



Doc No.: E337697-3000-15-124-0003

Submission 01

MARY RIVER PROJECT STEENSBY INLET AND MILNE INLET PORT OFFSHORE GEOTECHNICAL INVESTIGATION SUMMARY OF RESULTS

Report

Submitted to

HATCH Ltd.

PERMIT TO PRACTICE THURBER ENGINEERING LTD.

Signature

Date

9 November 2011

PERMIT NUMBER: P0176
The Association of Professional Engineers,
Geologists and Geophysicists of the NWT / NU

Rev: (

Date: November 9, 2011

File:

19-1605-126

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1. INTRODUCTION

1.1 General

This report presents the results of a geotechnical investigation supervised by Thurber Engineering Ltd. (Thurber) relating to the proposed marine facilities for the Steensby Inlet port and Milne Inlet port on Baffin Island, Nunavut.

The scope of work was outlined in our proposal letter dated March 18, 2011, prepared for Hatch Ltd. (Hatch). Authorization to proceed with the work was received from Hatch on April 12, 2011.

This report is subject to the Statement of General Conditions, which is included at the end of the text. The reader's attention is specifically drawn to these conditions as it is considered essential that they be followed for the proper use and interpretation of this report.

1.2 Project Description

Baffinland Iron Mines Corporation is planning to extract iron ore from a deposit located near the Mary River on Baffin Island, about 800 km northwest of Iqaluit, Nunavut. The development will require construction of an open pit mine near Mary River and a port facility on Steensby Inlet on the south coast of Baffin Island. The ore will be transported from the Mary River Mine Site to Port Steensby by rail, a distance of about 150 km. At Steensby Inlet, the ore will be loaded only ocean going vessels for transportation to world markets.

The selected ore dock location (referred to as the alternate ore dock in this report) will be located on the west side of the southernmost of two small islands. Access to the islands will require a causeway and railway bridge (referred to as the Island Bridge in this report) between the mainland and the northern island. The proposed ore dock facilities are to operate year round. The selected freight dock location (referred to as the south freight dock in this report) is located on the mainland approximately 2.5 kilometres east of the ore dock discussed above.

The 2011 site investigation also included several boreholes advanced at two separate locations referred to as the Base Case Ore Dock and the North Freight Dock. These two locations have subsequently been abandoned based on the conditions encountered.

Milne Inlet is located on the north coast of Baffin Island, approximately 80 km northwest of the Mary River mine site. Milne Inlet is connected to the Mary River Mine Site by an existing tote road. The facilities at Milne Inlet will support the construction and operation of the Mary River Mine site.

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2. SCOPE OF WORK

2.1 2011 Offshore Field Investigation

The 2011 offshore field investigation at Steensby Inlet was carried out during the period of April 28 to May 26. The program was carried out using up to 4 drill rigs operating from the sea ice to undertake 69 boreholes and Dynamic Cone Penetration Tests (DCPT). A total of 98 potential borehole and probe locations were originally identified by Hatch for planning purposes prior to commencing the program. A number of proposed boreholes were deleted or modified as necessary to address the site conditions encountered during the work. Also included in this report are 9 boreholes that were drilled on land but relate to the offshore port facilities included in this report.

The 2011 offshore field investigation at Milne Inlet was carried out during the period of June 3 to June 6. The program was carried out using one drill rig operating from the ice. A total of 3 sampled boreholes and 8 DCPTs were completed.

Table 1 below lists the structures at Port Steensby and Milne Inlet that were included in the investigation, the approximate coordinates of the structure and the naming convention for the boreholes associated with each structure.

TABLE 1: Structure Coordinates and Borehole Naming

		Coordinates			
Site	Structure	Northing (m)	Easting (m)	Borehole Naming	
Steensby	Island Bridge	7,800,370	594,385	MSIB, SI-RL & SI-MHS	
Steensby	Base Case Ore Dock	7,799,275	592,700	MSOD	
Steensby	Alternate Ore Dock	7,798,420	592,845	SI-OLD	
Steensby	South Freight Dock	7,798,910	595,565	MSFD	
Steensby	North Freight Dock	7,803,225	592,460	MSNFD	
Steensby	Construction Docks	Various	Various	SMLCD & SMICD	
Milne	Freight Dock	7,976,640	504,120	MMFD	

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3. BACKGROUND

3.1 Site Locations

Port Steensby port is located on the south side of Baffin Island, in Nunavut at 70.28 N latitude, 78.49 W longitude. Milne Inlet facilities are located on the north side of Baffin Island at 71.53 N latitude, 80.54 W longitude.

3.2 Port Steensby Facility Layout

The relative location of the various Port Steensby facilities at which geotechnical investigations were carried out under the current program are provided in Drawing A1 in Appendix A. The marine facilities investigated at Port Steensby include:

- Island Bridge
- Base Case Ore Dock
- Alternate Ore Dock
- South Freight Dock
- North Freight Dock (alternate location)
- Construction Docks (3 out of 5 proposed locations investigated)

3.3 Milne Inlet Facilities Layout

The relative locations of the proposed and existing facilities at Milne Inlet are shown on Drawing A8 in Appendix A. The geotechnical investigation was carried out for the proposed freight dock.

