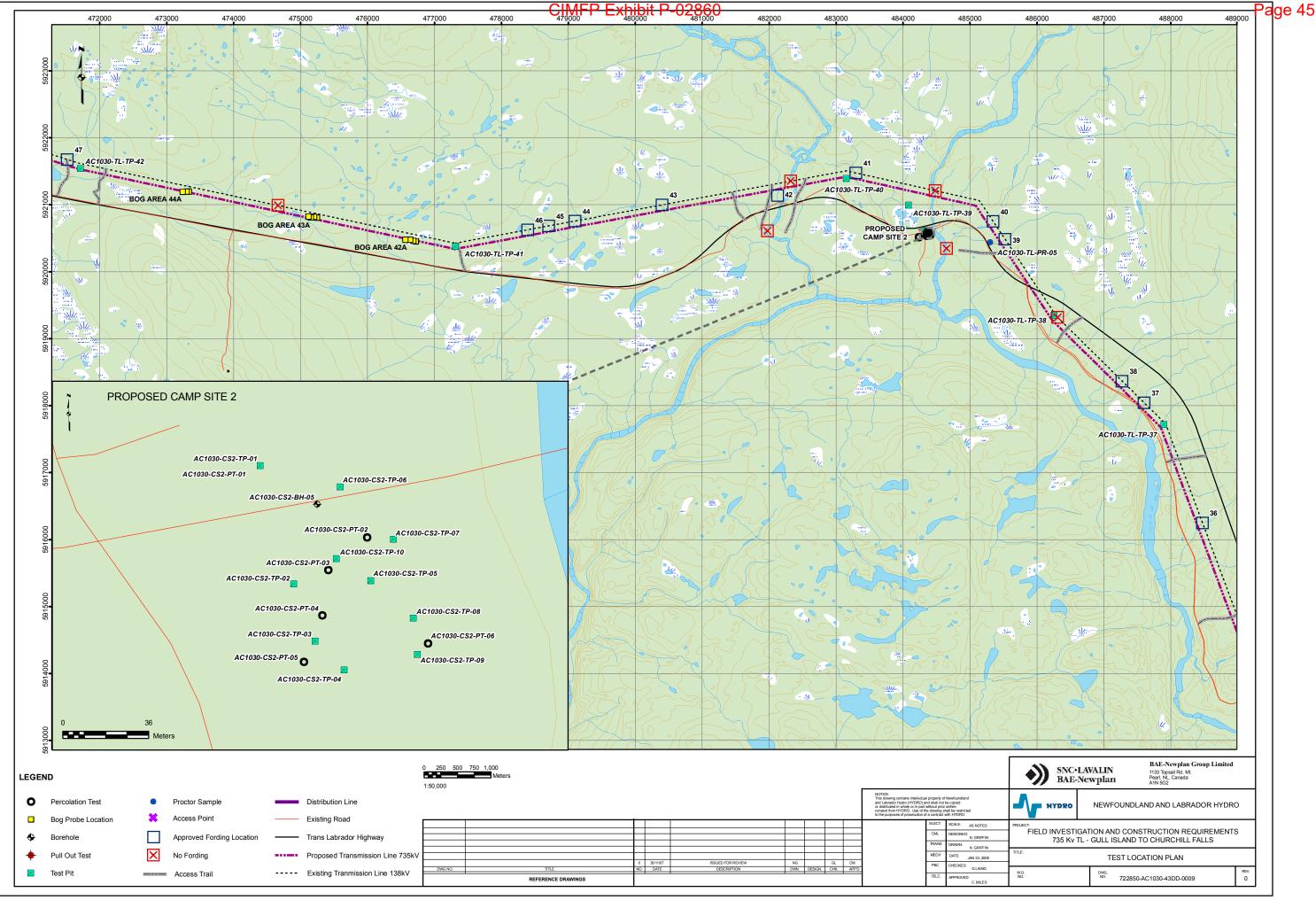
Field Investigation and Construction Infrastructure 735 kV Transmission Line – Gull Island to Churchill Falls

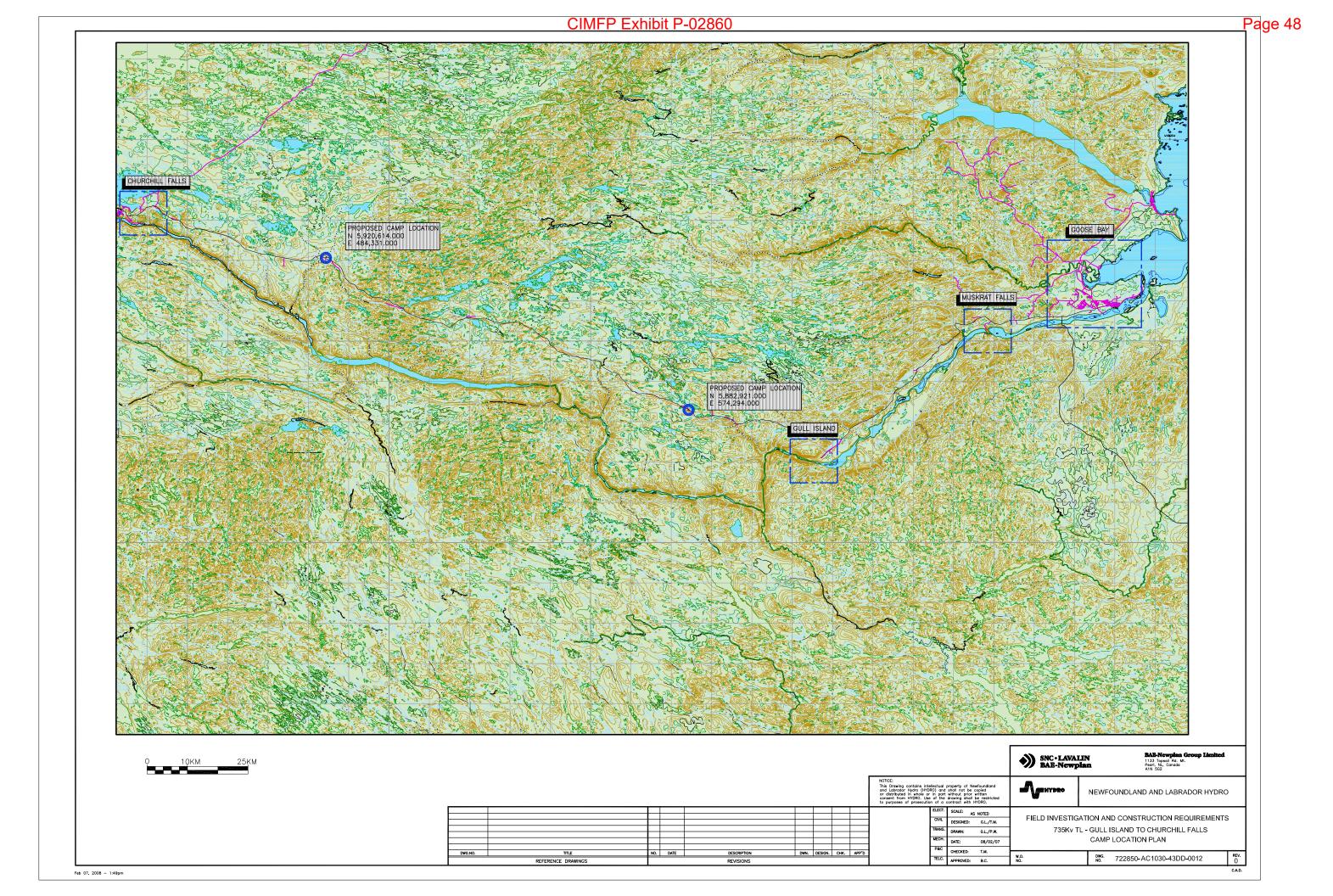
February 2008 Project No. 722850

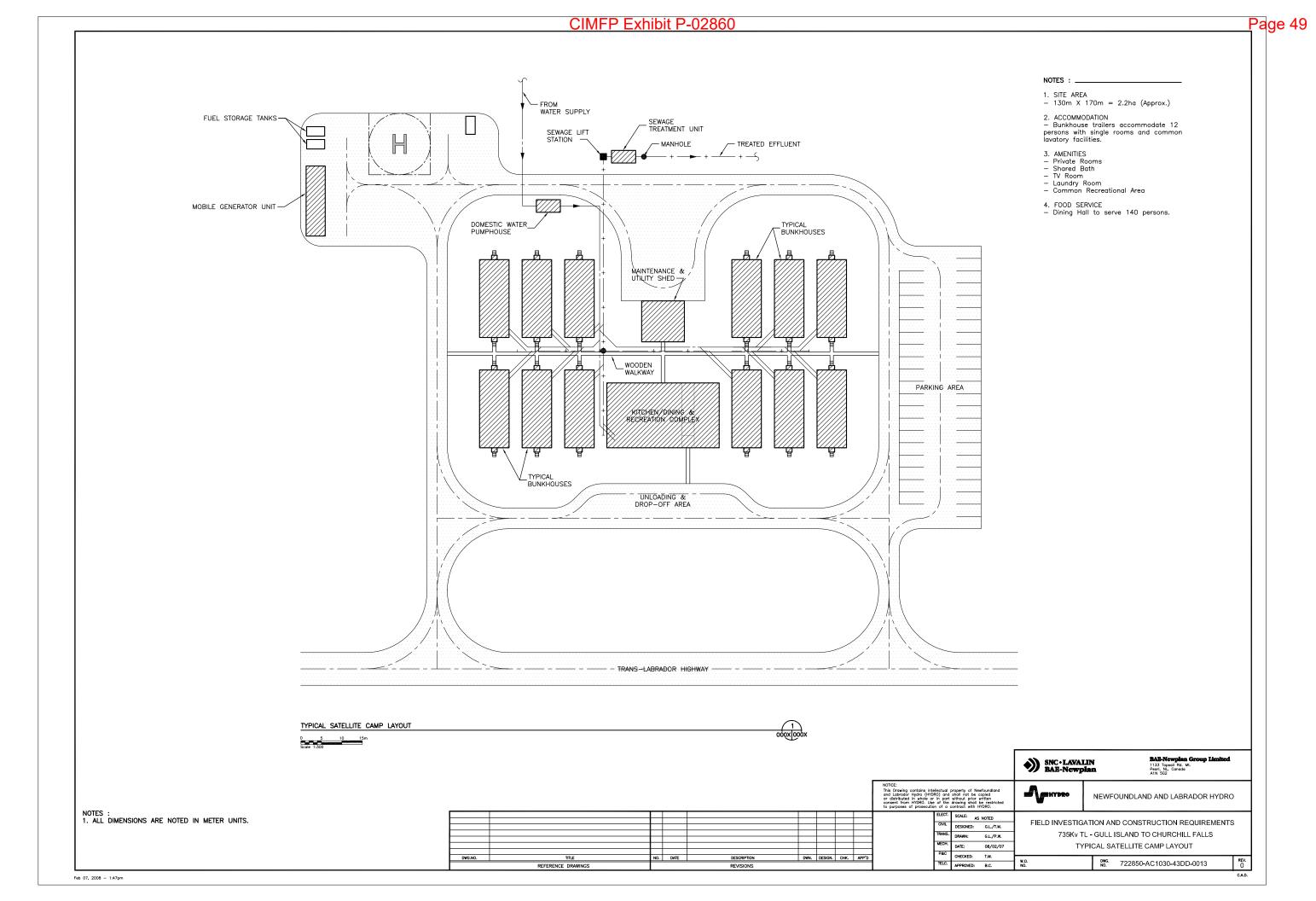
APPENDIX A

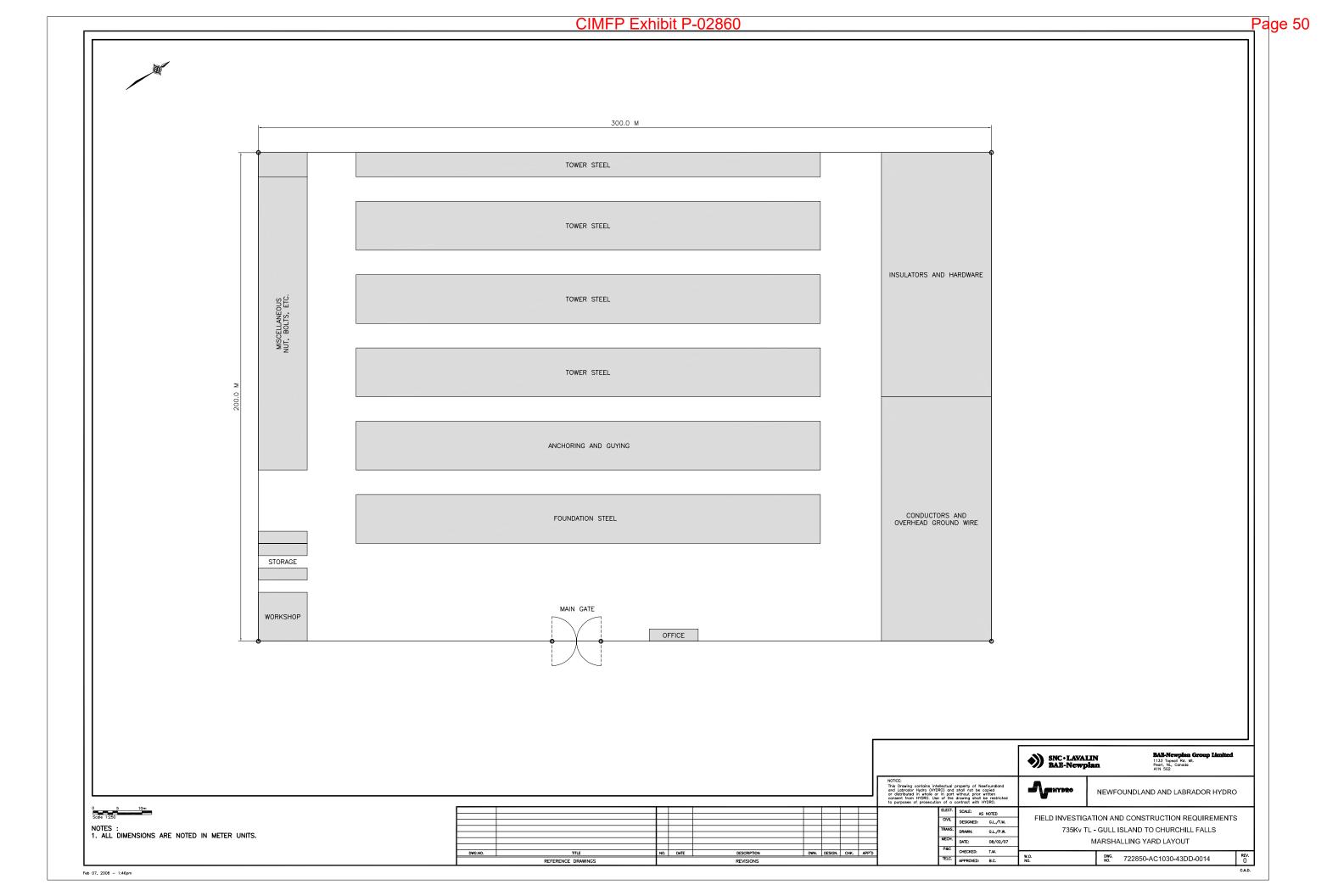
DRAWINGS











Field Investigation and Construction Infrastructure 735 kV Transmission Line – Gull Island to Churchill Falls

February 2008 Project No. 722850

APPENDIX B

TRANSMISSION LINE DATA



Test Pit: AC 1030 - 17										
Firm: Newfoundland and Labrador Hydro Date: 16-Sep-07										
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls									
Contract No. AC 1030 Location: N 5879024 E 0586417 Inspector: Dave Oldford										



		Soil and Groundwate	er Conditions							
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.3	PEAT - blac loose.	k organic soil, rootlets, moist,	NA	NA	NA					
0.3	BEDROCK									
Estimated Cobb	oles (%) 0	Estimated Boulders (%) 0	Estimated Max	Diameter (m): N	NA					
Start Time: 9:2	0 am	End Time: 9:30 am	Estimated Exc Volume (m ³)	avated	NA					
	General Notes									
North and East	North and East coordinates obtained using Garmin Etrex Legend Cx GPS.									
Water under pe	Water under peat layer and on top of bedrock.									

Test Pit: AC 1030 - 18										
Firm: Newfoundland and Labrador Hydro Date: 16-Sep-07										
Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No. AC 1030 Location: N 5878967 E 0586465 Inspector: Dave Oldford										
	Lower Churchill	Newfoundland and Labrador Hy Lower Churchill Project – 735 k\	Newfoundland and Labrador Hydro Lower Churchill Project – 735 kV Transmission Line	Newfoundland and Labrador Hydro Lower Churchill Project – 735 kV Transmission Line – Gull Island to Chu						







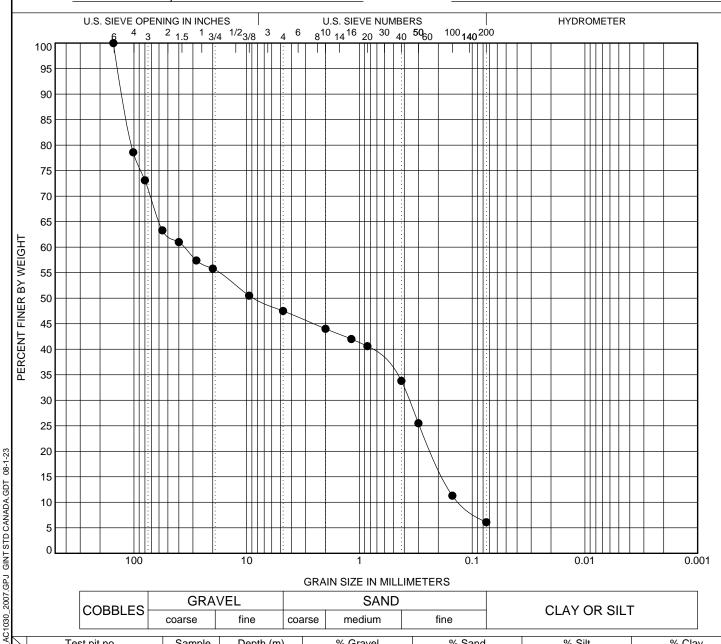
		Soil and Groundwater Condit	ions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1	PEAT - black	organic soil, rootlets, moist, loose.	NA	NA	NA
0.1 - 0.5	Topsoil SAND to compact, po	NA	NA	NA	
0.5 - 2.0		D - trace fines, some cobbles, some graded, subangular, moist, compact,	1	1.0 - 2.0	Grab
Estimated Cobb	les (%) 10 - 20	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m)	0.6
Start Time: 11:0	00 am	End Time: 11:20 am	Estimated Exc Volume (m³)	avated	10
		General Notes	1		
Moderate slough	ning within test p	it.			
North and East of	coordinates obta	ined using Garmin Etrex Legend Cx GF	PS.		

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

eg	Tes	st pit no.		San	nple	D	epth (m)	% G	ravel	% :	Sand		% :	Silt		% Cla	y
•	AC1030-0	18		GE	3-1	1	.00 - 2.00	23	3.8	4	1.4			6	5.1		•
•	1																
•																	
*	-																
* ① / ① 🗷 ▲ ·)																
abla	80 mm	56 mm	40	mm	28 r	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm 0.	075 mm
•	73.1	63.3	61	1.0	57	.4	55.8	50.5	47.5	44.0	40.6	33.	8	25.5	11.3	3	6.1
×	1																
•																	
*																	
•)																
	Tes	st pit no.		·		ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	AC1030-0	18		Co	bbly, C	Gravel	ly SAND with	trace Fines	36.2	0.4	0.1	7.2				0.0	287.2
· •	1																
X * 0																	
*																	
0																	



Test Pit: AC 1030 - 19									
Firm: Newfoundland and Labrador Hydro Date: 16-Sep-07									
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls								
Contract No. AC1030 Location: N 5881316 E 0575755 Inspector: Dave Oldford									





		Soil and Groundwater C	onditions			
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type	
0.0 - 0.2	PEAT - black	organic soil, rootlets, moist, loose.	NA	NA	NA	
0.2 - 0.3		SAND and FINES - rootlets, moist, act, poorly graded, light grey.	NA	NA	NA	
0.3 - 2.5		Poorly Graded GRAVEL with SAND oulders, trace fines, subrounded, pwn.	1	1.0 -2.0	Grab	
2.5 - 4.5	(SP) - some be	Poorly Graded SAND with GRAVEL bulders, some cobbles, trace fines, amp, light grey.	2	3.0 - 4.0	Grab	
Estimated Cobbl	es (%) 20 - 40	Estimated Boulders (%) 10 - 15	Estimated Ma	Estimated Max Diameter (m)		
Start Time: 9:20	am	End Time: 10:00 am	Estimated Ex Volume (m³)	cavated	20	
		General Notes	<u> </u>			

Severe to moderate sloughing within test pit.

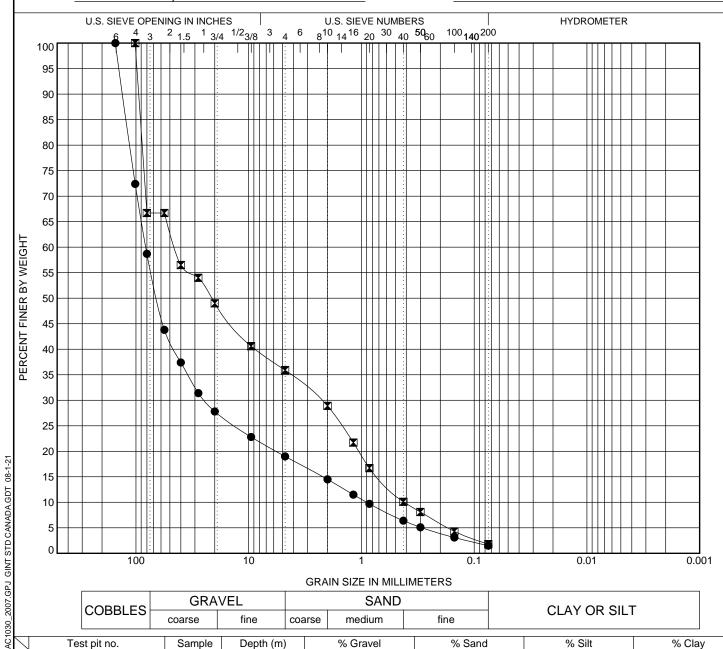
North and East coordinates obtained using Garmin Etrex Legend Cx GPS. Water entering test pit at 4.0 meter mark seeping slowly.

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

۲∟																		
Ž	\bigvee	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	%	Sand		% 5	Silt		% Cla	ıy
	•	AC1030-01	9		GE	3-1	1	.00 - 2.00	3	7.0	1	7.5			1	.5		
ğ I	X	AC1030-01	9		GE	3-2	3	.00 - 4.00	3(0.8	3	4.1	1.8					
DATABASE																		
ᅿ	T																	
┆┞	◁	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.	.075 mm
I KANSMISSION LINE	•	58.7	43.8	37	7.4	31	.4	27.8	22.8	19.0	14.5	9.7	6.4	4	5.1	3.1		1.5
ا ڇ	X	66.7	66.7	56	6.5	54	.0	49.0	40.6	35.9	28.9	16.7	10.	1	8.1	4.3		1.8
2																		
2																		
ŧΓ																		
IESI PII	abla	Tes	t pit no.				ASTN	/ Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
Ű	•	AC1030-01	9		POOF	RLY G	RADE	D GRAVEL w	vith SAND(GF	9) 81.8	24.6	0.9	7.7				8.2	91.2
וֹנֵי	X	AC1030-019 POORLY GRADED SAND with 0				GRAVEL(SF	P) 44.9	2.3	0.4	5.9				0.3	107.5			
SIZEZ																		
Z Z																		
٠.	\rightarrow										1				_		-	



Test Pit: AC 1030 - 20									
Firm: Newfoundland and Labrador Hydro Date: 16-Sep-07									
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls								
Contract No. AC1030 Location: N 5883266 E 0573377 Inspector: Dave Oldford									





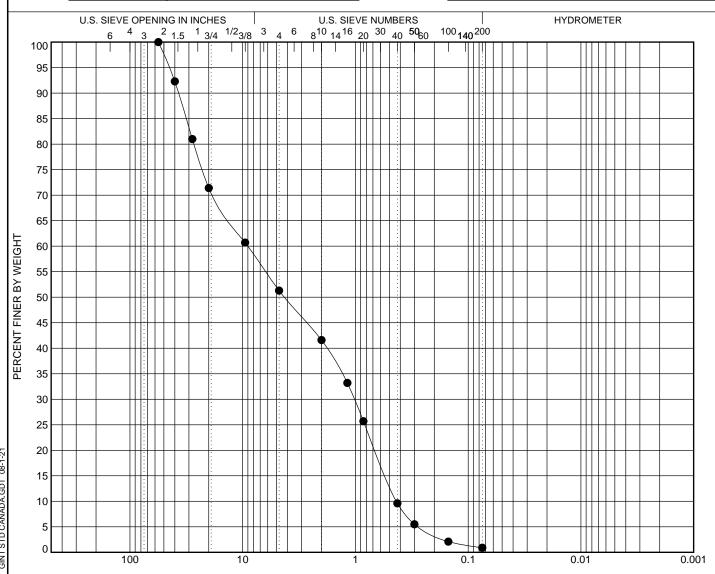
		Soil and Groundwater Cond	itions							
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.2	PEAT - black org	panic soil, rootlets, moist, loose.	NA	NA	NA					
0.2 - 0.6	Topsoil SAND - s graded, damp, lig	some fines, trace gravel, poorly ght brown.	NA	NA	NA					
0.6 - 1.1		VEL - some cobbles, trace fines, well ded, damp, loose to compact, olive	NA	NA	NA					
1.1 - 2.0	Medium SAND - poorly graded, lig	trace fines, loose to compact, moist, ght grey.	NA	NA	NA					
2.0 - 3.0		AND with GRAVEL (SP) - some nes, subrounded, damp, loose to	1	2.0 - 3.0	Grab					
3.0	BEDROCK		NA	NA	NA					
Estimated Cobbl	es (%) 15 - 25	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA					
Start Time: 10:4	2 am	End Time: 11:20 am	Estimated Exc Volume (m³)	avated	15					
General Notes										
Moderate sloughing within test pit.										
Water entering test pit at 2.5 meter depth steady flow.										
North and East of	oordinates obtaine	d using Garmin Etrex Legend Cx GPS	S							

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	20				:			:			Ш'	Ш	:			Ш												
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	40							:				$ \rangle$																
	10																											
	5																											
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									GRA	IN SIZ	F IN	MII	I IM	IFTFR	S													
					GRA\	/EI			J			AND																
		COBBLES	s⊢														1			CLA	Υ (DR	SI	LT	•			
				coars	е	fi	ne	coa	arse	me	diun	n		fi	ne													
V	Te	st pit no.		Sar	nple	D	epth (m	1)		% G	rave	l			% S	and				%	6 Sil	t				Ç	% Cla	у
•	AC1030-0	20		GI	B-1	2	.00 - 3.0	0		48	3.7				50	.4						0.	9					
A													-															
★ ⊙													-															
Ĭ	80 mm	56 mm	40	mm	28 ו	mm	20 m	m	9.52	5 mm	4.7	6 mr	n	2 m	m	0.8	35 m	ım	0.42	5 mm	1 (0.3	mm	ıΤ	0.1	5 mr	n 0.	075 m
•		100.0		2.3	81	.0	71.4	4	60).7	ţ	51.3		41.	6		25.7		9	0.6		5.	.5		2	2.1		0.9
A													\perp								_			_				
*													\dashv						-		+			\dashv			+	
0	То	 st pit no.				ΔΩΤΙΛ	l I Classi	fication	าท			D60		D3	3O	Г	010	1	W	1 1			PL	1	PI		Сс	Cu
•	AC1030-0			POO			D SAND			/EL(SP)	9	,	1			0.4	+	7.9	+-			<u></u>		- 1 1	+	0.3	20.
X					•				2.011	==(0.	+						<u></u>	\top										
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Test Pit: AC 1030 - 21												
Firm: Newfoundland and Labrador Hydro Date: 16-Sep-07												
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line	- Gull Island to Churchill	Falls							
Contract No. AC 1030 Location: N 5883819 E 0572021 Inspector: Dave Oldford												



North and East coordinates obtained using Garmin Etrex Legend Cx GPS. Water entering test pit at 3.5 meter mark, slow trickle.



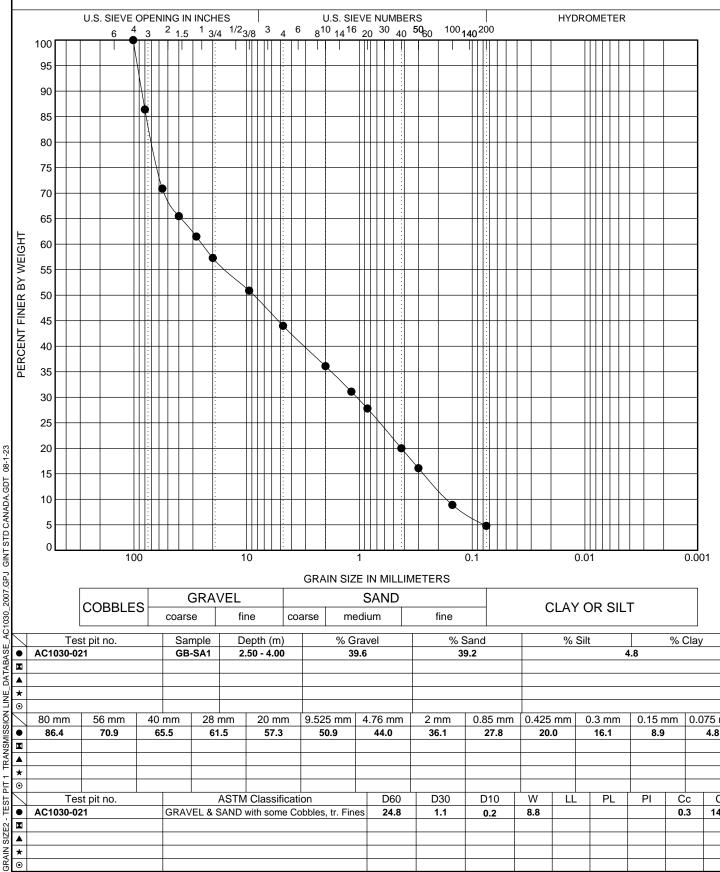
Soil and Groundwater Conditions											
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type						
0.0 - 0.1	PEAT - black org	anic soil, rootlets, moist, loose.	NA	NA	NA						
0.1 - 0.2		ered SAND, some fines, trace subrounded, damp, loose, grey and	NA	NA	NA						
0.2 - 2.0		and COBBLES - some fines, damp, t, well graded, subrounded, light	NA	NA	NA						
2.0 - 2.5	SAND – trace fin	es, moist, loose to compact, grey.	NA	NA	NA						
2.5 – 4.0		and COBBLES - some fines, some loose to compact, well graded, t brown.	1	2.5 – 4.0	Grab						
Estimated Cobbl	es (%) 20 - 30	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m)	1.0						
Start Time: 12:0	0 pm	End Time: 12:38 pm	Estimated Exc Volume (m ³)	avated	18						
		General Notes	•								
Moderate slough	ing within test pit.										

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	Tes	st pit no.		Sar	nple	D	epth (m)	% G	ravel	% \$	Sand		% 5	Silt		% Cla	ay
•	AC1030-02	21		GB-	-SA1	2.	50 - 4.00	39	9.6	3	9.2			4	1.8		
×																	
A																	
•																	
* 0	80 mm	56 mm	40	mm	28 m	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm 0	.075 mm
•	86.4	70.9	6	5.5	61.	.5	57.3	50.9	44.0	36.1	27.8	20.	0	16.1	8.9		4.8
×																	
A																	
*																	
•																	
	Tes	st pit no.			Δ	ASTM	Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	AC1030-02	21		GRAV	EL & S	AND 1	with some Co	bbles, tr. Fin	es 24.8	1.1	0.2	8.8				0.3	148.9
· ·																	
X A																	
★																	
•																	



Test Pit: AC 1030 - 22												
Firm: Newfoundland and Labrador Hydro Date: 16-Sep-07												
Project:	Lower Churchill I	Project – 735	5 kV Transmission Line -	- Gull Island to Churchi	l Falls							
Contract No. AC 1030 Location: N 5886412 E 0565189 Inspector: Dave Oldford												





		Soil and Groundwater Con-	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1	PEAT - black or	ganic soil, rootlets, moist, loose.	NA	NA	NA
0.1 - 0.5		some FINES, rootlets, moist, loose to graded, orange to light brown.	NA	NA	NA
0.5 – 4.0		AND - some cobbles, trace gular to subrounded, wet, compact, y.	1	3.0 - 4.0	Grab
Estimated Cob	obles (%) 20 - 30	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m) 0	0.6
Start Time: 1:	45 pm	End Time: 2:10 pm	Estimated Exca Volume (m³)	vated	18
		General Notes	•		•
Moderate slou	ghing within test p	it. Test pit was dry upon completion.			
North and Eas	t coordinates obta	ined using Garmin Etrex Legend Cx GF	PS	·	

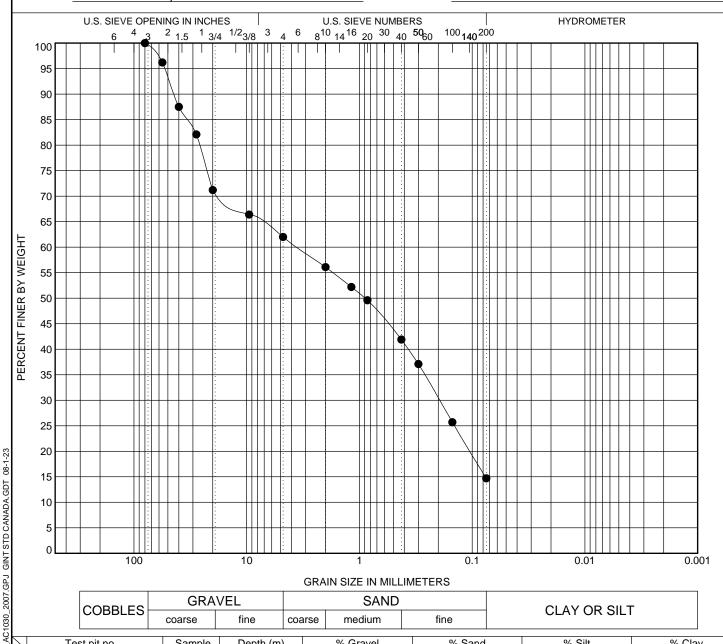
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CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE	ΙN	MILL	.IME	TERS
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COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

₹┝	_								_									
	V	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	% 9	Sand		% :	Silt		% C	lay
Ž	•	AC1030-02	2		GE	3-1	3	.00 - 4.00	37	7.3	4	7.3			14	4.7		
	I																	
1	A																	
4	*																	
0	9																	
[[]	J	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm	0.075 mm
	•	100.0	96.2	87	7.5	82	.1	71.2	66.4	62.0	56.1	49.6	41.	.9	37.1	25.7	7	14.7
	I																	
4	A																	
1 4	*																	
: [9																	
	$\sqrt{}$	Tes	t pit no.				ASTM	l Classificati	on	D60	D30	D10	W	LL	PL	PI	Co	Cu
•	•	AC1030-02	2		S	AND a	nd GF	RAVEL with so	ome Fines	3.5	0.2		6.7					
1	I																	
	A																	
· [7	*																	
9	э																	



Test Pit: AC 1030 - 23												
Firm: Newfoundland and Labrador Hydro Date: 17-Sep-07												
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls							
Contract No. AC1030 Location: N 5889949 E 0558459 Inspector: Dave Oldford												





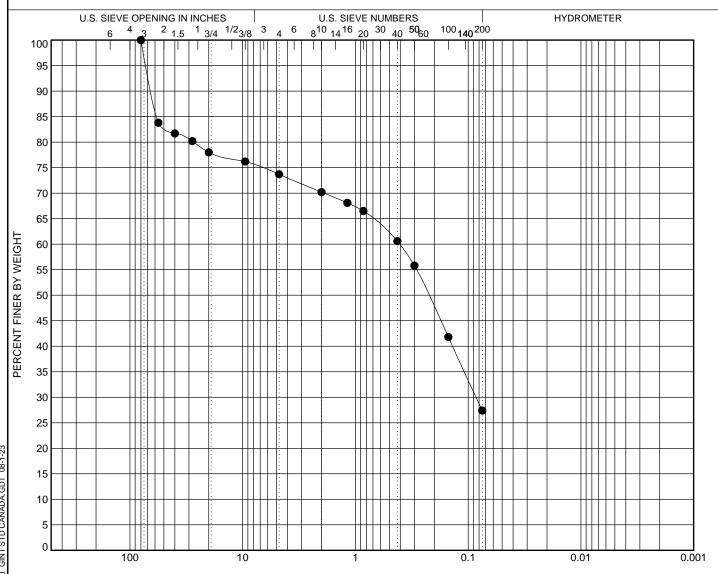
		Soil and Groundwater Cor	nditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.3		D - some fines, trace cobbles, np, loose to compact, well graded to l, light brown.	NA	NA	NA
0.3 - 4.0		SAND - some cobbles, trace st, compact, light grey.	1	3.0 - 4.0	Grab
Estimated Cobbl	es (%) 5 - 15	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m)	0.6
Start Time: 12:4	5 pm	End Time: 1:10 pm	Estimated Exc Volume (m³)	avated	18
		General Notes	1		
Slight sloughing	within test pit.	Test pit was dry upon completion.			
North and East c	oordinates obta	ained using Garmin Etrex Legend Cx G	SPS.		

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	20					1: 1													
	15			1 :		† †								+	H	H			
	10																		
	5									:									
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							GRAIN SIZ	E IN MILLII	METERS										
		COBBLES		GRAVE	EL			SAND				(CLAY	, OE		п т			
		COBBLES	coars	se	fine	coa	irse me	edium	fine				LAI	- Or		L			
		st pit no.	Sa	mple	Depth (n			ravel		Sand			% \$	Silt				% C	lay
•	AC1030-0	23	G	iB-1	3.00 - 4.0	00	2:	3.4		46.3						27	.4		
A																			
*																			
⊙		T 50	10				0.505	4.70		100		10.405					0.45		0.075
\geq	80 mm		40 mm	28 mn			9.525 mm	4.76 mm	2 mm	_	5 mm	0.425	_		mn	n	0.15		0.075 n
•	100.0	83.8	81.7	80.2	78.	.0	76.2	73.7	70.2	6	6.5	60	.6	5	5.8		41.	8	27.4
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<u>*</u>		+ +		+	+					+-						\dashv			
Ť	Te	st pit no.		AS	STM Class	ification	on	D60	D30	D	10	W	LL		PL		PI	Cc	С
•	AC1030-0		S	ilty, Grave	elly SAND w	ith tra	ce Cobbles	0.4	0.1			6.7		\top					
					•														
A																			
*																			
⊙																			



Test Pit: AC 1030 - 24												
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 17-Sep-07							
Project:	Lower Churchill F	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls							
Contract No. AC1030 Location: N 5893137 E 0552524 Inspector: Dave Oldford												





Soil and Groundwater Conditions												
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type						
0.0 – 0.5	PEAT - Dark I loose.	orown organic soil, rootlets, n	noist,	NA	NA	NA						
0.5 - 0.7	Sandy GRAV compact, wet,	EL - trace fines, wet, loose to grey.	ı	1	0.5 - 0.6	Grab						
0.7	BEDROCK											
Estimated Cobble	es (%) 20 - 30	Estimated Boulders (%) 1 -	5	Estimated Max	Diameter (m)	0.6						
Start Time: 2:45	pm	End Time: 3:10 pm		Estimated Exc Volume (m ³)	avated	1.5						
		General	Notes									

Moderate sloughing within test pit.

Another Test pit was done approximately 30 m away and the same results where obtained. North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

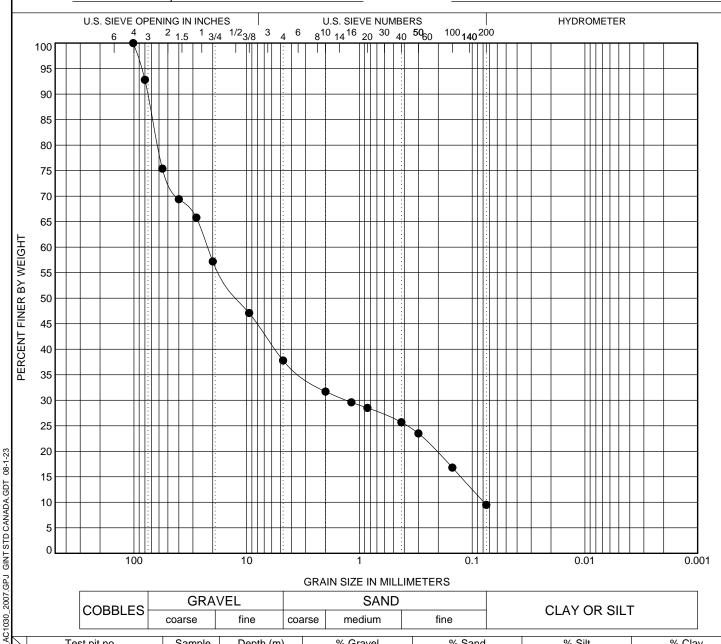
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line

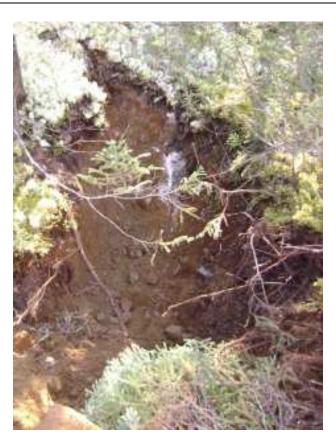


CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

	Tes	st pit no.		San	nple	D	epth (m)	% G	ravel	% \$	Sand		% 5	Silt		% Cla	y
•	AC1030-02	24		GE	3-1	0	.50 - 0.55	5′	1.9	2	8.3			9	9.5		•
•																	
*																	
*																	
\leq	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.	075 mm
•	92.8	75.4	69	9.4	65	.8	57.2	47.1	37.8	31.7	28.5	25.	7	23.5	16.8	3	9.5
X																	
•																	
*																	
•																	
$\overline{}$	Tes	st pit no.			-	ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	AC1030-02	24		Sand	y GRA	VEL v	vith some col	bles, tr. Fine	s 22.3	1.3	0.1	14.4				1.0	283.7
X * 0																	
*																	
0																	



Test Pit: AC 1030 - 25												
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 18-Sep-07							
Project:	Lower Churchill F	Project – 73	5 kV Transmission Line	- Gull Island to Churchill	Falls							
Contract No. AC1030 Location: N 586479 E 0546263 Inspector: Dave Oldford												





		Soil and Groundwater Cor	nditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.2	PEAT - Dark b loose.	prown organic soil, rootlets, moist,	NA	NA	NA
0.2 - 0.5		EL and COBBLES - some fines, boulders, well graded, moist to wet, brown.	1	0.2 - 0.5	Grab
0.5	BEDROCK		NA	NA	NA
Estimated Cobble	es (%) 5 - 15	Estimated Boulders (%) 10	Estimated Max	Diameter (m) 0	0.6
Start Time: 9:56	am	End Time: 10:10 am	Estimated Exca Volume (m³)	vated	1.0
		General Notes			

Mo sloughing.

Another Test pit was done approximately 5 m away and the same results where obtained.

Water present in other test pit, where soil and bedrock meet.

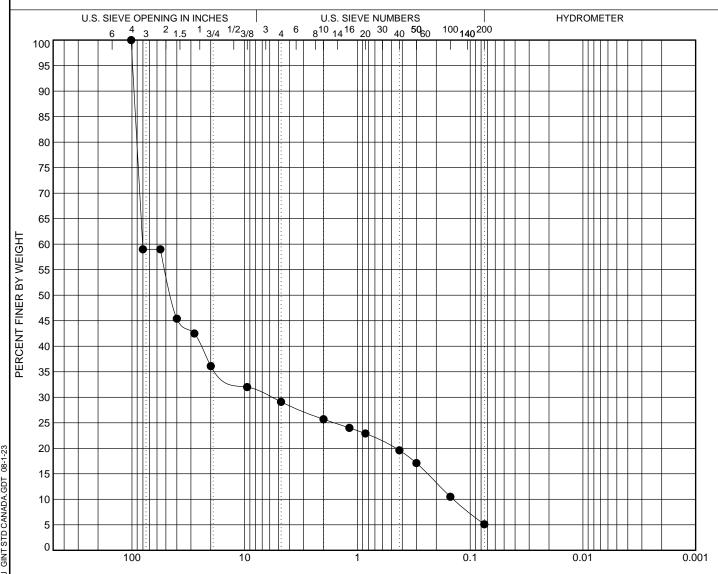
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

က	20 -			<u> [: </u>		1		Ш	:				Ш	\mathbb{N}	_			4						Ш	Ш					4	
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	AC10:		st pit no. 25			mple B-1		epth . 20 -				% G	rave).9				% S	sano 4.0	<u>a</u>				% \$	SIIT			 5.1		% CI	ay	
DATABASE			<u></u>																												
LINE @															_																
S C	80 m	m	56 mm	40	mm	28	l mm	20) mr	n	9.525	mm	4.7	6 mr	n l	2 m	m	0.	85 n	nm	0.4	25 r	nm	0.	3 m	ım	0.	15 m	m C	0.075	5 mm
¶SS		0	59.0	4	5.4	42	2.5	:	36.1		32		2	9.1	T	25.	7		22.9)	_	19.6	_		17.1			10.5		5.	1
TRANSMISSION LINE										_					_																
1 4															+																
PIT 1										\dashv					+																
TS			st pit no.				ASTM							D60		D3		ı	D10		W		LL		PI	L	Р	1	Сс	-	Cu
₽ •		30-02	25		Gra	velly, S	andy (COBE	BLES	S with	n trace	Fines		80.5	5	5.	9		0.1	\perp	16.3	3		4					3.1	5	572.0
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S Z	- r																							+						+	
GRAIN																								\top							



Test Pit: AC 1030 - 26													
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 18-Sep-07								
Project:	Lower Churchill F	Project – 73	5 kV Transmission Line	- Gull Island to Churchill	Falls								
Contract No.	Contract No. AC1030 Location: N 5898601 E 0539791 Inspector: Dave Oldford												



		Soil and Groundwater Cond	litions							
Depth (m) From - To		Description	Sample ID. Sample Depth (m)							
0.0 - 0.1	PEAT - Dark b loose.	prown organic soil, rootlets, moist,	NA	NA	NA					
0.1 - 0.5		AND - some fines, gravel, moist, loose otlets, moist, compact, poorly graded.	1	0.1 - 0.5	Grab					
0.5 - 0.6	BEDROCK an	d fractured bedrock pieces.	NA	NA	NA					
Estimated Cobble	es (%) 5 - 15	Estimated Boulders (%) 1 - 5	Estimated Max Diameter (m) 0.6							
Start Time: 10:2	0 am	End Time: 10:30 am	Estimated Exc Volume (m³)	0.8						
		General Notes								
No sloughing.										
No gradation and	alysis was done	on sample because it was mostly topso	il.							
North and East c	oordinates obta	ined using Garmin Etrex Legend Cx GP	S.							

Test Pit: AC 1030 - 27											
Firm:	Newfoundland and Labrador Hydro Date: 18-Sep-07										
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	Location:	N 5901291	E 0537168	Inspector: Dave Oldford						







Soil and Groundwater Conditions

Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.2	PEAT - Dark to loose.	prown organic soil, rootlets, moist,	NA	NA	NA
0.2 - 0.3		O - some fines, gravel, rootlets, act, poorly graded, light grey.	NA	NA	NA
0.3 - 1.2	trace boulders	fines, trace gravel, trace cobbles, s, gravel, subangular, moist, rly graded, light brown.	1	0.5 - 0.6	Grab
1.2	BEDROCK		NA	NA	NA
Estimated Cobble	es (%) 1 - 5	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m)	0.6
Start Time: 11:4	5 am	End Time: 12:00 pm	Estimated Exc Volume (m³)	5	

General Notes

No sloughing.

This test pit was dug 5 meters north of transmission line. Could not get to the 85 m offset, due to wetlands

The third picture is taken from where test pit should have been dug. Soil appears to be similar on both sides of the wetland. Bedrock outcrop present and visible from where test pit should be.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

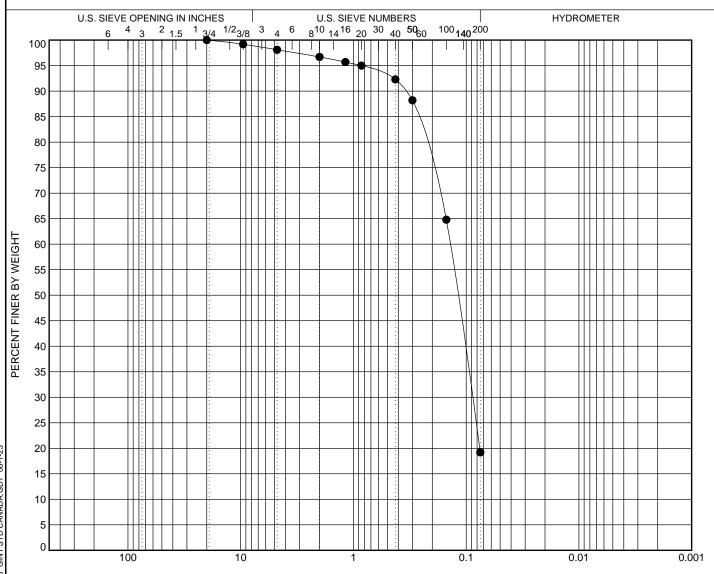
Water present at 1.0 m slow trickle.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE I	N MILL	.IMETERS
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COBBLES	GRA	VEL		SAND		CLAY OR SILT
	coarse	fine	coarse	medium	fine	CLAT OR SILT

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GPJ									GRA	AIN SIZ	ΈIN	MIL	LIN	IETERS													
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1030		OODDEL		coars	e	fir	ne		coarse	me	diun	n		fine								<u> </u>					
11 \							oth (m) % Gravel					Sand							\Box		% C	lay					
DATABASE	110100	027		GI	B-1	0.	50 - 0.55 1.9					7	78.9					1	19.2								
DAT/	+																										
TRANSMISSION LINE.	80 mm	56 mm	40	mm	28 r	mm	20	mm	9.52	25 mm	4.7	6 m	m	2 mm	0.	85 m	nm	0.425	mm	0	.3 m	ım	Т0.	15 n	nm	0.07	75 mm
■ NISSI								0.0		9.2		8.1		96.7		95.0		92.3		_	88.2		_	64.8			9.2
ANSN																							┿				
																							+				
TEST PIT 1																											
TEST		Test pit no. ASTM Classi 030-027 SAND with some Fine					ravol		D6		D30 0.1		D10		W 23.0	LL	.	Р	<u>L</u>	P	Pl	C		Cu			
-		021			SAIND V	VILIT SO	IIIE FII	162,	liace G	avei		0.		0.1				23.0				-				+	
SIZE																											
GRAIN SIZE2	_										_				+		+			\dashv			_			\dashv	
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Test Pit: AC 1030 - 28											
Firm:	Date: 18-Sep-07										
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	C1030 Location: N 59		E 0535714	Inspector: Dave Oldford						



North and East coordinates obtained using Garmin Etrex Legend Cx GPS



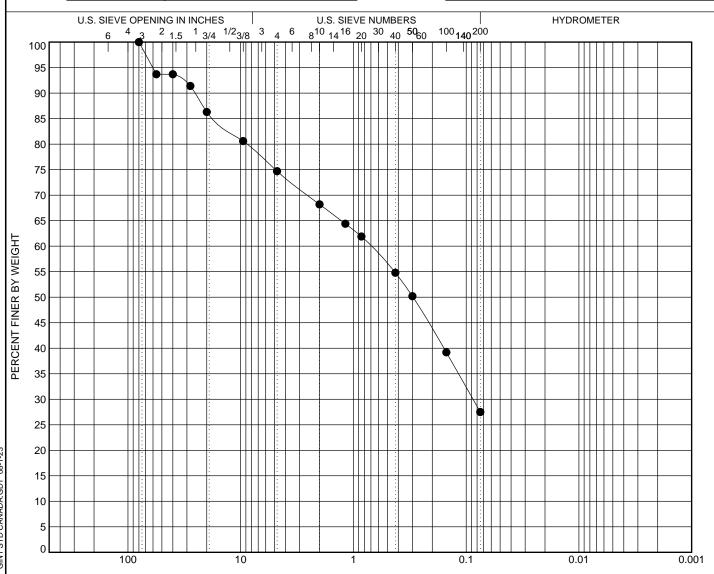
		Soil and Groundwater Co	nditions						
Depth (m) From - To		Description	Sample ID.	Sample Type					
0.0 - 0.1	PEAT - Dark loose.	brown organic soil, rootlets, moist,	NA	NA NA					
0.1 - 0.3	Topsoil, some compact mois	e fines, rootlets, moist, loose to st.	NA	NA NA					
0.3 - 1.0		Sand - wet, loose to compact, light oulders (pieces of broken	1	0.3 - 1.0	Grab				
1.0	BEDROCK		NA	NA	NA				
Estimated Cobbl	es (%) 5 - 15	Estimated Boulders (%) 1 - 5	Estimated Max Diameter (m) 1.2						
Start Time: 12:4	5 pm	End Time: 1:02 pm	Estimated Exc Volume (m³)	1.2					
		General Notes	•		•				
No sloughing wit	hin test pit.								
Trace water flow	ing between pe	at layer and topsoil.							

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



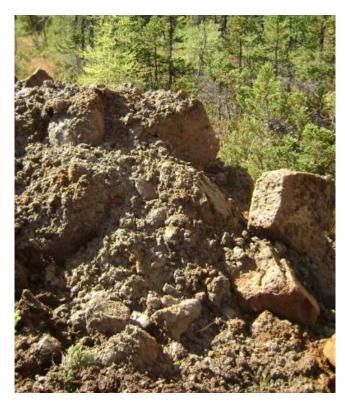
COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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						(GRAIN SIZ	E IN MILLIN	METERS												
		CODDITO		GRAVE	EL			SAND				>1 A \/	OD (эн т							
		COBBLES	coa	rse	fine	coai	se me	edium	fine			JLAY	OR S	SILI							
J	Te	st pit no.	S	ample	Depth (m	1)	% G	ravel	%	Sand		% \$	Silt			% Cla	ay				
•	AC1030-0	28	(GB-1	0.30 - 1.0		24	1.2		47.2	2		27	.5							
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\searrow	80 mm	56 mm	40 mm	28 mn			9.525 mm	4.76 mm	2 mm	0.85 m			0.3 m	_	0.15 r		.075 n				
•	100.0	93.7	93.7	91.4	86.	3	80.6	74.7	68.2	61.9	54	.8	50.2	2	39.2	2	27.5				
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0	To	st pit no.	1	Λς	 STM Classi	ificatio		D60	D30	D10	Tw		Р		PI	Cc	C				
					lly SAND w			0.7	0.1	1010	10.4		F	-+	1.1	- 00	+ -				
.	∆ C1030-0			Jiney, Grave	ily Ochro W	iiii iido	c oonnies	0.7	 0.1		10.4			-			-				
•	AC1030-0	20														1					
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	Test Pit: AC1030 - 29													
Firm: Newfoundland and Labrador Hydro Date: 18-Sep-07														
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls													
Contract No. AC1030 Location: N 5904621 E 0531330 Inspector: Dave Oldford														





		Soil and Groundwater Condit	tions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.5		o dark brown, organic soil, rootlets, ne cobbles, subrounded.	NA	NA	NA
0.5 - 2.0		SAND – trace cobbles, trace boulders poorly graded, angular, light grey.	1	1.0 - 2.0	Grab
2.0	BEDROCK		NA	NA	NA
Estimated Cobbl	es (%) 10 - 15	Estimated Boulders (%) 5 - 10	Estimated Max	Diameter (m)	0.6
Start Time: 1:40	pm	End Time: 2:00 pm	Estimated Exc Volume (m ³)	avated	6
		General Notes	•		
No sloughing.					

Trace water flowing at bottom of topsoil at 0.5 m.

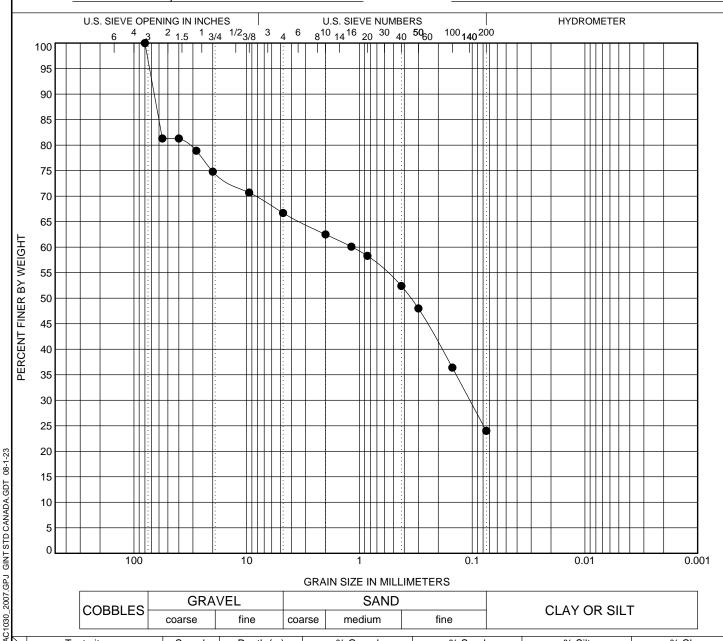
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRI ES	GRA	VEL		SAND		CLAV OD SILT
CODDLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

ă,	$ egthinspace{1.5em} olimits = 1.5em of the context of the contex$	Tes	t pit no.		Sam	nple	D	epth (m)	% G	ravel	% :	Sand		% Silt % Clay				ay
DATABASE	•	AC1030-02	9		GB	3-1	1	.00 - 2.00	29	9.9	4	2.7			2	4.0		
ΑB	X																	
ď.	A																	
٣Ľ	*																	
TRANSMISSION LINE	⊚																	
اِيَّ	\bigvee	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm C).075 mm
SE L	•	100.0	81.3	8′	1.3	78	.9	74.8	70.7	66.7	62.5	58.3	52.	4	48.0	36.4	ı	24.0
SS I	X																	
Ž.	A																	
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ΞĿ	⊚																	
<u>.</u>	\bigvee	Tes	t pit no.			- 1	ASTM	l Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
- IESI PII 1	•	AC1030-02	.9		Gra	avelly,	Silty S	SAND with tra	ce Cobbles	1.2	0.1		10.1					
E2	X																	
SIZ	▲																	
RAIN SIZE2 -	*																	
Ŷ.	ച																	

	Test Pit: AC 1030 - 30													
Firm: Newfoundland and Labrador Hydro Date: 18-Sep-07														
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls													
Contract No.	Contract No. AC1030 Location: N 5904099 E 0527900 Inspector: Dave Oldford													





	Soil and Groundwater Conditions												
	_	Soli and Groundwater Con	aitions		T								
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type								
0.0 - 0.1	PEAT - Dark I loose.	prown organic soil, rootlets, moist,	NA	NA									
0.1 - 0.3		veathered sand, some rootlets, some poorly graded, light brown.	NA	NA	NA								
0.3 - 3.0	boulders, dam	SAND - some cobbles, trace ip, compact, well graded, till like ingular, light grey.	1	1.0 – 3.0	Grab								
3.0	BEDROCK		NA	NA	NA								
Estimated Cobbl	es (%) 15 - 25	Estimated Boulders (%) 5 -10	Estimated Max	Diameter (m)	1.0								
Start Time: 2:25	pm	End Time: 2:40 pm	Estimated Exc Volume (m³)	avated	8								
		General Notes	•										

Slight sloughing within test pit. Test Pit was dry upon completion.

At 3.0 m either bedrock or large boulders, could not dig any deeper.

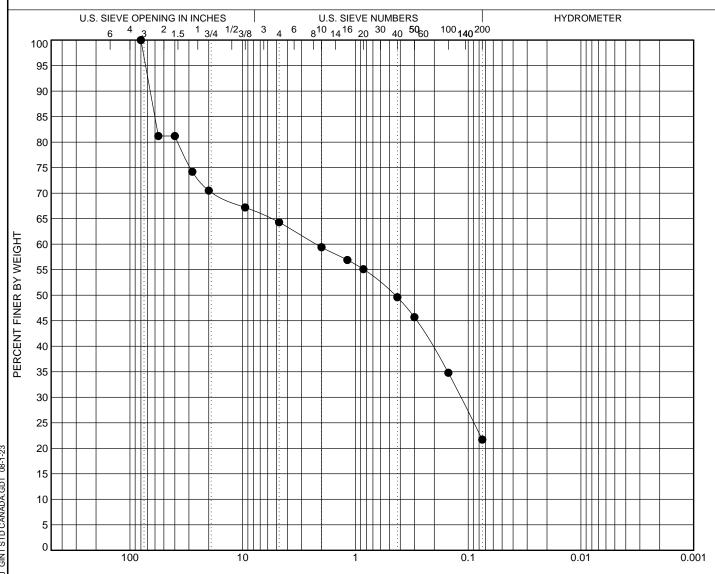
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE II	N MILL	.IMETERS
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COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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	15								Ш	11:1			111	:					Ħ		1			1	
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		COBBLES	coars	se	fine	cc	oarse	me	dium		fi	ne					JLA			OIL	. I 				
		est pit no.		mple	Depth				ravel			% S					%	Silt					% (Clay	
•	AC1030-0	30	G	B-1	1.00 - 3	.00		32	2.3			42	.6		21.7										
A																									
*																									
0	80 mm	56 mm	40 mm	28 mr	m 20	mm	0.52	.5 mm	1 76	3 mm	2 m	m	Λ 0	5 m	m	0.425	5 mm		3 m	am.	\top_{0}	.15 r	mm	0.07	75 r
•	100.0	81.2	81.2	74.2		0.5		7.2		4.3	59.			55.1	1111	49		_	45.		+	34.			21.7
	100.0	01.2	01.2	74.2		0.0	+ -			1.0	- 55	•		JJ. 1		70			70.	<u> </u>	+-	54.			- 1 - 7
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*																					+				
•																					\top				
J	Te	est pit no.		AS	STM Clas	sifica	tion			D60	D:	30	D	10	Π'	W	LL	.	Р	L	T	ΡI	С	С	С
•	AC1030-0		G	ravelly, Si	ilty SAND	with tr	ace Co	bbles		2.2	0.	.1				10.1									
A																									
*																					\perp				
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	Test Pit: AC 1030 - 31													
Firm: Newfoundland and Labrador Hydro Date: 19-Sep-07														
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls													
Contract No.	Contract No. AC1030 Location: N 5905300 E 0523294 Inspector: Dave Oldford													





		Soil and Groundwater Cond	itions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1	PEAT - Dark b loose.	rown organic soil, rootlets, moist,	NA	NA	NA
0.1 - 0.5		AND - some fines, gravel, moist, loose otlets, moist, compact, poorly graded.	NA	NA	NA
0.5 - 0.6		d SILT - some fines, compact, moist, greenish grey.	NA	NA	NA
0.6 - 3.5		I SAND (SP) - moist, trace avel, trace cobbles, brown.	1	3.0	Grab
Estimated Cobbl	Estimated Cobbles (%) 1- 10 Estimated Boulders (%) 0		Estimated Max	Diameter (m)	NA
Start Time: 9:15	am	End Time: 9:40 am	Estimated Exc Volume (m³)	avated	10

General Notes

Severe sloughing throughout.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

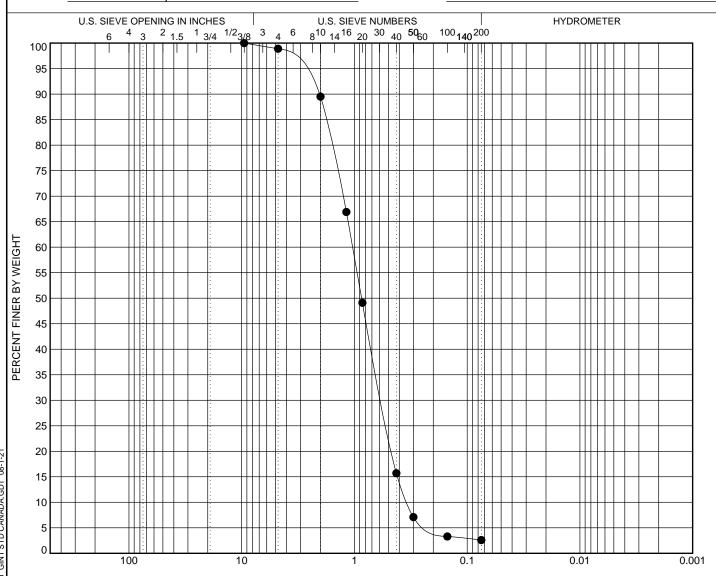
Water at 0.5 m entering freely, steady flow. Bottom of hole had about 1.5 m of saturated sand.

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

08-1-21	20			:					1						1																
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11.			st pit no.			nple		epth				% G		el				San	d				%	Silt					%	Clay	i
S	● AC	1030-03	31		GI	3-1	3.	00 - :	3.50)		1	.1				9	6.3									2.6				
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	*																														
ONL) mm	56 mm	40	mm	28 ו	mm	20) mn	n s	9.52	5 mm	4.7	76 n	nm	2 n	nm	0.	.85	mm	0.4	125	mm	0	1 8.0	mm	Τ.	0.15	mm	0.0	75 mm
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	•																										Ţ				ı
	● AC	Tes 1030-03	st pit no.				ASTM RLY G					١			60 1	_	30 . 6		D10	_		$\overline{}$	LL	-	F	PL		PI	_	Cc).9	Cu 3.1
		1030-03) i			PUU	KLI C	IKAL	ט⊒ט	SAINL	J(3P)					.0		0.3		13.								+	J. 9	3.1
SIZE2 -	A																														
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			Test Pit: AC 1030	- 32	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 19-Sep-07
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls
Contract No.	AC1030	Location:	N 5905964	E 0517518	Inspector: Dave Oldford



Moderate to slight sloughing near 1 m where water enters.

Very hard to dig through.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

Water at 1 m steady flow as bottom of hole is just about full by the time the bucket gets back in hole.



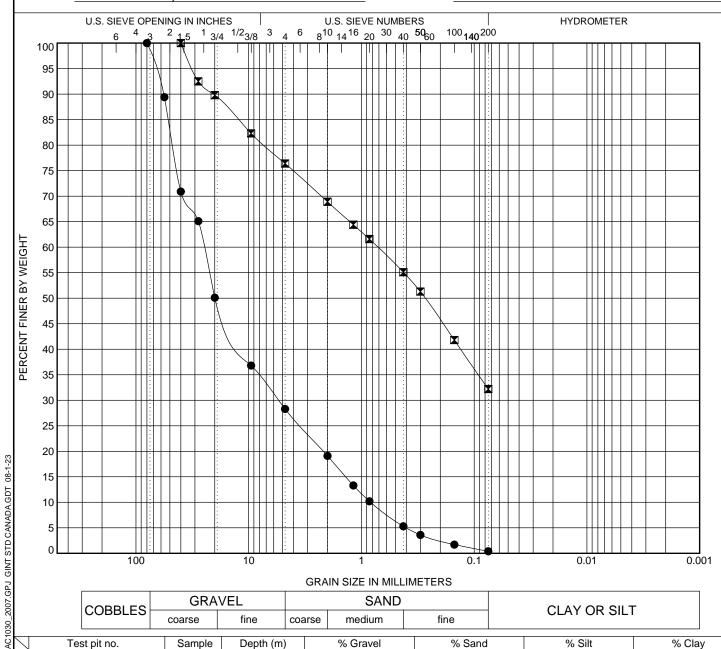
		Soil and Groundwater Conditi	ions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1	PEAT - Dark b	rown organic soil, rootlets, moist, loose.	NA	NA	NA
0.1 - 0.3		AND - some fines, gravel, moist, loose otlets, moist, compact, poorly graded.	NA	NA	NA
0.3 - 2.5		RAVEL with SAND (GW) - trace fines, subrounded, moist, compact, dark	1	0.3 - 2.5	Grab
2.5 - 3.5		SAND - some cobbles, subrounded, t, well graded, light grey.	2	2.5 – 3.5	Grab
Estimated Cobble	es (%) 15 - 25	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 10:55	5 am	End Time: 11:20 am	Estimated Exc Volume (m ³)	avated	12
		General Notes			

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

21																		
2	egthinspace = egt	Tes	st pit no.		Sar	mple	D	epth (m)	% G	ravel	%	Sand		% :	Silt		% Cla	ay
	•	AC1030-03	32		GI	B-1	0	.30 - 2.50	6	9.8	2	7.9			().4		
		AC1030-03	32		GI	B-2	2	2.50 - 3.50	2	3.6	4	14.2			3	2.2		
1																		
ľ																		
	$ egthinspace{1.5em}$	80 mm	56 mm	40	mm	28 ו	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm 0	.075 mm
ξĪ	•	100.0	89.4	70	0.9	65	5.1	50.1	36.8	28.3	19.1	10.2	5.3	3	3.6	1.7		0.4
	X			10	0.0	92	2.5	89.8	82.3	76.4	68.9	61.6	55.	1	51.3	41.8	3	32.2
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	\setminus	Tes	st pit no.				ASTN	// Classificati	ion	D60	D30	D10	W	LL	PL	PI	Сс	Cu
	•	AC1030-03	32		WEI	LL-GR/	ADED	GRAVEL wit	h SAND(GW)	25	5.5	0.8	9.6				1.4	30.2
1 1	X	AC1030-03	32				Silty,	Gravelly SAN	1D	0.7			10.4					
7																		
- 31262																		
					1												1	

			Test Pit: AC 1030	- 33								
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 19-Sep-07							
Project:	Lower Churchill F	Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030 Location: N 5905368 E 0510469 Inspector: Dave Oldford											





		Soil and Groundwat	ter Condit	ions		
0.2 - 0.5 some cobbles moist, compact, well graded, lig brown. 0.5 BEDROCK and fractured bedrock pieces. Estimated Cobbles (%) 15 - 20 Estimated Boulders (%) 0 Start Time: 1:20 pm End Time: 1:30 pm General Not No sloughing. Test Pit was dry upon completion.		Sample ID.	Sample Depth (m)	Sample Type		
Depth (m) From - To O.0 - 0.2 PEAT - Dark brown organic soil, rootlets, mois loose. Till - SAND and GRAVEL - angular, some fine some cobbles moist, compact, well graded, lightown. O.5 BEDROCK and fractured bedrock pieces. Estimated Cobbles (%) 15 - 20 Estimated Boulders (%) 0 Start Time: 1:20 pm End Time: 1:30 pm General Notes to the compact of the compa	ist,	NA	NA	NA		
0.2 - 0.5	some cobbles			1	0.2 - 0.5	Grab
0.5	BEDROCK and	d fractured bedrock pieces.		NA	NA	NA
Estimated Cobble	es (%) 15 - 20	Estimated Boulders (%) 0		Estimated Max	Diameter (m)	NA
			Estimated Exc Volume (m ³)	avated	1.5	
General Notes		lotes				
No sloughing. Te	est Pit was dry u	pon completion.	<u> </u>	·	·	
Till - SAND and GRAVEL - angular, some fines, some cobbles moist, compact, well graded, light brown. 0.5 BEDROCK and fractured bedrock pieces. Estimated Cobbles (%) 15 - 20 Estimated Boulders (%) 0 Start Time: 1:20 pm End Time: 1:30 pm General Note	nd Cx GPS					

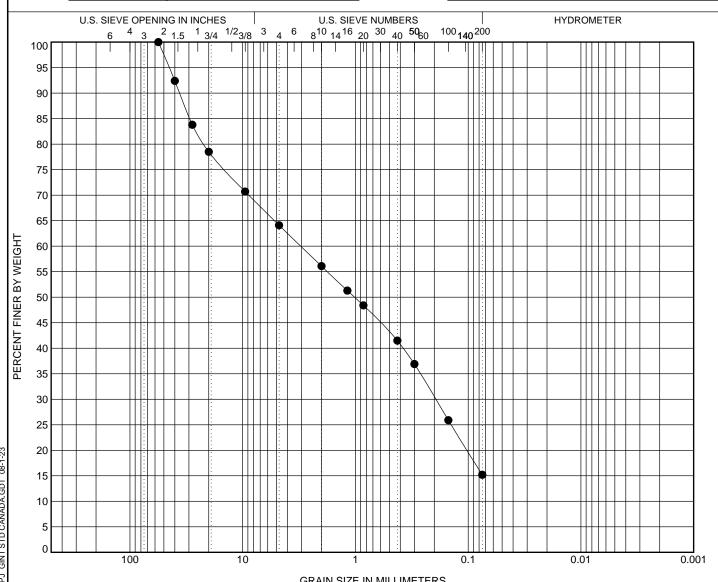
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CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS	

COBBLES:	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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	5								\Box			:			:						Ħ	\parallel	-				
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		COBBLES		coarse		fine	e	coa	arse	me	dium		fi	ine				(CLA'	Y O	R	SII	_T				
$\overline{}$	Te	st pit no.	_	San	nple	De	pth (m	1)		% G	ravel			% S	and				%	Silt			$\overline{\top}$		%	Clav	
•	AC1030-0			GE			20 - 0.5			35				48									15.2	:			
X																											
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★ ⊙																	_						—				
$\stackrel{\bullet}{\to}$	80 mm	56 mm	40	mm	28 m	m	20 m	m	9.525	mm	4.76	mm	2 m	nm	0.8	5 mi	m	0.425	mm	0	.3 n	nm	\top	0.15 i	mm	0.0	75 m
•	00 111111	100.0		2.4	83.8	_	78.5		70.		64		56			8.4		41		Ť	36.		+	25.		_	15.2
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X	AC 1030-0	JJ		3,	AND 411	u GRA	¬V⊏L W	vitii St	JITIE PII	162		J. I	+ "	.2				13.3	1				+		+		
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			Test Pit: AC 1030 -	34								
Firm:	Newfoundland a	nd Labrador	· Hydro		Date: 19-Sep-07							
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line	 Gull Island to Churchill 	Falls							
Contract No. AC1030 Location: N 5905943 E 0507699 Inspector: Dave Oldford												





		Soil and Groundwate	er Cond	litions		
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1	PEAT - Dark loose.	brown organic soil, rootlets, moi	ist,	NA	NA	NA
0.1 - 0.2	trace cobbles	hered SAND - some fines, grave , subrounded, moist, loose to t grey, some rootlets.	el,	NA	NA	NA
0.2 - 1.5		d GRAVEL with SAND - trace f , subrounded, damp, loose to e grey.	ines,	1	0.2 - 1.0	Grab
1.5 - 4.0	SAND – some compact, grey	e gravel, trace fines, damp, loos y.	se to	2	2.0 - 4.0	Grab
Estimated Cobb	oles (%) 1 - 5	Estimated Boulders (%) 0		Estimated Max	Diameter (m)	NA
Start Time: 2:2	0 pm	End Time: 2:55 pm		Estimated Exc Volume (m³)	avated	20
		General No	otes			
Severe sloughing	ng throughout.					
North and East	coordinates obta	ained using Garmin Etrex Legen	nd Cx GI	PS.		

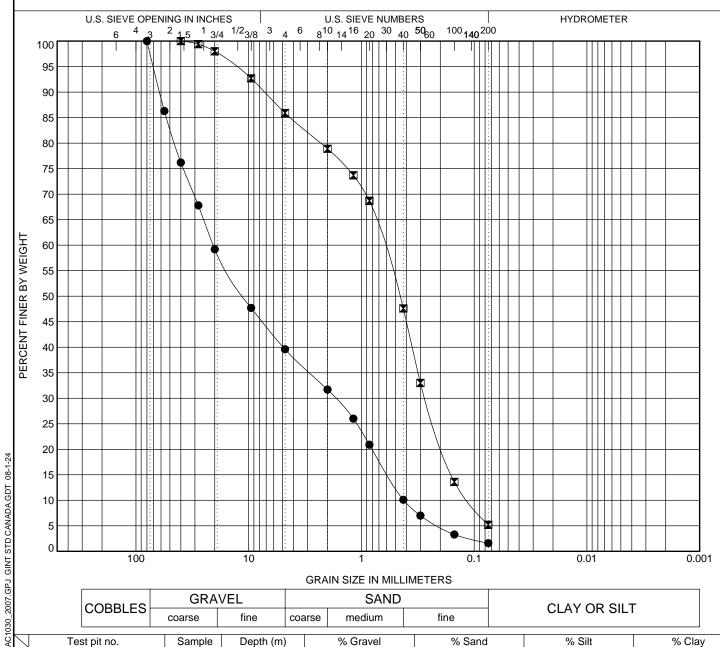
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TEST PIT AC1030-034

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

≓L	_								_									
<u> </u>	V	Tes	t pit no.		Sar	nple	D	epth (m)	% G	ravel	% :	Sand		% \$	Silt		% Cla	ıy
μĪ	•	AC1030-03	4		GE	3-1	0	.15 - 1.00	5	7.9	3	8.0			1	.6		
á	X	AC1030-03	4		GE	3-2	2	.00 - 4.00	14	4.1	8	0.7			5	5.2		
DATABASE																		
١																		
I KANSIMISSION LINE																		
	$\sqrt{}$	80 mm	56 mm	40	mm	28 ו	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0	.075 mm
g	•	100.0	86.3	76	6.2	67	.8	59.2	47.7	39.6	31.7	20.9	10.	1	7.0	3.3		1.6
	X			10	0.0	99	.4	98.0	92.7	85.9	78.9	68.7	47.	6	33.0	13.6	j	5.2
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٤L																		
EL																		
	\bigvee	Tes	t pit no.				ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
Ľ	•	AC1030-03	4		POOF	RLY G	RADE	D GRAVEL w	vith SAND(GF	20.6	1.7	0.4	5.4				0.3	49.1
2 6	I	AC1030-03	4		S	SAND v	vith sc	ome Gravel, tr	race Fines	0.6	0.3	0.1	3.9				1.0	5.7
SIZEZ																		
<u> </u>																		
٠.	-				t						1							



			Test Pit: AC 1030 -	35									
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 19-Sep-07								
Project:	Lower Churchill F	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls								
Contract No.	tract No. AC1030 Location: N 5908215 E 0503521 Inspector: Dave Oldford												





		Soil and Groundwater Con	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1		orown organic soil, rootlets, moist, on top some weathered sand.	NA	NA	NA
0.1 - 0.2		some fines, frequent rootlets, loose to st, poorly graded, light brown.	NA	NA	NA
0.2 - 4.0		ND – trace gravel, loose to compact graded, trace cobbles, trace boulders ole.	1	0.5 - 1.0	Grab
Estimated Cobble	es (%) 1 - 5	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m)	0.5
Start Time: 9:20	am	End Time: 9:45 am	Estimated Exc Volume (m ³)	avated	18
		General Notes			

Minor sloughing in first meter of sand. Test pit was dry upon completion.

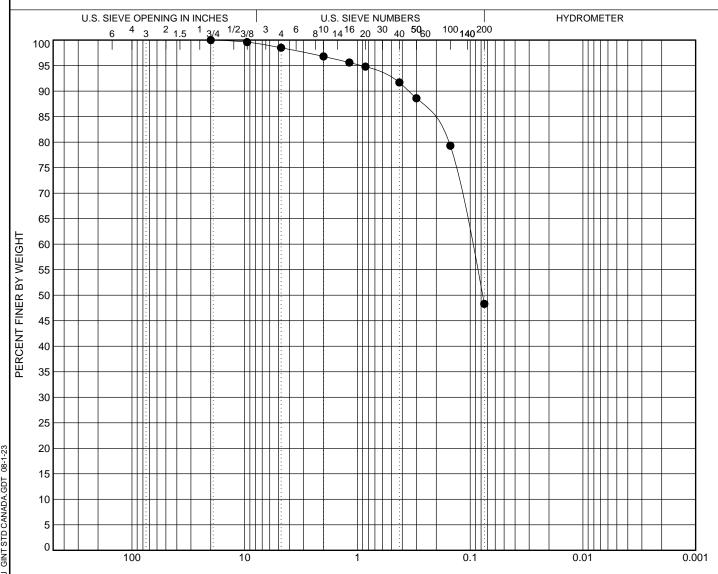
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRI ES	GRA	VEL		SAND		CLAV OD SILT
CODDLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

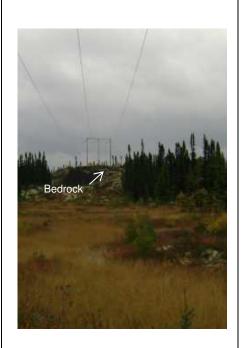
	20														:										
	15			1						Ш				III											
	10			- :		Ш		$\perp \perp$		Ш				Ш		Ш			4	Ш					
	5																								
	0 📖	100	·	1 1	10)			1				(0.1	·		1		0.01					0.	.001
								GRAIN	SIZE	IN I	MILLIN	/ETEF	RS												
		COBBLES		GRAV	/EL					SAI	ND.							CLA	⁄ ∩	D (211	т			
		CODDLES	coai	rse	fin	e	coa	arse	med	lium		f	ine					<i></i>	_)IL	'			
		st pit no.		ample		epth (m		Ç	% Gra				% S		l			%	Silt					% CI	ay
•	AC1030-0	35	(GB-1	0.5	50 - 1.00	0		1.5	5			50).2							4	8.3			
A																									
*																									
<u>•</u>	80 mm	56 mm	40 mm	28 m	nm	20 m	m	9.525 n	nm	4 76	mm	2 m	nm	0.8	35 m	nm	0.42	5 mm	0	3 m	m	10	15 m	nm ().075 n
•	00 111111	00 111111	40 111111	2011		100.	$\overline{}$	99.6	_	98		96			94.8		91		_	88.6		_	79.3		48.3
							_																		
A																									
*																									
•																									
		st pit no.				Classif				_	D60	D:	30	Е)10		W	LL	- [Р	L	F	Pl	Сс	С
•	AC1030-0	35		SAND	and S	ILT with	trace	e Gravel			0.1						15.0								
																_									
A																_									
*										_						4		1	_						
⊙																									



			Test Pit: AC 1030 -	36							
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 20-Sep-07						
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line -	- Gull Island to Churchil	Falls						
Contract No.	ct No. AC1030 Location: N 5910066 E 0496335 Inspector: Dave Oldford										







		Soil and Groundwater Cor	nditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.3	Root mat, pea	at, and moss, black, spongy, moist	NA	NA	NA
0.3 - 1.0	,	d SAND with GRAVEL (SP) - trace ct, damp, light brown	1	0.5 - 1.0	Grab
1.0 - 1.5	Fine SAND - some fines, o	compact, damp, poorly graded, live grey	NA	NA	NA
1.5 - 5.0	•	d SAND with GRAVEL (SP) - trace ct, damp, light brown	NA	NA	NA
5.0	Fine SAND - some fines, o	compact, damp, poorly graded, live grey	NA	NA	NA
Estimated Cobble	es (%) 1 - 5	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 11:1	0 am	End Time: 11:30 am	Estimated Exc Volume (m³)	avated	20
		General Notes	•		

Minor sloughing at 1.0 m

North and East coordinates obtained using Garmin Etrex Legend Cx GPS

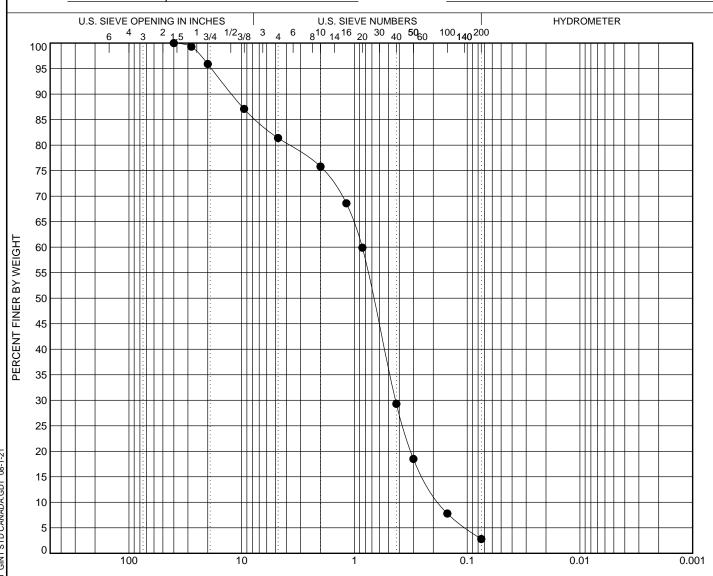
Bedrock outcrop near test pit location as seen in picture 3 above

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

1-21	20			:		:																					+				
GINT STD CANADA.GDT 08-1-21	15 10																\														
SANAD/		5																													
TSTD(:																						
N GIN			100)			1	0					1					0.1						0.0	1					0.00	1
7.GP				_							SRAI	N SIZ				1ETEF	RS		-											_	
500			COBBLES	sL	(GRA\	/EL						SA	/NE								С	LA`	Y ()R	SII	т				
AC1030_2007.GPJ			00000		coars	е	fir	ne		coar	se	me	diun	n		f	ine														
71			st pit no.			nple		epth				% G						San	d				%	Silt	t				%	Clay	
BAS	● AC	1030-0	36		G	B-1	0.	50 -	1.00			18	3.6				7	8.6			-						2.8				
\vdash	<u> </u>																				-										
	*																														
TRANSMISSION LINE	80	mm	56 mm	40	mm	28 r	mm	20) mn	n C	525	5 mm	47	'6 m	m	2 n	nm	10	85	mm	10.	125	mm	Τ () 3	mm	\top).15 ı	mm	0.0	75 mm
IISSI	•	, , , , , , , , , , , , , , , , , , , ,	00 11111		0.0	99			95.9		87			31.4		75		0.	59.		0.	29.			18		+	7.8		0.0	2.8
NSN	X																										\perp				
	*																										+				
_	<u>~</u>																										\top				
EST PIT			st pit no.				ASTM							D6	_		30		D10		V		LI	_	I	PL	\perp	PI	_	Ď	Cu
		1030-0	36		P00	RLY G	KADE	U SA	י טא	with G	iRAV	'EL(SP)	0.9	9	0	.4		0.2		2.	9					+		1	.3	4.9
SIZE2 -	<u> </u>																										\pm				
A N	*																										\bot				
Ŗ,	⊚																										丄				



Test Pit: AC 1030 - 37													
Firm:	n: Newfoundland and Labrador Hydro Date: 19-Sep-07												
Project:	Lower Churchill F	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls								
Contract No.													





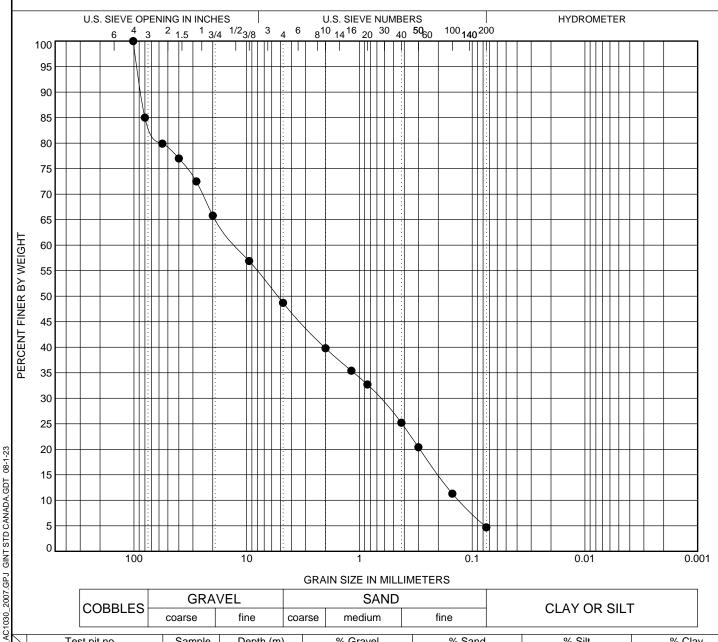
		Soil and Groundwater 0	Conditions							
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.2	PEAT - Dark to loose.	prown organic soil, rootlets, moist,	NA	NA	NA					
0.2 - 0.5	brown, freque well graded, n	nd SILT - some fines, wet compact, nt rootlets, some gravel, cobbles, ninor sloughing, subangular cobble	NA	NA	NA					
0.5 - 3.5		RAVEL - trace fines, trace cobbles, s, wet, compact, olive grey.	1	1.0 - 3.0	Grab					
Estimated Cobble	es (%) 10 - 20	Estimated Boulders (%) 1 - 5	Estimated Ma	Estimated Max Diameter (m)						
Start Time: 1:08	pm	End Time: 1:35 pm	Estimated Ext Volume (m³)	cavated	10					
		General Notes	}							
Severe sloughing in top layer at 0.5 m due to trickle of water flowing.										
North and East c	oordinates obta	ined using Garmin Etrex Legend C	x GPS.							