3.4 Steensby Inlet Previous Field Investigations - 2007 and 2008

Previous site investigations in the Steensby Inlet area have been carried out by Knight Piésold Ltd. (KP) during 2007 and 2008. The results of these investigations are summarized in the respective reports prepared by KP, dated February 15, 2008 and November 13, 2008.

KP faced similar challenges and limitations to those that were encountered during the 2011 offshore investigation. The reports note poor recovery and loss of drill steel due to tides, currents and difficult overburden conditions which appear to have limited their investigation. The 2011 offshore investigations incorporated full Dynamic Cone Testing (DCPT) and additional Standard Penetration Testing (SPT) equipment which had not been utilized sufficiently in the previous investigations.

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4. METHODOLOGY

4.1 Drilling Equipment and Methods

The site investigation at Port Steensby was carried out using up to 4 drill rigs operated by Boart Longyear (2) and Walker Drilling (2). At Milne Inlet only one drill rig operated by Walker Drilling was used. All rigs and equipment were heli-portable and operated on a continuous basis, 24 hours per day. Two of the drilling rigs were Boart Longyear LN-55 machines set up for wireline NQ coring, but not suitable for Standard Penetration Testing (SPT). The third rig was an Atlas Copco machine equipped for NQ wireline coring and capable of carrying out regular SPT tests. The fourth rig was a Diedrich D-50 which is also capable of coring and SPT testing. The latter two rigs were also set-up to carry out Dynamic Cone Penetration Tests (DCPT) in which a standard diameter (2 inch) cone is driven continuously using a standardized energy hammer (140 lbs dropped from 30 inches).

Drill rigs were mounted on skids and were moved into position either by dragging them on the ice or taking them apart and flying them to the location with a helicopter. Once a borehole location was selected, two holes were augered through the ice, and the drill rig was set up over one hole, while the second hole was used as a water source for drilling and to measure ice thickness.

Rock coring was carried out with NQ size core barrels capable of coring either 3 m or 1.5 m long runs. The diamond drills operated by Boart Longyear, which are typically used for mining exploration applications, were set up for using the longer core barrels producing 3 m runs. The Walker Drilling drill rigs, typically used for geotechnical drilling applications, used the shorter core barrels capable of 1.5 m runs.

Upon completion of the borehole the drill site was cleaned up as required by the permit conditions.

4.2 Borehole Locations

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Boreholes were advanced at coordinates identified by Hatch. Monteith and Sutherland Ltd. staked the borehole locations using GPS survey equipment. Once a borehole was completed Monteith and Sutherland returned to survey the as-drilled location as some borehole locations had to be moved due to ice conditions.

Borehole locations at Port Steensby and Milne Inlet are provided on Drawings A1 through A9 in Appendix A.

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4.3 Tidal Corrections

Seafloor elevations and bottom of borehole elevations were surveyed by Monteith and Sutherland. These elevations were surveyed relative to the geodetic coordinate system. Sample depths collected between the surveyed elevations were adjusted to allow for elevation corrections that were required due to the tidal ice movement.

Ice elevations at Port Steensby were surveyed hourly for a period of 24 hours at the beginning of the investigation and the results were compared to the Sevigny Point tidal charts provided by the Canadian Hydrographic Service. The comparison showed that the tidal charts from Sevigny Point were generally a good estimate of the measured tides at the Steensby Inlet port site. Subsequently, these tidal charts were used to correct elevations on the borehole logs. Allowing for some variations, this method provided a reasonable estimate of the elevations between the seafloor and the bottom of the borehole.

4.4 Borehole Logging

Subsurface conditions encountered in the boreholes were logged in the field by drill inspectors provided by Hatch, Thurber and Inspec-sol, under the supervision of Thurber Engineering Ltd. All material recovered, overburden and bedrock, in each core run was placed in a core box starting in the upper left corner. The beginning and ending of each run were marked with core blocks. The material recovered was then described and photographed. When overburden retrieved by coring was thought to be representative of the actual conditions (i.e. no material was believed to have been washed out) a sample was taken and placed in a sealed bag. Samples collect by split spoon sampling were described and also placed in a sealed bag. All samples, those bagged and those placed in core boxes were labeled and transported to the laboratory at Mary River Camp.

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4.5 Laboratory Sampling and Testing

All bagged samples and core boxes were returned to the laboratory operated at Mary River and Representative samples were selected for testing. The laboratory test results are summarized in Appendix C and include:

- Moisture content and visual classification
- Particle size analysis (ASTM D422)
- Atterberg Limit Tests (ASTM D4318)
- Point load testing (bedrock)
- Bedrock core logging

One sample of seabed sediment (silty clay) at borehole MSFD-P was selected and submitted to an analytical laboratory to assess chemical constituents related to disposal of dredged material. The analytical test results for this sample are included in Appendix C.

Borehole logs were prepared from the field and laboratory information and are included in Appendix B. Core photographs are also included in Appendix B.

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5. SITE DESCRIPTION

5.1 Steensby Inlet

5.1.1 Geology

Baffin Island was extensively glaciated starting about 120,000 years before present (BP). The last glacial maximum is thought to have occurred approximately 18,000 years BP, at which time the Laurentide ice sheet covered the area. Glacial drift from this phase is found over extensive areas of Baffin Island. Based on the trace of glacial erratics, it has been postulated (Dyke, A.S, 2004) that the ice generally flowed from south to north originating in an ice dome source area located in the Foxe Basin south of Steensby Inlet area. Rapid melt out of glacial ice in Foxe Basin approximately 6000 to 7000 years BP shifted the ice dome onto Baffin Island and reversed the flow direction where generally ice flowed south to the retreating ice front. The relatively sea-level at this time is expected to have been 50 – 100 m higher than currently.