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRI ES	GRA	VEL		SAND		CLAV OD SILT
CODDLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

\$	J	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	% :	Sand		% \$	Silt		% Cla	ıy	
	•	AC1030-03	37		GE	3-1	1	.00 - 3.00	3	5.4	4	4.0			4	1.7			
	I																		
7	•																		
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1	⊙																		
		80 mm	56 mm	40	mm	28	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.	.075 mm	
	•	85.0	79.9	7	7.0	72	2.5	65.8	56.9	56.9 48.7		39.8 32.7			25.2 20.4			4.7	
	I																		
1	•																		
	*																		
	э																		
	$ egthinspace{1.5em} $	Tes	t pit no.				ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu	
1	•	AC1030-037 SAND & GRAVEL with some C				bbles, tr. Fin	es 12.3	0.7	0.1	10.8				0.3	94.3				
; [I																		
2770 477	•																		
<u> </u>	*																		
1	0																		



Test Pit: AC 1030 - 38													
Firm:	Newfoundland and Labrador Hydro Date: 20-Sep-07												
Project:	Lower Churchill	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls								
Contract No.	o. AC1030 Location: N 5919345 E 0486259 Inspector: Dave Oldford												





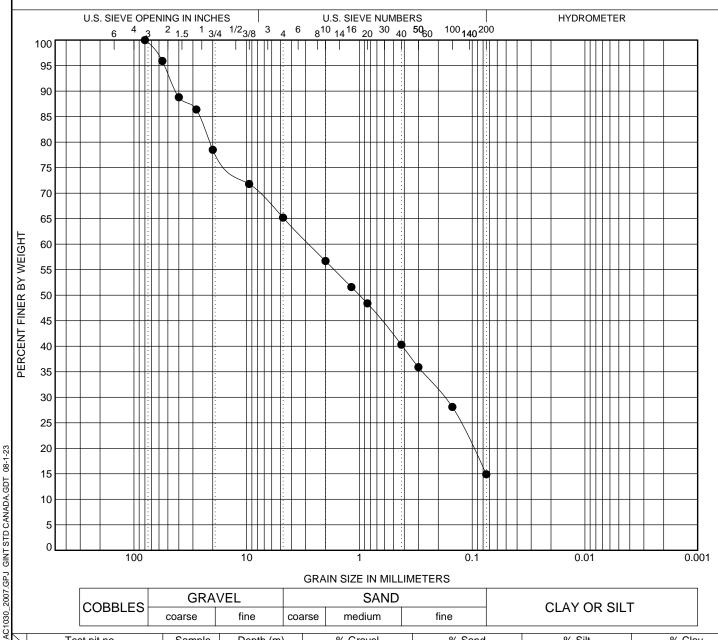
		Soil and Groundwate	er Cond	litions					
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type			
0	Boulders on to	op of moss and PEAT layer		NA	NA				
0.0 - 0.3	trace coarse g	AND and topsoil, damp, some fing gravel, loose to compact, poorly f grey and brown.		NA	NA	NA			
0.3 - 4.0		O - some cobbles, some fines, was gular, compact, moist, olive gress at 2.0 m.		1	2.0 - 3.0	Grab			
Estimated Cobbl	es (%) 10 - 15	Estimated Boulders (%) 1 - 5		Estimated Max Diameter (m) 1.0					
Start Time: 2:05	pm	End Time: 2:20 pm		Estimated Exc Volume (m ³)	18				
		General No	otes						
Moderate slough	ing.				<u>-</u>	<u>-</u>			
North and East of	oordinates obta	ined using Garmin Etrex Legen	d Cx GF	PS					

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



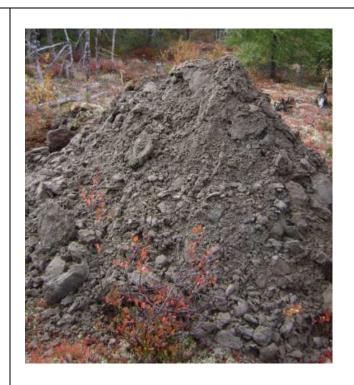
CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	Tes	st pit no.		Sample		Depth (m) % Grav		ravel	%	Sand		% \$	Silt		% CI	lay	
•	AC1030-03	38		GE	B-1	2.	00 - 3.00	34	1.1	5	50.3			1	4.9		
X																	
▲																	
★																	
⊙																	
• 🗷	80 mm	56 mm	40 r	mm	28 m	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm (0.075 mm
•	100.0	95.9	88	3.8	86.	4	78.5	71.8	65.2	56.7	48.4	40.	3	35.9	28.	1	14.9
A																	
*																	
•																	
	Tes	st pit no.			Д	STM	Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	AC1030-038			Grav	elly SA	ND wi	th some Fine	es, tr. Cobbles	2.8	0.2		11.8					
X																	
★																	
•																	



Test Pit: AC 1030 - 39														
Firm:	Newfoundland and Labrador Hydro Date: 20-Sep-07													
Project:	Lower Churchill F	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls									
Contract No.	AC1030													





		Soil and Groundwater Con	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.2	PEAT - Dark loose.	orown organic soil, rootlets, moist,	NA	NA	NA
0.2 - 0.7		fines, frequent roots, wet, loose to rly graded, light brown.	NA	NA	NA
0.7 - 3.0		ND (ML) – trace gravel, trace boulders, moist, compact, light grey.	1	2.0 - 3.0	Grab
Estimated Cobble	es (%) 5 - 10	Estimated Boulders (%) 5 - 10	Estimated Max	Diameter (m)	0.5
Start Time: 2:55	pm	End Time: 3:15 pm	Estimated Exc Volume (m³)	15	
		General Notes			

No sloughing, slow steam of water flowing at 0.7 m.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

Stopped digging due to boulders at 3.0m.

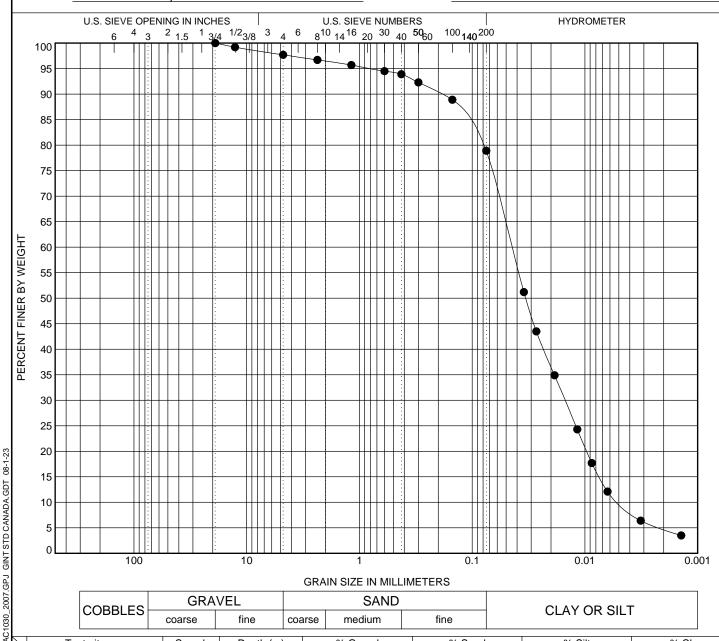
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

ŚĖ	$ egthinspace{1.5em} otag$	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	%	Sand		% :	Silt		% Cla	ay
	•	AC1030-03	9		GE	3-1	2	.00 - 3.00	2	2.3	1	8.8		74	.1		4.8	,
1	X																	
Ţ,	•																	
	*																	
	⊚																	
	egthinspace = egt	80 mm	56 mm	40	mm	28	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm C	0.075 mm
[•								98.6	97.7	96.4	95.0	93.	9	92.3	88.9)	78.9
Ī	X																	
L	A																	
	*																	
	⊚																	
	\searrow	Tes	t pit no.				ASTM	1 Classificati	ion	D60	D30	D10	W	LL	PL	PI	Сс	Cu
_	•	AC1030-039 SILT with some Sand, trace Cla				ay, trace Grav	el 0	0	0					1.0	9.0			
Ŀ	X																$ldsymbol{ld}}}}}}}}}$	
	▲																	
	*																	
П	െ																	



Test Pit: AC 1030 - 40											
Firm: Newfoundland and Labrador Hydro Date: 21-Sep-07											
Project:	Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	Location:	N 5921391	E 0483155	Inspector: Dave Oldford						



Water entering at 0.8 m.



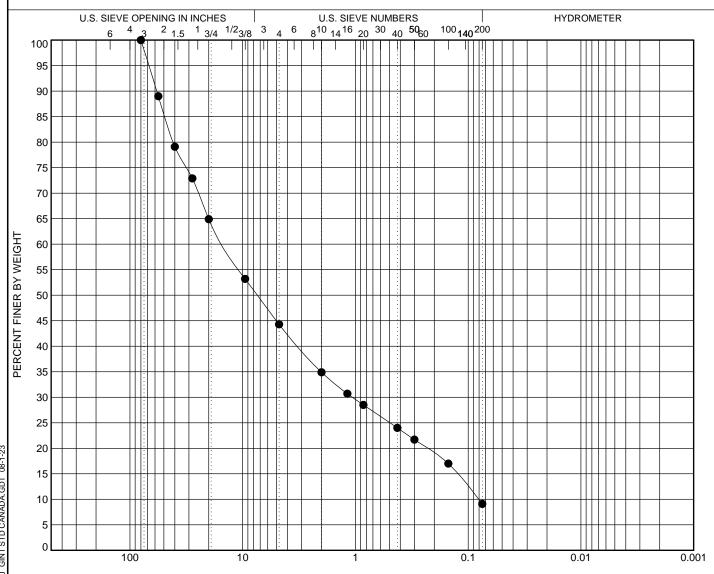
		Soil and Groundwater Cor	nditions							
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.1	PEAT - Dark I loose.	prown organic soil, rootlets, moist,	NA	NA	NA					
0.1 - 0.3		uent rootlets, some fines, sand, , moist, loose, brown.	NA	NA	NA					
0.3 - 1.0		RAVEL - trace fines, trace cobbles, well graded, light grey.	1	0.3 - 1.0	Grab					
1.0	BEDROCK		NA	NA	NA					
Estimated Cobbl	es (%) 10 - 15	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA					
Start Time: 9:30	am	End Time: 9:45 am	Estimated Exc Volume (m ³)	avated	6					
General Notes										
No sloughing.										
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.										

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE	ΙN	MILL	.IME	TERS
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CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

GINT STD CANADA.GDT 08-1-23	20 - 15 - 10 -																•												
T STD CANA	5 - 0 -																												
			10	0			1	0		(GRA	IN SIZ	1 E IN	I MIL	_LIN	IETER		0.1					0.01					0.0	001
AC1030_2007.GPJ			COBBLE	s	coars	GRA\ se		ne		coa	rse	me	S <i>A</i> ediur	1 N E) 	fi	ne			CLAY OR SILT									
TABASE	Test pit no. Samp ■ AC1030-040 GB-1 ■ Control Contr					epth . 30 -						% Sand 35.2				% Silt 9).1		% Cla	у							
	•																							_					
TRANSMISSION LINE			56 mm 89.0		mm 9.1	28 r 72		_) mr 64.9	_		5 mm 3.2		'6 m 44.3	m	2 m 34 .			35 m 28.5		0.425 24		_	.3 m 21. .		_	5 m 17.0	m 0	9.1
~ L	k									1																			
TEST P	AC103						Cobble	S	D6	_	D3		_	010 0.1		W 8.4	LL	-	Р	L	P	I	Cc 0.9	Cu 180.6					
AIN SIZE2 -	1																			+									
GRAIN	9																												



Test Pit: AC 1030 - 41											
Firm: Newfoundland and Labrador Hydro Date: 21-Sep-07											
Project:	Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	Inspector: Dave Oldford										





		Soil and Groundwater Con-	ditions						
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type				
0.0 - 0.1	PEAT - Dark I loose root ma	orown organic soil, rootlets, moist, at.	NA	NA	NA				
0.1 - 0.3	Topsoil, frequ graded, wet, l	ent rootlets, some fines, sand, poorly oose, brown.	NA	NA	NA				
0.3 - 1.5	•	D - some fines, some cobbles, t, well graded, compact, light grey.	1	0.5 - 1.5	Grab				
1.5	BEDROCK		NA	NA	NA				
Estimated Cobble	es (%) 1 - 5	Estimated Boulders (%) 0	Estimated Max	Max Diameter (m) NA					
Start Time: 10:20	0 am	End Time: 10:40 am	Estimated Exc Volume (m³)	1.5					
General Notes									

No sloughing.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS. Water flowing rapidly into test pit from beneath PEAT layer.

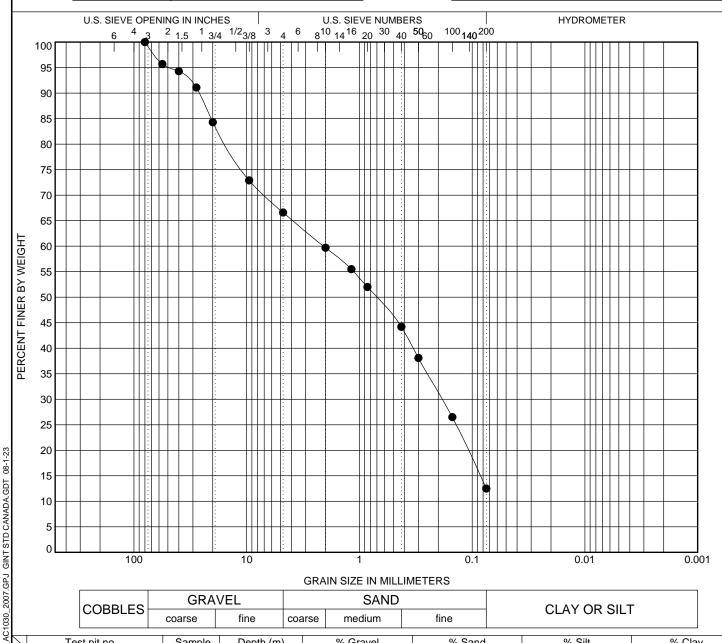
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETER:	
	2

CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

ζŀ	$ egthinspace{1.5em} otag$	Tes	st pit no.		San	nple	D	epth (m)	% G	ravel	%	Sand		% :	Silt		% C	% Clay	
	•	AC1030-04	11		GE	3-1	0	.50 - 1.50	3:	2.6	5	i4.1			1	2.5		•	
	I																		
7	•																		
١,	*																		
1	⊙																		
		80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm	0.075 mm	
	•	100.0	95.7	94	4.3	91	.1	84.3	72.9	66.6	59.7	52.0	44.	.2	38.1	26.5	5	12.5	
	I																		
1	•																		
	*																		
: 0	э																		
	$ egthinspace{1.5em} $	Tes	st pit no.		,		ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu	
	•	AC1030-04	11		Grave	elly SA	ND w	rith some Fine	es, tr. Cobble	s 2.1	0.2		15.8						
; [I																		
1	•																		
2770 477	*																		
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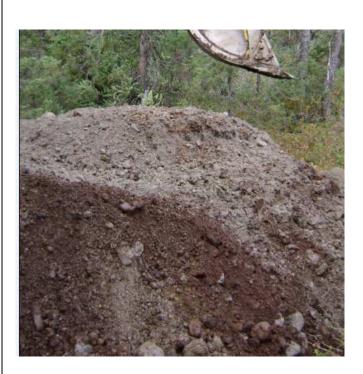


	Test Pit: AC 1030 - 42												
Firm: Newfoundland and Labrador Hydro Date: 21-Sep-07													
Project:	ect: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls												
Contract No. AC1030 Location: N 5921538 E 0471714 Inspector: Dave Oldfe													



North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

Water flowing at 0.2 m between peat and topsoil layers.



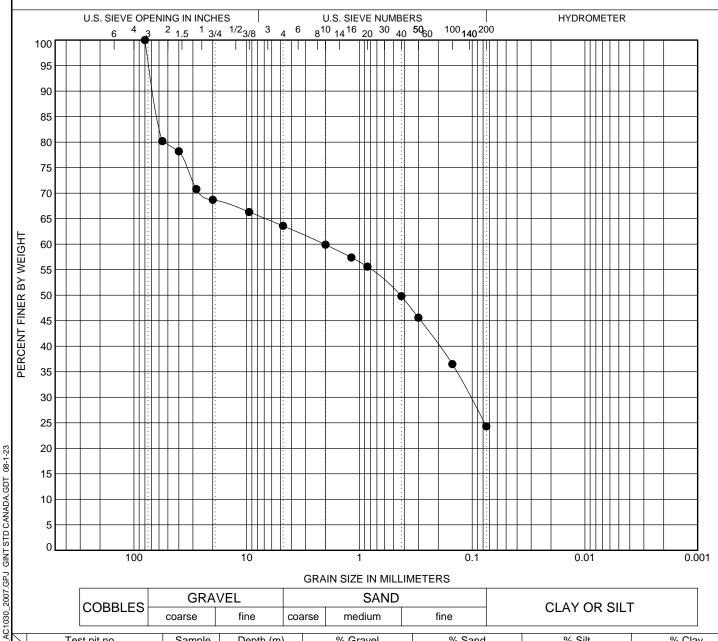
		Soil and Groundwater C	Conditions						
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type				
0.0 - 0.2	PEAT - Dark I loose.	orown organic soil, rootlets, moist,	NA	NA	NA				
0.2 - 0.7	Topsoil – blac subrounded c	k SAND and GRAVEL, wet. some obbles.	NA	NA	NA				
0.7 - 2.5		SAND - some cobbles, moist to ct, well graded, light grey.	1	1 1.0 - 2.5					
2.5	Bedrock		NA	NA	NA				
Estimated Cobbl	es (%) 10 - 20	Estimated Boulders (%) 0	Estimated Max	x Diameter (m)	NA				
Start Time: 11:5	0 am	End Time: 12:05 pm	Estimated Exc Volume (m³)	cavated	6				
	General Notes								
Minor sloughing where water enters test pit.									

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

	Tes	st pit no.		San	nple	D	epth (m)	% G	ravel	% \$	Sand		% :	Silt		% C	lay
•	AC1030-04	42		GE	3-1	1	.00 - 2.50	32	2.8	3	9.3			2	4.3		
•																	
*																	
* 0 •																	
	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm	0.075 mm
•	100.0	80.2	78	3.2	70	.8	68.7	66.3	63.6	59.9	55.6	49.	8	45.6	36.5	5	24.3
X																	
•																	
*																	
(O)	•																
	Tes	st pit no.				ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Cc	: Cu
•	AC1030-04	42		Gra	avelly,	Silty,	SAND with tra	ace Cobbles	2	0.1		10.7					
X																	
*																	
*																	
0																	



Test Pit: AC 1030 - 43											
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 21-Sep-07						
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	Location:	N 5923218	E 0465058	Inspector: Dave Oldford						



Water with bedrock and boulders.

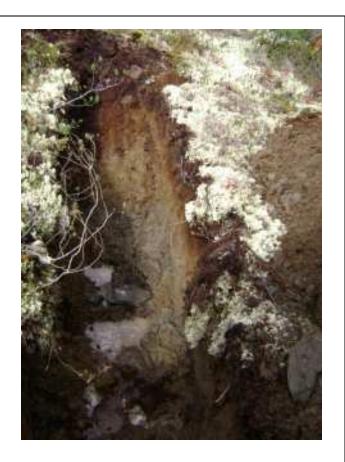
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.



		Soil and Groundwate	r Conditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 – 1.2	Boulders –	trace organics.	NA	NA	NA
1.2 – 2.0	SAND and dense.	GRAVEL with some fines, wet,	NA	NA	NA
Estimated Cobble	es (%) 0	Estimated Boulders (%) 0	Estimated Max	Diameter (m) N	IA .
Start Time: 1:05	pm	End Time: 1:10 pm	Estimated Exca Volume (m³)	vated	5
		General No	tes		



Test Pit: AC 1030 - 44											
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 21-Sep-07						
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	Location:	N 5926224	E 0459665	Inspector: Dave Oldford						





		Soil and Groundwater Con	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1	PEAT - Dark loose.	brown organic soil, rootlets, moist,	NA	NA	
0.1 - 0.4		to dark brown SAND and GRAVEL rootlets, moist, loose.	NA	NA	NA
0.4 - 1.4		Y SAND - trace cobbles, occasional, compact, olive green.	1	0.5 - 1.4	Grab
1.4	Bedrock		NA	NA	NA
Estimated Cobble	es (%) 1 - 5	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 1:45	pm	End Time: 2:00 pm	Estimated Exc Volume (m³)	avated	4
		General Notes			

No sloughing

North and East coordinates obtained using a Garmin Etrex Legend Cx GPS

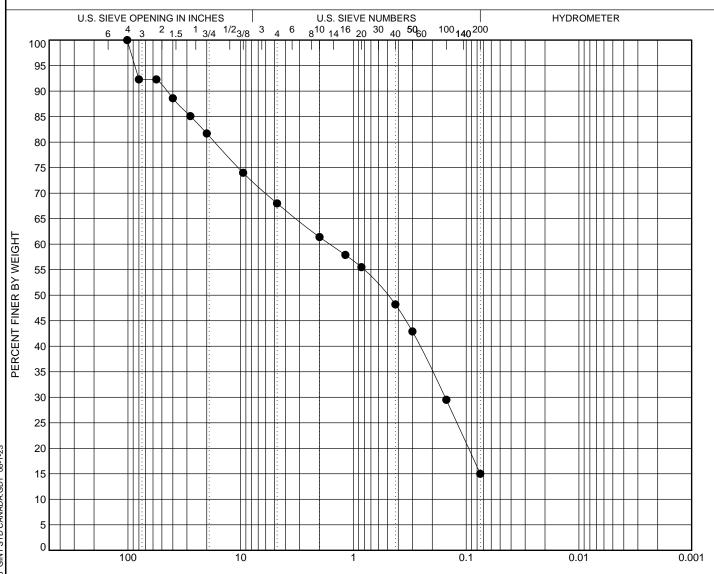
Water trickle at 1.4 meters on top of bedrock

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	20		:			:				\									
	15																		
	10							++++++						₩		+			
	5													\parallel		+			1
	0 📖	100	·		10	<u> </u>		1		0.1			(0.01		Ш.		С	0.001
						(GRAIN SIZ	E IN MILLI	METERS										
		COBBLES		GRAVE	L			SAND					CLAY	, OE		шт			
		COBBLES	coars	se	fine	coa	rse me	edium	fine				LAT	- OF		L			
		st pit no.		mple	Depth (m			ravel		Sand			% \$	Silt				% C	lay
•	AC1030-0	44	G	iB-1	0.50 - 1.4	10	24	4.3		53.0						15	.0		
						\rightarrow													
A						\longrightarrow													
*																			
⊙		T T										1							
\searrow	80 mm		40 mm	28 mm			9.525 mm	4.76 mm	2 mm	_	5 mm	0.425	_		mn	n	0.15		0.075 r
•	92.3	92.3	88.6	85.1	81.	7	74.0	68.0	61.4	,	55.5	48.	.2	4	2.9	_	29.	.5	15.0
						\rightarrow						-				\dashv			
<u> </u>												1				\dashv			
*		1				\rightarrow						-				\dashv			
0	To	st pit no.		V 6.	 TM Classi	ificatio		D60	D30		10	W	LL		PL	ᆉ	PI	Co	; C
•	AC1030-0		Gra				s, tr. Cobbles		0.2	+ -	10	13.6	<u> </u>	-	FL	+	<u> </u>	+	,
	AC 1030-0		Gla	VEHY SAINL	VVIIII SUIII	5 1 III CS	<u>, Copples</u>	, 1.0	0.2			13.0	-	+		+		+	
-								+						+		+		+-	
*								+						+		+		+	+
														-		\rightarrow			



Test Pit: AC 1030 - 45											
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 21-Sep-07						
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	Location:	N 5933498	E 0442013	Inspector: Dave Oldford						





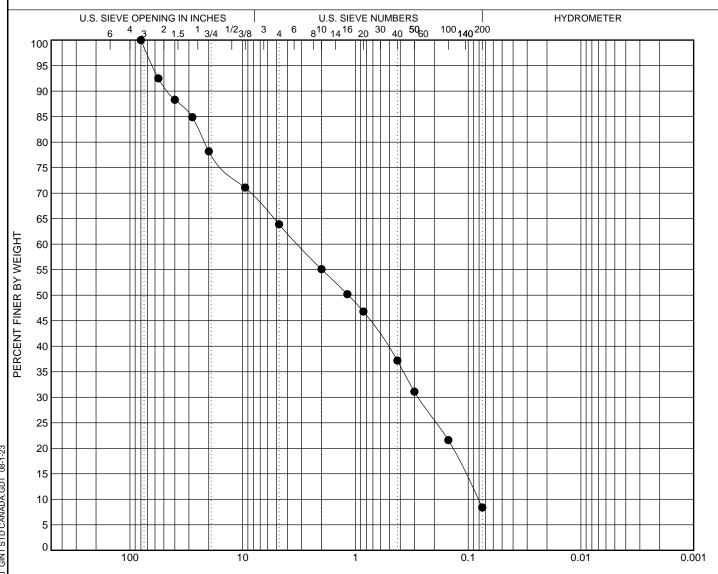
		Soil and Groundwater Cor	nditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.3	Root mat - so	me cobbles, and coarse gravel.	NA	NA	NA
0.3 - 1.0		D – trace fines, trace cobbles, wet, rly graded , light grey with a 0.2 m yer on top.	1	0.3 - 1.0	Grab
1.0	BEDROCK w	ith free water on top.	NA	NA	NA
Estimated Cobb	les (%) 10 - 20	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 2:35	5 pm	End Time: 3:00 pm	Estimated Exc Volume (m³)	avated	3
		General Notes			
No sloughing.					
North and East	coordinates obta	ined using a Garmin Etrex Legend Cx	GPS.		·

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE	ΙN	MILL	.IME	TERS
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CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	20							:						•									Ш				
	15							:			Ш				Ш						Ш						
	10		1:11		:		\coprod	-			Ш				$\perp N$		Ш				Ш		Ш				
	5																										
	0 📖	100	1.1 1			1	0	·			1	<u> </u>		(0.1	0.01					ш	0.001			01		
									GRA	NN SIZ	E IN	MILLII	METEF	RS													
		COBBLES	GRAVEL					SAND								CLAY OR SILT											
	COBBLES				e	fi	ne	со	coarse medium			fine			CLAT ON SILT												
	Test pit no. AC1030-045			Sample Depth (m						% Sand			% Silt					% Clay			/						
•				GB-1 0.30 - 1.00				0	34.8			55.5									8.4	4					
A																											
★																											
$\stackrel{\circ}{\prec}$	80 mm 56 mm 40 mm		mm	nm 28 mm 20 mn			m 9.525 mm		4.76 mm		2 mm 0.8		.85 mm		0.425 mm		0.3 mm		$\overline{}$	0.15 mm		100	0.075 n				
•	100.0	92.5		88.3 84						71.1		63.9		55.1		46.8		37.2		31.1		+	21.6		1 0.	8.4	
																							\dashv				
A																							T				
*																											
⊚																											
\searrow	Test pit no.				ASTM Classification						D60	D30		D10		W		L	LL PL		\perp			Сс			
•							avelly SAND with trace Fines and Cobbles					3.2	0	.3	(0.1	4	11.6					\perp			0.3	39.
											_		_				4		1				\bot		_		
A											_						_		-				+		\perp		
*											_						_		+				+		+		-
⊚																							┸				

BOREHOLE TL-BH-02

PAGE 1 OF 1

SN	IC•LA	AVALIN	BOREHOLE LOG											
CLII	ENT: _	Newfoundland and Labrador Hydro					SITI	E: <u>73</u>	5 kV T	ransmissi	on Line - Gull Islan	d to Churchil	l Falls	
PRO	DJECT:	Lower Churchill Project				_	LOC	CATIO	N: _Tı	ransmissio	n Line			
		CE LEVEL: Geodetic (NAD 83)									COMPLETED _			
CO	ORDIN	ATES: NORTHING 5886910.00 m												
DEE	EDEN	EASTING _564239.00 m					SIZE _ SIZE _							
KEI	LKLIN	CE ELEVATION			COR	IIVG	312E _	INQ						
NO	ΓES: _I	Borehole to confirm presence of bedrock.	No RC	QD record	ded		BED	ROC	K DEP	TH: 2.92	? m TOT	AL DEPTH:	5.03 m	
GRO		WATER LEVELS: TIME OF DRILLING 1.3 m			DATE		2007	2007.40.04			NTATION: legres):	SPT HAMMER SIZE : 63		
		TIME OF DRILLING <u>1.3 m</u> FER DRILLING Water table not measure									egres):90		DROP : 0.7	_
	1						- %			<u> </u>				OONTENT (9()
E_	ELEVATION (m)		<u> </u>	임립	SIZE	SAMPLE TYPE	SAMPLE NUMBER	₽R	or RQD	(s/t	TESTS & RESULTS		TER CONTENT	
DEPTH	EVA EVA	MATERIAL DESCRIPTION	STRAT.	PIEZO LEVEL (m)	SAMPLE	P	AME	ECOVERY	or F	K (cm/s)	EST		10 15 20 SPT N VALUE	
	日		, , , , , , , , , , , , , , , , , , ,		SAN	SAN	0.2	REC	Z				20 30 40	50
	0.00	SAND - Fine grained with trace gravel				M	AU-1				W = 6.9% Fines = 7.9%	•		:
-							000	7.	20	-	W = 1.6%			
-	1.83	SAND and GRAVEL	\$. V.				SS-2 SS-3	75 96	38 54		Fines = 11.5% W = 8.0%		, 1	
							SS-4	78	50		Fines = 8.6% W = 8.0%			I
	2.92	BEDROCK				П		1.0			Fines = 18.1%			
-						П	RC-5	100						
L ;	5	Dottom of hole at 5 02 m				Ц								
		Bottom of hole at 5.03 m.												:
														:
														:
														:
														:
														:
														:
														:
														:
														:
100	GED	BY <u>K.R.</u> CHECK	FD RY	CS				Δ	DPRU.	VED BY _	1			<u> </u>
LOC		J GILON												

BOREHOLE TL-BH-02

SNC · LAVALIN

Borehole no.

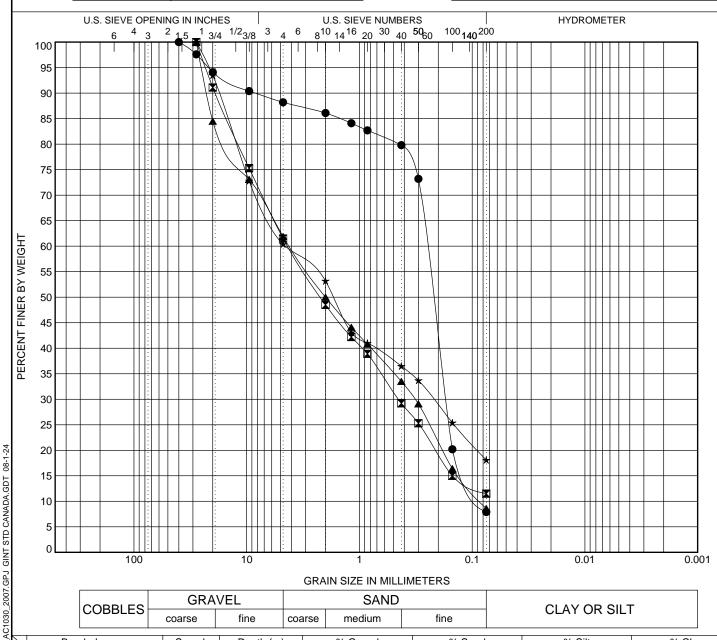
Sample

Depth (m)

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

% Gravel

COBBLES		VEL		SAND		CLAY OR SILT					
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT					

% Sand

% Silt

% Clay

ÄΚ	•	TL-BH-02			AU-1 0.00 - 0.76			11	1.8	8	0.3		7.9							
DATABAS	III TL-BH-02			SS-2		1.	.22 - 1.83	38	3.5	5	0.0		11.5							
Δ	▲ TL-BH-02				SS	S-3	1.	.83 - 2.44	38	3.1	5	8.6								
벨	*	★ TL-BH-02			SS-4		2.69 - 2.92		39.6		42.3		18.1							
TRANSMISSION LINE																				
잃	$ egthinspace{1.5em} otag$	80 mm	56 mm	40	mm	28 mm		20 mm	9.525 mm	4.76 mm	2 mm	2 mm 0.85 mm		mm	0.3 mm	0.15 n	nm 0.0	0.075 mm		
SIN.	•			10	00.0 97.0		.6 94.1		90.4	88.2	86.1	82.7	79.8		73.2	20.2	2	7.9		
SS	×				10		0.0	91.1	75.3	61.5	48.5	38.9	29.2		25.3	15.0)	11.5		
RA	A					100.0		84.5	73.1	61.9	50.0 40.8		33.	5	29.1	16.4	l l	8.6		
	*				100.0		0.0	93.5	72.8	60.4	53.2	41.0	36.	5	33.7	25.4	l l	18.1		
로																				
BOREHOLE		Borehole no. ASTM Classification							on	D60	D30	D10	W	LL	PL	PI	Сс	Cu		
8	•	TL-BH-02			SAND with some Gravel, to				race Fine	0.3	0.2	0.1	6.9				1.4	3.0		
E2 -	X	TL-BH-02			S	SAND a	ind GF	RAVEL with s	ome fines 4.3		0.5		1.6				0.8	77.3		
SIZE2	•	TL-BH-02			SAND and GRAVEL with tr				race fines	4.1	0.3	0.1	8.0				0.3	48.8		
	*	TL-BH-02	-		S	SAND a	nd GF	RAVEL with s	ome fines	4.5	0.2		8.0							

GEOTECH BH PLOTS TRANSMISSION LINE_DATABASE_AC1030_2007.GPJ GINT STD CANADA.GDT 08-1-21

BOREHOLE TL-BH-03

PAGE 1 OF 1 **BOREHOLE LOG** SNC · LAVALIN CLIENT: Newfoundland and Labrador Hydro SITE: 735 kV Transmission Line - Gull Island to Churchill Falls PROJECT: Lower Churchill Project LOCATION: <u>Transmission Line</u> **DATE STARTED** <u>2007-10-08</u> **COMPLETED** <u>2007-10-09</u> REFERENCE LEVEL: Geodetic (NAD 83) COORDINATES: **NORTHING** 5923961.00 m **DRILLING METHOD** Diamond drill **EASTING** 463251.00 m CASING SIZE NW REFERENCE ELEVATION _---CORING SIZE NQ NOTES: Borehole to confirm presence of Bedrock. No RQD recorded ___ TOTAL DEPTH: _9.3 m BEDROCK DEPTH: 7.39 m **GROUND WATER LEVELS: HOLE ORIENTATION:** SPT __ DATE _2007-10-08 AT TIME OF DRILLING 4.6 m AZIMUTH (degres): _ HAMMER SIZE: 63.5 Kg AFTER DRILLING Water table not measured DATE ---PLUNGE (degres): _-90 HAMMER DROP: 0.76 m SAMPLE SIZE SAMPLE TYPE ELEVATION (m) WATER CONTENT (%) SAMPLE NUMBER or RQD RECOVERY DEPTH (m) (cm/s) STRAT. PIEZO LEVEL (m) 5 10 15 20 25 MATERIAL DESCRIPTION SPT N VALUE 20 30 40 SAND and GRAVEL W = 9.0%AU-1 0.00 Fines = 11.8% **BOULDERS and COBBLES** 3.35 SAND and GRAVEL SS-2 60 30 W = 4.8%Fines = 5.8% SS-3 52 55 SS-4 33 17 W = 13.5%SS-5 83 19 Fines = 3.3%SS-6 43 23 SS-7 24 21 7.39 BEDROCK Bottom of hole at 9.30 m. LOGGED BY K.R. CHECKED BY C.S. APPROVED BY

SNC · LAVALIN

Borehole no.

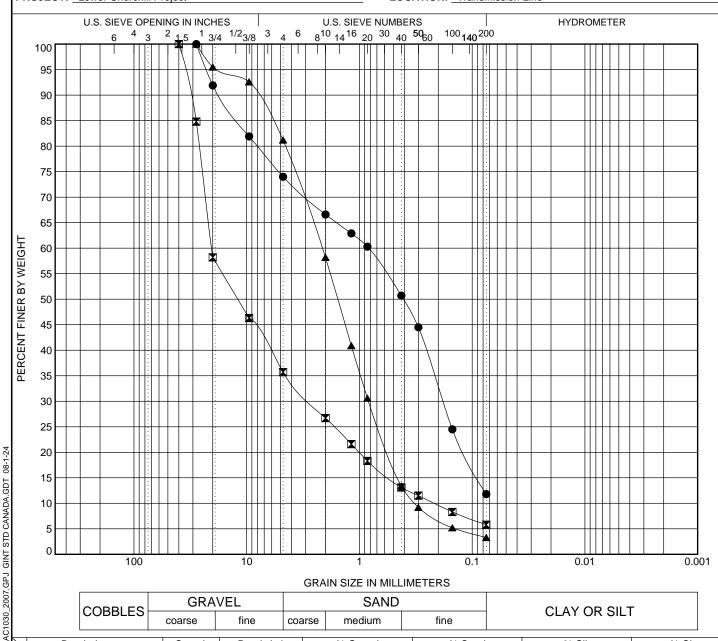
Sample

Depth (m)

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

% Gravel

CORRLES		VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

% Sand

% Silt

% Clay

DATABAS	•	TL-BH-03			AU	i-1	0.	.00 - 0.61	26	6.0	6	2.2			1	1.8		
ΤΑΕ		TL-BH-03			SS-2	2&3	3.	.35 - 4.57	64	4.3	2	9.9			5	5.8		
Ճ	A	TL-BH-03			SS	-5	5.	.49 - 6.10	18	3.9	7	7.8			3	3.3		
Ä																		
⊐ Z																		
SIO		80 mm	56 mm	40	mm	28 r	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.	075 mm
MIS	•				100.0 91.9			81.9	74.0	66.6	60.3	50.	7	44.5	24.5	5	11.8	
NSI	X			10	0.0	84	.8	58.2	46.3	35.7	26.7	18.3	13.	1	11.5	8.3		5.8
TRANSMISSION LINE	A					100	0.0	95.5	92.6	81.2	58.2	30.6	13.	4	9.2	5.2		3.3
BOREHOLE																		
RE		Bore	hole no.			ŀ	ASTM	l Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
B	•	TL-BH-03				Gravely SAND with some				0.8	0.2		9.0				0.6	12.2
E2 -	X	TL-BH-03		Sandy GRAVEL with trad				VEL with tra	ce fines	20.5	2.7	0.2	4.8				1.7	94.4
SIZE2	A	TL-BH-03 WELL-GRADED SAND with				SAND with G	RAVEL(SW)	2.1	0.8	0.3	13.5				1.0	6.7		
¥.																		
⋖⊢	-																	

GEOTECH BH PLOTS TRANSMISSION LINE_DATABASE_AC1030_

BOREHOLE TL-BH-04

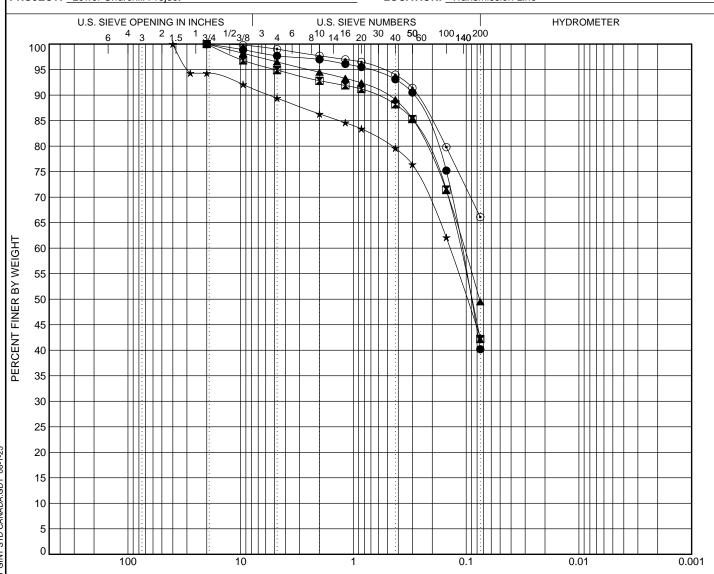
PAGE 1 OF 1 **BOREHOLE LOG** SNC · LAVALIN CLIENT: Newfoundland and Labrador Hydro SITE: 735 kV Transmission Line - Gull Island to Churchill Falls PROJECT: Lower Churchill Project LOCATION: Transmission Line **DATE STARTED** <u>2007-10-05</u> **COMPLETED** <u>2007-10-06</u> REFERENCE LEVEL: Geodetic (NAD 83) COORDINATES: **NORTHING** 5908198.00 m **DRILLING METHOD** Diamond drill **EASTING** 503529.00 m CASING SIZE NW REFERENCE ELEVATION _---CORING SIZE NQ ___ TOTAL DEPTH: _16.46 m NOTES: Did not reach bedrock. BEDROCK DEPTH: _---**GROUND WATER LEVELS: HOLE ORIENTATION: SPT** DATE 2007-10-05 AT TIME OF DRILLING 1.8 m AZIMUTH (degres): HAMMER SIZE: 63.5 Kg AFTER DRILLING Water table not measured DATE ---PLUNGE (degres): _-90 HAMMER DROP: 0.76 m SAMPLE SIZE SAMPLE TYPE ELEVATION (m) WATER CONTENT (%) SAMPLE NUMBER RQD RECOVERY (cm/s) DEPTH (m) STRAT. PIEZO LEVEL (m) 5 10 15 20 25 MATERIAL DESCRIPTION ō SPT N VALUE 20 30 40 SILTY SAND W = 19.2%AU-1 0.00 Fines = 40.2% N = 11.8%AU-2 Fines = 42.2% SANDY SILT W = 15.2% SS-3 100 8 Fines = 49.5% 100 SS-4 24 W = 12.2%Fines = 42.5%W = 16.1% SS-5 100 26 Fines = 66.1% SS-6 100 23 W = 10.6%4.27 BOULDER Fines = 34.6% 100 W = 5.8%SS-7 64 Fines = 5.8% SAND and GRAVEL W = 10.8%SS-8 12 25 Fines = 33.3%28 SS-9 100 2007.GPJ GINT STD CANADA.GDT 08-1-25 **SS-10** 100 49 8.28 W = 10.5%SILTY SAND- Trace gravel SS-11 100 51 Fines = 41.0% SS-12 100 49 9.50 BOULDER SS-13 100 50 - 10 10.52 SILTY SAND - Trace gravel SS-14 100 43 100 SS-15 51 11.74 SILTY SAND SS-16 100 10 12.34 SAND and SILT SS-17 100 10 12.95 CLAY and SILT - Trace sand W = 17.5%SS-18 50 56 Fines = 61.2%15 26 SS-19 100 15.85 W = 12.3%SAND and SILT SS-20 100 47 Fines = 28.2% Bottom of hole at 16.46 m. LOGGED BY K.R. CHECKED BY C.S. APPROVED BY

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN S	SIZE IN	MILL	IMET	-RS

1-25		20		1:1		:										+H	:				\blacksquare					
AC1030_2007.GPJ GINT STD CANADA.GDT 08-1-25		15						Ш	-			Ш				Ш										
-GD																										
ADA		10		∺		:		+	#			Ш	++:			+				+	Ш					
CAN		5				:		Ш								Ш										
STD									:																	
SINT		0 📖	100) 		<u> </u>	1	0	- -			1	11.			0.1	·			0.01	ш				0.00	01
PJ (GBA	INI CIZI	E INI	NAII I	11/11	ETERS											
07.G										GKA	IIN SIZ			IIVII	LIEKS											
20			COBBLES	s L	(GRAV	EL_					SA	ND						CLAY	′ O	R S	SIL :	г			
21030			OODDLLO		coars	е	fir	ne	(coarse	me	dium	1		fine								•			
1		Bore	ehole no.		Sar	nple	De	epth (m)		% G	ravel		Т	% 5	Sand			%	Silt				%	Clay	,
DATABASE	•	TL-BH-04			A	U-1		00 - 0			2.					7.5							0.2			
ΨTΑ		TL-BH-04				U-2		61 - 1.	_		5.			\perp		2.7							2.2			
- 114	A	TL-BH-04			_	S-3		52 - 2.	_		3.			_		7.0							9.5			
뵑	*	TL-BH-04			_	S-4		13 - 2.			10	_		_		6.9							2.5			
NO.	0	TL-BH-04	50	40		S-5		05 - 3.		0.50	1.		C	\perp		2.9		0.40	C	0	2	_	6.1		100	75
SSI	$\stackrel{\frown}{=}$	80 mm	56 mm	40	mm	28 m	m	20	0.0		5 mm 3.9		6 mm 7.7	+	2 mm		85 mn 95.5		5 mm 3.1		3 m 90.5			5 mm 5.2	0.0	075 mm 40.2
TRANSMISSION LINE									0.0		5.8		4.9	+	92.8		91.2		8.2		85.3			1.5		42.2
RA	<u> </u>								0.0	_	3.2		6.5	\top	94.5		92.4	_	9.1		85.4			1.3		49.5
	*			10	0.0	94.3	3	94	1.3	92	2.1	8	9.4		86.3	1	83.4	7	9.6		76.4	ļ	6	2.1		42.5
로	•							10	0.0	99	9.8	9	9.0	1	97.7	,	96.5	9	4.0	. !	91.4	ļ.	7	9.8		66.1
BOREHOLE	\searrow		ehole no.					Class					D60		D30	D	10	W	LL		PI	L	PI	(Сс	Cu
	•	TL-BH-04								ace Grav			0.1					19.2								
SIZE2		TL-BH-04				SAND and SILT with tra						0.1					11.8		_							
SIS	A	TL-BH-04 SILT and SAND v							-	+	0.1					15.2		_				_				
GRAIN	*	TL-BH-04 SAND and SI				_			_	0.1	\dashv				12.2		+									
Ŗ.	⊙	IL-BH-04	TL-BH-04 SILT an			nd SA	MD w	th tr	ace Grav	/el							16.1									

SNC · LAVALIN

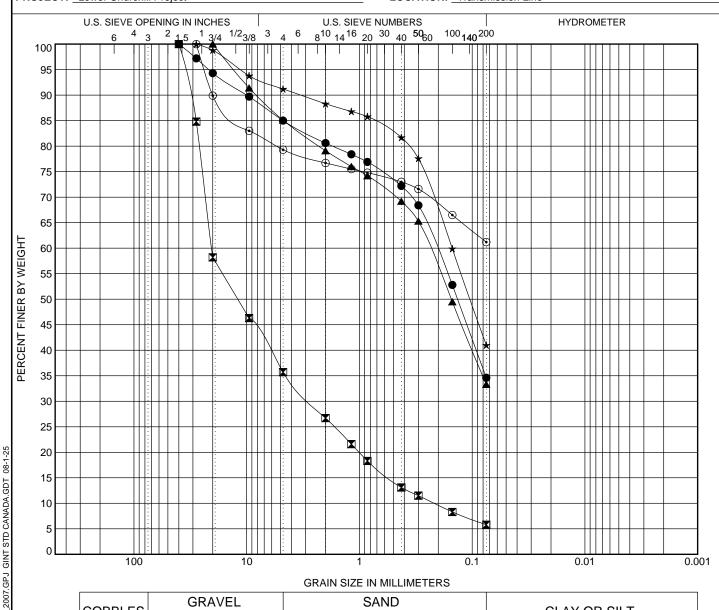
⊙ TL-BH-04

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE	IN	MILLIMETERS
(SA	ND

GRAVEL

Gravelly SILT with some Sand

YI.		COBBLE	<u>د</u> لــــ		J. () ()					O, 1.1D				N N	OR SIL	Т		1
		COBBLE	3	coars	е	fine	С	coarse	me	dium	fine			LAT	OK SIL	1		
	Bor	ehole no.		San	nple	Dept	th (m)		% Gı	ravel	% 5	Sand		% S	ilt		% Cla	y
	TL-BH-04			SS	6-6	3.66	- 4.27		15	5.0	50	0.4			3.	4.6		
×	TL-BH-04			SS	S-7	4.60	- 5.00		64	1.3	29	9.9			5	5.8		
•	TL-BH-04			SS	8-8	6.45	- 7.06		14	1.9	5	1.8			3	3.3		
*	TL-BH-04								8.	.8	50	0.2			4	1.0		
•	TL-BH-04			SS	-18	13.72	- 14.33		20).7	18	3.1			6	1.2		
	80 mm	56 mm	40	mm	28 m	nm 2	20 mm	9.525	5 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.	.075 mm
•			10	0.0	97.	2	94.3	89).7	85.0	80.6	76.9	72.	2	68.4	52.8	3	34.6
* 0 / 0 1			10	0.0	84.	8	58.2	46	5.3	35.7	26.7	18.3	13.	1	11.5	8.3		5.8
•							100.0	91	.4	85.1	79.1	74.2	69.	2	65.3	49.5	,	33.3
*					100	.0	98.8	93	3.8	91.2	88.3	85.8	81.	7	77.6	59.9	,	41.0
•					100	.0	89.9	83	3.0	79.3	76.7	74.8	73.	0	71.6	66.5	,	61.2
* 0	Bor	ehole no.			Α	STM CI	lassifica	ation		D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	TL-BH-04 Silty SAND with				ith some	e Gravel		0.2			10.6							
X						L with to	race fines	s	20.5	2.7	0.2	5.8				1.7	94.4	
Image: Standard Stand							0.2			10.8								
*	TL-BH-04				SAND	and SILT	Γ with tra	ace Grav	el	0.2			10.5					

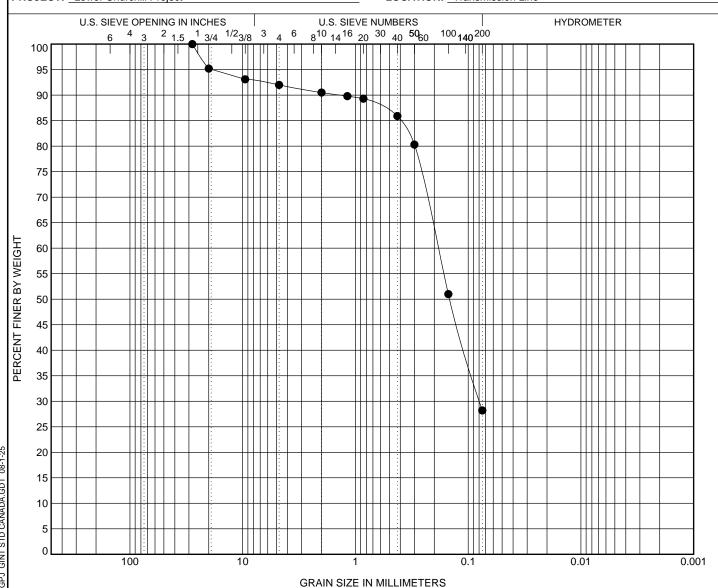
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



		COBBLES	GRA'	VEL		SAND		CLAY OR SILT	
		CODDLES	coarse	fine	coarse	medium	fine	CLAY OR SILT	
	Bore	ehole no.	Sample	Depth (m))	% Gravel	% Sand	% Silt	% Clay
•	TL-BH-04		SS-20	15.85 - 16.4	46	8.0	63.8	28.	2

GINT STD CANADA.GDT 08-1-25		20 - 15 - 10 - 5 -																														
				1	100			1	0			GRA	IN SIZ	1 = IN	I I I I	I I IN	IETEG		0.1					0	.01					C).00 [^]	l
AC1030_2007.GPJ				COBBL	ES	coars	GRA\		ne		coa				ANI			ine					CL	.AY	OI	₹ 5	SIL	T				
DATABASE_AC	•	TL-BI		ehole no.			mple 3-20		epth . 85 -				% G 8	rave . 0	el			% S	Sand 3.8	d				% \$	Silt		2	8.2		% C	lay	
- 1																																
TRANSMISSION LINE	•	80 m	nm	56 mm	40) mm	28 ı) mr 95.2	_	9.52	5 mm 3.1		76 m 92.0	_	2 n			85 ı 89 .	mm 3	0.42	25 m 8 5.9	nm		3 m 3 0.3		0.	15 m 51.0			75 mm 28.2
BOREHOLE	•	TL-BI		ehole no.				ASTM ty SAN							D6 0 .			30		D10)	W 12.3		LL		Pl	L	F	Pl	Co		Cu
GRAIN SIZE2 -																																



			Bog Pr	obing – Bog 7A		
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Northwest	
	604382	5876582	2.10	7A		

			Bog Pr	obing – Bog 7B		
Project:	Lower Ch	urchill Proje		- Muskrat Falls to Gull Island	Tested By:	Dave Oldford
Client:			abrador Hydro		Date Test:	27-Sept-07
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lool	king West	
2	604135	5876603	2.70	7B		



			Bog Pr	obing – Bog 7C		
Project:	Lower Ch	urchill Proje	ect – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	ing North	
3	603936	5876615	0.77			
4	603890	5876619	1.10			
5	603838	5876613	0.92			- Contract
				7C		7B

			Bog Pr	obing – Bog 8A		
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Southeast	
1	597643	5879963	0.80	The second second	Br 1500	
2	597682	5879920	0.75	A CONTRACTOR OF		
3	597710	5879891	0.79	THE RESERVE		
4	597744	5879865	1.00			
				8A		



			Bog Pr	obing – Bog 9A				
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	abrador Hydro	Date Test:	27-Sept-07			
Project No.:	722855		•					
Probe No.	Easting	asting Northing Penetrated (m) Depth View Looking West (m)						
1	595806	5880180	0.90	9A				

	Bog Probing – Bog 10A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking West						
1	590392	5879410	0.47	The state of the s	W. Service	X				
2	590377	5879412	0.88		A MANUAL PROPERTY OF THE PARTY					
				10A						



	Bog Probing – Bog 10B									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07				
Project No.:	722855									
Probe No.	Easting	(m)								
3	590175	5879363	0.40		To take the same	THE PARTY OF				
4	590150	5879360	0.37			INVESTIGATION OF				
				10B						

	Bog Probing – Bog 10C										
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford							
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07					
Project No.:	722855										
Probe No.	Easting	Northing	Depth Penetrated (m)	d View Looking Southwest							
5	589767	5879308	0.43	CHOICE DESCRIPTION	1000	William Co.					
6	589739	5879307	0.46		Sales State	MAN TO STATE OF THE STATE OF TH					
				10C							



	Bog Probing – Bog 10D									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07				
Project No.:	722855									
Probe No.	Easting	(m)								
7	589614	5879826	0.40	The second liverage and the second	Statement of the last of the l					
8	589581	5879274	0.40	AND SHAPE OF THE PARTY OF THE P		A Design of the last of the la				
				10D						

			Bog Pro	obing – Bog 11A				
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford				
Client:	Newfound	Newfoundland and Labrador Hydro				27-Sept-07		
Project No.:	722855							
Probe No.	Easting	Easting Northing Depth Penetrated (m) View Looking East						
1	581691	5880875	0.55					
2	581641	5880891	1.80					
3	581596	5880878	1.10	11A				
4	581543	5880903	0.72	11B				
5	581465	5880924	0.50	11C	The same of	Sur-		
				11D				



			Bog Pro	obing – Bog 11B				
Project:	Lower Ch	urchill Proje	Muskrat Falls to Gull Island	Tested By:	Dave Oldford			
Client:	Newfound	dland and La	abrador Hydro	Date Test:	27-Sept-07			
Project No.:	722855							
Probe No.	Easting	Tasting Northing Penetrated (m) View Looking East						
6	581217	5880969	0.41					
7	581174	5880972	0.52		_			
8	581127	5880988	0.40	11A				
9	581073	5880994	0.90	11B				
10	581026	5880993	1.00	116	- The same of the	National Control		
11	580945	5880948	0.50	A STATE OF THE PARTY OF THE PAR				
12	580886	5880889	0.66	110	THE STATE OF			
13	580840	5880894	0.55	HANH H	- M-10			
				The same of the sa	A SECTION AND ADDRESS OF THE PARTY OF THE PA			
				40000000000000000000000000000000000000				
				T SALL IN	mh l			

	Bog Probing – Bog 11C									
Project:	Lower Ch	urchill Proje	Muskrat Falls to Gull Island	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro	Date Test:	27-Sept-07					
Project No.:	722855									
Probe No.	Easting	asting Northing Penetrated View Looking East (m)								
14	580740	5880906	0.43							
15	580684	5880916	1.33							
16	580615	5880915	1.05	11A						
17	580581	5880876	0.64	11B		-				
				110	The same of the same of					
				11D						



			Bog Pro	obing – Bog 11D				
Project:	Lower Ch	urchill Proje	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford			
Client:	Newfound	dland and La	abrador Hydro		Date Test:	27-Sept-07		
Project No.:	722855							
Probe No.	Easting	Easting Northing Penetrated (m) View Looking East						
18	580402	5880860	0.56					
19	580297	5880841	0.66		_			
20	580228	5880826	0.83	11A		4		
21	580109	5880827	1.00	11B		-		
22	580043	5880789	0.56	110	THE RESERVE OF THE PERSON NAMED IN	Money in		
23	579937	5880759	0.60					
24	579883	5880744	0.87	30	THE STATE OF			
25	579819	5880736	1.40	11D	THE RES			
26	579720	5880742	0.70	The second second				
				40000000000000000000000000000000000000				
					ph			

			Bog Pro	obing – Bog 12A				
Project:	Lower Ch	urchill Proje	ect – 735kV TL	Muskrat Falls to Gull Island	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	abrador Hydro	Date Test:	29-Sept-07			
Project No.:	722855							
Probe No.	Easting	(m)						
1	572729	5883494	0.50					
2	572685	5883508	1.10	The second second	San Lines			
3	572340	5883631	0.52	12B		-		
				12A				



Bog Probing – Bog 12B									
Project:	Lower Ch	urchill Proje	ect – 735kV TL	Muskrat Falls to Gull Island	Tested By:	Dave Oldford			
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855								
Probe No.	Easting	(m)							
4	572214	5883677	0.75						
5	572107	5883691	0.76	And the second second					
					12B				

	Bog Probing – Bog 13A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting	Easting Northing Penetrated View Looking South (m)								
1	569696	5884652	0.52		STATE OF THE PARTY.	A				
2	569660	5884676	0.37	and the same						
3	569613	5884697	0.42	一 一种 二甲基磺胺二甲基						
4	569566	5884717	0.73							
				13A		E Wite at the				
				是自然的學習的學習	A PROSESSOR	Miles Land				
				A CONTRACTOR OF THE PARTY OF TH						
				经公司 建印度影响		The same of the sa				
				1970年19月1日	THE STATE OF THE S					
				《 第二位等不图》		100000				



Bog Probing – Bog 14A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855								
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Southwest				
1	563361	5887362	0.45	THE RESERVE THE PARTY OF THE PA					
2	563315	5887367	1.25		- TO THE REAL PROPERTY.				
3	563265	5887380	0.54	The state of the s	A STATE OF THE PARTY OF THE PAR				
4	563252	5887383	0.73	14	A				

			Bog Pro	obing – Bog 15A		
Project:	Lower Ch	nurchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	29-Sept-07		
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lookin	g Northwest	
1	559242	5889522	0.38	No. of Concession, Name of Street, or other party of the Concession, Name of Street, or other pa		1
2	559219	5889537	0.45	A BOARD TO SERVE		
3	559175	5889564	0.47	THE RESERVE OF THE PERSON NAMED IN	A STATE OF THE PARTY OF THE PAR	THE REAL PROPERTY.
4	559127	5889576	0.40	15A West	ALL WATER	THE REAL PROPERTY.
5	559083	5889593	0.65	West		
						15A East



	Bog Probing – Bog 16A									
Project:	Lower Ch	urchill Proje		- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Northwest					
1	556083	5891213	1.77							
2	556048	5891233	1.20	AND DESCRIPTION OF THE PERSON NAMED IN		A CONTRACTOR OF THE PERSON NAMED IN				
3	556003	5891258	1.00	The second secon		The Later of the L				
4	555923	5891252	1.12	A STATE OF THE STA		1 42 12 12				
5	555895	5891281	0.97	PARTIE TO A LOAD		The same of the same of				
6	555858	5891292	0.55	16A	WALLEY TO					
				一次的一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一个一		W100 10 17				
				Cart Carte Cart	Setting (1)					
				THE CO. LAND OF STREET	THE REAL PROPERTY.					
				and de and		TO STATE OF THE PARTY OF THE PA				
						To the				

			Bog Pro	obing – Bog 17A		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07
Project No.:	722855				•	
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lookin	g Northwest	
1	552747	5892998	0.76			
2	552702	5893025	0.80			ALC: NAME OF TAXABLE PARTY.
3	552651	5893021	0.76		THE PERSON NAMED IN	1000
4	552589	5893031	0.87			100
5	552553	5893060	1.42	The state of the s	No. of Concession, Name of Street, or other Persons, Name of Street, or ot	
6	552525	5893077	1.19	WALKER ST. P. C.	一些和他没以	
					17A	
					11	
				第二次的特别的		
						NO STATE OF THE PARTY OF THE PA



	Bog Probing – Bog 18A									
Project:	Lower Ch	urchill Proje		- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La		Date Test:	29-Sept-07					
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Northwest					
1	552138	5893306	0.50	THE RESERVE TO SHAREST PARTY.						
2	552096	5893321	0.47		SUPPLIES TO SERVICE					
3	552067	5893350	0.71	THE RESERVE TO SERVE THE PARTY OF THE PARTY	The end					
4	551999	5893361	0.60		101,000	The same of the sa				
5	551954	5893395	0.60	18	A					
6	551910	5893407	0.62							
7	551892	5893440	0.95	STATE OF STREET	No.					
				这些人的,但是一个特别的		2000				
				"大学的人们的人们是有什么 "	HADE					
				医原则是是自己的原则						

			Bog Pro	obing – Bog 19A		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	29-Sept-07		
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Southwest	
1	550767	5893959	0.50	MARKET ST.	and the	
2	550721	5893977	1.00		70	a de tro
3	550678	5894002	0.72	A STATE OF THE PARTY OF THE PAR	1990 000	
				19A	and the	A CONTRACTOR



	Bog Probing – Bog 20A									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro	Date Test:	29-Sept-07					
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West					
1	542468	5897685	0.49	THE RESIDENCE OF THE PARTY OF T	1000					
2	542412	5897739	1.80		1000	TO THE DAY OF				
3	542386	5897769	1.50			MIT				
				20A						

	Bog Probing – Bog 21A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Southwest					
1	536538	5901876	0.42			PRINCIPLE AND ADDRESS OF				
2	536511	5901906	0.63		MISSION SHIP					
				21A						



	Bog Probing – Bog 22A									
Project:	Lower Ch	urchill Proje		Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro	Date Test:	29-Sept-07					
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Northwest					
1	535846	5902601	0.76		No. of Concession,					
2	535810	5902614	0.59		Didn't be of	THE RESERVE				
3	535762	5902649	0.81	The second secon						
4	535712	5902683	0.44	400	The Carlot	The state of				
5	535656	5902691	0.75			115				
6	535620	5902742	0.76	Section 1	7 10	BALL THE RESIDENCE OF THE PARTY				
				The same of the sa	22A					
					430					

			Bog Pro	obing – Bog 23A		
Project:	Lower Ch	nurchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	01-Oct-07		
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lookin	g Northwest	
1	534853	5903083	1.20			
2	534827	5903076	0.38	The second secon	0	
				The state of the s		A Maria
				1.0		
				23A		real a
				Maria Calabara	The second	1.16
					THE STATE OF THE S	
				TO THE PROPERTY OF		
				ALC: A STATE OF		THE STATE OF THE S



	Bog Probing – Bog 23B										
Project:	Lower Ch	urchill Proje	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07					
Project No.:	722855										
Probe No.	Easting	Depth Penetrated View Looking Northwest (m)									
3	534519	5903256	0.3	238							

	Bog Probing – Bog 24A									
Project:	Lower Ch	urchill Proje	ect – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro	Date Test:	01-Oct-07					
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Northwest					
1	534332	5903305	0.35		Name of Street,	The same of the sa				
2	534312	5903313	1.02	Tellin History Continued in Con						
3	534295	5903320	1.25		- 1 - T	All and				
				24A						



	Bog Probing – Bog 24B										
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07					
Project No.:	722855										
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lookin	g Northwest						
4	533953	5903295	0.45								
5	533966	5903344	1.13		The same of the sa	-					
6	533940	5903413	1.11	100							
					24B						

			Bog Pro	obing – Bog 25A		
Project:	Lower Ch	nurchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	abrador Hydro	Date Test:	01-Oct-07	
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lookin	g Northwest	
1	533676	5903529	0.40	The state of the s	and the same of the same of	
2	533612	5903558	0.98			
3	533590	5903549	1.07		No.	
4	533500	5903559	1.50	The same of the sa	-	-
5	533431	5903560	0.40	THE RESERVE OF THE PERSON OF T	ALC: NO	
6	533395	5903529	0.55	441	25A	
7	533310	5903538	0.60		ZJA	
8	533388	5903721	0.74		-	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
9	533325	5903714	0.68			
10	533261	5903725	0.40		2	
				7		



	·		Bog Pro	obing – Bog 25B		
Project:	Lower Ch	nurchill Proje	ect – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king North	
11	532970	5903905	0.42			
12	532923	5903923	0.40			
13	532856	5903949	0.76			
14	532802	5903985	0.46	TO STATE OF THE PARTY OF THE PA	THE REAL PROPERTY.	
15	532746	5903967	0.56	MARIO TO KANDA TO THE		
				25B		

			Bog Pro	obing – Bog 26A			
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford	
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07	
Project No.:	722855						
Probe No.	Easting	(m)					
1	532293	5904177	1.22				
2	532263	5904171	0.90	A STATE OF THE PARTY OF THE PAR	-		
3	532234	5904171	0.44	Charles and the same of the sa		THE REAL PROPERTY.	
				26A		A	



			Bog Pro	obing – Bog 28A		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	01-Oct-07		
Project No.:	722855					•
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West	
1	530437	5904490	0.40			
2	530385	5904475	0.60			The same of
3	530335	5904488	0.60			
4	530282	5904454	0.81	THE PROPERTY OF THE PARTY OF TH	And the State of t	and a second
5	530238	5904435	0.91			
6	530207	5904425	0.35	28A	STATE OF THE PARTY	
				201	Telephone State	
					(I) (II) (II) (II)	
				京是《高州州第出版》		100115
					Lawrence Constitution	
				BAS LOUIS NO SERVICE		三大型等和
				用的特別不過過		

			Bog Pro	obing – Bog 28B		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	01-Oct-07		
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West	
7	529784	5904352	0.50			
8	529754	5904330	0.83			
9	529706	5904337	0.55	The state of the state of		
10	529664	5904335	0.52			
				28	B	



	Bog Probing – Bog 29A									
Project:	Lower Ch	nurchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking Northwest						
1	527031	5904131	0.75		The fall of the last of the la	从外面接近一 多				
				THE RESERVE OF THE PERSON NAMED IN		- 10				
					29B	HOYE VELL				
					290	E VICE TO SE				
				The state of the s	B1037405					
					GODS OF THE					
				The state of the s	17. D	经过过的现在分				
				White the standard state of 2	9A	STATE OF STATE				
				一种工作工作	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	March Strate				
					11 8 16 W	HARLES SE				
				设定建设设施		700年9月1日				
					MANUAL BY	相同即無利益				

			Bog Pro	obing – Bog 29B		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	01-Oct-07		
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lool	king East	
2	526942	5904267	2.20		A 1 7	
3	526887	5904292	0.92			and the same
4	526830	5904290	1.50		100	THE RESERVE
5	526799	5904301	0.93		22.	
				29B		



	Bog Probing – Bog 29C									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	(m)								
6	526698	5904352	0.85	A STATE OF THE BUILDING	STATE OF THE PARTY					
7	526669	5904378	2.15							
				29C						

			Bog Pro	obing – Bog 30A		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:			abrador Hydro	Date Test:	01-Oct-07	
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lool	king West	
1	525325	5904679	1.50			
2	525298	5904699	1.36	The second secon		STORES -
				30A		



	Bog Probing – Bog 30B									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Northwest					
3	525945	5904551	1.92			August 10 Towns of				
4	525911	5904555	1.65	The state of the s		THE COLUMN ST. ST. S.				
5	525865	5904569	1.10	COMMUNICATION ALCOHOLS						
6	525826	5904595	0.62	30B						

			Bog Pro	obing – Bog 31A		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La	Date Test:	01-Oct-07		
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West	
1	518002	5905874	0.57			
2	517946	5905874	1.55			
3	517893	5905860	0.82	The state of the state of	W. T	
4	517856	5905871	1.15			
				31A		



	Bog Probing – Bog 31B									
Project:	Lower Ch	urchill Proje	ect – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	(m)								
5	519061	5905744	0.55		The same of the sa					
6	519003	5905748	0.50	The second secon	- Variable	and the same				
7	518943	5905767	0.83	Take the second	No. of Lot	AND THE REAL PROPERTY.				
8	518918	5905774	0.72	31B		41.47				

			Bog Pro	obing – Bog 32A			
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford			
Client:	Newfound	dland and La	abrador Hydro	Date Test:	01-Oct-07		
Project No.:	722855						
Probe No.	Easting	(m)					
1	517142	5905929	0.48	The state of the s	ALCO AND ADDRESS OF THE PARTY O	mineral by the same of the sam	
2	517098	5905905	0.85			The state of the s	
3	517044	5905896	0.75	angual line	and dall		
4	516995	5905896	0.57		The same of	- CO /	
				32A			



			Bog Pr	obing – Bog 33A				
Project:	Lower Ch	urchill Proje	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford			
Client:	Newfound	dland and La	abrador Hydro	Date Test:	01-Oct-07			
Project No.:	722855							
Probe No.	Easting	Depth Penetrated View Looking North (m)						
	516350	5905782	0.96		33A			

			Bog Pro	obing – Bog 34A				
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro	Date Test:	01-Oct-07			
Project No.:	722855							
Probe No.	Easting	(m)						
1	513037	5905550	0.60					
2	512979	5905532	0.56					
3	512928	5905507	0.80		1			
				34A				



	Bog Probing – Bog 34B									
Project:	Lower Ch	nurchill Proje		Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	(m)								
4	513313	5905515	0.69		-					
5	513303	5905561	0.92	A STATE OF THE PARTY OF THE PAR		-				
6	51327	5905581	0.42	A STATE OF THE STATE OF THE STATE OF						
				34B						

	Bog Probing – Bog 34C									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking West						
7	513620	5905569	0.70							
8	513655	5905559	0.56			-				
9	513713	5905565	0.96	A STATE OF THE STA	TO A STATE OF THE PARTY OF THE					
				34C						



Bog Probing – Bog 35A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07			
Project No.:	722855								
Probe No.	Easting	Northing	Depth Penetrated (m)	ed View Looking West					
1	512742	5905500	1.50						
2	512701	5905494	2.41						
3	512644	5905485	1.30		1	-			
				35A					

	Bog Probing – Bog 36A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	01-Oct-07				
Project No.:	722855									
Probe No.	Easting	Easting Northing Penetrated View Looking Southwest (m)								
1	510232	5905441	0.78	THE RESERVE OF THE PARTY OF THE	2200					
2	510194	5905453	2.00	The state of the s	STALL PROPERTY					
				36A						



	Bog Probing – Bog 37A									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West					
1	509920	5905514	0.45							
2	509875	5905544	1.34		-					
3	509817	5905563	0.60		1	11/2				
4	509764	5905552	1.50			and the same of th				
5	509689	5905570	0.92	The state of the s	<u> </u>	A CONTRACTOR OF THE PARTY OF				
				37A	3					

			Bog Pro	obing – Bog 37B		
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford		
Client:	Newfound	dland and La		Date Test:	29-Sept-07	
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West	
6	509659	5905599	0.58			
7	509608	5905607	2.00		-	
				37A	37B	



	Bog Probing – Bog 38A									
Project:	Lower Ch	urchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting	(m)								
1	501420	5908863	0.96			The Property				
2	501380	5908870	1.06	AMILE STATES	EU .	建 的发生。				
3	501332	5908885	1.41		- Charles	Marcon .				
				38A						

	Bog Probing – Bog 39A									
Project:	Lower Ch	urchill Proje	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting	Northing	Depth Penetrated (m)	View Looking	g Southeast					
1	494197	5911314	1.24	The second secon	-	1000				
2	494143	5911337	1.30			100				
3	494086	5911371	1.61	Company of the Compan						
4	494049	5911433	0.93	Charles and the same						
5	493983	5911478	0.76	3	9A	7280 m				
6	493914	5911507	1.83	The state of the s		The state of				
					-					
					建作的 ==					
				AND THE RESERVE						
					THE REAL PROPERTY.					
						To Mile				
				I AMERICA A TOP A		SE SECTION AND ADDRESS OF THE PARTY OF THE P				



	Bog Probing – Bog 40A								
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855								
Probe No.	Easting Northing Penetrated (m) View Looking East								
1	492252	5912488	1.00						
2	492182	5912505	0.97		-	CONTRACTOR OF THE PARTY OF			
3	492148	5912522	1.12	THE RESERVE OF THE PERSON NAMED IN		-			
				40A					

			Bog Pro	obing – Bog 41A					
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855	2855							
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	king West				
1	491621	5912882	0.70	41B	STREET, SQUARE,				
2	491566	5912912	0.94	1415	Northwest				
3	491508	5912934	0.70		1000	(10)			
				THE RESERVE OF THE PARTY OF THE					
				41A					
					10 SEC SEC. 4				
					WATER TO SERVICE AND ADDRESS OF THE PARTY OF				
_				英州区市共和国共和国共和国共和国共和国共和国共和国共和国共和国共和国共和国共和国共和国共		AND DESCRIPTION OF THE PARTY OF			
				NEW WILLIAM STREET	The second second				
					100				



	Bog Probing – Bog 41B								
Project:	Lower Ch	urchill Proje	ct – 735kV TL	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855								
Probe No.	Easting	Easting Northing Penetrated (m) Depth View Looking South							
4	491248	5913036	0.50						
5	491205	5913061	0.56		2650	The same of the sa			
				4	1B				

			Bog Pro	obing – Bog 42A					
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855	2855							
Probe No.	Easting	Northing	orthing Depth Penetrated View Looking Northwest (m)						
1	476722	5920450	0.44	Name and Publisher Street, Square, Squ	35.35.40				
2	476684	5920458	0.69			The state of the			
3	476638	5920476	0.60						
4	476566	5920477	0.82	And the second					
					42A				



	Bog Probing – Bog 43A								
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855	22855							
Probe No.	Easting Northing Penetrated (m) View Looking Northwest								
1	475244	5920806	0.53	The state of the s					
2	475200	5920820	0.45						
3	475152	5920813	0.39	TOTAL STATE OF THE STATE OF					
4	475118	5920823	0.40		43A				

	Bog Probing – Bog 44A									
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford						
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07				
Project No.:	722855									
Probe No.	Easting Northing Penetrated (m) View Looking Southwest									
1	473329	5921195	1.48	A51 183 (1945)	43/2	CEU C				
2	473296	5921195	1.07			The second				
3	473235	5921191	2.20	WALL AND DESIGNATION OF THE PERSON OF THE PE		1 0 80 M				
				44A						



			Bog Pr	obing – Bog 46A				
Project:	Lower Ch	nurchill Proje	Tested By:	Dave Oldford				
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07		
Project No.:	722855	22855						
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lookin	g Northwest			
1	462206	5925004	0.67					
2	462157	5925029	0.90	The state of the s	STATE OF THE PARTY OF	THE REAL PROPERTY.		
3	462102	5925022	0.51	Zeromen and the second				
4	462057	5925032	1.43	THE RESERVE OF THE PARTY OF THE	Security and	Maria Salama		
5	461989	5925028	0.66	WHAT THE STATE OF				
				46A				

	Bog Probing – Bog 47A								
Project:	Lower Ch	urchill Proje	Tested By:	Dave Oldford					
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07			
Project No.:	722855								
Probe No.	Easting Northing Penetrated (m) View Looking Southwest								
1	461185	5925378	0.50	The state of the s	-	N-M			
2	461139	5925479	0.70			AND LANG			
3	461081	5925483	0.60	The state of the s		Contract of			
				47A	the second second	100			
				20 Sept 10 Sep	NOTE OF	-			
				Carcles Village					
					AS LINE	200			
						对加州			
					THE REAL PROPERTY.	A CONTRACTOR			
-						Ratio Co.			



	Bog Probing – Bog 48A						
Project:	Lower Ch	Lower Churchill Project – 735kV TL - Muskrat Falls to Gull Island				Dave Oldford	
Client:	Newfound	Newfoundland and Labrador Hydro				29-Sept-07	
Project No.:	722855						
Probe No.	Easting	Northing	Depth Penetrated (m)	d View Looking West			
1	458795	5926473	0.95	THE RESERVE THE PERSON NAMED IN			
2	458739	5926423	1.16		-	1	
					48A		

	Bog Probing – Bog 49A							
Project:	Lower Ch	Lower Churchill Project – 735kV TL - Muskrat Falls to Gull Island				Dave Oldford		
Client:	Newfound	dland and La	abrador Hydro		Date Test:	29-Sept-07		
Project No.:	722855							
Probe No.	Easting	Northing	Depth Penetrated (m)	View Lool	king West			
1	453794	5927718	0.45	-	C 15 10 50			
2	453648	5927779	0.74			S CHARLE IN		
3	453617	5927782	0.68	Air	STONE STONE	WE SHOW		
				49A	A	CT THE REAL PROPERTY.		
				AND THE PARTY OF T	W. L.			
				在 法国内证 人名英格兰人		450		
				5 4 5		A PROPERTY OF		
						CHE W		
				A STATE OF THE PARTY OF THE PAR		100		
					THE NEW YORK			
						ME FIN		



Bog Probing – Bog 50A						
Project:	Lower Ch	nurchill Proje	ct – 735kV TL	- Muskrat Falls to Gull Island	Tested By:	Dave Oldford
Client:	Newfound	Newfoundland and Labrador Hydro				01-Oct-07
Project No.:	722855					
Probe No.	Easting	Northing	Depth Penetrated (m)	View Look	ing North	
1	445548	5931283	0.77			
2	445489	5931308	0.97			
					and the second	-
						Gold and a second
						11/2
						ar he in the
				50A		11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
				SAN NE SEL CONTRACTOR OF THE SECOND S		



ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID	AC1030-PO-1
DATE	18 Sept 2007	START 13:30	FINISH 15:20

TEST LOCATION							
Northing 5880030 Easting 585529							
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 37) 							
 Test conducted 	 Test conducted on rock out-crop, ~ 50 m south of TLH and ~ 50 m east of Bob's Brook. 						

ROCK CONDITION OBSERVATIONS

- Rock out-crop predominated by fractured granite (rock sample collected for geological confirmation).
- Difficult drilling from 0.0 m to 1.2 m (slightly fractured).
- Hardest drilling from 1.2 m to 1.5 m.
- Easier drilling from 1.5 m to 1.6 m (moderately fractured).
- Steady seep of water in hole at 1.5 m.

	PULL-OUT TEST RESULTS				
TIN	ΛE	Applied	Jack		
From	То	Load (Tons)	Rise (cm)	Notes	
15:03	15:05	0 - 0.5	5.2	Anchor setting into rock	
15:05	15:06	3	nil	Held at 3 Tons.	
15:06	15:07	6	nil	Increased load to 6 Tons with 3 pumps of jack.Held at 6 Tons.	
15:07	15:08	10	nil	Increased load to 6 Tons with 2.5 pumps of jack.Held at 10 Tons.	
15:08	15:09	15	nil	Increased load to 6 Tons with 2.25 pumps of jack.Held at 10 Tons.	
15:09	15:11	18	nil	 Increased load to 18 Tons with 2 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 	

PHOTOS







ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-PC)-2
DATE	19 Sept 2007	START	10:00	FINISH	12:00

TEST LOCATION							
Northing 5880966 Easting 583676							
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 38) 							
 Test conducted 	Test conducted on rock out-crop, ~ 20 m south of TLH.						

- Rock out-crop predominated by granite (rock sample collected for geological confirmation).
- Easy drilling from 0.0 m to 1.8 m.
- No water in hole.

PULL-OUT TEST RESULTS					
TIN	1E	Applied	Jack		
From	То	Load (Tons)	Rise (cm)	Notes	
11:00	11:01	0 - 3.5	5.8	Anchor setting into rock	
11:01	11:02	5	nil	Held at 5 Tons.	
11:02	11:03	10	nil	Increased load to 10 Tons with 4 pumps of jack.Held at 10 Tons.	
11:03	11:04	15	nil	 Increased load to 15 Tons with 3 pumps of jack. Held at 15 Tons. 	
11:04	11:05	18	nil	 Increased load to 18 Tons with 1.5 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 	

PHOTOS				
No Photo Available	No Photo Available			



ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-PC	D-3
DATE	19 Sept 2007	START	12:30	FINISH	14:30

TEST LOCATION							
Northing 5885200 Easting 570033							
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 39) 							
Test conducted on rock out-crop, ~ 50 m north of TLH.							

- Rock out-crop predominated by granite (rock sample collected for geological confirmation).
- Easy drilling from 0.0 m to 1.5 m.
- Difficult drilling from 1.5 m to 1.8 m.
- No water in hole.

PULL-OUT TEST RESULTS						
TIN	ΛE	Applied	Jack			
From	То	Load (Tons)	Rise (cm)	Notes		
14:00	14:01	0 - 3	5.6	Anchor setting into rock		
14:01	14:02	5	nil	Held at 5 Tons.		
14:02	14:03	10	nil	Increased load to 10 Tons with 5 pumps of jack.Held at 10 Tons.		
14:03	14:04	15	nil	Increased load to 15 Tons with 4 pumps of jack.Held at 15 Tons.		
14:04	14:05	18	nil	 Increased load to 18 Tons with 2 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 		







ROCK ANCHOR PULLOUT TEST RECORD

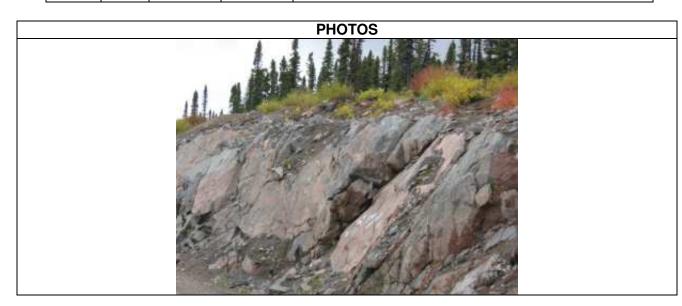
Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL) TEST ID		AC1030-PO-4			
DATE	19 Sept 2007		START	15:00	FINISH	16:45

TEST LOCATION							
Northing 5886911 Easting 564035							
Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 40)							
Test conducted on rock out-crop, ~ 10 m north of TLH.							

- Rock out-crop predominated by granite (rock sample collected for geological confirmation).
- Easy drilling from 0.0 m to 1.8 m.
- No water in hole.

	PULL-OUT TEST RESULTS						
TIN	ΛE	Applied	Jack				
From	То	Load (Tons)	Rise (cm)	Notes			
16:15	16:16	0 - 2.5	5.6	Anchor setting into rock			
16:16	16:17	5	nil	Held at 5 Tons.			
16:17	16:18	10	nil	Increased load to 10 Tons with 2.5 pumps of jack.Held at 10 Tons.			
16:18	16:19	15	nil	Increased load to 15 Tons with 3 pumps of jack.Held at 15 Tons.			
16:19	16:20	18	nil	 Increased load to 18 Tons with 2 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 			





ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL) TEST ID		AC1030-PO-5		
DATE	20 Sept 2007	START	09:00	FINISH	10:30

TEST LOCATION							
Northing 5890823 Easting 557572							
Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 41)							
 Test conducted 	Test conducted on rock out-crop, ~ 10 m north of TLH.						

- Rock out-crop predominated by fractured granite (rock sample collected for geological confirmation).
- Easy drilling from 0.0 m to 1.8 m.
- No water in hole.
- The anchor slipped in the hole probably due to a dust build up in the hole.

	PULL-OUT TEST RESULTS						
TIN	ΛE	Applied	Jack				
From	То	Load (Tons)	Rise (cm)	Notes			
10:00	10:01	0 – 6	3.2	Anchor setting into rock			
10:01	10:02	6	nil	Held at 6 Tons.			
10:02	10:03	10	4.5	Increased load to 10 Tons with 10 pumps of jack.Slipped back to 9 Tons.			
10:03	10:04	16	5.5	Increased load to 16 Tons with 16 pumps of jack.Held at 16 Tons.			
10:04	10:05	18	nil	 Increased load to 18 Tons with 1.5 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 			





ROCK ANCHOR PULLOUT TEST RECORD

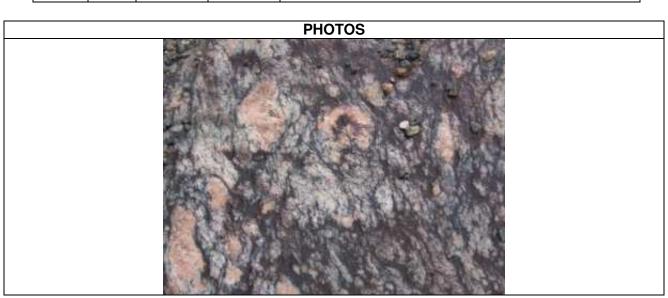
Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-PO-6	
DATE	20 Sept 2007	START	10:45	FINISH	12:30

TEST LOCATION							
Northing 5895769 Easting 547439							
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 42) 							
Test conducted on rock out-crop, ~ 60 m south of TLH.							

- Rock out-crop predominated by granite (rock sample collected for geological confirmation).
- Easy drilling from 0.0 m to 1.8 m.
- No water in hole.

	PULL-OUT TEST RESULTS						
TIN	ΛE	Applied	Jack				
From	То	Load (Tons)	Rise (cm)	Notes			
12:00	12:01	0 - 4	5.3	Anchor setting into rock			
12:01	12:02	7	nil	Held at 7 Tons.			
12:02	12:03	11	nil	Increased load to 11 Tons with 2 pumps of jack.Held at 11 Tons.			
12:03	12:04	15	nil	Increased load to 15 Tons with 2 pumps of jack.Held at 15 Tons.			
12:04	12:05	18	nil	 Increased load to 18 Tons with 2 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 			





ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-PO-7	
DATE	20 Sept 2007	START	13:30	FINISH	15:00

TEST LOCATION							
Northing 5904757 Easting 531388							
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 43) 							
Test conducted on rock out-crop, ~ 20 m north of TLH.							

- Rock out-crop predominated by granite (rock sample collected for geological confirmation).
- Difficult drilling from 0.0 m to 1.8 m.
- Very hard rock.
- No water in hole.

	PULL-OUT TEST RESULTS						
TIN	ΛE	Applied	Jack				
From	То	Load (Tons)	Rise (cm)	Notes			
14:30	14:31	0 - 2	5.6	Anchor setting into rock			
14:31	14:32	6	nil	Held at 6 Tons.			
14:32	14:33	10.5	nil	Increased load to 10.5 Tons with 2 pumps of jack.Held at 10.5 Tons.			
14:33	14:34	15	nil	Increased load to 15 Tons with 2.5 pumps of jack.Held at 15 Tons.			
14:34	14:35	18	nil	 Increased load to 18 Tons with 1.5 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 			





ROCK ANCHOR PULLOUT TEST RECORD

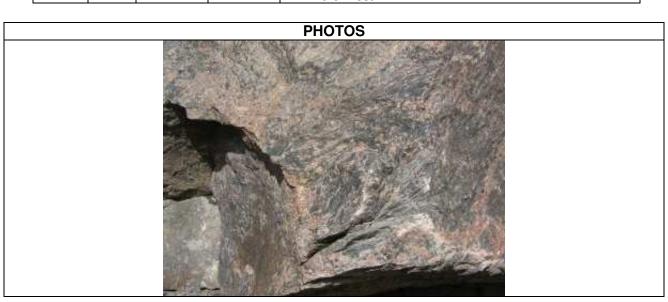
Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-P0	D-8
DATE	20 Sept 2007	START	15:30	FINISH	16:45

TEST LOCATION						
Northing 5909127 Easting 501454						
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 43) 						
Test conducted on rock out-crop, ~ 10 m north of TLH.						