The quaternary geology of the Steensby Inlet map area (Dyke, A.S. 2006) is controlled by a pattern of ice regression, in which the ice front retreating in numerous stages from south to the north through the inlet. Carbon date tests of molluscs in marine shoreline deposits indicate that the deglaciation occurred in this area from about 5500 to 4000 years before present (BP). The deglaciation was accompanied by a higher relative sea level than exists today, approximately 95 m above the current sea level at that time (5500 years BP). The relative sea-level curve for the Rowley River, Steensby Inlet area is shown in Figure A.1 in Appendix A and indicates the relative sea-level had dropped to about 35 m elevation by 4000 BP. Continuing glacial rebound following deglaciation has resulted in the emergence of the lowland coastal areas from the sea since this time.

Valleys such as Cockburn Lake exhibit series of lateral and end moraine deposits associated with temporary re-advance or standstill of the ice front during the course of the icefront regression. Moraine deposits can contain significant quantities of remnant ice which remains frozen in place where ground temperatures have remained below the freezing point. At locations where ice rich materials have been covered by bodies of surface water, ground temperatures would have increased resulting in melting of the ground ice and formation of kettles. An example of this is present near the Nina Bang lake area west of the project area where end moraine deposits are typically kettled indicating that they contained significant remnant ice since melted out by thawing conditions present beneath former bodies of water (such as the sea or lakes).

There are ongoing active depositional processes that continue to deposit materials overtop of the older materials discussed above, and these processes have resulted in the formation of

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several landform types encountered in the offshore project area including: beach deposits, colluvial deposits and marine sediments.

Based on the geology of the area, it is expected that the following sequence of materials will be encountered in the port areas starting with youngest materials at the top of the sequence:

- marine sediment deposits (clays, silts and sands) or marine deltaic sediments that have accumulated below the sea-level. These deposits are expected to contain ice-rafted dropstones and colluvium (talus) associated with mass movement of jointed bedrock or submarine sediments.
- Moraine deposits
- Bedrock

The bedrock in the Steensby Inlet port area on the east side of Steensby Inlet consists of Proterozoic Eon banded migmatite where bands of white to light grey granitoid rock alternate with darker more mafic bands. The migmatite also contains occasional intrusive diabase sills. The regional bedrock mapping also indicates a second bedrock type is present on the west side of Steensby Inlet where much younger sedimentary rocks of the Ordovician Period are mapped. These rocks consist of dolomite, limestone and sandstone. The location of the contact between these two rock types is unknown but is located somewhere under the waters of Steensby Inlet.

5.1.2 Surface Conditions

The proposed port facility area is comprised of two islands which lie off the mainland and form an embayment facing open water to the south. The two islands have relatively low relief and bedrock-controlled, irregular surface morphology. The bathymetry shows relatively gently sloped foreshore deposits to the north and south of the islands. The submarine slopes to the east side of the islands are generally steeply sloped, and are likely influenced by erosion from long shore currents.

The ore dock location is comprised of extensive bedrock outcrop showing jointing and undulating gneissic foliation. Photographs showing the bedrock surface are included in Figures A.2 thru A.5 in Appendix A.

5.1.3 Subsurface Conditions

The following section provides a generalized description of the soil conditions for summary purposes. The attached test hole logs provide detailed descriptions of the soil conditions encountered in the investigation and must be used in preference to these generalized descriptions.

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The boreholes were advanced through sea-ice and open water to the seabed. The thickness of sea ice varied from about 1.5 m to 1.8 m thick. Based on the condition of the SPT samples recovered and the DCPT test, the soils below the seabed are believed to be unfrozen.

The soil profile encountered below the seabed in boreholes drilled in the Steensby Inlet area generally becomes coarser with increasing depth. The generalized stratigraphy encountered in the boreholes consisted of a layer of soft, silty clay underlain by sand containing variable proportions of gravel, cobbles and boulders. The sand unit was in turn underlain by a deposit of cobbles and boulders or by bedrock. The thicknesses of the deposits encountered were variable.

5.1.4 Silty Clay

At many locations, the silty clay was generally very soft to soft as indicated by the SPT and DCPT tests where the sampler typically sank up to several metres under the weight of the rods or hammer. Higher N-values (up to 50 blows 300 mm) were observed in interbedded sands or gravelly zones. Moisture contents of recovered samples typically ranged from 23 to 45%. The Atterberg limit tests indicated liquid limits ranging from 25 to 37, suggesting low to medium plasticity. The plastic index ranges from 6 to 15. Occasional sand layers and sporadic gravel, cobble and boulders were encountered in the deposit at some locations.

5.1.5 Gravelly Sand

A gravelly sand unit was typically encountered underlying the silty clay. The gradation of this deposit is variable ranging from sand and gravel trace silt to silty or clayey sand trace gravel. Excluding more extreme values likely related to gravel or cobbles, the SPT N-values in the sand generally ranged from 8 to 20 indicating loose to compact relative density. The particle size analysis indicate the deposit is poorly graded. Within the sand unit, the recovery of gravel, cobbles and boulder fragments obtained during coring was 10-25% of the run lengths.