- Rock out-crop predominated by granite (rock sample collected for geological confirmation).
- Easy drilling from 0.0 m to 1.8 m.
- Fractured rock for first 15 cm.
- Soft rock at 1.2 m depth for approximately 20 cm.
- Water in hole at 1.2 m depth.

PULL-OUT TEST RESULTS						
TIN	1E	Applied	Jack			
From	То	Load (Tons)	Rise (cm)	Notes		
16:30	16:31	0 - 2.5	5.5	Anchor setting into rock		
16:31	16:32	6	nil	Held at 6 Tons.		
16:32	16:33	10	nil	Increased load to 10 Tons with 2 pumps of jack.Held at 10 Tons.		
16:33	16:34	15	nil	Increased load to 15 Tons with 2.5 pumps of jack.Held at 15 Tons.		
16:34	16:35	18	nil	 Increased load to 18 Tons with 2 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 		





ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-PC	D-9
DATE	22 Sept 2007	START	11:15	FINISH	13:15

TEST LOCATION							
Northing 5910567 Easting 498350							
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 48 							
Test conducted on rock out-crop on north side of Trans Labrador Highway.							

ROCK CONDITION OBSERVATIONS

- Rock out-crop predominated by quartzite with frequent mica seams. Gneiss and granite at west and east ends of outcrop.
- Quartzite highly weathered along blast face, however, granite and gneiss materials appear unweathered. Sample collected for geological confirmation.
- Difficult drilling from 0.0 m to 1.8 m, with soft zones (typically 25 to 50 mm) at 0.3 m, 0.7 m and 0.9 m.
- Hardest drilling from 1.2 m to 1.5 m.
- No seepage encountered.

			PUL	L-OUT TEST RESULTS	
TIN	1E	Applied	Jack		
From	То	Load (Tons)	Rise (cm)	Notes	
12:59	13:00	0	5.4	Anchor setting into rock	
13:00	13:01	3	nil	Held at 3 Tons.	
13:01	13:02	6	nil	Increased load to 6 Tons with 3 pumps of jack.Held at 6 Tons.	
13:02	13:03	10	nil	Increased load with 3 pumps of jack.Held at 10 Tons.	
13:03	13:04	15	nil	Increased load with 4 pumps of jack.Held at 15 Tons.	
13:04	13:05	18	nil	 Increased load to 18 Tons with 2.5 pumps of jack. Held at 18 Tons (start of pump overload). End of Test 	

PHOTOS





NOTE: Old borehole found at base of rock cut on south side of TLH, across from pull out test (N 5910538 E 498329)



ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-PC	D-10
DATE	21 Sept 2007	START	14:20	FINISH	15:20

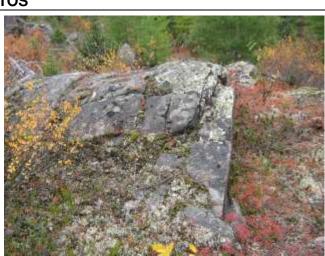
TEST LOCATION						
Northing 5929506 Easting 448425						
 Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 47). 						
Test conducted on bedrock outcrop at southeast bank of East Mitchum River.						

- Fairly hard drilling from 0.0 m to 1.8 m.
- Seepage encountered at 1.4 m.

	PULL-OUT TEST RESULTS						
TIME	(sec)	Applied	Jack				
From	То	Load (Tons)	Rise (cm)	Notes			
0	30	0 - 5	1.8	Anchor setting into rock			
30	60	10	2.2	Increased load with 5 pumps of jack.Held at 10 Tons.			
60	90	15	2.7	Increased with 8 pumps of jack.Fell back to 13 Tons.			
90	1200	18	3.2	 Increased load with 9 pumps of jack. Fell back to 17.5 Tons (at pump overload). End of Test . 			









ROCK ANCHOR PULLOUT TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-P0	D-11
DATE	21 Sept 2007	START	13:00	FINISH	14:00

	TEST LOCATION						
Northing	5923187	Easting	463869				

- Location marked with Garmin recreational grade GPS: S/N 36115779 (WPT No. 45).
- Located at rock outcrop off Trans Labrador Highway, approximately 1 km east of Ozzie's Brook.

ROCK CONDITION OBSERVATIONS

- Fairly easy drilling from 0.0 m to 1.8 m.
- No seepage encountered.

			PUL	L-OUT TEST RESULTS
TIME	TIME (sec) Applied		Jack	
From	То	Load (Tons)	Rise (cm)	Notes
0	30	0 – 5	5.6	Anchor setting into rock
30	60	10	nil	Increased load with 2 pumps of jack.Held at 10 Tons.
60	90	15	nil	Increased load with 2.5 pumps of jack.Held at 15 tons.
90	120	18	nil	 Increased load with 1.5 pumps of jack. Held at 18 Tons (start of pump overload). End of Test .

PHOTOS







ROCK ANCHOR PULLOUT TEST RECORD
Field Investigation and Construction Requirements 735 kV Transmission Line – Gull Island to Churchill Falls

WTO	AC 1030 (Gull to Churchill TL)	TEST ID		AC1030-P0	D-12
DATE	21 Sept 2007	START	10:30	FINISH	12:45

	TEST L	OCATION	
Northing	5929506	Easting	448425
 Location marke 	d with Garmin recreations	al grade GPS: S/N 36115	779 (WPT No. 45)

- Hard drilling from 0.0 m to 1.8 m.
- No seepage encountered.

			PUL	L-OUT TEST RESULTS
TIME	TIME (sec)		Jack	
From	То	Load (Tons)	Rise (cm)	Notes
0	30	4	5.6	Anchor setting into rock
30	60	8	nil	Held at 8 Tons.
60	90	15	5.7	 Increased load to 15 Tons with 3.5 pumps of jack. Fell back to 7.5 Tons.
90	1200	18	nil	 Increased load with 3 pumps of jack. Held at 18 Tons (start of pump overload). End of Test .







Lab No: 713

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-01

Location N 5880124 E 0594735

Gravelly Sand from TLH cut through esker -

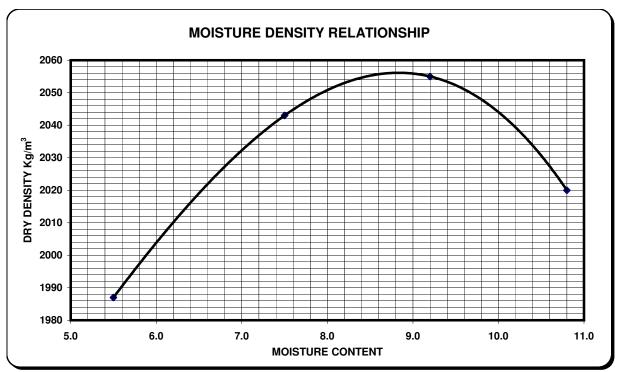
Sample Type / Source: taken 1.5 m below top of esker

Date Sampled: September 28, 2007 Sampled By Dwayne Druggett

Date Received: September 28, 2007 Preparation Moist

Percent Retained: > 19mm = 20.4%

Compaction Std.	ASTM	D698	Method	С
Moisture Content	5.5	7.5	9.2	10.8
•	3.3	7.5	3.2	10.0
Dry Density kg/m ³	1987	2043	2055	2020



Note: Oversized Material Correction > 19mm = 20.4%

Maximum Dry Density 2056 kg/m3 Corrected Dry Density 2128.6 kg/m3 Maximum Moisture 8.8 % Corrected Moisture 7.3 %

TEST PIT TL-PR-01

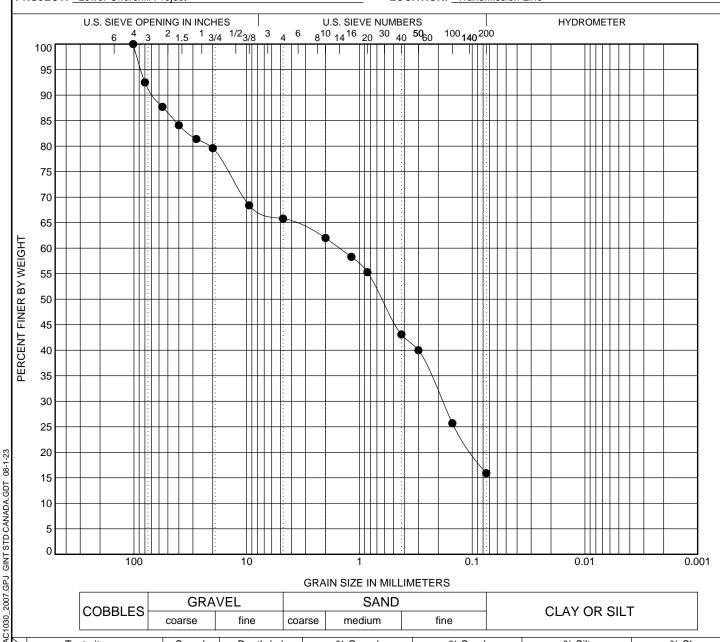
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

<u> </u>		Tes	t pit no.		Sam	nple	D	epth (m)	% G	ravel	%	Sand		% \$	Silt		% CI	lay
DATABASE	•	TL-PR-01			GE	3-1	0	.00 - 0.00	2	5.8	4	19.9			1	5.9		-
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5	•															-		
	*																	
į	* • •																	
		80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm (0.075 mm
	•	92.5	87.7	84	4.1	81	.4	79.6	68.4	65.8	62.0	55.3	43.	.1	40.0	25.7	7	15.9
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		Tes	t pit no.			,	ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
!	•	TL-PR-01			Gravel	ly SAN	ND wit	h some Fines	, trace Cobbl	es 1.5	0.2		5.0					
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Lab No: 714

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-02

Location N 5886923 E 0564234

Sample Type / Source: Till(Sand/Gravel) from TLH cut through

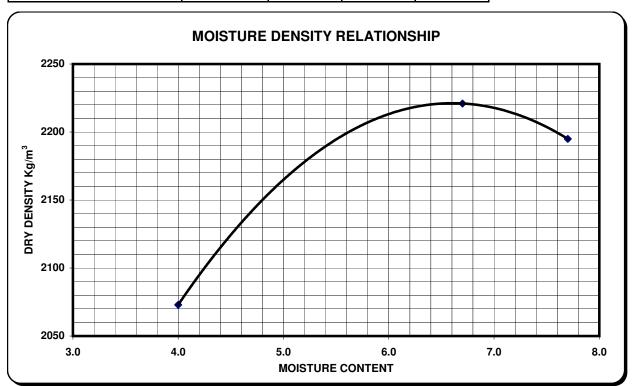
esker - taken 1.5 m below top of esker

Date Sampled: September 30, 2007 Sampled By Dwayne Druggett

Date Received: September 30, 2007 Preparation Moist

Percent Retained: > 19mm = 44.3%

Compaction Std.	ASTM	D698	Method	С
Moisture Content	4.0	6.7	7.7	
Dry Density kg/m ³	2073	2221	2195	



Note: Oversized Material Correction > 19mm = 44.3%

Maximum Dry Density 2230.0 kg/m3 Corrected Dry Density 2310.6 kg/m3 Maximum Moisture 6.0 % Corrected Moisture 4.0 %

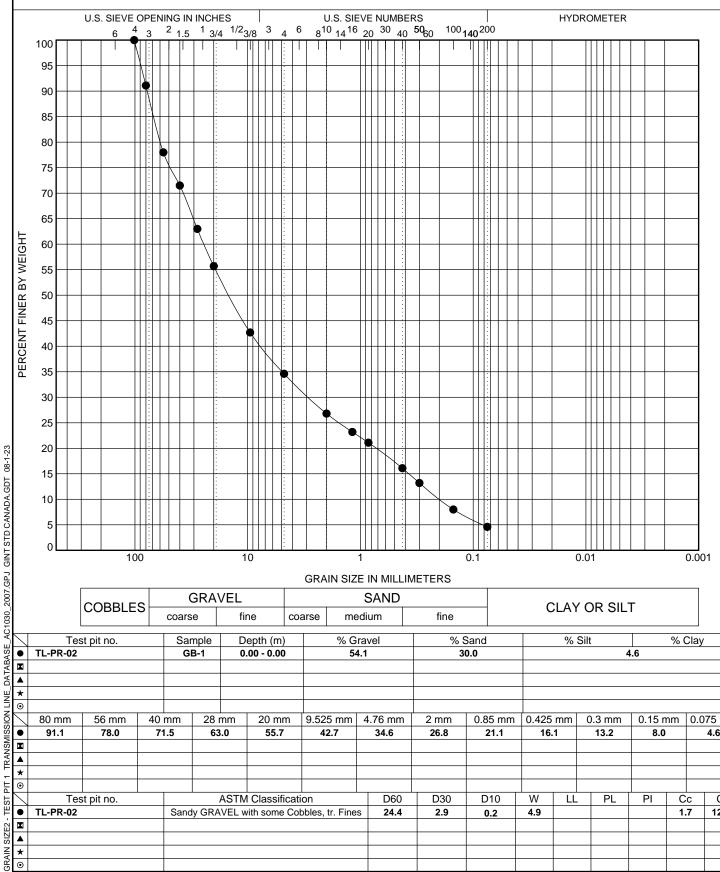
SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

TEST PIT TL-PR-02

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

COBBLES:	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

eg	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	% \$	Sand		% 5	Silt		% Cla	ay
● X	TL-PR-02			GE	3-1	0.	.00 - 0.00	54	4.1	3	0.0			4	.6		-
X																	
A																	
																-	
•																	
	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm (0.075 mm
* 0 •	91.1	78.0	71	1.5	63	.0	55.7	42.7	34.6	26.8	21.1	16.	1	13.2	8.0	,	4.6
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	Tes	t pit no.		,		ASTM	Classificati	on	D60	D30	D10	W	LĽ	PL	PI	Сс	Cu
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X																	
X A																	
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Lab No: 715

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-03

Location N 5905553 E 0522066

Sample Type / Source: Gravely Sand from TLH cut through esker -

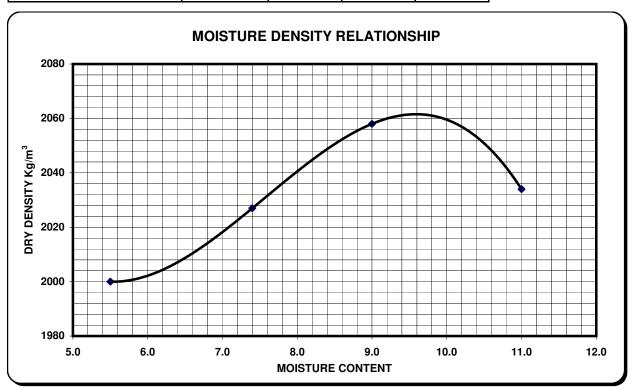
taken 2.0 m below top of esker

Date Sampled: September 30, 2007 Sampled By Dwayne Druggett

Date Received: September 30, 2007 Preparation Moist

Percent Retained: > 19mm = 9.6%

Compaction Std.	ASTM	D698	Method	С
Moisture Content	5.5	7.4	9.0	11.0
Dry Density kg/m ³	2000	2027	2058	2034



Note: Oversized Material Correction > 19mm = 9.6%

Maximum Dry Density 2062.0 kg/m3 Corrected Dry Density 2095.6 kg/m3 Maximum Moisture 9.6 % Corrected Moisture 8.8 %

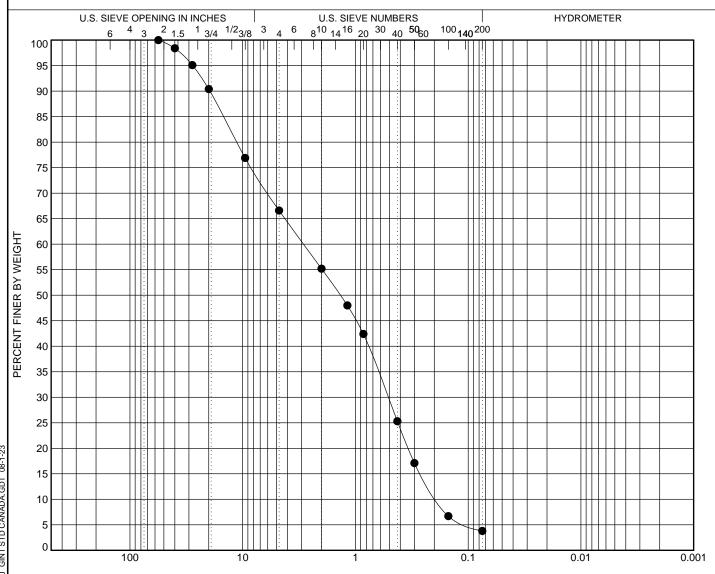
SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

TEST PIT TL-PR-03

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

COPPLES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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							0.5													
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		COBBLES		GR.	AVEL				SAND					CLAY	/ OF	o CII	т			
		CODDLLS	C	coarse	fi	ne	coarse	e me	edium		fine			CLAI	<u> </u>	\	- '			
J	Te	est pit no.		Sample	e D	epth (m	1)	% G	ravel		% :	Sand		%	Silt				% Clay	у
•	TL-PR-03			GB-1	0	.00 - 0.0	0	33	3.4		6	2.8					3.8			
X																				
A																				
★			-							-										
+	80 mm	56 mm	40 m	nm 2	 8 mm	20 m	m 9.5	25 mm	4.76 mr	n :	2 mm	0.85 mm	0.42	5 mm	0.3	3 mm	0.	15 m	m 0 (075 m
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Lab No: 716

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-04

Location N 5932491 E 0439266

Sample Type / Source: Till(Sand/Gravel) adjacent to TLH in area of

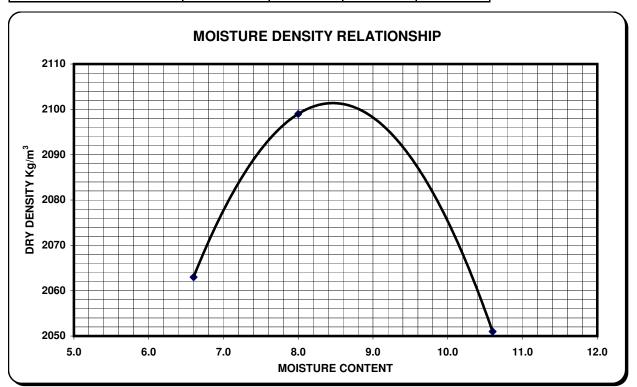
cut through till 1.5 m BGS

Date Sampled: September 30, 2007 Sampled By Dwayne Druggett

Date Received: September 30, 2007 Preparation Moist

Percent Retained: > 19mm = 27.5%

Compaction Std.	ASTM	D698	Method	С
Moisture Content	6.6	8.0	10.6	
Dry Density kg/m ³	2063	2099	2051	



Note: Oversized Material Correction > 19mm = 27.5%

Maximum Dry Density 2100.0 kg/m3 Corrected Dry Density 2185.8 kg/m3 Maximum Moisture 8.5 % Corrected Moisture 6.2 %

TEST PIT TL-PR-04

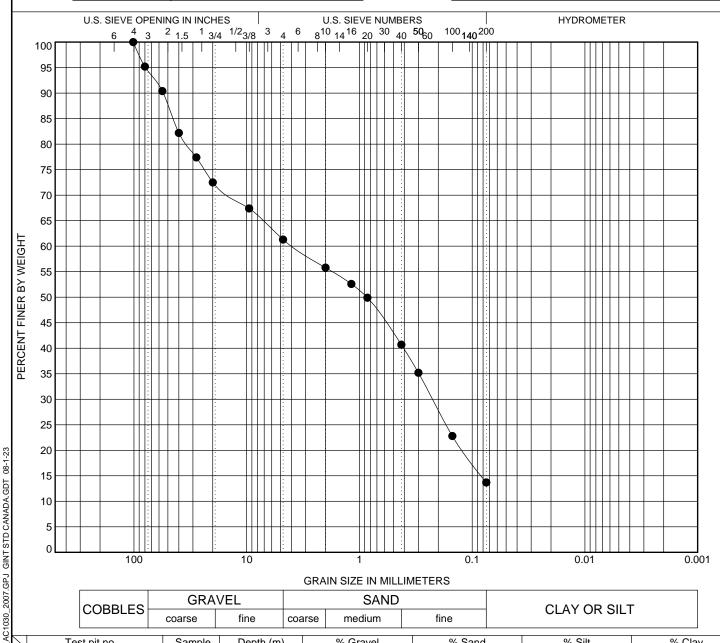
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE	ΙN	MILL	.IME	TERS
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COBBLES:	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

	-																_
	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	%	Sand		% \$	Silt		% CI	lay
•	TL-PR-04			GE	3-1	0	.00 - 0.00	3:	3.0	4	17.6			1:	3.7		-
X																	
A																	
*																	
•																	
	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm (0.075 mm
* 0 1	95.2	90.4	82	2.2	77	.4	72.5	67.4	61.3	55.8	49.9	40.	7	35.2	22.8	3	13.7
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•																	
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(O)																	
	Tes	t pit no.			-	ASTN	/ Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	TL-PR-04 Gravelly SAND with some Fines, trace					, trace Cobbl	es 3.9	0.2		7.4							
X																	
*																	
*																	
0																	



Lab No: 717

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-05

Location N 5920440 E 0485299

Sample Type / Source: Till(Sand/Gravel) adjacent to TLH in area of

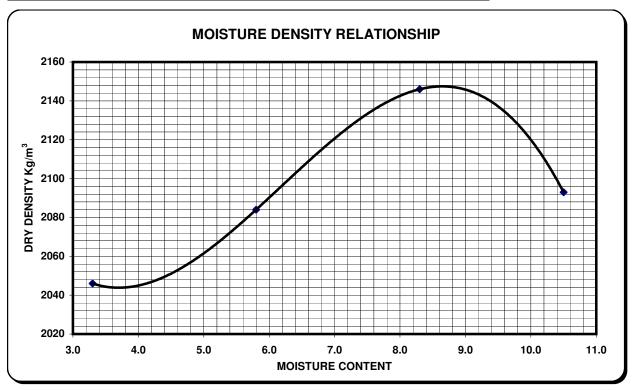
cut through till 2.5 m BGS

Date Sampled: September 30, 2007 Sampled By Dwayne Druggett

Date Received: September 30, 2007 Preparation Moist

Percent Retained: > 19mm = 20.4%

Compaction Std.	ASTM	D698	Method	С
	-	_		-
Moisture Content	3.3	5.8	8.3	10.5
Dry Density kg/m ³	2046	2084	2146	2093



Note: Oversized Material Correction > 19mm = 20.4%

Maximum Dry Density 2148.0 kg/m3 Corrected Dry Density 2201.9 kg/m3 Maximum Moisture 8.6 % Corrected Moisture 7.2 %

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

TEST PIT TL-PR-05

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line U.S. SIEVE OPENING IN INCHES U.S. SIEVE NUMBERS HYDROMETER 2 $_{1.5}$ 1 $_{3/4}$ $^{1/2}$ $_{3/8}$ 3 $_{4}$ 6 $_{8}$ 10 $_{14}$ 16 $_{20}$ 30 $_{40}$ 50 $_{60}$ 100 $_{140}$ 200 100 95 90 85

80 75 70 65 PERCENT FINER BY WEIGHT 60 55 50 45 40 35 30 25

GRAIN S	SIZE IN	MILL	IMET	-RS

CORRI ES	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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	5									Ш																		
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								GRA	IN SIZ	E IN	MILL	_IM	ETER	RS														
		COBBLES		GRA\	/EL					SA	AND								_	LAY	<i>-</i>	D	CII	т.				
		COBBLES	coa	rse	fii	ne	coa	arse	me	diur	n		fi	ne						LAI		'I'N	ااک					
		st pit no.		ample		epth (m			% G		el			% S						%	Silt					%	6 Clay	/
•	TL-PR-05		- (GB-1	0.	.00 - 0.0	0		18	3.0		_		48	3.6									23.	2			
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*																												
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	30.3	67.7	00.4	- 65		13.	•	- /、	J.J		71.0	+	07.	.2		01.0	,		33.			40.		+	33	.0		23.2
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•	TL-PR-05		Silt	y SAND	with s	ome Gra	avel,	some (Cobble	s	0.7		0.	.1				8.0)									
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Lab No: 718

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-06

Location N 5906348 E 0506003

Sample Type / Source: Sand from TLH cut throught esker 3 m

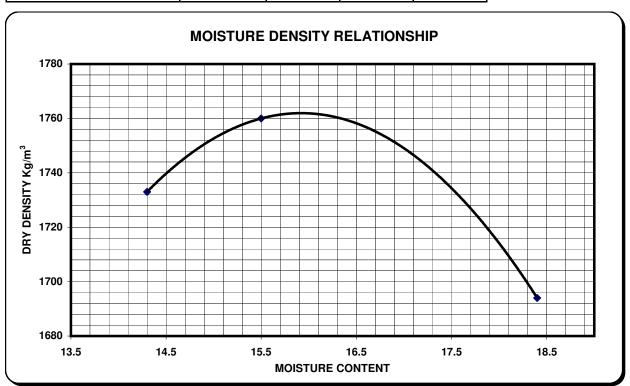
below top of esker

Date Sampled: September 30, 2007 Sampled By Dwayne Druggett

Date Received: September 30, 2007 Preparation Moist

Percent Retained: > 19mm = 0.0%

Compaction Std.	ASTM	D698	Method	С
Moisture Content	14.3	15.5	18.4	
Dry Density kg/m ³	1733	1760	1694	



Note: Oversized Material Correction > 19mm = 0.0%

Maximum Dry Density 1762.0 kg/m3 Corrected Dry Density 1762 kg/m3 Maximum Moisture 15.8 % Corrected Moisture 18.8 %

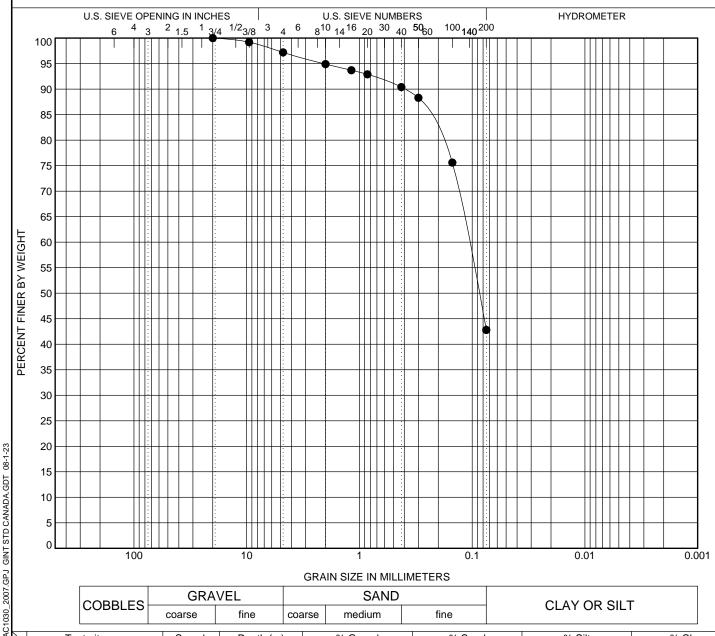
SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

TEST PIT TL-PR-06

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

Ă٢	V	Tes	t pit no.		Samp	ole	De	epth (m)	% G	ravel	% 5	Sand		% S	Silt		% CI	ay
DATABASE	•	TL-PR-06			GB-	1	0.	00 - 0.00	2	.8	5	4.4			4:	2.8		
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'n.	*																	
I KANSIMISSION LINE	⊚																	
		80 mm	56 mm	40	mm	28 m	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm (0.075 mm
<u>ĕ</u> L	•							100.0	99.2	97.2	94.9	92.9	90.	4	88.3	75.6	<u>; </u>	42.8
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ζ.	•																	
	*																	
1 1 1 1	⊙																	
0		Tes	t pit no.			Α	STM	Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
	•	TL-PR-06			SA	AND a	and FI	NES with trad	ce Gravel	0.1			19.0					
Z	X																	
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Lab No: 719

Client: Newfoundland and Labrador Hydro

Project No: 722855

Project: AC1030 TL Gull Island to Churchill Falls

Sample # AC1030-TL-PR-07

Location N 5898164 E 0541205

Sample Type / Source: Till(Sand/Gravel) Adjacent to TLH 0.5 m

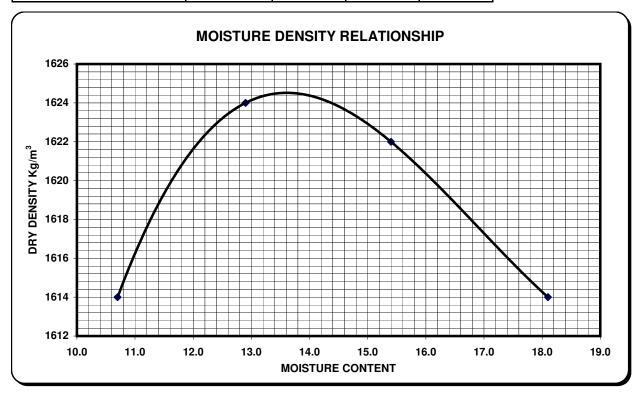
below ground surface

Date Sampled: September 28, 2007 Sampled By Dwayne Druggett

Date Received: September 28, 2007 Preparation Moist

Percent Retained: > 19mm = 0.0%

Compaction Std.	10.7	D698	Method	С
Moisture Content	10.7	12.9	15.4	18.1
Dry Density kg/m ³	1614	1624	1622	1614



Note: Oversized Material Correction > 19mm = 0.0%

Maximum Dry Density 1624.6 kg/m3 Corrected Dry Density 1624.6 kg/m3 Maximum Moisture 13.5 % Corrected Moisture 13.5 %

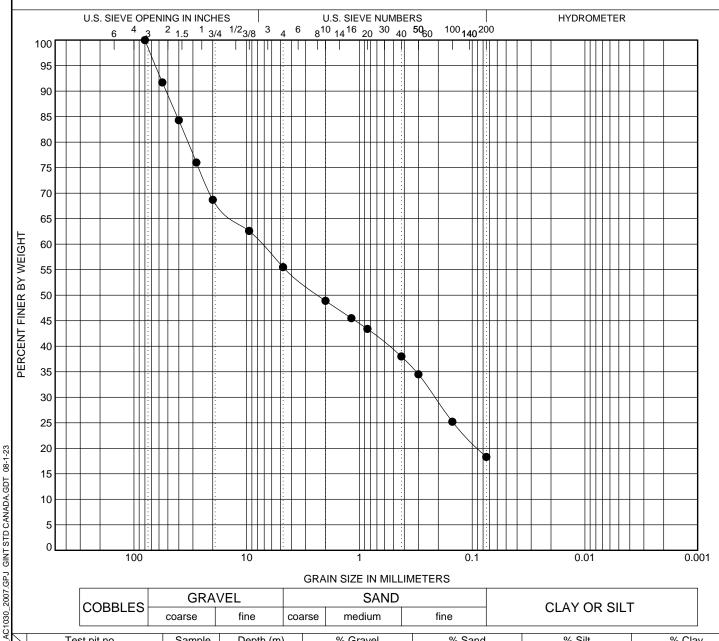
SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

TEST PIT TL-PR-07

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Transmission Line



GRAIN SIZE IN MILLIMETERS

CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	Tes	t pit no.		San	nple	De	epth (m)	% G	ravel	%	Sand		% :	Silt		% CI	av
•	TL-PR-07			GE			00 - 0.00	43	3.0	3	37.2			1	8.3		
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▲																	
★																	
⊙																	
•	80 mm	56 mm	40 :	mm	28 n	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm (0.075 mm
•	100.0	91.7	84	1.3	76.	0	68.7	62.6	55.5	48.9	43.4	38.	0	34.5	25.2	2	18.3
A																	
*																	
•																	
	Tes	t pit no.			A	STM	Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	TL-PR-07			GRAV	EL & S	AND ۱	with some Fir	nes, tr. Cobbl	es 7.4	0.2		8.2					
X																	
X																	
★																	
•																	

Field Investigation and Construction Infrastructure 735 kV Transmission Line – Gull Island to Churchill Falls

February 2008 Project No. 722850

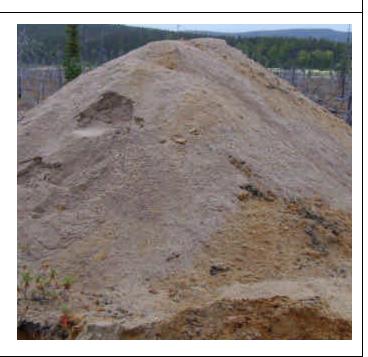
APPENDIX C

MARSHALLING YARD DATA



			Test Pit: AC1030	- 1								
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 13-Sep-07							
Project:												
Contract No.	ontract No. AC1030 Location: N 5875402 E 0612009 Inspector: Dave Oldford											





Soil and Groundwater Conditions

Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.04	PEAT - black org	anic soil, rootlets, moist, loose	NA	NA	NA
0.04 - 0.3		trace fines, trace rootlets poorly compact, orange to light brown.	NA	NA	NA
0.3 - 3.5		ED SAND (SP) - trace fines, trace bbles, sub angular, loose to compact, to light grey	1	0.3 - 3.5	Grab
Estimated Co	bbles (%) 1 – 5	Estimated Boulders (%) 0	Estimated Max I	Diameter (m)	NA
Start Time	e: 10:25 am	End Time: 11:10 am	Estimated Excav Volume (m ³)	/ated	30
		General Notes	•		

Severe sloughing within test pit. Test Pit was dry upon completion

North and East coordinates obtained using Garmin Etrex Legend Cx GPS

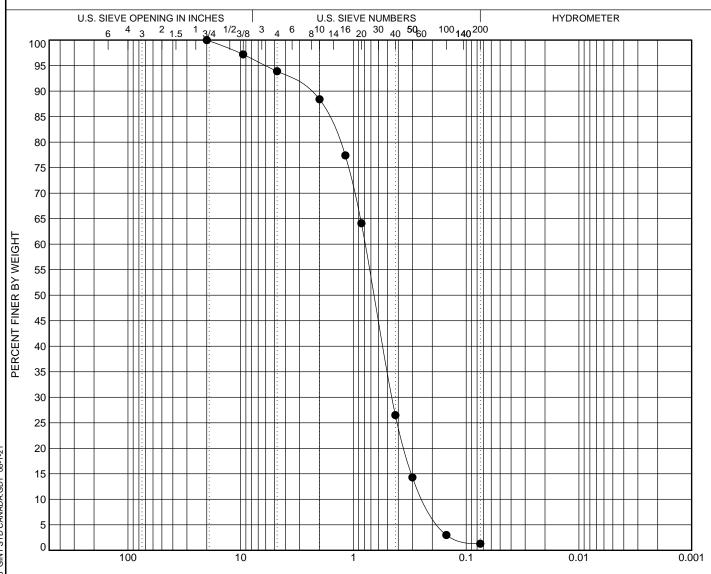
TEST PIT AC1030-001

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



GRAIN SIZE IN MILLIMETERS

CORRI ES	GRA	VEL		SAND		CLAV OD SILT
CODDLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

38-1-21	20																										+				
AC1030_2007.GPJ GINT STD CANADA.GDT 08-1-21	15 10																														
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711			st pit no.			nple		epth	<u> </u>			% Gı						San	d				%	Silt			\perp		%	Clay	
BAS	AC1	030-0	01		GI	B-1	0.	30 - 3	3.50			6.	1				9	2.6									1.3				
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		030-01	71			100	/KLT C	מאות	LD	OANL	/(31)			0.0		'			0.2			.0					+		<u> </u>	••	3.7
SIZE2 -	A .																										\perp				
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			Test Pit: AC1030	- 2									
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 13-Sep-07								
Project:													
Contract No.	AC1030	Location:	N 5875383	E 0611950	Inspector: Dave Oldford								



Depth (m)

From - To



Sample

Depth (m)

Sample Type

Description Sample ID.

Soil and Groundwater Conditions

0.0 - 0.03	PEAT - black orç	ganic soil, rootlets, moist, loose	NA	NA	NA		
0.03 - 0.13		- trace fines, trace rootlets poorly compact, orange to light brown.	NA	NA	NA		
0.13 - 3.5		ED SAND (SP) - trace fines, trace obbles, sub angular loose to compact, to light grey	1	1.2	Grab		
Estimated Cobl	oles (%) 1	Estimated Boulders (%) 0	Estimated Max I	Diameter (m) N	IA .		
		Estimated Evaporated					

Start Time: 11:15 am

End Time: 11:45 am

Estimated Boulders (%) 0

Estimated Max Diameter (m) NA

Start Time: 11:15 am

End Time: 11:45 am

30

General Notes
Severe sloughing within test pit. Test Pit was dry upon completion

North and East coordinates obtained using Garmin Etrex Legend Cx GPS

TEST PIT AC1030-002

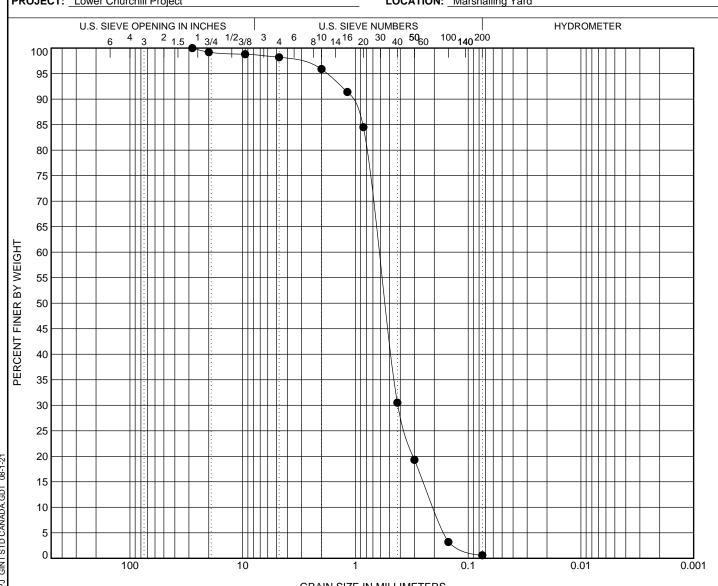
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



GRAIN SIZ	E IN MIL	LIMETERS
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COBBLES:	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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		COBBLES											(CLAY	OF	R SIL	Т			
			coar	se	fine	•	coars	e me	edium	fine										
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★																				
$\stackrel{\bullet}{\leftarrow}$	80 mm	56 mm	40 mm	28 m	nm	20 m	m 9	525 mm	4.76 mm	2 mm	0.8	5 mm	0.425	mm	0.3	mm	10	.15 n	om 0	.075 m
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•	AC1030-0	st pit no.					fication SAND(<u>SD</u>)	D60 0.6	D30 0.4	_	10	2.9	LL		PL		PI	Cc 1.4	3.1
X	AC 1030-0	02		FUUI	KLI GF	MUEL	J SAND(31)	0.6	0.4).2	2.9						1.4	3.1
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Test Pit: AC1030 - 3										
Firm: Newfoundland and Labrador Hydro Date: 13-Sep-07										
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls									
Contract No.	AC1030	Location:	Inspector: Dave Oldford							







Soil and Groundwater Conditions

Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.03	PEAT - black org	ganic soil, rootlets, moist, loose	NA	NA	NA
0.03 - 0.13		- trace fines, trace rootlets poorly compact, orange to light brown.	NA	NA	NA
0.13 - 3.5		ED SAND (SP) - trace fines, trace bbles, sub angular, loose to compact, to light grey	1	1.0 - 3.0	Grab
Estimated Cobb	oles (%) 1	Estimated Boulders (%) 0	Estimated Max [Diameter (m) N	NA
Start Time: 11:	53 am	End Time: 12:30 pm	Estimated Excav Volume (m³)	/ated	30
		General Notes			

Severe sloughing within test pit. Test Pit was dry upon completion

North and East coordinates obtained using Garmin Etrex Legend Cx GPS

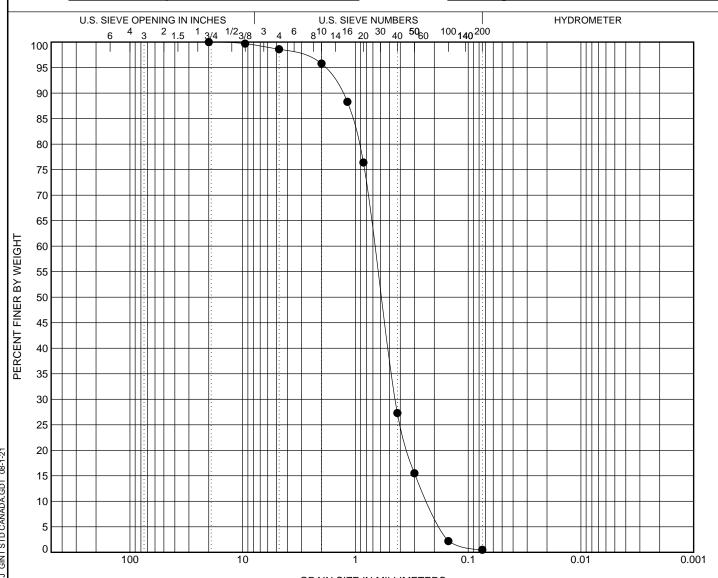
TEST PIT AC1030-003

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



GRAIN SIZE	ΙN	MILL	.IME	TERS
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COPPLES	GRA	VEL		SAND		CLAV OD SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

Test pit no. Sample Depth (m) % Gravel % Sand % Silt % Clay		20			:			:			шш				1:1	\perp				Ш		$\perp \perp$			
100		20																							
COBBLES GRAVEL SAND CLAY OR SILT		15			+ - :			:				++	*		 	+			+		+	\vdash	-		
COBBLES GRAVEL SAND CLAY OR SILT													$ \setminus $												
COBBLES GRAVEL SAND CLAY OR SILT		10	1 1 111					<u> </u>				Hi	+		+ + + + + + + + + + + + + + + + + + +	+			+						
COBBLES GRAVEL SAND CLAY OR SILT		_						:																	
COBBLES GRAVEL SAND CLAY OR SILT		٦																							
COBBLES GRAVEL SAND CLAY OR SILT		0			:								<u> </u>									Ш			
Test pit no. Sample Depth (m) % Gravel % Sand % Silt % Clay			100			1	0				1			0.	1			(0.01					0.0	01
Test pit no. Sample Depth (m) % Gravel % Sand % Silt % Clay								(SRAI	N SIZI	E IN I	MILLII	METERS												
Test pit no. Sample Depth (m) % Gravel % Sand % Silt % Clay					GRAV	/FI					SA	ND													
Test pit no. Sample Depth (m) % Gravel % Sand % Silt % Clay AC1030-003 GB-1 1.00 - 3.00 1.4 98.1 0.5 80 mm 56 mm 40 mm 28 mm 20 mm 9.525 mm 4.76 mm 2 mm 0.85 mm 0.425 mm 0.3 mm 0.15 mm 0.075 m 100.0 99.7 98.6 95.8 76.4 27.3 15.5 2.2 0.5 Test pit no. ASTM Classification D60 D30 D10 W LL PL Pl Cc Cu AC1030-003 POORLY GRADED SAND(SP) 0.7 0.4 0.2 3.1 1.3 3.0 A **			COBBLES										£:					CLAY	′ OI	R S	3IL	Γ			
● AC1030-003				coars	se	TII	ne	coar	se	me	aium		Tine)											
● AC1030-003	abla	Te	st pit no.	Sa	mple	D	epth (m	1)		% Gı	ravel			% Sa	nd			%	Silt			Т		% Cla	у
★ ★ 0		AC1030-0	030-003 GB-1			1.	.00 - 3.0	- 3.00 1.4					98.1			0.5									
* 0 80 mm 56 mm 40 mm 28 mm 20 mm 9.525 mm 4.76 mm 2 mm 0.85 mm 0.425 mm 0.3 mm 0.15 mm 0.075 mm • 100.0 99.7 98.6 95.8 76.4 27.3 15.5 2.2 0.5 • 100.0 99.7 98.6 95.8 76.4 27.3 15.5 2.2 0.5 • 100.0 99.7 98.6 95.8 76.4 27.3 15.5 2.2 0.5 • 100.0 99.7 98.6 95.8 76.4 27.3 15.5 2.2 0.5 • 100.0 99.7 98.6 95.8 76.4 27.3 15.5 2.2 0.5 • 100.0 <t< td=""><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	_																								
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80 mm 56 mm 40 mm 28 mm 20 mm 9.525 mm 4.76 mm 2 mm 0.85 mm 0.425 mm 0.3 mm 0.15 mm 0.075 mm																									
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▲ ★ O D30 D10 W LL PL PI Cc Cc Cu ● AC1030-003 POORLY GRADED SAND(SP) 0.7 0.4 0.2 3.1 1.3 3.0 ★ ★ Image: Company of the company of							100.			•		,,,,	00.0		. 0.										0.0
Test pit no. ASTM Classification D60 D30 D10 W LL PL PI Cc Cu AC1030-003 POORLY GRADED SAND(SP) 0.7 0.4 0.2 3.1 1.3 3.0 X<	-																								
Test pit no. ASTM Classification D60 D30 D10 W LL PL PI Cc Cu ♠ AC1030-003 POORLY GRADED SAND(SP) 0.7 0.4 0.2 3.1 1.3 3.0 ★	*																								
● AC1030-003 POORLY GRADED SAND(SP) 0.7 0.4 0.2 3.1 1.3 3.0 ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■	•																								
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A * *				SANI	D(SP)			0.7	0.4		0.2	_	3.1		4				\perp	1.3	3.0				
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Test Pit: AC1030 - 4										
Firm: Newfoundland and Labrador Hydro Date: 13-Sep-07										
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls									
Contract No.	AC1030	Location:	Inspector: Dave Oldford							