5.1.6 Cobbles and Boulders

The cobble and boulder deposit was comprised of very strong igneous rock particles. Occasional very large boulders with dimensions greater than 0.7 m were encountered in the core at some locations. Relatively minor amounts of sandy silt pockets were noted in some runs.

5.1.7 Bedrock

Bedrock was typically strong to extremely strong granitic gneiss. The weathering state ranged from highly weathered to fresh but the rock mass is typically slightly weathered to fresh. The

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use of moderately weathered to highly weathered in the borehole logs applied to specific zones of rock that was more highly fractured and weathered. RQD values ranged from 0 to 100%, indicating very poor to excellent rock quality.

Core recovery was typically good, greater than 95%. Lower recoveries were found in zones that were highly fractured and more highly weathered. These sections of core are difficult to piece together to record an exact length for core recovery accounting for recoveries of less than 100%. Also, it is possible that small pieces of fractured were lost while retrieving the core barrel from the hole.

5.2 Milne Inlet

5.2.1 Geology

Available surficial geology mapping indicates that the Milne Inlet camp sits on deltaic sediments consisting of clay, silt, sand and gravel up to 20 m thick. The general soil profile is upward coarsening consistent with slowly declining sea levels in the area. More recent unconsolidated marine sediments (clays, silts and sands) have accumulated below the current sea-level.

Regional bedrock mapping indicates that the local bedrock consists of granitic and gneissic rock of the Proterozoic Eon.

5.2.2 Surface Conditions

The proposed freight dock is located north of the camp area on Milne Inlet. The onshore topography in area of the freight dock is fairly flat and slopes gently towards the inlet. The bathymetry shows relatively gently sloped foreshore deposits to the north.

5.2.3 Subsurface Conditions

The following section provides a generalized description of the soil conditions for summary purposes. The attached test hole logs provide detailed descriptions of the soil conditions encountered in the investigation and must be used in preference to these generalized descriptions.

The boreholes were advanced through sea-ice and open water to the seabed. The thickness of sea ice varied from about 1.5 m to 1.8 m thick. Based on the condition of the SPT samples recovered and the DCPT tests, the soils below the seabed are believed to be unfrozen.

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The generalized stratigraphy encountered in the boreholes consisted of a loose to compact silty sand underlain by sand containing varying amounts of gravel and cobbles. The thickness of the sand deposit is unknown as all boreholes were terminated within this unit.

5.2.4 Silty Sand

In two of the three boreholes a layer of silty sand was encountered at the surface of the seabed. This layer was loose to compact as indicated by the SPT tests. Moisture contents of the recovered samples ranged from 18 to 19%. A grain size analysis carried out on one sample indicated that the sample contained 3% gravel, 47% sand, 35% silt and 14 % clay. This layer ranged from 1.5 to 3 m in thickness.

5.2.5 Sand

A sand unit containing varying amounts of gravel was encountered underlying the silty sand. The gradation of this deposit is variable ranging from sand with trace gravel and silt to sand and gravel. The SPT N-values in the sand ranged between 4 and 59 indicating a loose to very dense relative density. Occasional cobbles were noted within this unit.

5.2.6 Bedrock

Bedrock was not encountered during the 2011 drilling program at Milne Inlet.

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6. LIMITATIONS

The use of wireline coring equipment for the investigation allows for portability and rapid penetration through frozen or bouldery deposits, but this method typically does not provide adequate geotechnical sample recovery in soft or loose soils. The samples collected with this equipment may therefore over-represent the coarse fraction such as gravel, cobbles and boulders relative to sand, silt and clay fractions.

The use of SPT samplers, which was available on 2 of the 4 rigs, allowed for recovery of samples of fine-grained material at specific locations, but does typically not provide continuous profiling of the deposit. As a result of the limited recovery, there remains some uncertainty of the extent and nature of the soft or loose fine-grained deposits at the site.

Additional subsurface investigation work using methods specifically suited to offshore sampling and testing of fine-grained material containing cobbles and boulders are recommended where port facilities or fill will be supported by these materials.

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STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.



INTERPRETATION OF THE REPORT (continued)

- c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.
- d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

9. INDEPENDENT JUDGEMENTS OF CLIENT

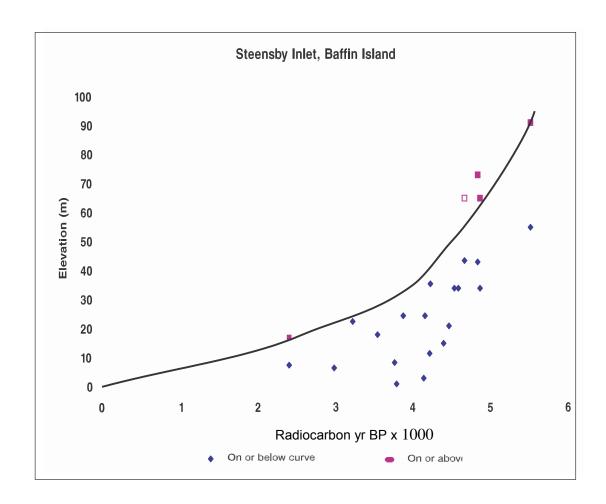
The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



APPENDIX A

DRAWINGS AND FIGURES

Figure A.1:	Relative Sea Level Data
Figure A.2:	Bedrock at North End of Alternate Ore Dock
Figure A.3:	Bedrock at South End of Alternate Ore Dock
Figure A.4:	Close-Up View of Bedrock at North End of Alternate Ore Dock
Figure A.5:	Close-Up View of Bedrock at South End of Alternate Ore Dock
Drawing A.1:	Steensby Inlet Location Plan
Drawing A.2:	Steensby Inlet Existing Borehole Locations Plan South Freight Dock
Drawing A.3:	Steensby Inlet Existing Borehole Locations Plan Island Bridge
Drawing A.4:	Steensby Inlet Existing Borehole Locations Plan Alternate Ore Dock
Drawing A.5:	Steensby Inlet Existing Borehole Locations Plan Base Case Ore Dock
Drawing A.6:	Steensby Inlet Existing Borehole Locations Plan Construction Docks
Drawing A.7:	Steensby Inlet Existing Borehole Locations Plan North Freight Dock
Drawing A.8:	Milne Inlet Location Plan
Drawing A 0.	Milne Inlet Existing Borehole Locations Plan Freight Dock



Relative sea-level curve for Rowley River area, Steensby Inlet (Dyke, 2007 A.S. GSC Open File 5017)