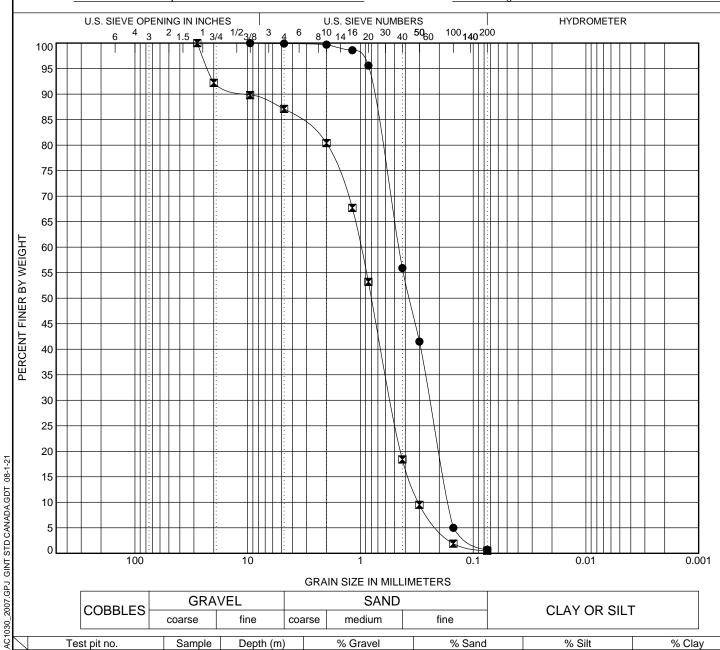
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type				
0.0 - 0.03	PEAT - black org	ganic soil, rootlets, moist, loose	NA	NA	NA				
0.03 - 0.6		ED SAND (SP) - trace fines, trace compact, moist, orange to light brown.	1	0.6	Grab				
0.6 - 3.5		ED SAND (SP) - trace fines, trace bbles, sub angular, loose to compact, to light grey	2	3.0	Grab				
Estimated Cobb	oles (%) 1	Estimated Boulders (%) 0	Estimated Max [Diameter (m) N	IA				
Start Time: 12:	35 pm	End Time: 1:05 pm	Estimated Exca Volume (m ³)	vated	30				
General Notes									
Severe sloughing within test pit. Test Pit was dry upon completion									
North and East	coordinates obtai	ned using Garmin Etrex Legend Cx GP	S						

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



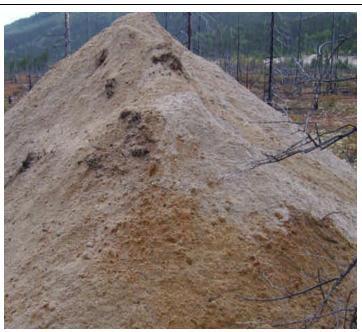
CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

A.	\setminus	Tes	t pit no.		Sam	ple	D	epth (m)	% G	ravel	% 9	Sand		% S	Silt		% Clay	y
띴	•	AC1030-00	4		GB-	-1	0.	.50 - 0.60	0	.1	9	9.2			0).7		
BA		AC1030-00	4		GB-	-2	3.	.00 - 3.50	12	2.9	8	6.6			C).5		
DATABASE																		
鵥																		
TRANSMISSION LINE	$ egthinspace{1.5em}$	80 mm	56 mm	40	mm	28 n	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.0	075 mm
SS	•								100.0	99.9	99.7	95.6	55.	9	41.5	5.0		0.7
ĬŽ.						100	0.0	92.2	89.8	87.1	80.4	53.2	18.	4	9.5	1.9		0.5
AN																		
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TEST PIT	egthinspace = egt	Tes	t pit no.			F	ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
쁘	•	AC1030-00	4			POO	RLY (GRADED SAI	ND(SP)	0.5	0.2	0.2	9.3				0.8	2.8
E2 -	X	AC1030-00	4			POO	RLY (GRADED SAI	ND(SP)	1	0.5	0.3	6.7				0.9	3.2
SIZ																		
RAIN SIZE2 -																		
≈																		



			Test Pit: AC1030	- 5	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 13-Sep-07
Project:	Lower Churchill	Project – 73	5 kV Transmission Line	– Gull Island to Churchil	Falls
Contract No.	AC1030	Location:	N 5875486	E 0611932	Inspector: Dave Oldford





		Soil and Groundwater Cond	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.03	Depth (m) From - To Description 0.0 - 0.03 PEAT - black organic soil, rootlets, moist, loosed to compact, orange to light brown graded, loose to compact, orange to light brown gravels, trace cobbles, sub angular, loose to moist, olive grey to light grey Stimated Cobbles (%) 1 End Time: 1:40 pm General evere sloughing within test pit, Test Pit was dry upon completed.		NA	NA	NA
0.03 - 0.3			NA	NA	NA
0.3 - 3.0	gravels, trace co	obbles, sub angular, loose to compact,	1	3.0	Grab
Estimated Cob	bles (%) 1	Estimated Boulders (%) 0	Estimated Max [Diameter (m) N	NA
Start Time: 1:	15 pm	End Time: 1:40 pm	Estimated Excav Volume (m3)	/ated	28
		General Notes	•		
Severe slough	ing within test pit,	Test Pit was dry upon completion	· · · · · · · · · · · · · · · · · · ·	<u> </u>	· · · · · · · · · · · · · · · · · · ·
North and Eas	t coordinates obta	ined using Garmin Etrex Legend Cx GF	PS	·	

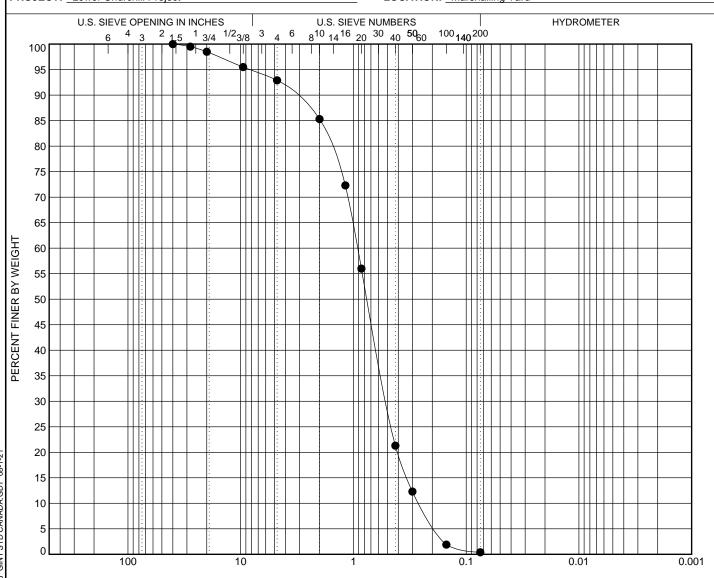
SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

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CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



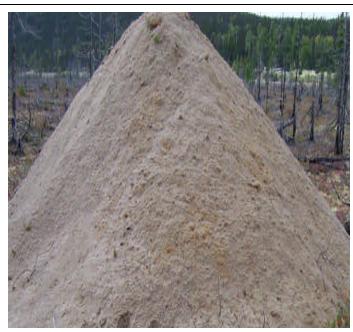
CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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- II \		st pit no.			nple		epth (ı			% G					Sanc	i		%	Silt					% Cla	у
DATABASE A M O	AC1030-0	05		GI	3-1	2.	80 - 3.	00		- 7	.1			,	92.5						- 0	.4			
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TRANSMISSION LINE				70.0	33.	.5	30		33	,.5		2.3		00.0		30.0				12.5			1.3		0.7
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ZE2 -																									
GRAIN SIZE2											_								+		\dashv		+		
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			Test Pit: AC1030	- 6	
Firm:	Newfoundland a	nd Labrador	· Hydro		Date: 13-Sep-07
Project:	Lower Churchill	Project – 73	5 kV Transmission Line	 Gull Island to Churchill 	Falls
Contract No.	AC1030	Location:	N 5875489	E 0611990	Inspector: Dave Oldford





SAII	and	Ground	water (Conditions	

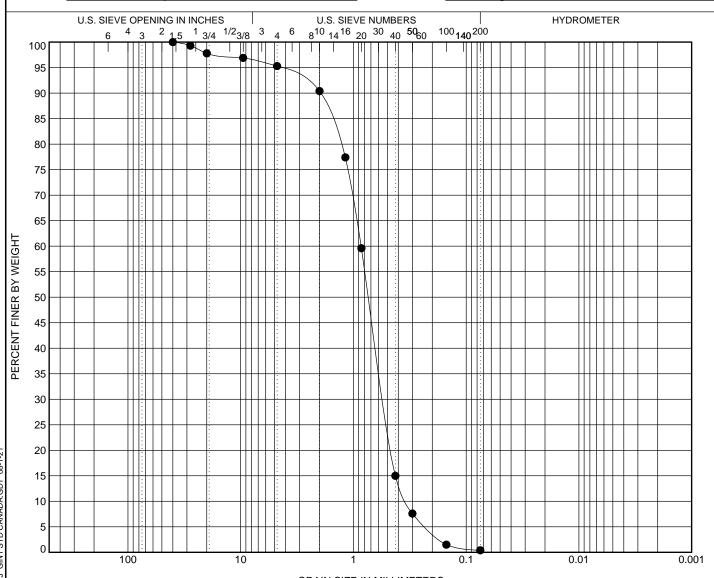
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.02	PEAT - black or	ganic soil, rootlets, moist, loose	NA	NA	NA
0.02 - 0.25		- trace fines, trace rootlets poorly compact, orange to light brown.	NA	NA	NA
0.25 - 3.5		ED SAND (SP) - trace fines, trace obbles, sub angular, loose to compact, to light grey	1	3.5	Grab
Estimated Cobb	bles (%) 1	Estimated Boulders (%) 0	Estimated Max I	Diameter (m) N	IA
Start Time: 1:4	15 pm	End Time: 2:10 pm	Estimated Excav Volume (m ³)	vated	30
		General Notes	•		•
Severe sloughi	ng within test pit.	Test Pit was dry upon completion			
North and East	coordinates obtain	ined using Garmin Etrex Legend Cx GF	PS		<u>-</u>

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



GRAIN SIZE	INI	1111	EDC

CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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0	80 mm	56 mm	40 mm	28 1	mm	20 m	m 0	525 mm	4.76 mm	2 mm	0.85	mm	0.425	mm	0.3	3 mm	10	15 m	m 10	075 m
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			Test Pit: AC1030	- 7	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 13-Sep-07
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line	 Gull Island to Churchill 	Falls
Contract No.	AC1030	Location:	N 5875500	E 0612053	Inspector: Dave Oldford





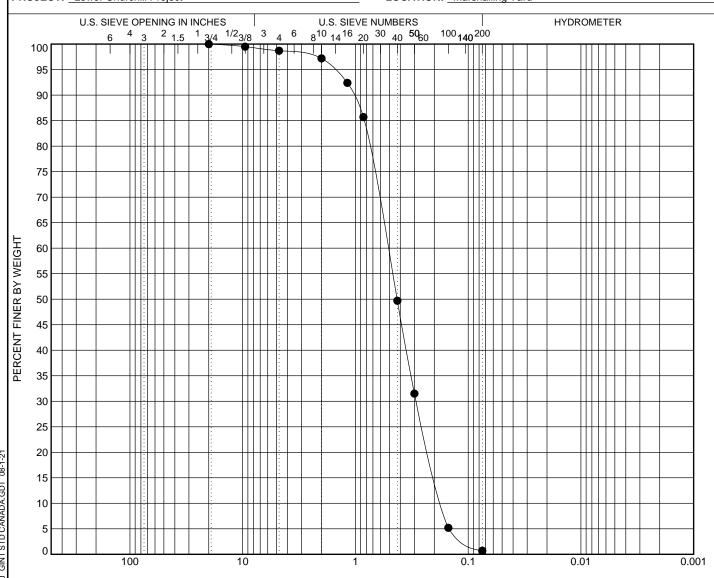
Soil and Groundwater Conditions Depth (m) Sample From - To **Description** Sample ID. Depth (m) Sample Type 0.0 - 0.04PEAT - black organic soil, rootlets, moist, loose NA NA NA Oxidized SAND - trace fines, trace rootlets poorly 0.04 - 0.3NA NA NA graded, loose to compact, orange to light brown. POORLY GRADED SAND (SP) - trace fines, trace 2.0 Grab 1 0.3 - 3.5gravels, trace cobbles, sub angular, loose to compact, moist, olive grey to light grey Estimated Boulders (%) 0 Estimated Cobbles (%) 1 Estimated Max Diameter (m) NA **Estimated Excavated** Start Time: 2:11 pm End Time: 2:35 pm 30 Volume (m³) **General Notes** Severe sloughing within test pit. Test Pit was dry upon completion North and East coordinates obtained using Garmin Etrec Legend Cx GPS

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



COBBLES:	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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.GPJ										G	RAIN	SIZI	E IN	MIL	LIM	IETER	S														
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71			st pit no.			nple		epth	<u> </u>		(% Gı					% 5		d				%	Silt			\perp		%	Clay	
BAS	● AC1	030-0	07		GI	B-1	2.	00 - 2	2.50			1.	.3				98	8.0									0.7				
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TRANSMISSION LINE	● 80	mm	56 mm	40	mm	28 ו	mm	20	mn	n g	.525 r	mm	4.7	6 m	m	2 m	m	0.	.85	mm	0.4	125	mm	0.	3 m	nm	Το	.15 r	mm	0.0	75 mm
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		030-00	U7			POU	RLY	KAD	יבט	SANL	(SP)		+	0.5)	0.	3		0.2		5.0	•		-			-		-	.9	3.0
SIZE2 -	A																														
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			Test Pit: AC1030	- 8	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 13-Sep-07
Project:	Lower Churchill	Project – 73	5 kV Transmission Line	 Gull Island to Churchill 	Falls
Contract No.	AC1030	Location:	N 5875575	E 0612102	Inspector: Dave Oldford





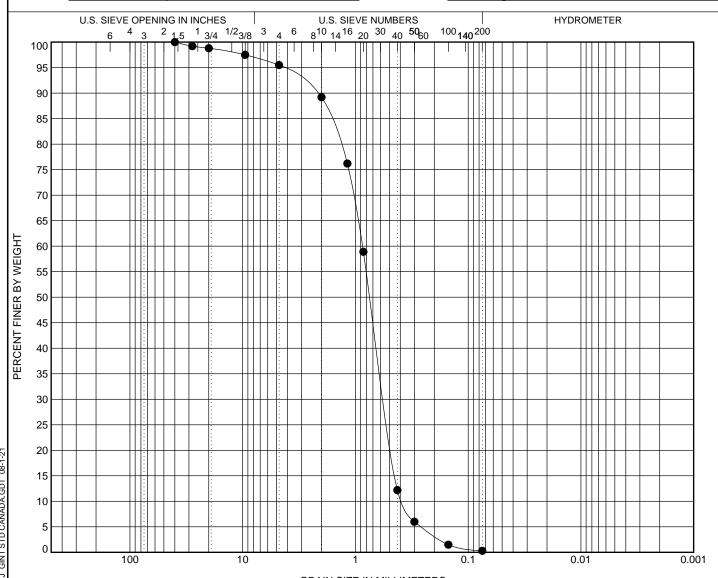
		Soil and Groundwater Con-	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.05	PEAT - black or	rganic soil, rootlets, moist, loose	NA	NA	NA
0.05 - 0.15		- trace fines, trace rootlets poorly compact, orange to light brown.	NA	NA	NA
0.15 - 3.5		DED SAND (SP) - trace fines, trace sobbles, sub angular, loose to compact, y to light grey	1	1.0 - 3.0	Grab
Estimated Cob	bles (%) 1	Estimated Boulders (%) 0	Estimated Max	Diameter (m) 1	NA
Start Time: 2:	30 pm	End Time: 3:00 pm	Estimated Excar Volume (m³)	vated	30
		General Notes	•		
Severe sloughi	ng within test pit.	Test Pit was dry upon completion	·		
North and East	t coordinates obta	ained using Garmin Etrex Legend Cx GF	PS		

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



COBBLES:	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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		COBBLES		coars	е	fi	ne	coa	arse	me	dium		fin	е				CLA	ΥO	RS	SIL	I			
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•	AC1030-0	08			B-1		.00 - 3.0				.5			95.	2						0).3			,
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			10	JU.U	99	1.2	30.0	0	9	7.3	9.	J.J	09.2		30	.9	1.	2.2		0.0			1.3		0.3
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abla	Te	st pit no.					l Classi					D60	D30)	D1	0	W	LL	-]	Ρl		Р	I	Сс	Cı
•	AC1030-0	08			POC	RLY	GRADED	SAI	ND(SP	')		0.9	0.6		0.4	ı	3.3							0.9	2.
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			Test Pit: AC1030	- 9	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 13-Sep-07
Project:	Lower Churchill	Project – 73	5 kV Transmission Line	 Gull Island to Churchill 	Falls
Contract No.	AC1030	Location:	N 5875589	E 0612019	Inspector: Dave Oldford





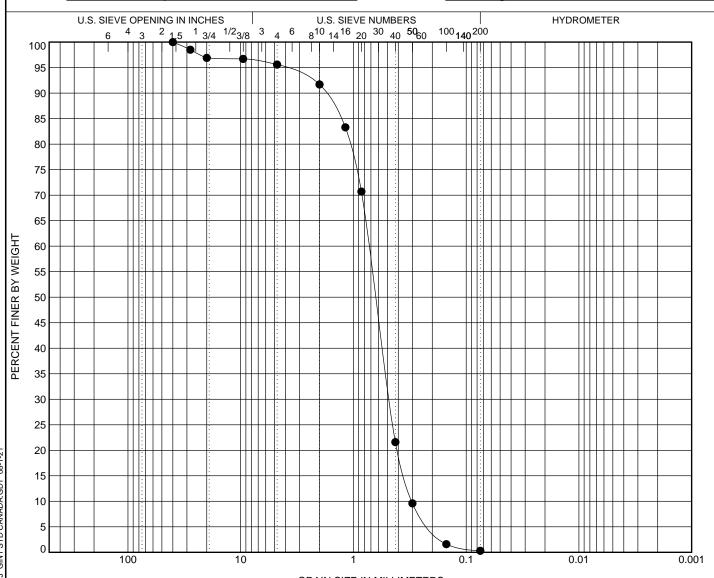
Soil and Groundwater Conditions Depth (m) Sample From - To **Description** Sample ID. Depth (m) Sample Type 0.0 - 0.06PEAT - black organic soil, rootlets, moist, loose NA NA NA Oxidized SAND - trace fines, trace rootlets poorly 0.06 - 0.3NA NA NA graded, loose to compact, orange to light brown. POORLY GRADED SAND (SP) - trace fines, trace 2.0 - 3.0Grab 1 0.3 - 3.0gravels, trace cobbles, sub angular, loose to compact, moist, olive grey to light grey Estimated Boulders (%) 0 Estimated Cobbles (%) 1 Estimated Max Diameter (m) NA Estimated Excavated Start Time: 3:10 pm End Time: 3:45 pm 28 Volume (m³) **General Notes** Severe sloughing within test pit. Test Pit was dry upon completion North and East coordinates obtained using Garmin Etrex Legend Cx GPS

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

8-1-21	20																										1
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71.			st pit no.		_	mple		epth	<u> </u>			Grav	el e		Q	% Saı				%	Silt					% CI	ay
BAS	AC10	30-0	09		G	B-1	2.	00 - 3	3.00			4.4				95.3	8	-					0).3			
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	*																										
TRANSMISSION LINE	. 80 r	nm	56 mm	40	mm	28 1	mm	20	mm	n 9	.525 mm	4	.76 m	nm	2 mm		0.85 m	m	0.425	mm	0.	3 m	m	0.	15 m	m (0.075 mr
IISSI	•				0.00	98			6.9		96.7		95.6		91.7		70.7		21.			9.6			1.6		0.3
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	9											I,															_
	• AC10		st pit no.				ASTM RLY C						D(D30 0.5	+	D10	-	W 3.3	LL	-	Pl		P	1	Cc 1.0	Cu 2.4
		J3U-U	ບອ			FUC	KLIC	JKAD	יבט ,	SAND	(37)		U.	.,	0.5		0.3		3.3							1.0	2.4
SIZE2 -	A																										
ĕ ,	★ ⊙											_									-		_				
Q C	ا ح																										



			Test Pit: AC1030 -	· 10	
Firm:	Newfoundland a	nd Labrador	· Hydro		Date: 13-Sep-07
Project:	Lower Churchill	Project – 73	5 kV Transmission Line	 Gull Island to Churchill 	Falls
Contract No.	AC1030	Location:	N 5875562	E 0611970	Inspector: Dave Oldford





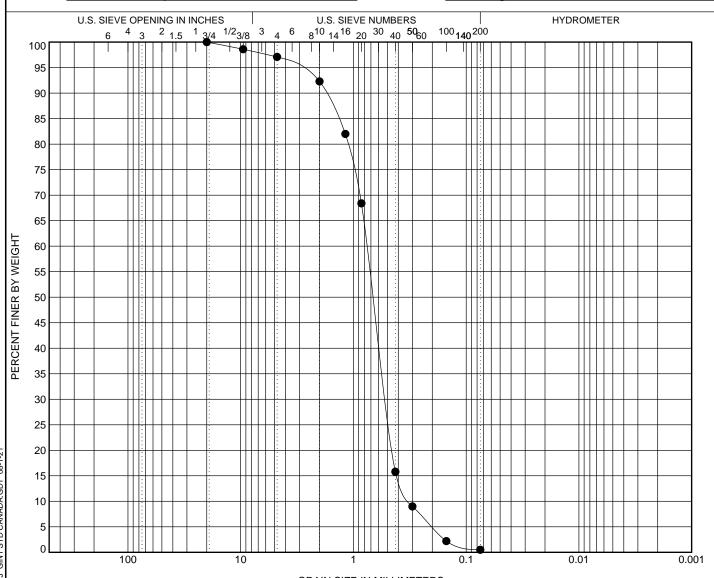
Soil and Groundwater Conditions Depth (m) Sample From - To **Description** Sample ID. Depth (m) Sample Type 0.0 - 0.06PEAT - black organic soil, rootlets, moist, loose NA NA NA Oxidized SAND - trace fines, trace rootlets poorly 0.06 - 0.35NA NA NA graded, loose to compact, orange to light brown. POORLY GRADED SAND (SP) - trace fines, trace 1.0 - 3.0 Grab 1 0.35 - 3.5gravels, trace cobbles, sub angular, loose to compact, moist, olive grey to light grey Estimated Boulders (%) 0 Estimated Cobbles (%) 1 Estimated Max Diameter (m) NA **Estimated Excavated** Start Time: 4:15 pm End Time: 3:45 pm 30 Volume (m³) **General Notes** Severe sloughing within test pit. Test Pit was dry upon completion North and East coordinates obtained using Garmin Etrex Legend Cx GPS

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Marshalling Yard



COPPLES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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*												+															
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	80 mm	56 mm	40 mm	28 1	mm	20 m	ım S	9.525 r	mm	4.76	mm	T	2 mr	n	3.0	35 n	nm	0.42	5 mm	1 (0.3	mm	n	0.1	5 m	m 0	.075 r
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Field Investigation and Construction Infrastructure 735 kV Transmission Line – Gull Island to Churchill Falls

February 2008 Project No. 722850

APPENDIX D

CAMPSITES DATA



		Tes	st Pit: CAMP 1 AC 1030	- 1 of 10	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 23-Sep-07
Project:	Lower Churchill I	Project – 73	5 kV Transmission Line -	- Gull Island to Churchill	Falls
Contract No.	AC1030	Location:	N 5882869	E 0574331	Inspector: Dave Oldford





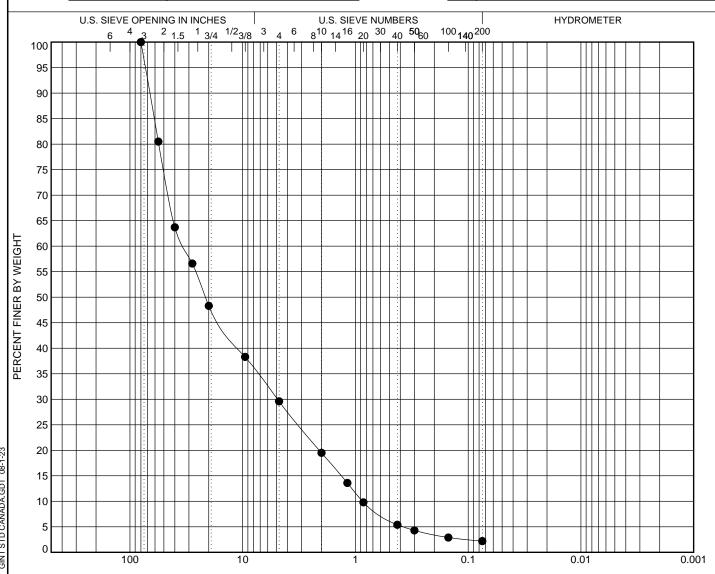
Malast DV - Com	P. American	Transaction and the second	TO VARIOUS								
		Soil and Groundy	water Cor	ditions							
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 2.5	cobbles, some	d Gravel with Sand (GP) – se boulders, trace fines, compact, moist, light brown		1	1.0 - 2.0	Grab					
2.5	Refusal due to	o Boulders or Bedrock.		NA	NA	NA					
Estimated Cobble	es (%) 25 - 35	Estimated Boulders (%) 5	5 - 10	Estimated Max	Diameter (m)	1.0					
Start Time: 8:00	am	End Time: 8:20 am		Estimated Excavated Volume (m³)							
		Genera	l Notes								
Minor sloughing where boulders where removed and soil lost support.											
North and East c	North and East coordinates obtained using Garmin Etrex Legend Cx GPS.										
Water entering te	Water entering test pit at 2.3 m just above bedrock or large boulders.										

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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								GRA	N SIZ	E IN	MILL	IME	TERS	;														
		COBBLES	(GRAV	EL					SA	ND								CLA'	v ()D	Q1	υт	-				
		COBBLES	coars	se	fine	9	coa	arse	me	diun	n		fine	9				`				ان 						
		st pit no.		mple		pth (m			% G		l			% Sa					%	Silt	t					% Cl	ay	
•	AC1030 C	S1-001	G	B-1	1.0	0 - 2.0	0		66	6.9				27.	4								2.	2				
A																												
*																												_
<u>•</u>	80 mm	56 mm	40 mm	28 m	m	20 m	ım	9.525	5 mm	47	6 mm	+	2 mm		0.85	5 m	m	0.42	5 mm	T (1 3	mm	<u>, </u>	0.1	5 m	m (.07	5 n
•	100.0	80.5	63.7	56.6	_	48.3		38			29.6		19.5	<u> </u>		9.8			. 4	+	4.		•		2.9	111		2.2
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*																												_
•																												
		st pit no.			STM (-			D60		D30)	D′	10	Ľ	W	LI	L		PL		ΡI		Сс		С
•	AC1030 C	S1-001	Sandy	y GRAVE	L with	trace	Cobb	les, tra	ce Fin	es	33.2		4.9		0.	9		5.3								0.8		38
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A																			1									
*										\perp							\perp											
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		Tes	t Pit: CAMP 1 AC 10	030 – 2 of 10						
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 23-Sep-07					
Project:	Lower Churchill I	Project – 73	5 kV Transmission L	ine – Gull Island to C	Churchill Falls					
Contract No. AC1030 Location: N 5882868 E 0574313 Inspector: Dave Oldford										





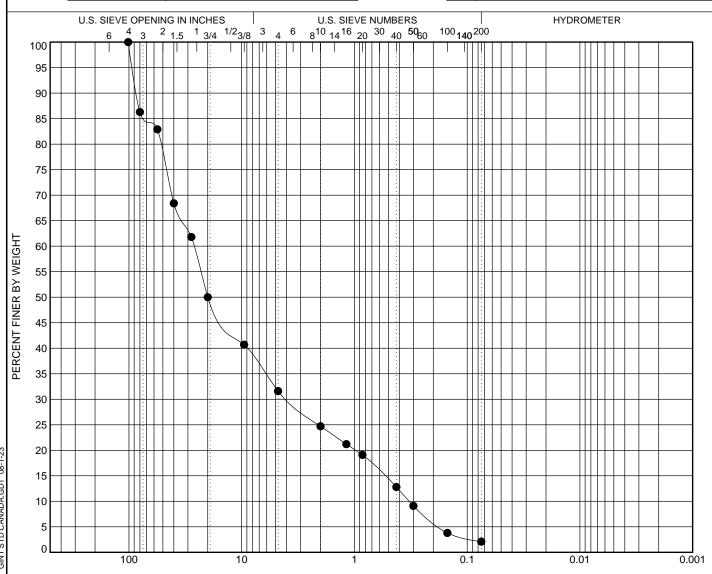
		Soil and Groundy	water Cor	nditions						
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type				
0.0 - 1.4	some cobbles,	D GRAVEL WITH SAND some boulders, trace fine ompact, moist, well grade	es,	1	1.0	Grab				
1.4	Refusal due to	Bedrock or Boulders		NA	NA	NA				
Estimated Cobb	les (%) 25- 25	Estimated Boulders (%)	5 - 10	Estimated Max	Diameter (m)	0.5				
Start Time: 8:22	am	End Time: 8:35 am		Estimated Exc Volume (m ³)	avated	10				
		Genera	l Notes							
No sloughing. To	est pit was dry u	oon completion.								
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.										

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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STDC	5																			
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GPJ								GRAIN SIZ	E IN MILL	IMETERS										
2007		COBBLES		(GRAVE	L			SAND				c	CLAY	OP.	SII	т			
1030		CODDLLC	_	coars	е	fine	co	arse me	dium	fine	!				- Oik	OIL	. '			
		st pit no.			nple	Depth (r		% G		C	% Sand			% 5	Silt			9	6 Clay	′
DATABASE M M	AC1030 C	S1-002		GI	3-1	1.00 - 1.3	80	54	l.1		29.5						2.1			
TRANSMISSION LINE																				
Sign	80 mm 86.3	56 mm 82.9		mm	28 mm	20 n		9.525 mm	4.76 mm			35 mm 19.1	0.425	_		mm	_	5 mn	n 0.0	75 mm 2.1
• ISWIS	86.3	82.9	6	8.4	61.8	50.	U	40.7	31.6	24.7		19.1	12	.8	9	.1		3.8		2.1
* TRA																				
_																				
TEST PIT	Te AC1030 C	st pit no.		Sandy		TM Class		on oles, trace Fin	D60 es 26.6	D30 3.9)10).3	W 4.4	LL		PL	PI		Cc 1.7	Cu 81.5
-	AC 1030 C	31-002		Sariuy	GNAVEL	with Some	CODI	nes, liace fill	ES 20.0	3.9		J.3	4.4						1.7	01.3
GRAIN SIZE2								·												
GRAI •																				

		T	est Pit: CAMP 1 AC	1030 – 3 of 10							
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 23-Sep-07						
Project:	Project: Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No.	AC1030	Inspector: Dave Oldford									





		Soil and Groundwater Cond	itions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.45		AVEL - some fines, trace cobbles, t, well graded, subangular, light brown	NA	NA	NA
0.45 - 0.75		il, some organics, oxidized sand, compact, moist, orange to light brown.	NA	NA	NA
0.75 - 2.5		AVEL - some fines, some cobbles, t, well graded, subangular, light brown.	NA	NA	NA
2.5 - 3.0	SANDY SILT - firm, light grey	- trace gravel, moist, compact, stiff to	1	2.5 - 3.0	Grab
Estimated Cobble	es (%) 20 - 25	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 8:30	am	End Time: 8:45 am	Estimated Exc Volume (m³)	avated	24
		General Notes	•		

Moderate sloughing throughout.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

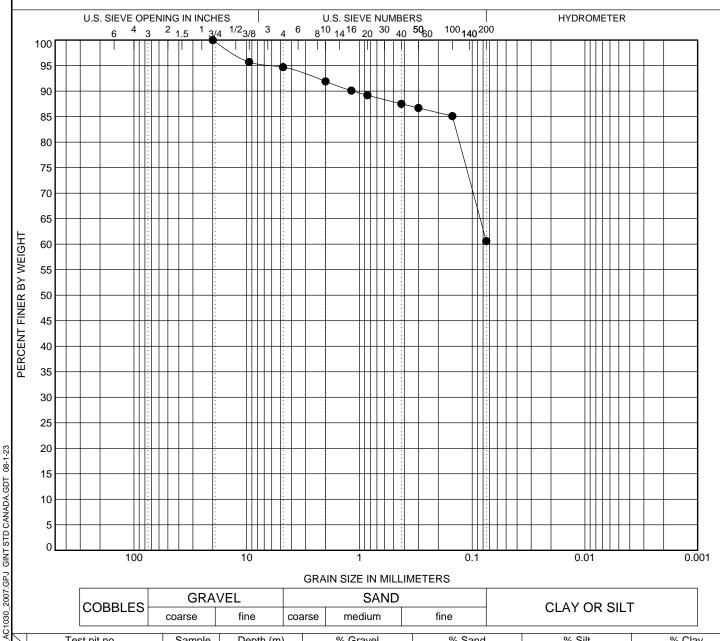
Water entering test pit at 2.8 m mark where old septic system was placed in old camp.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



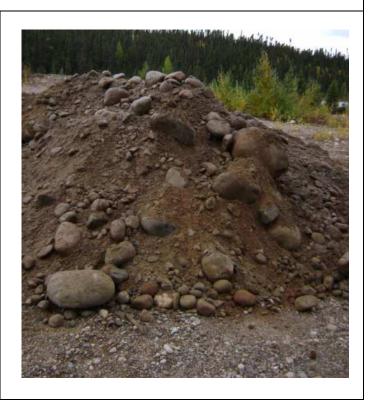
CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

																	_
	Tes	st pit no.		Sar	mple	D	epth (m)	% G	ravel	%	Sand		% \$	Silt		% Cla	ay
•	AC1030 C	S1-003		GI	B-1	2	.50 - 3.00	5	i.3	3	34.1			6	0.6		
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A																	
*																	
•																	
eg	80 mm	56 mm	40	mm	28 r	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 m	ım 0	0.075 mm
•							100.0	95.7	94.7	91.9	89.2	87.	5	86.7	85.1		60.6
X																	
A																	
*																	
•																	
$\overline{\ }$	Tes	st pit no.			,	ASTM	l Classificati	ion	D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	AC1030 C	S1-003			San	dy SIL	T with trace	Gravel				21.8					
X																	
A																	
*																	
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CIMFP Exhibit P-02860

		Te	est Pit: CAMP 1 AC	1030 – 4 of 10	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 23-Sep-07
Project:	Lower Churchill I	Project – 73	5 kV Transmission L	ine – Gull Island to C	hurchill Falls
Contract No.	AC1030	Location:	N 5882881	E 0574301	Inspector: Dave Oldford





		Soil and Groundwater Cond	litions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.3		RAVEL - some fines, cobbles, ell graded, compact, moist, light brown	NA	NA	NA
0.3 - 0.4		xidized sand, poorly graded, moist, act, yellowish orange.	NA	NA	NA
0.4 - 3.0	some cobbles	ADED GRAVEL with SAND (GP) - , some subangular to subrounded e fines, compact, moist, greenish grey.	1	1.0 - 2.0	Grab
Estimated Cobble	es (%) 20 - 25	Estimated Boulders (%) 1 - 10	Estimated Max	Diameter (m)	0.5
Start Time: 8:48	am	End Time: 9:00 am	Estimated Exc Volume (m³)	avated	25
	·-		·	·	

General Notes

Moderate to severe sloughing.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

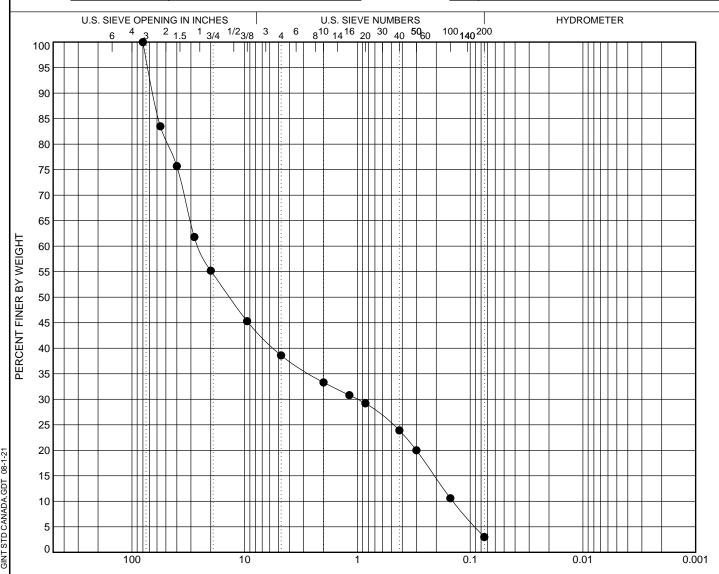
Water entering test pit at 2.5 m slow to steady trickle.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

-1-21	20					:				+				$\dagger \dagger$											Ħ		+				
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31030					coars	e	fir	ne		coar	se	me	dium	1		f	ine														
711			st pit no.		_	mple		epth	\ /			% Gı						San	d				%	Silt			\perp		%	Clay	i
BAS	AC10	30 C	S1-004		G	B-1	1.	00 - 1	2.00	1		58	.4				3	5.6			-						3.0				
\vdash \vdash	<u> </u>																														
	*																														
TRANSMISSION LINE	● 80 m	nm	56 mm	40	mm	28 r	mm	20) mn	n 9	9.525	mm	4.7	6 mi	m	2 m	nm	0	85 ו	nm	0.4	25	mm	0	.3 r	nm	Τ.).15 ı	mm	0.0	75 mm
IISSI	100		83.5		5.7	61			55.2		45.			8.6		33			29.		_	23.9		_	20.		Ĭ	10.			3.0
ANSI	X																										+				
F)	*																										+				
ST PIT 1	9															_											丄				ı
	● AC10		st pit no. S1-004		BOO	RLY GI	ASTM					ID/CD	+	D6	_		30 1	+	D10	<u> </u>	7.5	\rightarrow	LL	-	F	L_	-	PI	_	Cc).3	Cu 179.9
		30 C	51-004		P00	KLT G	KADEI	JGR	AVE	L WILI	II SAI	ND(GP	+	25.	.		ı		0.1		7.5	,					+		+	1.3	179.9
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		Te	st Pit: CAMP 1 AC	1030 – 5 of 10	
Firm:	Newfoundland a	nd Labrador	Hydro		Date: 23-Sep-07
Project:	Lower Churchill I	Project – 73	5 kV Transmission L	ine – Gull Island to (Churchill Falls
Contract No.	AC1030	Location:	N 5882899	E 0574312	Inspector: Dave Oldford



North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

Refusal at 2.5 m due to bedrock or boulders.



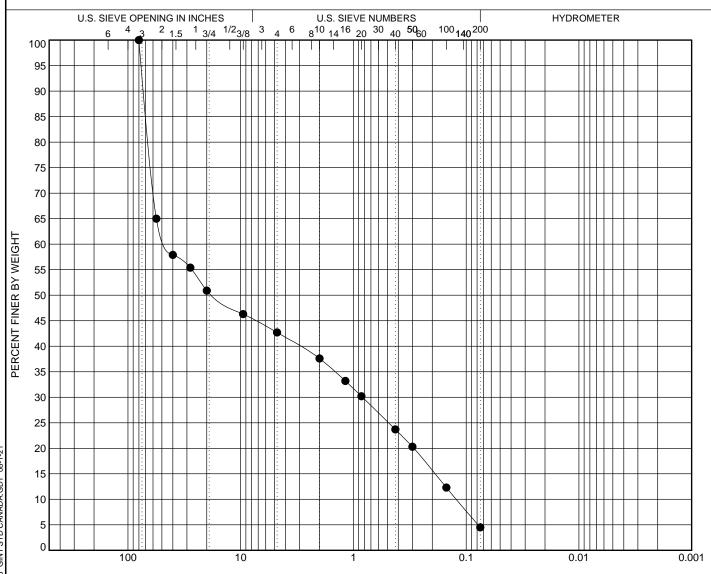
		Soil and Ground	water Cond	ditions		
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.6	boulders, subi	RAVEL - some fines, cobble rounded, well graded, moist brown (fill zone).		NA	NA	NA
0.6 - 0.75		e grey weathered sand, with ange to light brown, poorly go compact.		NA	NA	NA
0.75 - 2.5	some cobbles	ADED GRAVEL with SAND, some subrounded boulder t, moist, light brown.		1	1.0 - 2.0	Grab
Estimated Cobble	es (%) 15 - 25	Estimated Boulders (%) 1	- 10	Estimated Max	Diameter (m)	0.7
Start Time: 9:02	am	End Time: 9:15 am		Estimated Exc Volume (m ³)	avated	20
		Genera	l Notes			
Moderate slough	ing as boulders	get removed/moved.				