Bedrock at North End of Alternate Ore Dock

FIGURE A.2





Bedrock at South End Alternate Ore Dock

FIGURE A.3





Close-Up View of Bedrock at North End of Alternate Ore Dock

FIGURE A.4

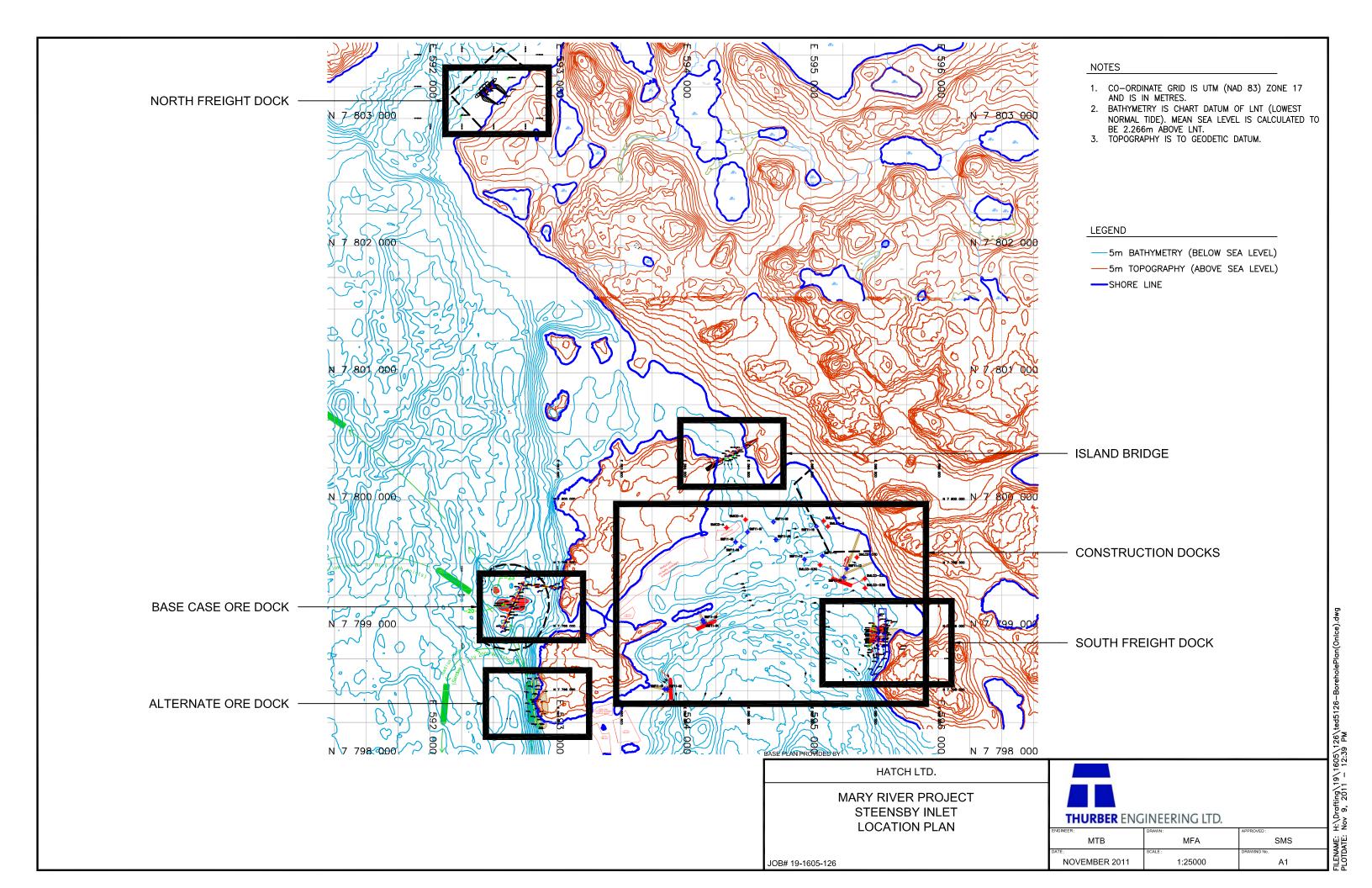


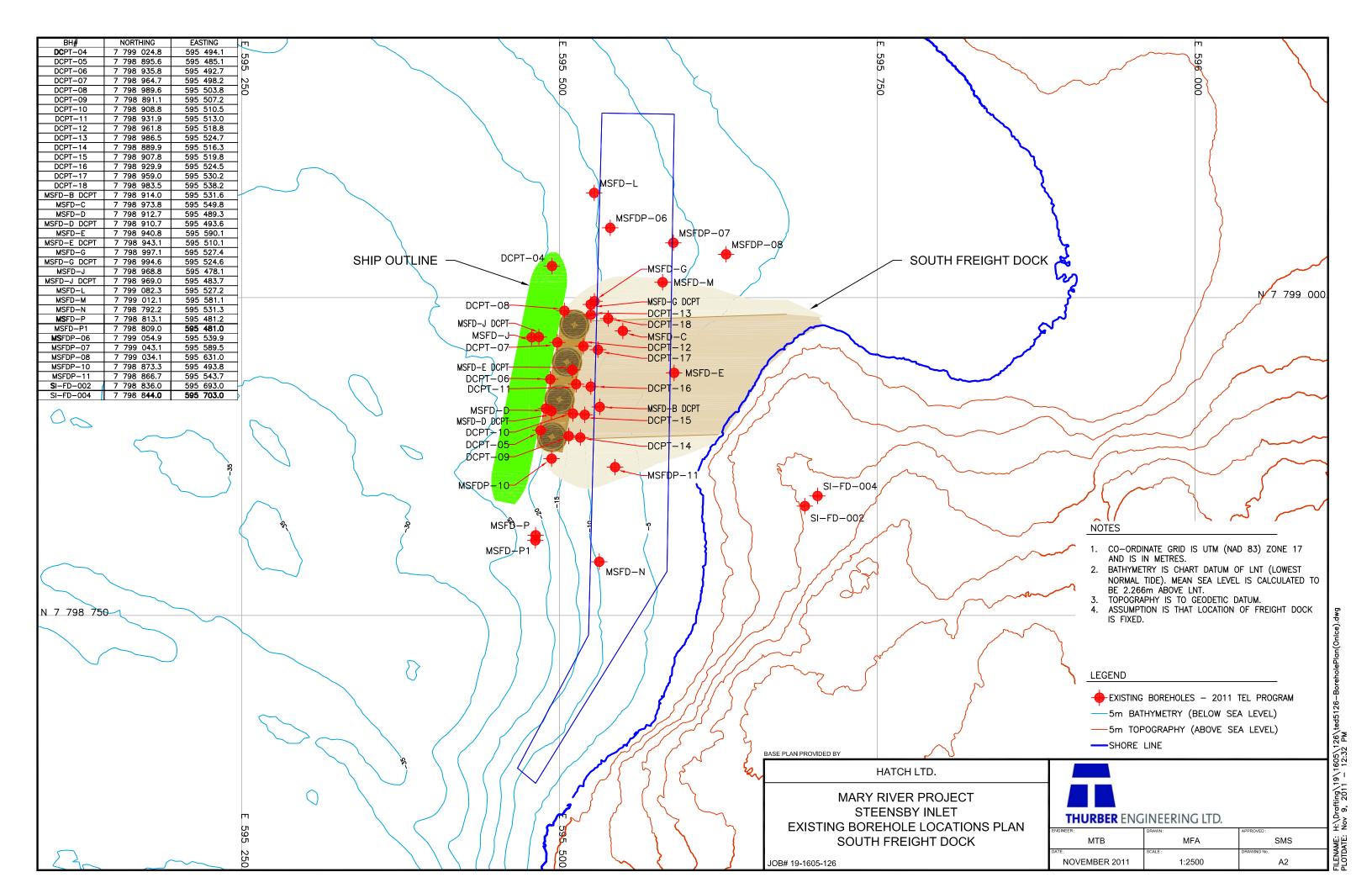


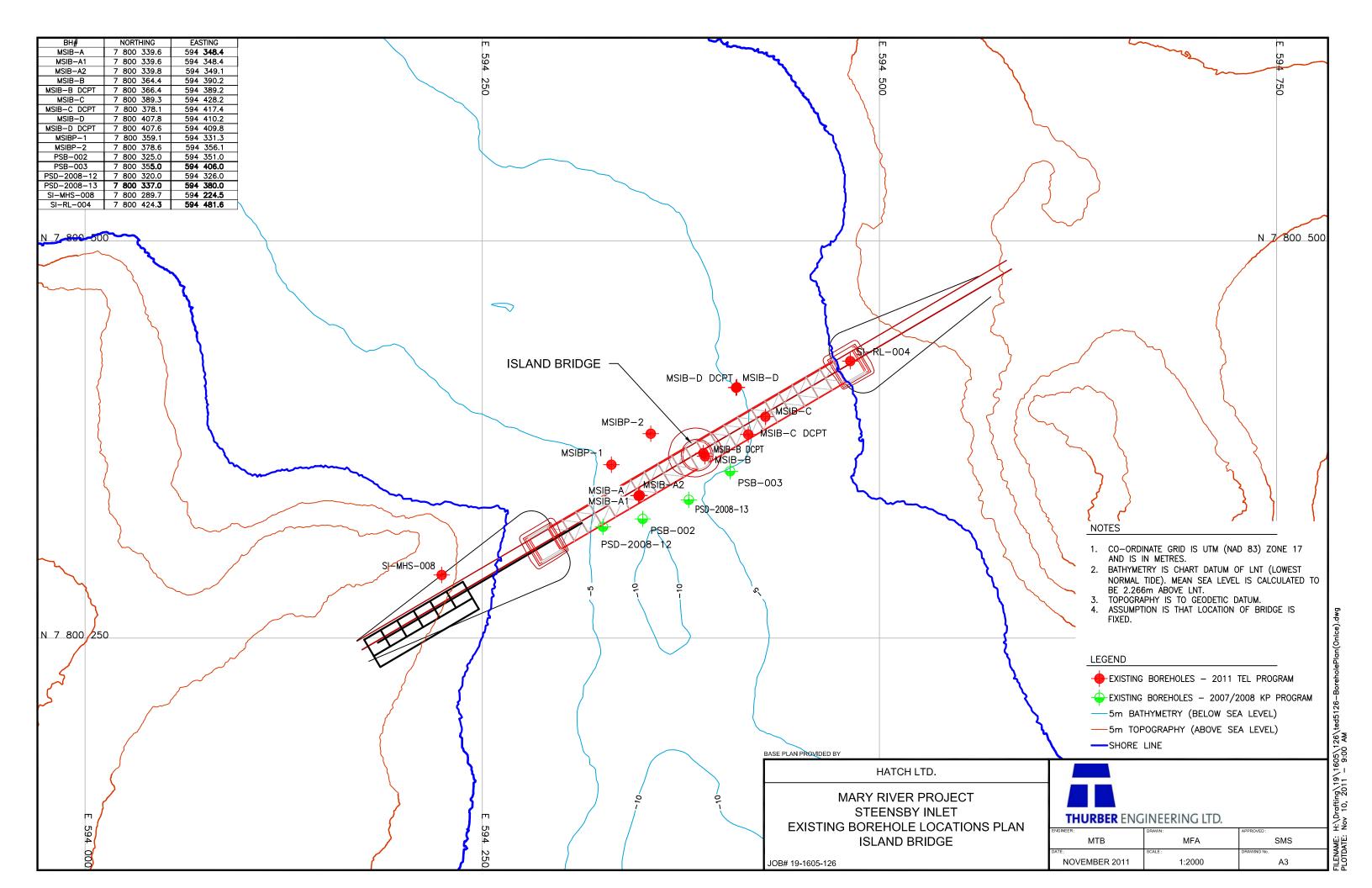
Close-Up View of Bedrock at South End of Alternate Ore Dock