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

-1-21	20												:								+		
D1 08	15				:			:			:		:					++					
AC1030_2007.GPJ GINT STD CANADA.GDT 08-1-21	10		:																				
DCAN	5				:						:							\mathbb{H}			+		
S	0	100			:		ЩШ	:		ЩЩ						L							•
5		100	J			1	0			1			0.1			(0.01					0.0	01
									GRAIN SIZ	ZE IN M	IILLIN	IETERS											
7007		COBBLES	ياء	(GRA\	/EL				SAN	ID_				(CLAY	⁄ ∩I	R S	ר וו:	г			
1030		OODDLL		coars	e	fir	ne	coa	arse m	edium		fine							,ı.				
1 \ \		st pit no.			mple		epth (m			Fravel			Sand			%	Silt				ç	% Clay	/
BAS	AC1030 C	S1-005		GI	B-1	1.	.00 - 2.0	0	5	1.0		3	88.2						4	.5			
DATABASE M																							
[O	00		10		- 00		00		0.505	4.70		0	0.05		0.405	1		0		0.41		- 10	275
TRANSMISSION LINE TRANSMISSION LINE TRANSMISSION LINE	80 mm 100.0	56 mm 65.0		mm 7.9	28 r 55		20 m		9.525 mm 46.3	4.76 42 .	_	2 mm 37.6		mm 0.2	0.425			3 mr 20.3		0.1	2.3	n 0.0	075 mm 4.5
INS.											-	00											
▼																							
TEST PIT 1 ● ○ ○	Te	st pit no.				ASTM	l I Classi	ficati	on	<u> </u>	060	D30	D1	0	W	LL	.	PL	. 1	PI		Сс	Cu
. —	AC1030 C			POO	RLY GI	RADE	D GRA\	/EL w	ith SAND(GI	P) 4	4.2	0.8	0.	1	12.1							0.1	361.4
ZEZ A													-			-					+		
GRAIN SIZEZ																							
% ⊙																			\dashv				

CIMFP Exhibit P-02860

		Te	est Pit: CAMP 1 AC	1030 – 6 of 10	
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 23-Sep-07
Project:	Lower Churchill F	Project – 73	5 kV Transmission L	ine – Gull Island to C	Churchill Falls
Contract No.	AC1030	Location:	N 5882897	E 0574291	Inspector: Dave Oldford





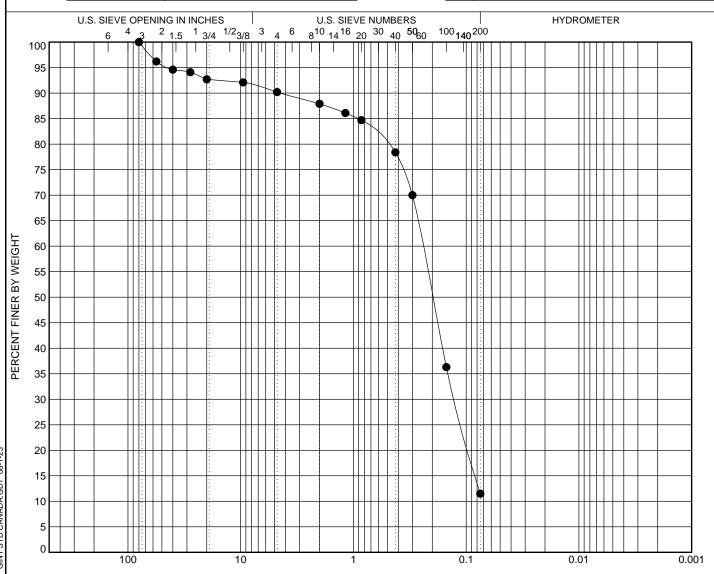
		Soil and Groundwater Cond	ditions						
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type				
0.0 - 0.4		RAVEL - trace cobbles, some fines, ompact, moist, well graded, light	NA	NA	NA				
0.4 - 0.6	some oxidized	brown, some grey weathered sand, I orange to light brown sand, some t, moist, poorly graded.	NA	NA	NA				
0.6 - 1.2		me fines, trace gravel, some cobbles, st, poorly graded, light grey.	1	0.6 - 1.2	Grab				
1.2	Refusal bedro	ck or boulders.	NA	NA	NA				
Estimated Cobble	es (%) 10 - 20	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA				
Start Time: 9:16 am End Time: 9:30 am Estimated Excavated Volume (m³)									
		General Notes							
No sloughing. Te	est pit was dry u	pon completion.							
North and East c	oordinates obta	ined using Garmin Etrex Legend Cx GF	PS						

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

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	15									Ш					(:											
	10						:			Ш					•	Ш			Ш	Ш	Ш					
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								GRAII	N SIZ	E IN	MILL	IMET	ERS													
		COBBLES		GRA\	/EL					SA	ND							CLA	<i>/</i> ^	ь (SII	_				
		COBBLES	coa	arse	fir	ne	coa	arse	me	diun	n		fine					JLA			31L	. !				
		st pit no.		Sample		epth (m			% G		l			Sand	t			%	Silt					% C	lay	
•	AC1030 C	S1-006		GB-1	0.	.60 - 1.7	0		9	.1				78.7							1	11.5				
A																										
*																										
0	80 mm	56 mm	40 mm	28 r	mm	20 m	m	9.525	mm	17	6 mm	1 -	? mm	10	85 m	<u></u>	0.42	- mm		3 m	-m	Τ_0	15 n	om I	0.07	75 n
•	100.0	96.2	94.6	94		92.7		9.525			0.2		87.9	0.	84.7			3.4	_	70.0		-	36.3			1.5
	100.0	30.2	34.0	- 34	••	32	•	J.	•		, U. L		01.5		04.7			,. . 		, 0			50.0			1.0
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0																										
abla	Te	st pit no.			ASTM	Classi	ficati	on			D60		D30		D10 W LL PL		Ĺ	기	Co	:]	С					
•	AC1030 C		SA	AND with:	some	Fines, tr	. Gra	vel & C	obbles	3	0.2		0.1			12.3			0.9		3.					
A																										
*														1		\perp										
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CIMFP Exhibit P-02860



	Test Pit: CAMP 1 AC 1030 - 7 of 10											
Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07												
Project:	Lower Churchill I	Project – 73	5 kV Transmission L	ine – Gull Island to (Churchill Falls							
Contract No. AC1030 Location: N 5882886 E 0574279 Inspector: Dave Oldford												





		Soil and Groundwater Cond	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.1		RAVEL - trace cobbles, fines, vell graded, compact, moist, light	NA	NA	NA
0.1 - 1.5		fines, compact, moist, poorly graded, subrounded, light grey.	NA	NA	NA
1.5 - 2.0	Bed of boulde	rs.	NA	NA	NA
2.0 - 4.0		ADED SAND with GRAVEL(SP) - et, compact, dark grey.	1	3.0 - 4.0	Grab
Estimated Cobbl	es (%) 5 - 15	Estimated Boulders (%) 5 - 15	Estimated Max	Diameter (m)	0.5
Start Time: 9:37	am	End Time: 10:10 am	Estimated Exc Volume (m³)	40	

General Notes

Moderate to severe sloughing throughout test pit.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

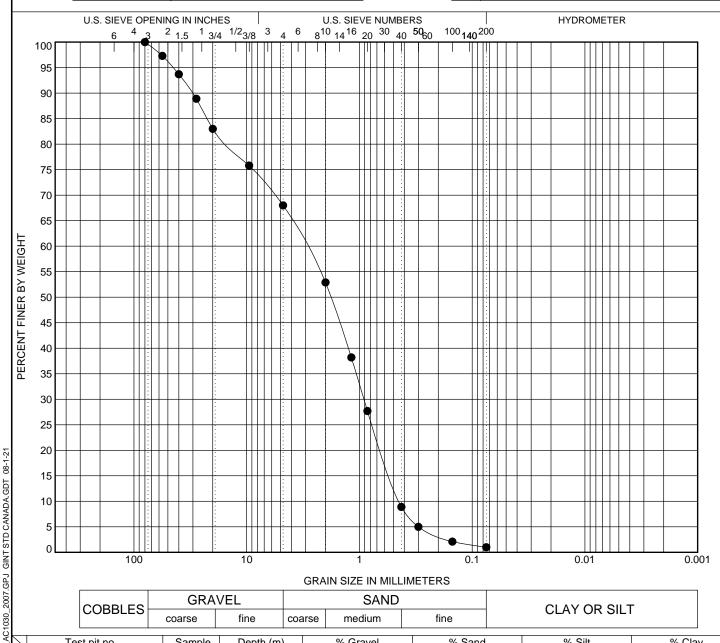
Water entering test pit at 2.5 m.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



COBBLES	GRA	VEL		SAND		CLAV OD SILT
	coarse	fine	coarse	medium	fine	CLAY OR SILT

3	_						_						1			1				
	\setminus	les	t pit no.		San	nple	ט	epth (m)	% G	ravel	% \$	Sand		% :	Silt		% Cla	ay		
	•	AC1030 CS	61-007		GE	3-1	3	.00 - 4.00	3	1.5	6	7.0		1.		.0	.0			
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4	A																			
	*																			
•	9																			
* @ \ 	J	80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0	0.075 mm		
•	•	100.0	97.3	93	3.7	88	.9	83.0	75.8	68.0	52.9	27.7	8.9 5.0		3.9 5.0		8.9 5.0			1.0
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	$\sqrt{}$	Tes	t pit no.			,	ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu		
	•	AC1030 CS	61-007		POOF	RLY G	RADE	D SAND with	GRAVEL(SF	9) 3	0.9	0.4	10.7				0.6	6.8		
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CIMFP Exhibit P-02860

	Test Pit: CAMP 1 AC 1030 – 8 of 10											
Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07												
Project:	Lower Churchill F	Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No. AC1030 Location: N 5882899 E 0574267 Inspector: Dave Oldford												



Water entering test pit at 2.8 m mark.

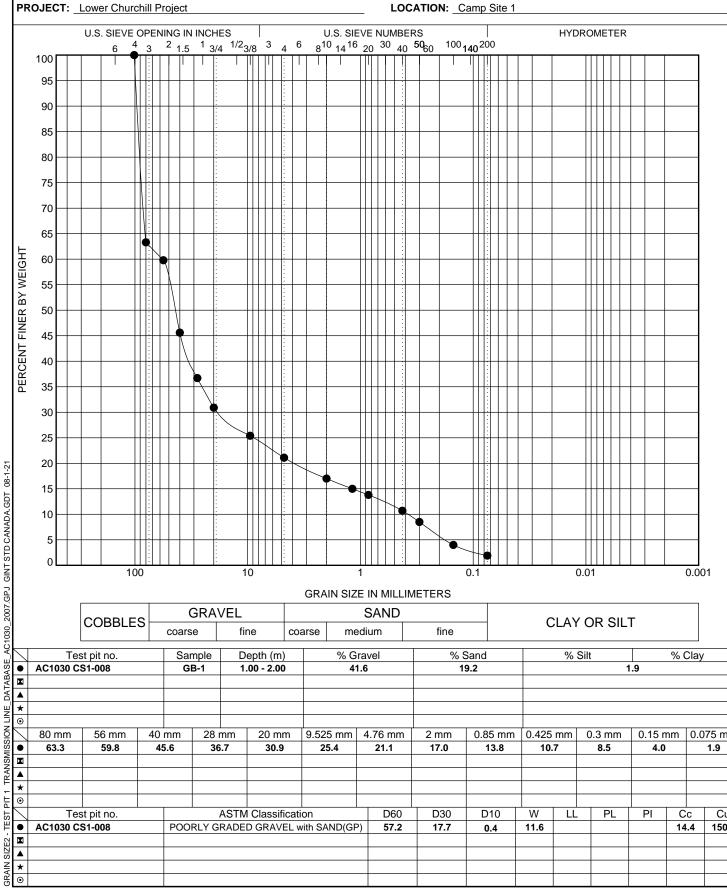


		Soil and Groundwater Con	ditions								
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type						
0.0 - 2.0		ADED GRAVEL with SAND - some obbles, trace boulders, trace fines, ct, light brown.	1	1.0 - 2.0	Grab						
2.0 - 4.0	SAND and GF poorly graded	RAVEL - trace fines, wet, compact, , dark grey.	NA	NA	NA						
Estimated Cobbl	es (%) 35 - 45	Estimated Boulders (%) 5 - 15	8.0								
Start Time: 10:3	0 am	End Time: 10:55 am	Estimated Exc Volume (m³)	avated	30						
	General Notes										
Moderate sloughing in first 2 meters of test pit.											
North and East of	North and East coordinates obtained using Garmin Etrex Legend Cx GPS.										

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
CODDLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

																	J
· \	Tes	st pit no.		Sar	nple	D	epth (m)	% G	iravel	%	Sand		% :	Silt		% Cla	ıy
	AC1030 C	S1-008		G	B-1	1	.00 - 2.00	4	1.6	1	9.2			1	.9		
▲																	
*																	
⊚																	
	80 mm	56 mm	40	mm	28 n	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.	.075 mm
•	63.3	59.8	4	5.6	36.	.7	30.9	25.4	21.1	17.0	13.8	10.	7	8.5	4.0		1.9
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(o				,						<u> </u>							
•	4	st pit no.					1 Classificat		D60	D30	D10	W	LL	PL	PI	Сс	Cu
•	AC1030 C	S1-008		POO	RLY GF	RADE	D GRAVEL V	with SAND(GI	P) 57.2	17.7	0.4	11.6				14.4	150.2
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A																	
★																	
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	Test Pit: CAMP 1 AC 1030 – 9 of 10											
Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07												
Project:	Lower Churchill F	Lower Churchill Project – 735 kV Transmission Line – Gull Island to Churchill Falls										
Contract No. AC1030 Location: N 5882917 E 0574279 Inspector: Dave Oldford												





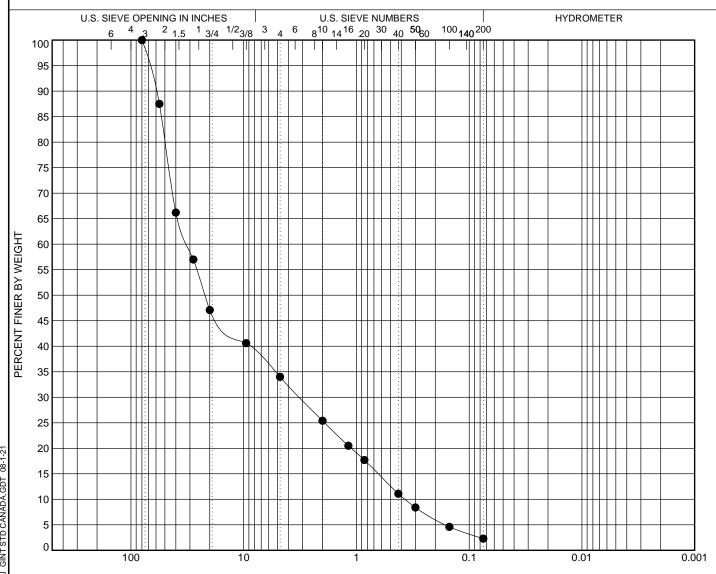
		The state of the s							
		Soil and Groundwater	Conditions						
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type				
0.0 - 2.0	some, cobbles	DED GRAVEL with SAND (GP, some boulders, trace fines, noist, compact, light brown.	1	1.0 - 2.0	Grab				
2.0	Refusal due to	boulders or bedrock.	NA	NA	NA				
Estimated Cobble	es (%) 25 - 35	Estimated Boulders (%) 5 - 15	Estimated Max	Estimated Max Diameter (m) 1.0					
Start Time: 11:0	0 am	End Time: 11:25 am	Estimated Exc Volume (m³)	avated	10				
General Notes									
No sloughing. Test pit was dry upon completion.									
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.									

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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	Te	st pit no.		Sar	nple	D	epth (m	n)		% G	rave	 			% Sa	and				9	6 Sil	t					% C	Clay	
•	AC1030 C	S1-009	GB-1 1.00 - 2.00				0		63	3.8				31.	.7								2	.3					
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	80 mm	56 mm	40	mm	28 r	mm	20 m	nm	9.52	25 mm	4.7	76 mn	$^{\perp}$	2 m	m	0.8	5 m	m	0.42	5 mm	1 (0.3	mn	n	0.	15 n	nm	0.0	75 m
•	100.0	87.5		6.2	57		47.			10.6		34.0				17.7			1.1			.4		-	4.6			2.3	
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•	AC1030 C	st pit no.		POOL			1 Classi			AND(GF	<u>, </u>	D60	$\overline{}$	D3			D10		WL		<u>.L</u>	+	PL	-	Р	1	0.9	\rightarrow	Cι 85.
	AC 1030 C	31-009		POOI	KLT GI	KADE	D GRAV	/EL W	/1111 5/	AND(GF	7	31.3	,	3.	_).4		5.0								0.	9	65.
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	Test Pit: CAMP 1 AC 1030 – 10 of 10														
Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07															
Project:	Lower Churchill I	Project – 73	5 kV Transmission L	ine – Gull Island to C	hurchill Falls										
Contract No.	AC1030	Location:	N 5882921	E 0574294	Inspector: Dave Oldford										





		Soil and Ground	dwater Co	onditions							
Depth (m) From - To		Description		Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 2.5	trace fines, sor	D GRAVEL with SAND (G me cobbles, trace boulders noist, compact, light brown	s, [′]	1	1.0 - 2.0	Grab					
2.5	Refusal due to	bedrock or boulders.		NA	NA	NA					
Estimated Cobble	es (%) 30 - 40	Estimated Boulders (%)	5 - 10	0 Estimated Max Diameter (m) 0.6							
Start Time: 11:30	0 am	End Time: 12:00 pm		Estimated Exc Volume (m ³)	avated	10					
		Gener	al Notes								
Minor sloughing in top meter of sand and gravel. Test pit was dry upon completion											
North and East c	oordinates obtai	ned using Garmin Etrex Le	egend Cx	GPS	<u>-</u>						

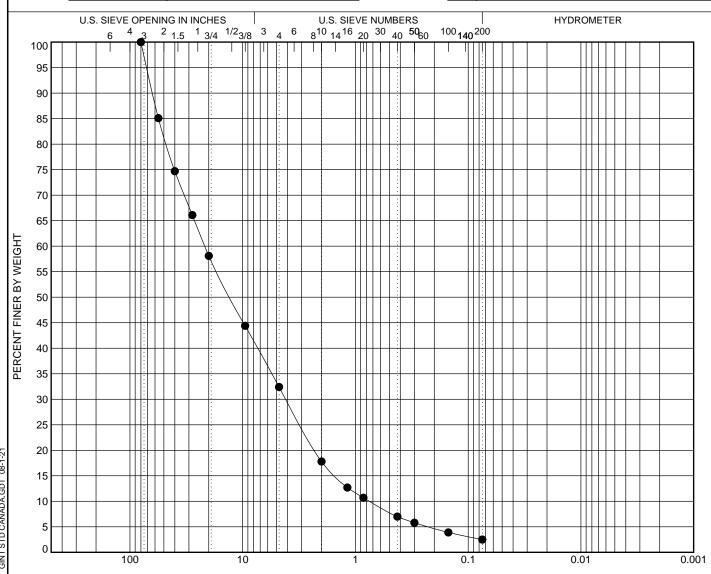
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TEST PIT AC1030 CS1-010

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



COPPLES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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	COBBLES coarse fine						coa	ırse	me	dium	m fine CLAY OR SILT													
	Test pit no. Sample Depth (% G	*a. (a.l			% Sa				0/	Silt		_		0	/ Cla	
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•	100.0	85.1	74.7	7	66.1	58.	1	44.	4	32	2.4	17.	8	10	0.7	7	.0		5.8		3	3.9		2.5
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	AC1030 C			WELL-G	RADED	GRAVE	L with	SAND	(GW)		21.7	4.	1	0.	7	4.3							1.1	29.
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BOREHOLE CS1-BH-01

PAGE 1 OF 1

SN	C•L	AVALIN		ь		-	JLE	LO	G				
						_					ion Line - Gull Islan	d to Churchill Fa	ls
										amp Site			
		CE LEVEL: _Geodetic (NAD 83) ATES: NORTHING _5882914.00	ım								COMPLETED _		-
	KDIN	EASTING 574286.00 m											_
REF	EREN	CE ELEVATION					SIZE						_
тои	ES:	Borehole to confirm presence of bedro	ck. No RO	QD recor	rded		BED	ROCK	K DEP	TH: 5.79	9 m TOT		 32 m
		WATER LEVELS:									NTATION:	SPT	
		TIME OF DRILLING 2.6 m TER DRILLING Water table not meas	ured				2007-				degres): egres):90	HAMMER SIZ	
		Water table not meas	ureu					%	. ""	.ONGE (u	egies)90		
Е	ELEVATION (m)			۳٥	SIZE	SAMPLE TYPE	띰		g	(8)	8 S L		CONTENT (%)
(m)	E. (m)	MATERIAL DESCRIPTION	STRAT.	PIEZO LEVEL		PLE	SAMPLE NUMBER	ECOVERY	or RQD	K (cm/s)	TESTS & RESULTS		15 20 25
	H		l w		SAMPLE	SAM	ďΞ	REC	z	Α	= = = =		N VALUE 30 40 50
	0.00	SAND and GRAVEL	,			X	AU-1				W = 14.6% Fines = 13.8%	10 20	• : :
						X	AU-2				W = 6.0%	•	
	1.22	Removed boulders	7								Fines = 7.3%		
			7										
	3.20	SAND and GRAVEL		,							W = 7.7%		
	3.20	SAND and GRAVEL				\bigvee	SS-3	42	17		Fines = 3.2% W = 15.9%	1 7	
				3			SS-4	13	15		Fines = 4.4%		•
- 5						\bigotimes	SS-5 SS-6	29 21	79 20		W = 7.6% Fines = 6.5%		
	5.79	BEDROCK		·]			SS-0 SS-7	\ 0 /	50		W = 7.7% Fines = 3.1%		_
							RC-8	100					
							NC-0	100					
		Bottom of hole at 7.82 m.	<u> </u>										
.og	GED E	BY K.R. CHEC	CKED BY	C.S.			_	AF	PRO	VED BY_			
							•						

BOREHOLE CS1-BH-01

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CS1-BH-01

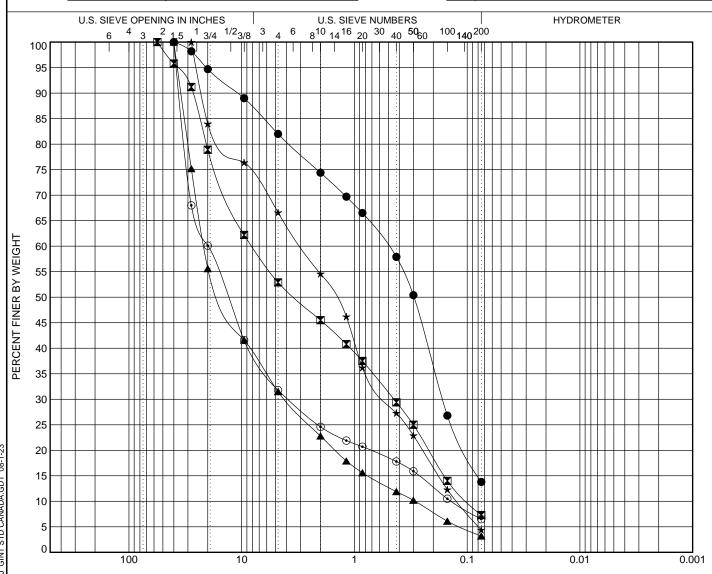
CS1-BH-01

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



GRAIN SIZE IN MILLIMETERS SAND

POORLY GRADED SAND with GRAVEL(SP)

Sandy GRAVEL with trace Fines

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30			COBBLES	> <u> </u>	coars	ie I	fir	ne	cos	arse	me	dium		fine		(LAY	OR SIL	. I			
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SE		Bore	ehole no.		Sar	mple	D	epth (n	n)		% G	ravel		%	Sand		% 5	Silt		% Cla	ıy	
BAS	CS1-	BH-01	<u> </u>		A	U-1		00 - 0.6			18	3.0		(88.2				13.8			
₹ X						U-2		61 - 1.2				7.1			15.6				7.3			
à	CS1-				_	S-3		20 - 3.8				3.5			28.3				3.2			
≝					_	S-4		81 - 4.4				3.4			52.2				4.4			
Z ©					_	S-5		57 - 5.1				3.2			25.3	1			6.5			
SION	80 n	nm	56 mm		mm	28 r		20 n			5 mm	4.76 r		2 mm	0.85 mm		_	0.3 mm	0.15 r	_	.075 mm	
TRANSMIS					0.0	98		94.			9.0	82.0	_	74.4	66.5	57	-	50.4	26.8		13.8	
V NS			100.0		5.8	91		78.	-	-	2.2	52.9	_	45.5	37.5	29		25.0	14.0	_	7.3	
				10	0.0	75		55.	_		1.6	31.	_	22.8	15.6	11	-	10.2	6.1		3.2	
<u>*</u>						100	-	84.	_	_	6.4	66.0		54.6	36.2	27	-	22.9		12.3 4		
REHOL 0)			10	0.0	68	-	60.			1.6	31.8		24.6	20.7	17		15.9		10.5 6.5		
<u> </u>	¥		hole no.					Class		_			60	D30	D10	W	LL	PL	PI	Cc	Cu	
9	CS1-					SAND w).5	0.2		14.6						
ZE2						GRAVE							3.1	0.4	0.1	6.0				0.2	81.5	
SIZ	CS1-	BH-01			WEI	LL-GR/	ADED	GRAVE	L with	n SAN	D(GW)	2	1.6	4.1	0.3	7.7			2.7 74.4			

3

19.9

0.5

15.9

7.6

0.1

0.1

0.8

24.1

144.8

BOREHOLE CS1-BH-01

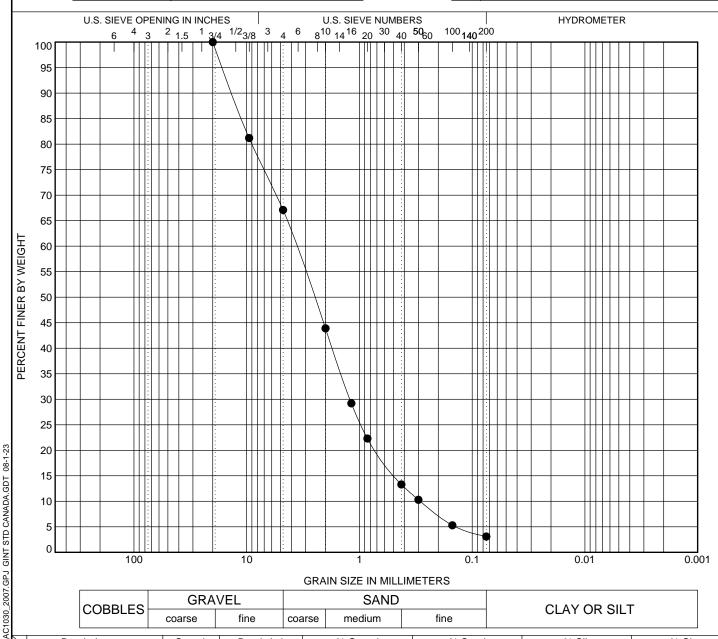
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CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 1



CODDI ES	OBBIES			SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

S1-BH-01						,, ,	ravel	70 (Sand	1	% S	7111		% Clay	/
			SS-6	SS-6 5.18 - 5.79		33	3.0	6	3.9	3.1					
30 mm	56 mm	40 r	mm 2	3 mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm 0.0	075 mm
					100.0	81.2	67.1	43.9	22.3	13.3	3	10.3	5.3		3.1
Borel	nole no.			ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
S1-BH-01			WELL-G	WELL-GRADED SAND with GRAVEL(S)			3.7	1.2	0.3	7.7				1.4	12.7
	Borel	Borehole no.	Borehole no.	Borehole no.	Borehole no. ASTM	Borehole no. ASTM Classificati	Borehole no. ASTM Classification	100.0 81.2 67.1	Borehole no. ASTM Classification D60 D30	100.0 81.2 67.1 43.9 22.3	100.0 81.2 67.1 43.9 22.3 13.1	100.0 81.2 67.1 43.9 22.3 13.3	100.0 81.2 67.1 43.9 22.3 13.3 10.3	100.0 81.2 67.1 43.9 22.3 13.3 10.3 5.3	Borehole no. ASTM Classification D60 D30 D10 W LL PL Pl Cc





Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO AC1030 (Gull to Churchill TL)			TEST ID	AC1030-CS1-PT-01			
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY			
	TEST LOCATION & DEPTH						
Northing		See Below	Easting	See Below			

- Camp Site 1 Former Camp on south side of TLH. 43 km passed Gull Island Turn Off.
- Test Completed in Test Pit AC1030-CS1-TP-6. See test pit log for coordinates.
- Percolation Test conducted from 0.7 to 1.0 m below ground surface.

STRATIGRAPHY & TEST DETAILS

- STATIGRAPHY: See Test Pit AC1030-CS1-TP-6:
 - 0 0.4: FILL (SAND & GRAVEL)
 - 0.4 0.6: TOPSOIL
 - o 0.6 1.2 SAND
- **TEST DEPTH:** Performed in fine sand, trace to some fines at a depth of 0.7 to 1.0 m.
- TEST HOLE DIMENSIONS: 230 mm Ø x 300 mm deep.
- TEST HOLE PREPERATION: 50 mm of fine sand loosely placed at bottom of hole. Tap water used.

Wale	water used.					
	F	PERCOLATION	N TEST RESULTS			
TIME	REFERENCE MEASUREMENT (mm)	WATER LEVEL DROP (mm)	Notes			
09:47:00	696		Filled hole 3 times.Level dropping at constant rate.			
09:49:50	696	0	Start test.			
09:50:03	703	7	•			
09:50:30	720	24	•			
09:51:00	731	35	•			
09:51:30	735	39	•			
09:52:00	741	45	•			
09:52:28	746	50	Dropped 50 mm. End of Test.			
09:53:00	753	57	•			
09:53:00	760	64	•			
09:53:30	764	68	•			
	Total Time to Drop 50 mm = 2 min and 38 sec					

PHOTOS









Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC1030 (Gu	II to Churchill TL)	TEST ID	AC1030-CS1-PT-02			
DATE	23 Sept 200	7	TECHNOLOGIST	DJD / JY			
	TEST LOCATION & DEPTH						
Northing		See Below	Easting	See Below			

- Camp Site 1 Former Camp on south side of TLH. 43 km passed Gull Island Turn Off.
- Test Completed next to Test Pit AC1030-CS1-TP-3. See test pit log for coordinates.
- Percolation Test conducted from 0.65 to 0.95 m below ground surface.

STRATIGRAPHY & TEST DETAILS

- STATIGRAPHY: See Test Pit AC1030-CS1-TP-3. Stratigraphy at perc test location:
 - \circ 0 0.3: FILL (SAND & GRAVEL)
 - 0.3 0.4: TOPSOIL
 - o 0.4 0.95 SAND, fine to medium grained, trace to some gravel, some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.65 to 0.95 m.
- TEST HOLE DIMENSIONS: 290 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

ai bo	at bottom of hole. Tap water used.							
	PERCOLATION TEST RESULTS							
TIME	REFERENCE MEASUREMENT (mm)	WATER LEVEL DROP (mm)	Notes					
10:05:07	722		Filled hole 3 times.Level dropping at constant rate.					
10:05:50	722	0	Start test.					
10:06:00	733	11	•					
10:06:30	745	23	•					
10:07:00	762	40	•					
10:07:16	772	50	Dropped 50 mm. End of Test.					
	Total Time to Drop 50 mm = 1 min and 26 sec							









Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO AC1030 (Gull to Churchill TL)			TEST ID	AC1030-CS1-PT-03			
DATE	23 Sept 200	7	TECHNOLOGIST	DJD / JY			
	TEST LOCATION & DEPTH						
Northing See Below		Easting	See Below				

- Camp Site 1 Former Camp on south side of TLH. 43 km passed Gull Island Turn Off.
- Test Completed next to Test Pit AC1030-CS1-TP-1. See test pit log for coordinates.
- Percolation Test conducted from 0.60 to 0.90 m below ground surface.

STRATIGRAPHY & TEST DETAILS

- STATIGRAPHY: See Test Pit AC1030-CS1-TP-1. Stratigraphy at per test location:
 - \circ 0 0.9: SAND, fine to medium grained, trace to some gravel, some fines
- TEST DEPTH: Performed in sand layer from a depth of 0.60 to 0.90 m.
- TEST HOLE DIMENSIONS: 250 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

D	ED	\sim	ΛT	ION	TEST	RESU	DT I
~			_ A I I	IC JIV	1601	RESU	டாக

TIME	REFERENCE MEASUREMENT (mm)	WATER LEVEL DROP (mm)	Notes			
10:24:02	664		Filled hole 3 times.Level dropping at constant rate.			
10:24:30	671	7	Start test.			
10:25:00	679	8	•			
10:25:30	683	4	•			
10:26:00	692	9	•			
10:26:30	697	5	•			
10:27:00	702	5	•			
10:27:30	706	4	•			
10:27:35	711	5	•			
10:27:43	714	3	Dropped 50 mm. End of Test.			
	Total Time to Drop 50 mm = 3 min and 41 sec					

PHOTOS









WTO	AC1030 (Gu	Il to Churchill TL)	TEST ID	AC1030-CS1-PT-04			
DATE	23 Sept 200	7	TECHNOLOGIST	DJD / JY			
	TEST LOCATION & DEPTH						
Northing		See Below	Easting	See Below			

- Camp Site 1 Former Camp on south side of TLH. 43 km passed Gull Island Turn Off.
- Test Completed next to Test Pit AC1030-CS1-TP-10. See test pit log for coordinates.
- Percolation Test conducted from 0.7 to 1.0 m below ground surface.

STRATIGRAPHY & TEST DETAILS

- **STATIGRAPHY:** See Test Pit AC1030-CS1-TP-10. Stratigraphy at perc test location:
 - 0 1.0: SAND, fine to medium grained, trace to some gravel, some cobbles some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.60 to 0.90 m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- TEST HOLE PREPERATION: 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

PERCOL	.ATION	TEST	RESUI	_TS
--------	--------	-------------	-------	-----

TIME	REFERENCE MEASUREMENT (mm)	WATER LEVEL DROP (mm)	Notes		
10:47:15	666		Filled hole 3 times.Level dropping at constant rate.		
10:47:32	668	2	Start test.		
10:48:30	672	4	•		
10:49:30	680	8	•		
10:50:30	684	4	•		
10:51:30	688	4	•		
10:53:00	694	6	•		
10:54:00	699	5	•		
10:58:00	709	10	•		
11:00:10	716	7	Dropped 50 mm. End of Test.		
	Total Time to Drop 50 mm = 12 min and 55 sec				

PHOTOS







Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC1030 (Gu	Il to Churchill TL)	TEST ID	AC1030-CS1-PT-05
DATE	23 Sept 200	7	TECHNOLOGIST	DJD / JY
		TEST LOCA	TION & DEPTH	
Northing		See Below	Easting	See Below

- Camp Site 1 Former Camp on south side of TLH. 43 km passed Gull Island Turn Off.
- Test Completed next to Test Pit AC1030-CS1-TP-5. See test pit log for coordinates.
- Percolation Test conducted from 0.8 to 1.1 m below ground surface.

STRATIGRAPHY & TEST DETAILS

- STATIGRAPHY: See Test Pit AC1030-CS1-TP-5. Stratigraphy at percolation test location :
 - \circ 0 1.0: SAND, fine to medium grained, trace to some gravel, some cobbles some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.80 to 1.1 m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

at bu	at bottom of noie. Tap water used.									
	į.	PERCOLATION	N TEST RESULTS							
TIME	REFERENCE MEASUREMENT (mm)	WATER LEVEL DROP (mm)	Notes							
11:25:00	635		Filled hole 3 times.Level dropping at constant rate.							
11:25:15	639	4	Start test.							
11:26:00	645	6	•							
11:27:00	654	9	•							
11:27:30	660	6	•							
11:28:00	665	5	•							
11:28:30	672	7	•							
11:29:30	677	5	•							
11:30:00	682	5	•							
11:30:07	685	3	Dropped 50 mm. End of Test.							
	Total Time to Drop 50 mm = 4 min and 52 sec									

PHO	OTOS
N/A	N/A





Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC1030 (Gu	Il to Churchill TL)	TEST ID	AC1030-CS1-PT-06
DATE	23 Sept 200	7	TECHNOLOGIST	DJD / JY
		TEST LOCA	TION & DEPTH	
Northing		See Below	Easting	See Below

- Camp Site 1 Former Camp on south side of TLH. 43 km passed Gull Island Turn Off.
- Test Completed next to Test Pit AC1030-CS1-TP-9. See test pit log for coordinates.
- Percolation Test conducted from 0.6 to 0.9 m below ground surface.

STRATIGRAPHY & TEST DETAILS

- STATIGRAPHY: See Test Pit AC1030-CS1-TP-9. Stratigraphy at percolation test location :
 - \circ 0 0.9: SAND, fine to medium grained, trace to some gravel, some cobbles some fines
- TEST DEPTH: Performed in sand layer from a depth of 0.6 to 0.9 m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

PERCOL	MOLTA	TEST	BEGIII	TC

TIME	TIME REFERENCE MEASUREMENT (mm)		Notes					
11:34:30	669	(mm)	Filled hole 3 times.Level dropping at constant rate.					
11:34:58	664	5	Start test.					
11:35:30	679	15	•					
11:36:00	685	6	•					
11:36:30	690	5	•					
11:37:00	696	6	•					
11:37:30	700	4	•					
11:38:00	705	5	•					
11:38:30	710	5	•					
11:39:11	715	5	Dropped 50 mm. End of Test.					
	Total Time to Drop 50 mm = 4 min and 41 sec							

PHOTOS



Test Pit: CAMP 2 AC 1030 - 1 of 10										
Firm: Newfoundland and Labrador Hydro Date: 22-Sep-07										
Project:	Lower Churchill	Project - 735kV	Transmission Line	- Gull Island to Ch	urchill Falls					
Contract No. AC 1030 Location: N 5920614 E 0484331 Inspector: Dave Oldford										





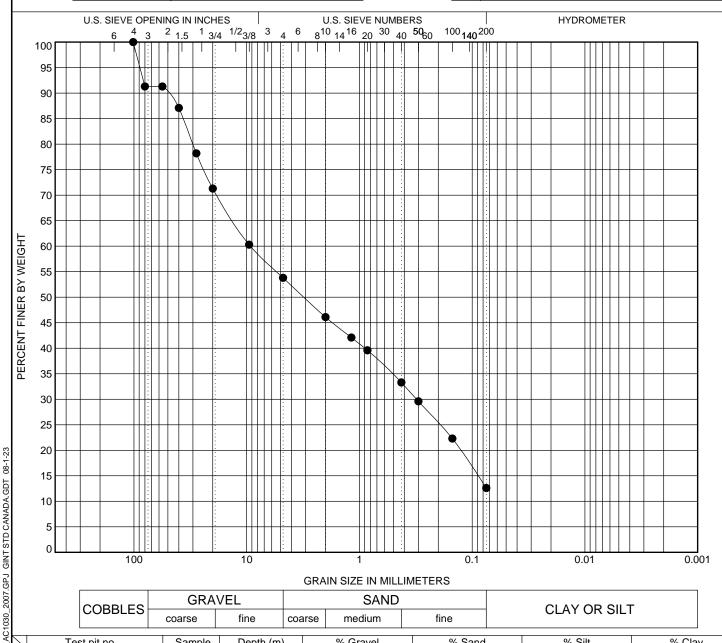
	Soil and Groundwater Conditions										
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type						
0.0 - 0.7		RAVEL (fill) - some fines, damp, pact, some cobbles, sub angular,	NA	NA	NA						
0.7 - 0.8		prown, frequent roots, some sand nes, cobbles, sub angular, loose to graded.	NA	NA	NA						
0.8 - 1.6		avel, cobbles, some fines, trace ular, compact, damp, well graded,	1	1.0 - 1.55	Grab						
1.6	Refusal due to	b bedrock or boulders.	NA	NA	NA						
Estimated Cobble	es (%) 10 - 20	Estimated Boulders (%) 1 - 10	Estimated Max	Diameter (m)	0.5						
Start Time: 8:50	am	Estimated Exc Volume (m³)	Estimated Excavated Volume (m³)								
	General Notes										
No sloughing. To	No sloughing. Test pit was dry upon completion.										
North and East c	oordinates obta	ined using Garmin Etrex Legend Cx	GPS.								

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COPPLES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

K	Tes	st pit no.		San	nple	D	epth (m)	% G	ravel	% \$	Sand		% 5	Silt		% C	lay
	AC1030 C	S2-001		GE	3-1	1	.00 - 1.55	37	7.5	4	1.2	12.6					
X	1																
•	\ \ \																
*	7																
0)																
* @ / @ *	80 mm	56 mm	40	mm	28 n	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm	0.075 mm
•	91.3	91.3	8	7.1	78.	.2	71.3	60.3	53.8	46.1	39.6	33.	33.3 29.0		29.6 22.3		12.6
I	1																
4																	
	r																
•)																
	Tes	st pit no.			P	ASTM	Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu
	AC1030 C	S2-001		SAND	& GRA	AVEL	with some Fir	nes, tr. Cobbl	es 9.2	0.3		10.3					
X	1	· · · · · · · · · · · · · · · · · · ·															
*																	
*	7																
0																	



Test Pit: CAMP 2 AC 1030 - 2 of 10											
Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07											
Project:	Project: Lower Churchill Project - 735kV Transmission Line - Gull Island to Churchill Falls										
Contract No.	Contract No. AC1030 Location: N 5920566 E 0484349 Inspector: Dave Oldford										





Soil and Groundwater Conditions

Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.3		roots, sand, fines, trace cobbles, graded, damp, compact, brown.	NA	NA	NA					
0.3 - 1.2		RAVLE - some fines, some cobbles, , angular, compact, well graded, ey.	1	0.5 - 1.0	Grab					
1.2	Refusal due to	bedrock or boulders.	NA	NA	NA					
Estimated Cobble	es (%) 5 - 15	Estimated Boulders (%) 1 - 5	Estimated Max	Diameter (m)	0.5					
Start Time: 9:15 am		End Time: 9:25 am	Estimated Exc Volume (m³)	avated	10					
	Our well Notes									

General Notes

No sloughing. Test pit was dry upon completion.

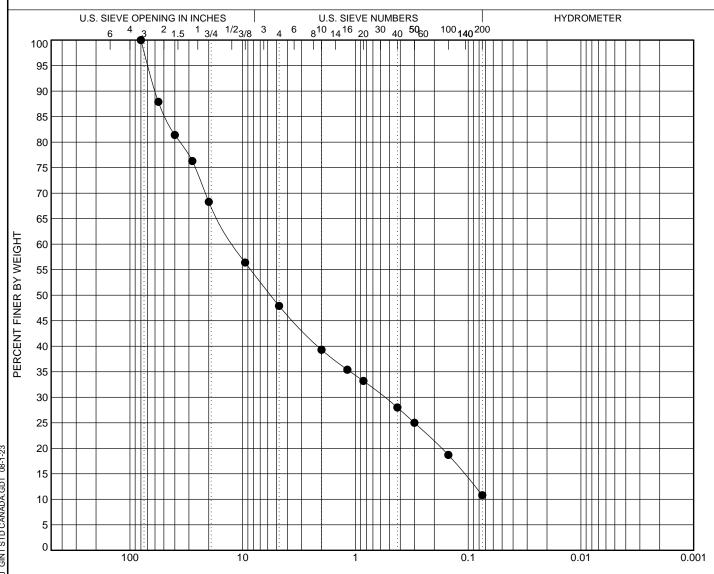
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COBBI ES	GRA	VEL		SAND		CLAV OP SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

08-1-23	20				:		++	<u> </u>				₩	H			•	+	:		+			₩	+	\forall				
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A.GD	10		:				Ш					Ш		:									Ш	Ш	Ш				
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C103									coars					<u> </u>	- "					_					_				
		est pit no. CS2-002			mple B-1		epth (50 - 1				Gra 49.9	avel				% S	3ano 7.1	d				% S	Silt		10			% Cla	ıy
DATABA:		C32-002		G	D-1	U.	3U - I	.00			49.	9				3	/.1).o			
LINE ●																													
TRANSMISSION LINE	80 mm	56 mm	40	mm	28 n	nm	20	mm	n 9	525 mn	n .	4.76	mr	n	2 m	m	0.	85 r	nm	0.4	25 m	m	0.3	3 mr	m	0.1	5 m	m 0	.075 mm
MISS	100.0	87.9	8	1.4	76.	.3	6	8.3		56.4		4	7.9		39.	3		33.	2	:	28.0		2	5.0	=	1	8.7		10.8
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TEST	\	est pit no. CS2-002		GRAV				_	cation	, tr. Cob	hlas	_	D60	_	D3			D10		7.0	+	LL	+	PL	-	PI	+	0.4	Cu 170.5
		002-00Z		JIVAV	LLUJ	י מאט י	witti 50	OIIIC	, , 11103	, 000	טוטפ		11.6	_	0.	•				7.0					\dashv		1		170.5
GRAIN SIZE2 -																									\exists				
RAN *												+							-		+		+		\dashv		+		
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Test Pit: CAMP 2 AC 1030 - 3 of 10											
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 23-Sep-07						
Project:	Lower Churchill F	Project - 735	kV Transmission Lir	ne - Gull Island to Ch	urchill Falls						
Contract No. AC1030 Location: N 5920543 E 0484360 Inspector: Dave Oldford											





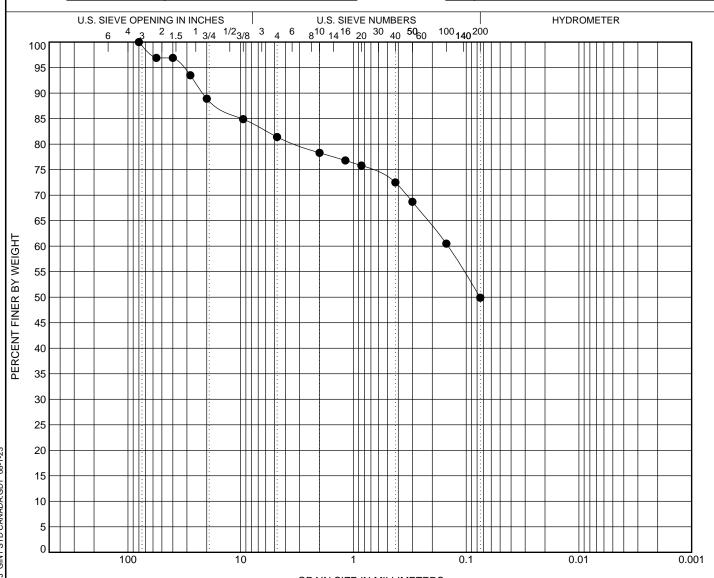
Soil and Groundwater Conditions											
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type						
0.0 - 1.2		S - some coarse gravel, some cobbles, s, roots frequent throughout, light grey, ct.	NA	NA	NA						
1.2	Refusal due to	b bedrock or boulders.	1	1.0	Grab						
Estimated Cobbl	es (%) 5 - 15	Estimated Boulders (%) 1 - 5	Estimated Max	c Diameter (m)	0.5						
Start Time: 9:27	am	End Time: 9:40 am	Estimated Exc Volume (m³)	avated	10						
General Notes											
No sloughing. To	No sloughing. Test pit was dry upon completion.										
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.											

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GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

	20		:		:		:														
	15				:	11111	<u> </u>		1111111						$\dagger \dagger \dagger$		\forall	+	+		
	10				:																
	5																				
	0	100	1.1		1	10			1		0.1			О	.01					0.001	1
								GRAIN SIZ	'E IN MILLI	METERS											
		COBBLES		GRA	AVEL				SAND					CLAY	00			_			
		COBBLES	'	coarse	fi	ne	coa	arse me	edium	fine				LAY	OR	. SI	L				
J	Te	st pit no.		Sample	D	epth (m	1)	% C	Gravel	%	Sand			% 5	Silt				%(Clay	
•	AC1030 C	S2-003		GB-1	1	.00 - 1.2	.0	1	8.0		31.5						49	.9			
A																					
*																					
⊙		T ==											1				_				
\downarrow	80 mm	56 mm	40 r		3 mm	20 m		9.525 mm	4.76 mm	2 mm	_	5 mm	0.425			mm	n	0.15		0.07	
•	100.0	96.9	96	.9	93.5	88.9	9	84.9	81.4	78.3	+ -	75.8	72	.5	6	8.7	\dashv	60.	.5	4	19.9
X							\longrightarrow										\dashv				
*							\longrightarrow										\dashv			\vdash	
<u>^</u>							\longrightarrow										\dashv			\vdash	
	Te	st pit no.			ASTN	⊥ ⁄l Classi	fication	 on	D60	D30		10	W	LL		PL	\dashv	PI	ТС	С	Cı
•	AC1030 C			Sandy FIN				, trace Cobbl			<u> </u>		15.8		+		_		† <u> </u>		
X															\top		+		+	-	
A									\neg						\top		\top		1	\dashv	_
\rightarrow																	\neg		+-	-	
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Test Pit: CAMP 2 AC 1030 - 4 of 10											
Firm:	Newfoundland ar	nd Labrador	Hydro		Date: 23-Sep-07						
Project:	Lower Churchill F	Project - 735	kV Transmission Lir	e - Gull Island to Ch	nurchill Falls						
Contract No. AC1030 Location: N 5920532 E 0484373 Inspector: Dave Oldford											



North and East coordinates obtained using Garmin Etrex Legend Cx GPS.



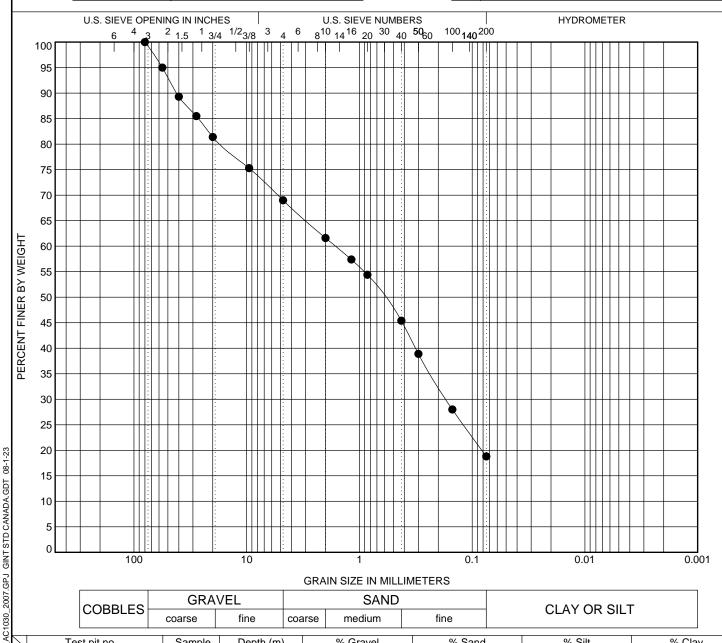
		Soil and Groundwater Cor	ditions							
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.1		some fines, roots, trace coarse to compact, poorly graded, light	NA	NA	NA					
0.1 - 2.5		SAND - some fines, compact, trace st, some cobbles, light grey.	1	1.0 - 2.5	Grab					
Estimated Cobble	es (%) 10 - 20	Estimated Boulders (%) 1 - 10	Estimated Max	Diameter (m)	0.4					
Start Time: 9:42	am	End Time: 9:58 am	Estimated Exc Volume (m³)	avated	25					
General Notes										
No sloughing. Test pit was dry completion.										

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

K	Tes	st pit no.		San	nple	D	epth (m)	% G	ravel	% :	Sand		% 5	Silt		% CI	ay		
•	AC1030 C	S2-004		GE	3-1	1	.00 - 2.50	30	D.1	5	0.2	18.8							
	1																		
•	\ \ \																		
*	7																		
* © • •)																		
$\overline{\ }$	80 mm	56 mm	40	mm	28 r	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm (0.075 mm		
•	100.0	95.0	89	9.3	85	.5	81.4	75.3	69.0	61.6	54.4	45.4	4	38.9	28.0	0	18.8		
I	1																		
4	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \																		
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$\overline{}$	Tes	st pit no.			-	ASTM	l Classificati	on	D60	D30	D10	W	LL	PL	PI	Сс	Cu		
•	AC1030 C	S2-004		Gravel	ly SAN	ID witl	n some Fines	, trace Cobbl	es 1.6	0.2		8.3							
X	1																		
*																			
*	7																		
0																			

Test Pit: CAMP 2 AC 1030 - 5 of 10												
Firm:	Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07											
Project:	Lower Churchill F	Project - 735	kV Transmission Lin	e - Gull Island to Ch	urchill Falls							
Contract No. AC1030 Location: N 5920570 E 0484381 Inspector: Dave Oldford												





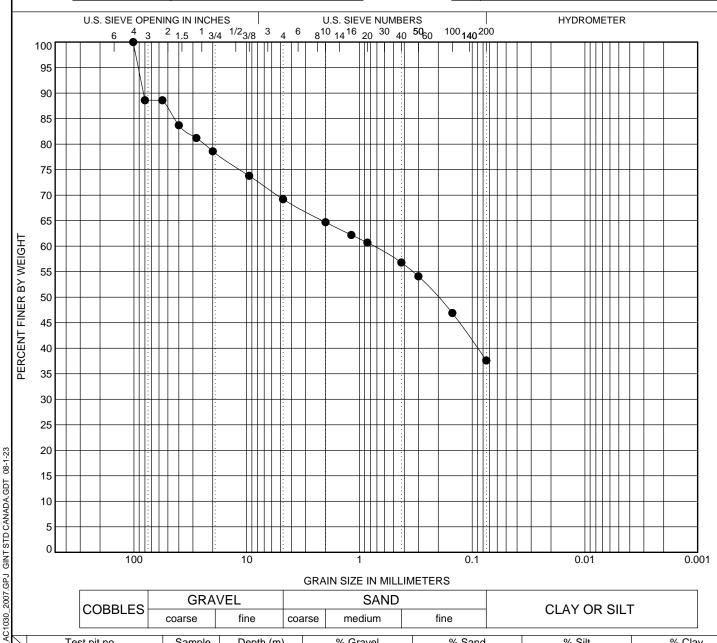
		Soil and Groundwater Con-	ditions							
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type					
0.0 - 0.5		D - some gravel, fines, loose to e rootlets, damp, poorly graded, light	NA	NA	NA					
0.5 - 2.5	GRAVELY FII damp, compa	NES and SAND – trace cobbles, ct, olive grey.	1	1.0 - 2.5	Grab					
2.5	Bedrock or la	rge boulder.	NA	NA	NA					
Estimated Cobble	es (%) 1 - 5	Estimated Boulders (%) 0	Estimated Max	NA						
Start Time: 10:0	0 am	End Time: 10:09 am	Estimated Exc Volume (m³)	avated	15					
General Notes										
No sloughing. Test pit was dry upon completion.										
North and East coordinates obtained using Garmin Etrex Legend Cx GPS.										

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

₹	_																	
	V	Tes	t pit no.		San	nple	D	epth (m)	% G	ravel	% 9	Sand		% :	Silt		% C	lay
	•	AC1030 CS	S2-005		GE	3-1	1	.00 - 2.50	19	9.4	3	1.6			3.	7.6		
	I																	
1	A																	
	*																	
0	9																	
	J	80 mm	56 mm	40	mm	28 r	nm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 n	nm	0.075 mm
•	•	88.6	88.6	83	3.7	81	.2	78.6	73.8	69.2	64.7	60.7	56.	8	54.1	46.9	•	37.6
	I																	
7	•																	
1 7	*																	
0	9																	
	$ \overline{} $	Tes	t pit no.			-	ASTM	1 Classificati	on	D60	D30	D10	W	LL	PL	PI	Co	Cu
	•	AC1030 CS	62-005		Sand	y SILT	with s	some Gravel,	trace Cobble	s 0.8			12.6					
	X																	
4	A																	
7	*																	
(<u> </u>																	

	Test Pit: CAMP 2 AC 1030 - 6 of 10													
Firm:	irm: Newfoundland and Labrador Hydro Date: 23-Sep-07													
Project:	Project: Lower Churchill Project - 735kV Transmission Line - Gull Island to Churchill Falls													
Contract No.	Contract No. AC1030 Location: N 5920608 E 0484365 Inspector: Dave Oldford													





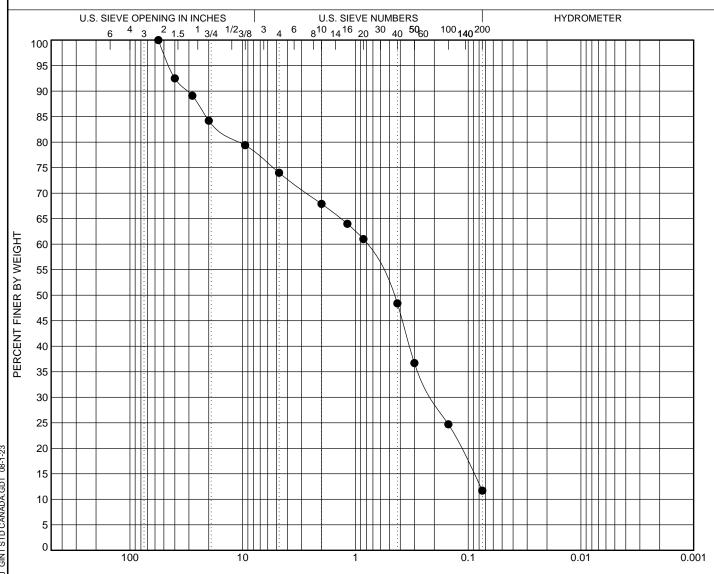
		Soil and Groundwater Cond	litions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 1.0		AVEL - some cobbles, fines, trace p, loose, well graded, light brown.	NA	NA	NA
1.0 - 2.5		gravel, some fines, fill placed over a s between 0.8 m and 1.2 m.	1	1.0 - 2.5	Grab
2.5	Bedrock or box	ulders.	NA	NA	NA
Estimated Cobbl	es (%) 1- 10	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 10:1	0 am	End Time: 10:23 am	Estimated Exc Volume (m³)	avated	20
		General Notes			
No sloughing. T	est pit was dry u	oon completion.			
North and East of	coordinates obtai	ned using Garmin Etrex Legend Cx GF	PS.		

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

1-23	20		:		:	+					1 :			111:										
AC1030_2007.GPJ GINT STD CANADA.GDT 08-1-23	15		1:1			$-\!$					+ :	\perp		<u> </u>				\parallel	Ш	+				
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NAD																								
) 10 10 10	5													111:										
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77.GF			_		20.41/5			GR	AIN SIZ			IVIE	IEKS											1
700		COBBLES	s _		GRAVE						ND.					(CLAY	′ OI	R S	SIL	Т			
21030				coars	e	fine		coarse	me	dium	1		fine											
		st pit no.			nple	Depth				ravel				and			%	Silt					% Cla	ıy
ABAS	AC1030 C	S2-006		GI	B-1	1.00 -	2.50)	20	6.0			62	2.3						1	1.7			
DATABASE A A O																								
												\perp												
S N N	80 mm	56 mm	40	mm	28 mm	1 2	0 mr	n 9.5	25 mm	4.76	6 mm	+	2 mm	0.8	5 mm	0.42	5 mm	0.	3 m	m	0.	15 m	m 0	.075 mm
ISSI 💿		100.0		2.5	89.1	_	84.2		79.4		4.0		67.9		1.0	_	3.4		36.7		_	24.7		11.7
TRANSMISSION LINE. ▼ ▼ ● ▼ ⊙ ★												+									\vdash		_	
* *																								
												Ļ												
TEST PIT	Te AC1030 C	st pit no.			AS Gravelly	TM Cla			200		D60 0.8	+	D30 0.2	D	10	7.3	LL	-	Pl	-	Р	1	0.8	11.7
	AC 1030 C	32-000			Giavelly	SAND	vviti1	SUITIE FI	169		0.0	+	0.2			1.3		+					0.0	11.7
SIZE																								
SRAIN ◆												+						+				\dashv		
ত 😃																								

	Test Pit: CAMP 2 AC 1030 - 7 of 10													
Firm:	Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07													
Project:	Project: Lower Churchill Project - 735kV Transmission Line - Gull Island to Churchill Falls													
Contract No.	Contract No. AC1030 Location: N 5920588 E 0484389 Inspector: Dave Oldford													





Soil and	Groundwater	Conditions
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Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.6	FILL - place o built.	ver original soil when old camp was	NA	NA	NA
0.6 - 0.8		AND - grey with black organic soil on pe/brown oxidized sand below (0.2 m	NA	NA	NA
0.8 - 1.5		fines, trace cobbles, trace gravel, rly graded, damp, light grey.	NA	NA	NA
1.5 - 3.5	SILT and CLA olive grey.	AY – trace sand, firm to stiff, moist,	1	2.0 - 3.0	Grab
Estimated Cobble	es (%) 1- 5	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 10:2	5 am	End Time: 10:38 am	Estimated Exc Volume (m ³)	avated	35
		0 111 1	•		

General Notes

No sloughing.

North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

Test pit was dry upon completion.

Stopped digging at 3.5 m due to bedrock or boulders.

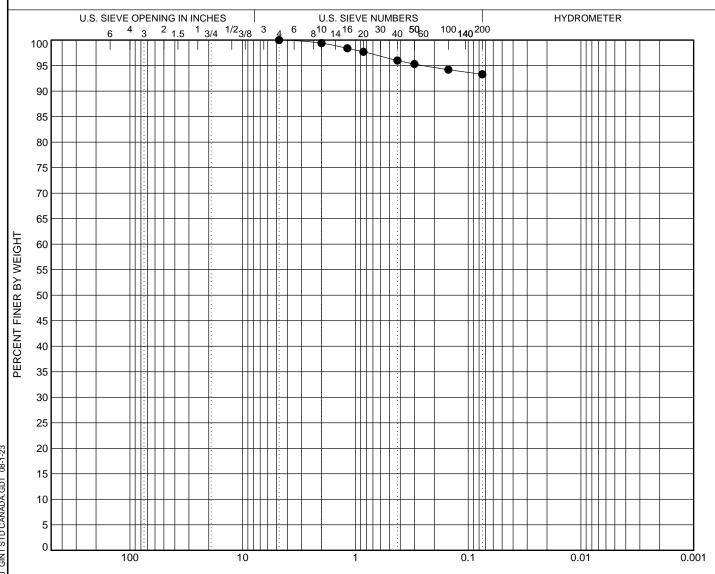
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

-1-23	20													\parallel				+				+		$^{+}$	H						
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.GPJ										C	RA	IN SIZ	ΈIΝ	۱M	ILLIN	/IETEF	RS													_	
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1			st pit no.			mple		epth				% G		el			% 5		d				%	Silt					% C	lay	
< .	AC10	030 C	S2-007		G	B-1	2.	00 - 3	3.00			0	.0				- 6	5.7			-					9	3.3				
	A																														
LINE	* 9																														
TRANSMISSION LINE	80 r	nm	56 mm	40	mm	28 r	nm	20	mn	n S	9.52	5 mm		76 r		2 n		0.	.85 r		_	25 r			3 m		0.	15 n	_		5 mm
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TRAN	A .																														
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EST PIT			st pit no.				ASTM							D	60	D	30		D10		W	_	LĽ		Р	L	F	Pl	Co	;	Cu
)30 C	S2-007			ŀ	INES	with t	race	e San	d									\dashv	21.4	4		\dashv							
N SIZE2 -	A																			1				1							
⋖∟	* 9				+								+							\dashv		+		\dashv						+	

	Test Pit: CAMP 2 AC 1030 - 8 of 10													
Firm:	irm: Newfoundland and Labrador Hydro Date: 23-Sep-07													
Project:	Project: Lower Churchill Project - 735kV Transmission Line - Gull Island to Churchill Falls													
Contract No.	Contract No. AC1030 Location: N 5920556 E 0484400 Inspector: Dave Oldford													





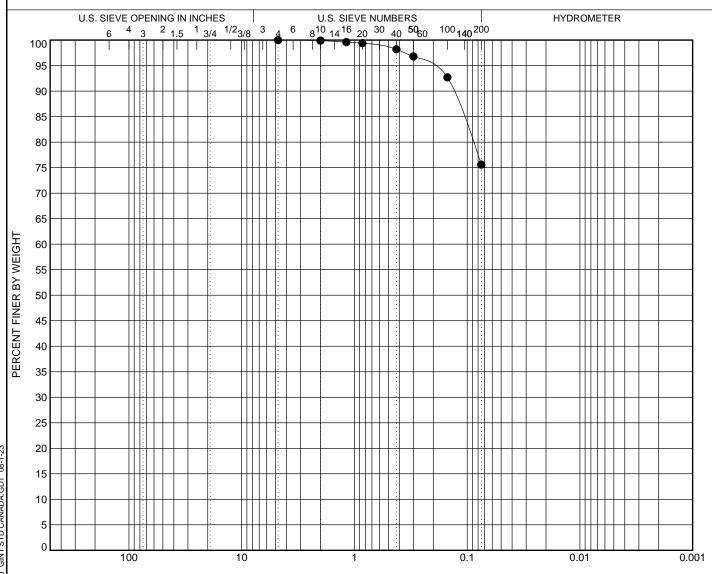
		Soil and Groundwater Cond	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 1.0	SAND - trace graded, light g	fines, loose to compact, moist, poorly prey.	NA	NA	NA
1.0 - 3.0	SANDY FINE: low plasticity.	S - stiff to firm, moist, olive grey, very	1	1.0 - 3.0	Grab
3.0	Bedrock or lar	ge boulders.	NA	NA	NA
Estimated Cobble	es (%) 0	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 10:4:	5 am	End Time: 11:05 am	Estimated Exc Volume (m³)	avated	30
		General Notes			
Test Pit was dry	upon completio	n.	·	·	`
Minor sloughing	within first mete	r of sand layer.			
North and East c	oordinates obta	ined using Garmin Etrex Legend Cx G	PS.		

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



CORRI ES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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	15																											
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		COBBLES		GRAV	/EL					SA	AND								\sim L \wedge	V (~ D			_				
		COBBLES	coars	se	fir	ne	coa	arse	me	diun	n		fine						CLA		<u> ۲</u>		IL	l 				
		st pit no.	Sa	mple	De	epth (m	1)		% G	rave	l		9	% Sa	nd				%	sil	lt					% C	lay	
•	AC1030 C	S2-008	G	B-1	1.	00 - 3.0	0		0	.0				24.4	4								7	5.6				
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* ⊙																												
	80 mm	56 mm	40 mm	28 m	nm	20 m	nm	9.52	5 mm	4.7	6 mm		2 mm		0.85	5 m	m	0.42	5 mm	1	0.3	mr	n	0.1	5 m	ım (0.07	5 n
•										1	0.00		99.9		9	9.4		98	3.2		9	6.8		,	92.7		7:	5.6
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Ť	Te	est pit no.			ASTM	Classi	ficati	on			D60	\perp	D30		D1	10	\top	W	L	.L	Τ	PL		l Pl		Cc		С
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	Test Pit: CAMP 2 AC 1030 - 9 of 10													
Firm:	Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07													
Project:	Project: Lower Churchill Project - 735kV Transmission Line - Gull Island to Churchill Falls													
Contract No.	p. AC1030 Location: N 5920541 E 0484403 Inspector: Dave Oldford													





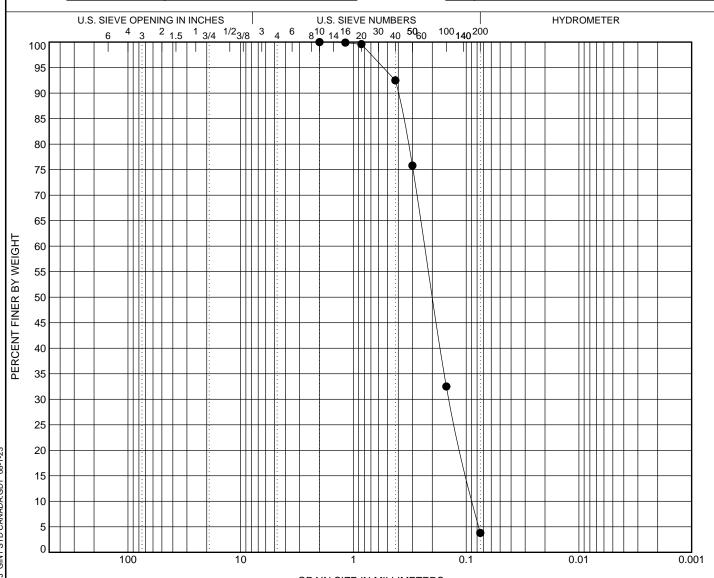
		Soil and Groundwater Cond	ditions		
Depth (m) From - To		Description	Sample ID.	Sample Depth (m)	Sample Type
0.0 - 0.15		RAVEL - some fines, cobbles, loose to p, light brown, well graded.	NA	NA	NA
0.15 - 3.0	SAND - trace light grey.	fines, compact, moist, poorly graded,	1	1.0 - 2.0	Grab
3.0 - 4.0	SAND and FIN very low plast	NES - stiff to firm, moist, olive grey, city.	NA	NA	NA
Estimated Cobb	oles (%) 0	Estimated Boulders (%) 0	Estimated Max	Diameter (m)	NA
Start Time: 11:	10 am	End Time: 11:20 am	Estimated Exc Volume (m³)	avated	40
		General Notes			
Test Pit was dry	upon completion	າ.	·		·
Minor sloughing	within 3m of sar	nd layer.	·	·	·
North and East	coordinates obta	ined using Garmin Etrex Legend Cx G	PS.		

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

1-23	20		:					:		+		1:1		₩										
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1030		COBBLE		coars	e	fine	е	coa	rse n	nediu	um		fine											
		st pit no.			mple		pth (m			Grav	/el			Sand			%	Silt					% Cla	у
DATABASE A A O	AC1030 C	S2-009		GI	B-1	1.0	0 - 2.00	0		0.0			9	96.2						3	8.8			
DAT/																								
¥ ×																								
ON □	80 mm	56 mm	40	mm	28 mr	n	20 m	m	9.525 mm	4	.76 n	nm	2 mm	0.8	35 mm	0.42	5 mm	0.3	3 m	m	0.1	5 m	m 0.	075 mm
MISS													100.0		99.6	92	2.5	- 1	75.8		:	32.5		3.8
TRANSMISSION LINE																								
~ *																								
TEST PIT	Т.	st pit no.			Λ C	STM 4	Classif	icatio	ın	1	D/	 60	D30	Г	010	W	LL	<u> </u>	PL		PI	ı T	Cc	Cu
TES]	AC1030 C				POORI							. 2	0.1).10).1	7.2	<u> L</u> L	+	ΓL	-	<u> </u>	1	1.0	2.7
ZE2 -									-															
GRAIN SIZE2																								
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Test Pit: CAMP 2 AC 1030 - 10 of 10													
Firm: Newfoundland and Labrador Hydro Date: 23-Sep-07													
Project: Lower Churchill Project - 735kV Transmission Line - Gull Island to Churchill Falls													
Contract No.	AC1030	Location:	E 0484366	Inspector: Dave Oldford									





Soil and Groundwater Conditions Sample Depth (m) From - To Sample ID. Depth (m) Sample Type **Description** SAND and GRAVEL - some fines, some cobbles 0.0 - 0.5 NA NA NA loose to compact, well graded, damp, light brown. FINES and SAND - trace gravel, moist, compact, 0.5 - 2.5 1 1.0 - 2.5 Grab light grey. Bedrock or Boulders. NA NA NA 2.5 Estimated Cobbles (%) 1 - 5 Estimated Boulders (%) 0 Estimated Max Diameter (m) NA **Estimated Excavated** Start Time: 11:25 am End Time: 11:38 am 18 Volume (m³)

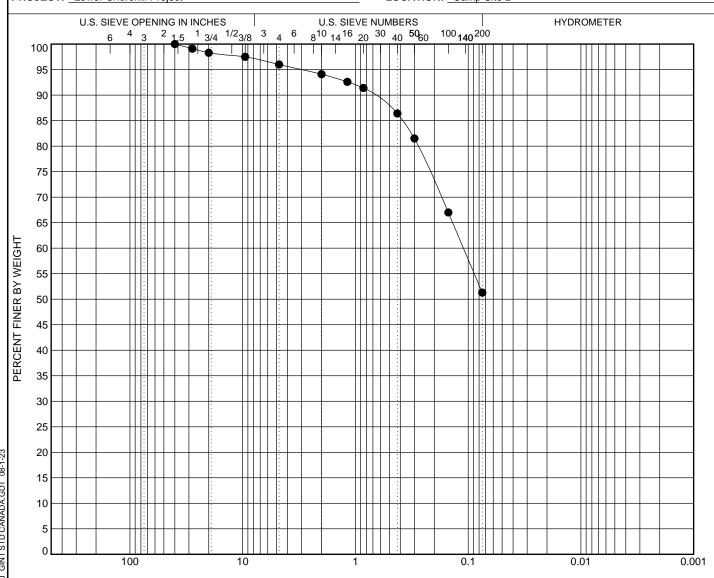
General Notes Test Pit was dry upon completion. No sloughing. North and East coordinates obtained using Garmin Etrex Legend Cx GPS.

SNC · LAVALIN

GRAIN SIZE DISTRIBUTION

CLIENT: Newfoundland and Labrador Hydro SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



COBBLES	GRA	VEL		SAND		CLAY OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAT OR SILT

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*												_						1										
0	80 mm	56 mm	40 mm	28 m	nm	20 m	nm	9.52	5 mm	47	6 mm	,	2 mr	m	0.8	35 n	nm	0.4	25.	mm	0	3 m	nm	Τ.	0.15	mm	0.0	75 n
•	00 111111	30 11111	100.0	99.		98.			7.5		96.0	+	94.1	_		91.4		_	86.4	_		81.		+	67.			51.3
					-							+												\top		-		
\blacksquare																												
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•																												
		st pit no.				Classi		_			D60		D3	0	D	10		W		LL		Р	Ľ		ΡI	(Сс	С
•	AC1030 C	S2-010		FINES a	and S	AND wi	th tra	ce Gra	vel		0.1							15.9	9									
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GEOTECH BH PLOTS TRANSMISSION LINE_DATABASE_AC1030_2007.GPJ GINT STD CANADA.GDT 08-1-21

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SN	C•L	AVALIN		БОГ	\ C I	יוח	OLE	LU	G			
		Newfoundland and Labrador Hydro : Lower Churchill Project				_				ransmissi amp Site 2		d to Churchill Falls
REF	EREN	CE LEVEL: Geodetic (NAD 83)		ı	DATE	E S	TARTE	D 200	7-10-	06	COMPLETED _2	2007-10-07
cod	ORDIN	ATES: NORTHING <u>5920600.00 m</u>	1	ı	DRIL	LIN	NG MET	HOD_	Diamo	ond drill		
		EASTING 484356.00 m			CASI	NG	SIZE _	NW				
REF	EREN	CE ELEVATION		•	CORI	NG	SIZE _	NQ				
NOT	Γ ES : _	Borehole to confirm presence of bedrock	. No RQ	D recorde	ed		BEC	ROCI	K DEP	PTH: <u>1.91</u>	m TOT	AL DEPTH : <u>9.14 m</u>
GRO		WATER LEVELS:									NTATION:	<u>SPT</u>
		TIME OF DRILLING Water table not me									legres):	HAMMER SIZE : 63.5 Kg
	AF	TER DRILLING Water table not measure	ed		DA	TE	<u></u>		PL	.UNGE (de	egres): <u>-90</u>	HAMMER DROP : 0.76 m
	Z				SIZE	SAMPLE TYPE	~	% 			~ v	WATER CONTENT (%)
DEPTH (m)	ELEVATION (m)	MATERIAL DESCRIPTION	STRAT.	PIEZO LEVEL (m)	ы S	Ш	SAMPLE NUMBER	ECOVERY	or RQD	K (cm/s)	TESTS & RESULTS	5 10 15 20 25
		WATERIAL DESCRIPTION	STF	음민의	SAMPLE	F	NAW NOW	00	ō) S	ESI ESI	SPT N VALUE
	П				SAI	SAN	0,2	RE(Z		F &	10 20 30 40 50
	0.00	SAND and GRAVEL				X	AU-1					
-						X	AU-2				W = 7.7% Fines = 16.9%	•
	l . <u></u>					\boxtimes	SS-3	1	51		1 11103 = 10.070	*
_	1.91	BEDROCK										
-												
-												
_	5											
							RC-4					
-												
_												
-												
		Bottom of hole at 9.14 m.	1									
100	·CED !	BV KD CUECK	ED BY	C S		_	1			VED BY	1	<u> </u>
LOG	GED I	BY K.R. CHECK	ENRY	U.S.				Al	-PKO	VED BY _		

BOREHOLE CS2-BH-01

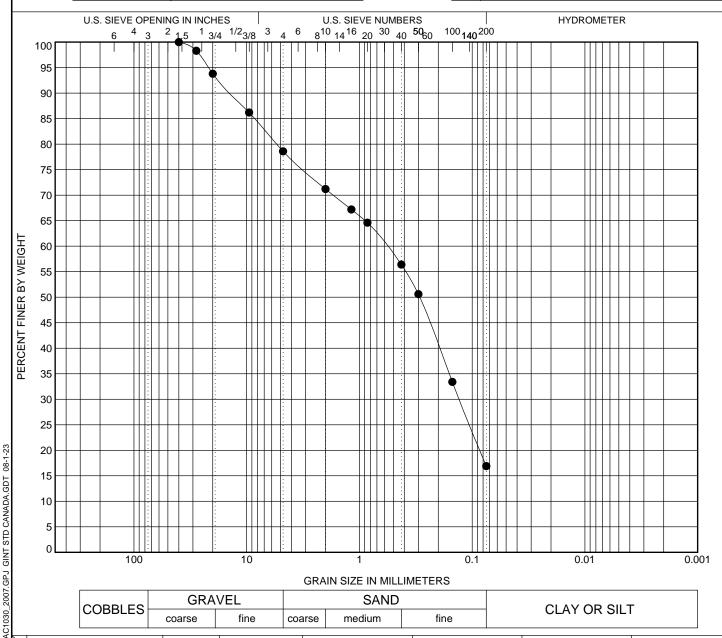
SNC · LAVALIN

CLIENT: Newfoundland and Labrador Hydro

GRAIN SIZE DISTRIBUTION

SITE: _735 kV Transmission Line - Gull Island to Churchill Falls

PROJECT: Lower Churchill Project LOCATION: Camp Site 2



CORRICC	GRA	VEL		SAND		CLAV OR SILT
COBBLES	coarse	fine	coarse	medium	fine	CLAY OR SILT

DALABASE A	$\sqrt{}$	Bore	hole no.		San	nple	D	epth (m)	% G	ravel	%	Sand		% 5	Silt		% C	lay
SAS	•	CS2-BH-01			Αl	J-2	0	.61 - 1.52	2.	1.4	6	1.7			1	6.9		•
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į																		
j																		
		80 mm	56 mm	40	mm	28 r	mm	20 mm	9.525 mm	4.76 mm	2 mm	0.85 mm	0.425	mm	0.3 mm	0.15 r	nm (0.075 mm
≨ ē	•			10	0.0	98	.3	93.8	86.2	78.6	71.2	64.6	56.	4	50.6	33.4	4	16.9
2																		
:[
<u> </u>		Bore	hole no.		,		ASTM	1 Classificati	ion	D60	D30	D10	W	LL	PL	PI	Сс	: Cu
3	•	CS2-BH-01 Gravely SAND with some Fines			e Fines	0.6	0.1		7.7									
- 7																		
31252																		
<u> </u>																		



PERCOLATION TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO AC1030 (Gull to Churchill TL)			TEST ID	AC1030-CS2-PT-01		
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY		
TEST LOCATION & DEPTH						
Northing		5920609	Easting	484328		

- Camp Site 2 Former Camp Location at East Mitchum River (~57 km East of Churchill Falls Switchyard).
- Test Completed next to Camp Site Test Pit.
- Percolation Test conducted from 1.0 to 1.3m below ground surface.

STRATIGRAPHY & TEST DETAILS

• STATIGRAPHY:

- \circ 0 0.1: TOPSOIL
- 0.2 0.95: SAND, grey, fine to medium grained, trace to some gravel, some cobbles, some fines, some organics (black, rootlets).
- **TEST DEPTH:** Performed in sand layer from a depth of 0.65 to 0.95 m.
- TEST HOLE DIMENSIONS: 250 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

ai 50	at bottom of hole. Tap water used.							
	PERCOLATION TEST RESULTS							
TIME REFERENCE MEASUREMENT (mm) WATER LEVEL DROP (mm) Notes		Notes						
11:31:00	720		Filled hole 3 times.Level dropping at constant rate.					
11:32:03	720		Start test.					
14:20:30	740	20	•					
14:44:30	755	15	•					
15:13:00	765	10	•					
15:18:37	770	5	Dropped 50 mm. End of Test.					
	Total Time to Drop 50 mm = 3 hours 47 min and 37 sec							

PHOTOS







Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO AC1030 (Gull to Churchill TL)			TEST ID	AC1030-CS2-PT-02		
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY		
TEST LOCATION & DEPTH						
Northing		5920588	Easting	484378		

- Camp Site 2 Former Camp Location at East Mitchum River (~57 km East of Churchill Falls Switchyard).
- Test Completed next to Camp Site Test Pit.
- Percolation Test conducted from 1.0 to 1.3m below ground surface.

STRATIGRAPHY & TEST DETAILS

• STATIGRAPHY:

- 0 0.2: FILL
- \circ 0.2 0.4: TOPSOIL/PEAT
- 0.4 1.3: SAND, grey, fine to medium grained, trace to some gravel, some cobbles, some fines (Possible FILL)
- **TEST DEPTH:** Performed in sand layer from a depth of 1.0 to 1.3 m.
- TEST HOLE DIMENSIONS: 270 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

PERCOLATION TEST RESULTS

TIME REFERENCE MEASUREMENT (mm)		WATER LEVEL DROP (mm)	Notes				
13:59:50	34		Filled hole 3 times.Level dropping at constant rate.				
14:01:00	46	12	Start test.				
14:02:00	62	8	•				
14:03:00	70	8	•				
14:04:00	79	9	•				
14:04:56	86	7	Dropped 50 mm. End of Test.				
	Total Time to Drop 50 mm = 5 min and 6 sec						

PHOTOS







PERCOLATION TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO AC1030 (Gull to Churchill TL)			TEST ID	AC1030-CS2-PT-03		
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY		
TEST LOCATION & DEPTH						
Northing		5920573	Easting	484363		

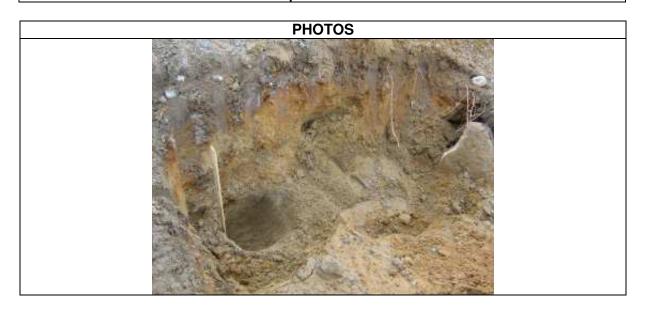
- Camp Site 2 Former Camp Location at East Mitchum River (~57 km East of Churchill Falls Switchyard).
- Test Completed next to Camp Site Test Pit.
- Percolation Test conducted from 0.75 to 1.05m below ground surface.

STRATIGRAPHY & TEST DETAILS

• STATIGRAPHY:

- \circ 0 1.05: SAND, brown, fine to medium grained, trace to some gravel, some cobbles, some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.75 to 1.05 m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

PERCOLATION TEST RESULTS WATER **REFERENCE** TIME LEVEL **MEASUREMENT Notes DROP** (mm) (mm) Filled hole 3 times. 15:02:00 700 · Level dropping at constant rate. 15:03:00 700 Start test. 15:04:30 722 22 750 15:06:30 28 • Dropped 50 mm. End of Test. Total Time to Drop 50 mm = 3 min and 30 sec





PERCOLATION TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO AC1030 (Gull to Churchill TL)			TEST ID	AC1030-CS2-PT-04		
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY		
TEST LOCATION & DEPTH						
Northing		5920554	Easting	484362		

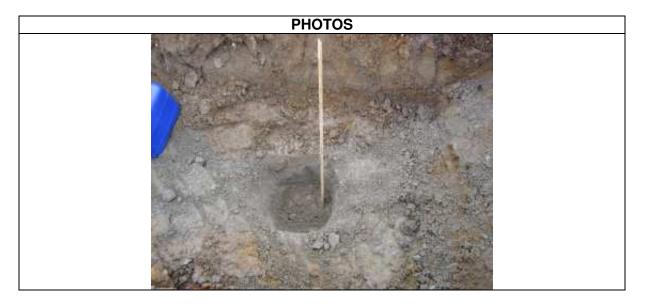
- Camp Site 2 Former Camp Location at East Mitchum River (~57 km East of Churchill Falls Switchyard).
- Test Completed next to Camp Site Test Pit.
- Percolation Test conducted from 0.6 to 0.9 m below ground surface.

STRATIGRAPHY & TEST DETAILS

• STATIGRAPHY:

- \circ 0 0.9: SAND, grey, fine to medium grained, trace to some gravel, some cobbles, some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.6 to 0.9m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

at bottom of holo: Tup Mater about							
	PERCOLATION TEST RESULTS						
TIME REFERENCE MEASUREMENT (mm) WATER LEVEL DROP (mm)		DROP	Notes				
13:25:00	600		Filled hole 3 times.Level dropping at constant rate.				
13:25:30	600		Start test.				
13:32:00	630	30	•				
13:39:25 550 20 • Dropped 50 mm. End of Test.							
Total Time to Drop 50 mm = 14 min and 25 sec							





PERCOLATION TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC1030 (Gu	II to Churchill TL)	TEST ID	AC1030-CS2-PT-5		
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY		
TEST LOCATION & DEPTH						
Northing		5920534	Easting	484375		

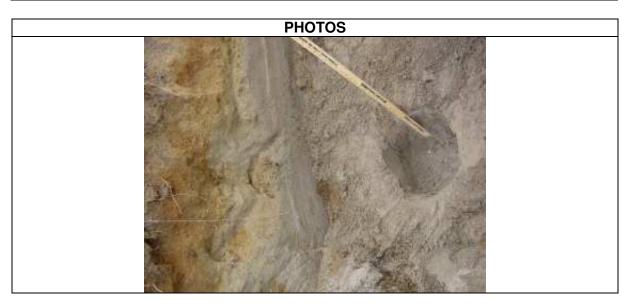
- Camp Site 2 Former Camp Location at East Mitchum River (~57 km East of Churchill Falls Switchyard).
- Test Completed next to Camp Site Test.
- Percolation Test conducted from 0.6 to 0.9m below ground surface.

STRATIGRAPHY & TEST DETAILS

• STATIGRAPHY:

- \circ 0 0.9: SAND, brown to grey, fine to medium grained, trace to some gravel, some cobbles, some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.6 to 0.9m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

at bottom of hole. Tap water asea.							
	PERCOLATION TEST RESULTS						
TIME REFERENCE MEASUREMENT (mm) WATER LEVEL DROP (mm) Notes		Notes					
14:00:00			Filled hole 3 times.Level dropping at constant rate.				
14:00:00	700		Start test.				
14:02:00	670	30	•				
14:04:00	650	20	Dropped 50 mm. End of Test.				
Total Time to Drop 50 mm = 4 min and 00 sec							





PERCOLATION TEST RECORD

Field Investigation and Construction Requirements 735 kV Transmission Line - Gull Island to Churchill Falls

WTO	AC1030 (Gu	Ill to Churchill TL)	TEST ID	AC1030-CS2-PT-06		
DATE 23 Sept 2007			TECHNOLOGIST	DJD / JY		
TEST LOCATION & DEPTH						
Northing		5920546	Easting	484407		

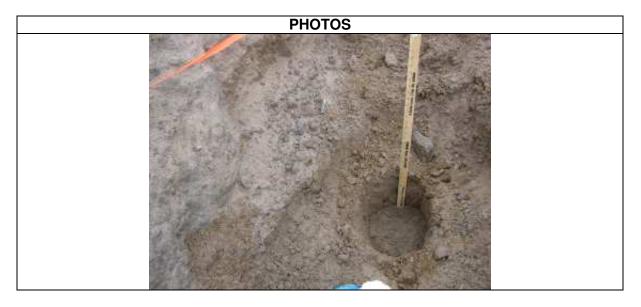
- Camp Site 2 Former Camp Location at East Mitchum River (~57 km East of Churchill Falls Switchyard).
- Test Completed next to Camp Site Test Pit.
- Percolation Test conducted from 0.6 to 0.9m below ground surface.

STRATIGRAPHY & TEST DETAILS

• STATIGRAPHY:

- \circ 0 0.9: SAND, brown to grey, fine to medium grained, trace to some gravel, some cobbles, some fines
- **TEST DEPTH:** Performed in sand layer from a depth of 0.6 to 0.9 m.
- TEST HOLE DIMENSIONS: 300 mm Ø x 300 mm deep.
- **TEST HOLE PREPERATION:** 50 mm of fine to medium sand to fine gravel loosely placed at bottom of hole. Tap water used.

at bottom of hole: Tap water about							
	PERCOLATION TEST RESULTS						
TIME REFERENCE LEVEL DROP (mm)		Notes					
15:03:00			Filled hole 3 times.Level dropping at constant rate.				
15:03:00	700		Start test.				
15:02:00	680	20	•				
15:06:00 650 30 • Dropped 50 mm. End of Test.							
Total Time to Drop 50 mm = 3 min and 00 sec							



Field Investigation and Construction Infrastructure 735 kV Transmission Line – Gull Island to Churchill Falls

February 2008 Project No. 722850

APPENDIX E

LIMITATIONS

February 2008 Project No. 722850

LIMITATIONS OF REPORT

The conclusions and recommendations given in this report are based on information determined at the test locations. 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. The elevations used in this report are primarily to establish relative elevation differences between the test locations and should not be used for other purposes, such as grading, excavating, planning development, etc.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, it is recommended that the final design be verified as being consistent with the recommendations, and that the assumptions made in this analysis are valid.

Any comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test locations may not be sufficient to determine all the factors that may affect construction methods and costs. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

Any use which a third party makes of this report, or any reliance on or decisions made based on it, are the responsibility of such third parties. SNC Lavalin Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.



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