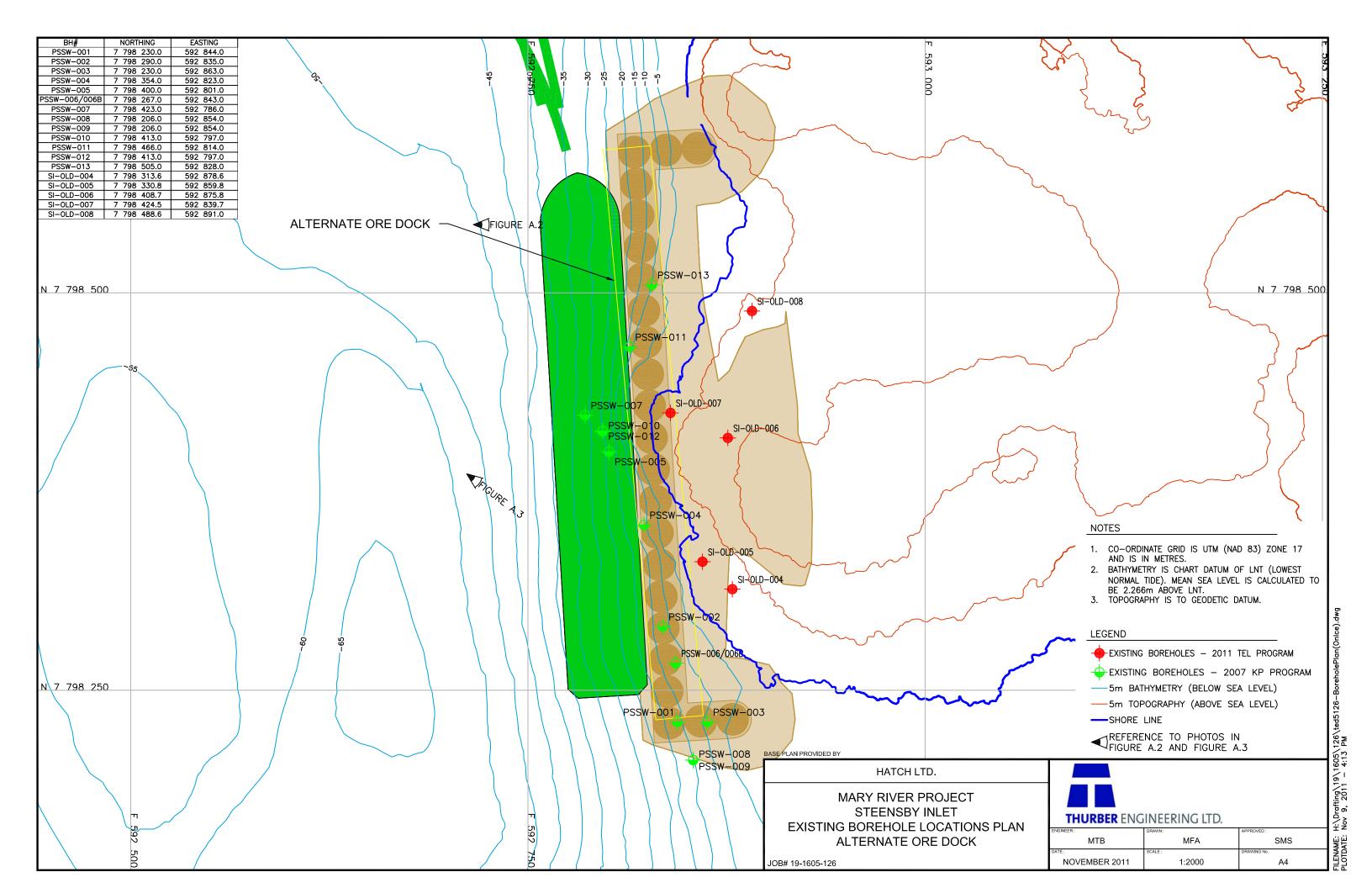
FIGURE A.5

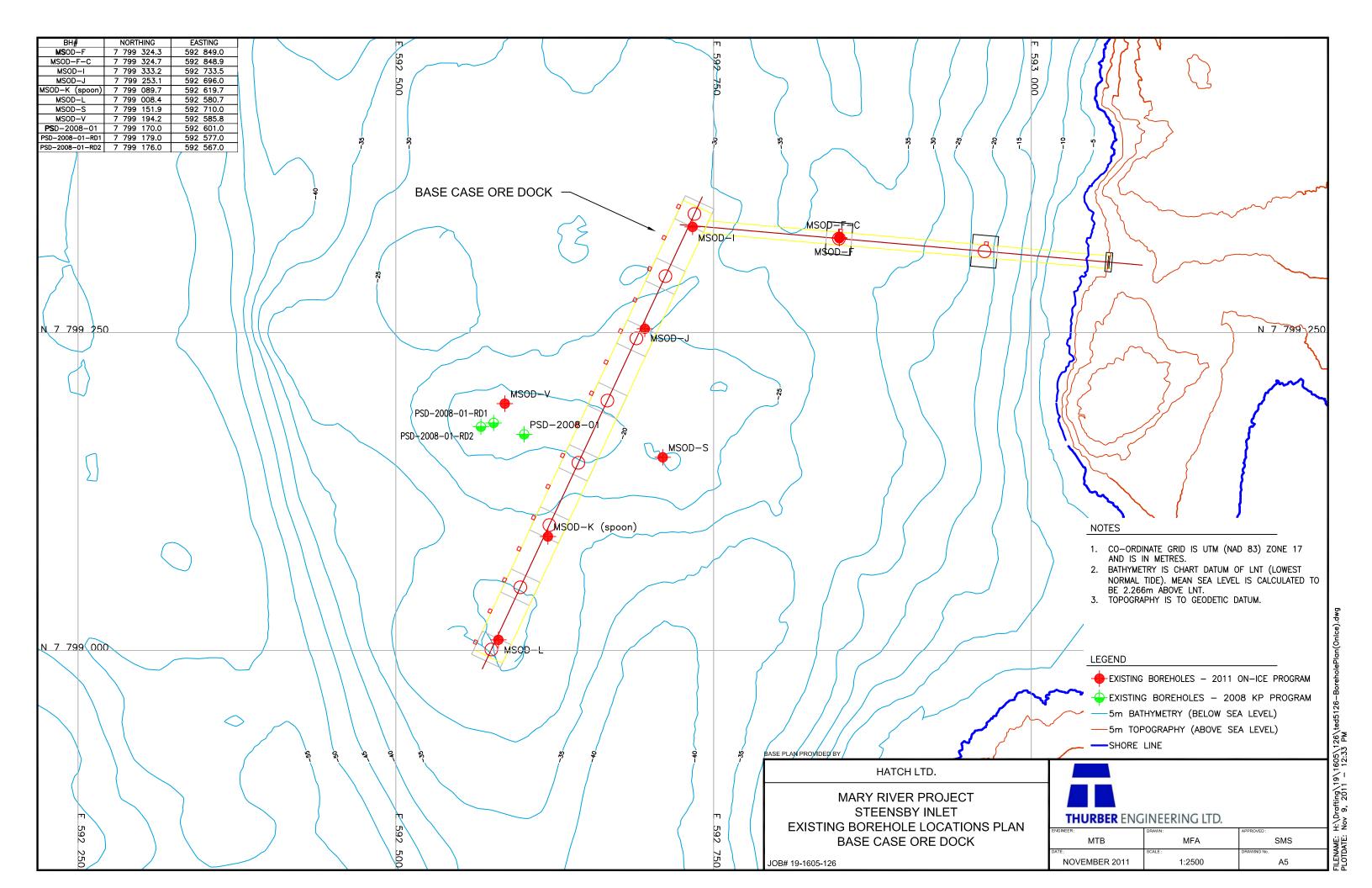


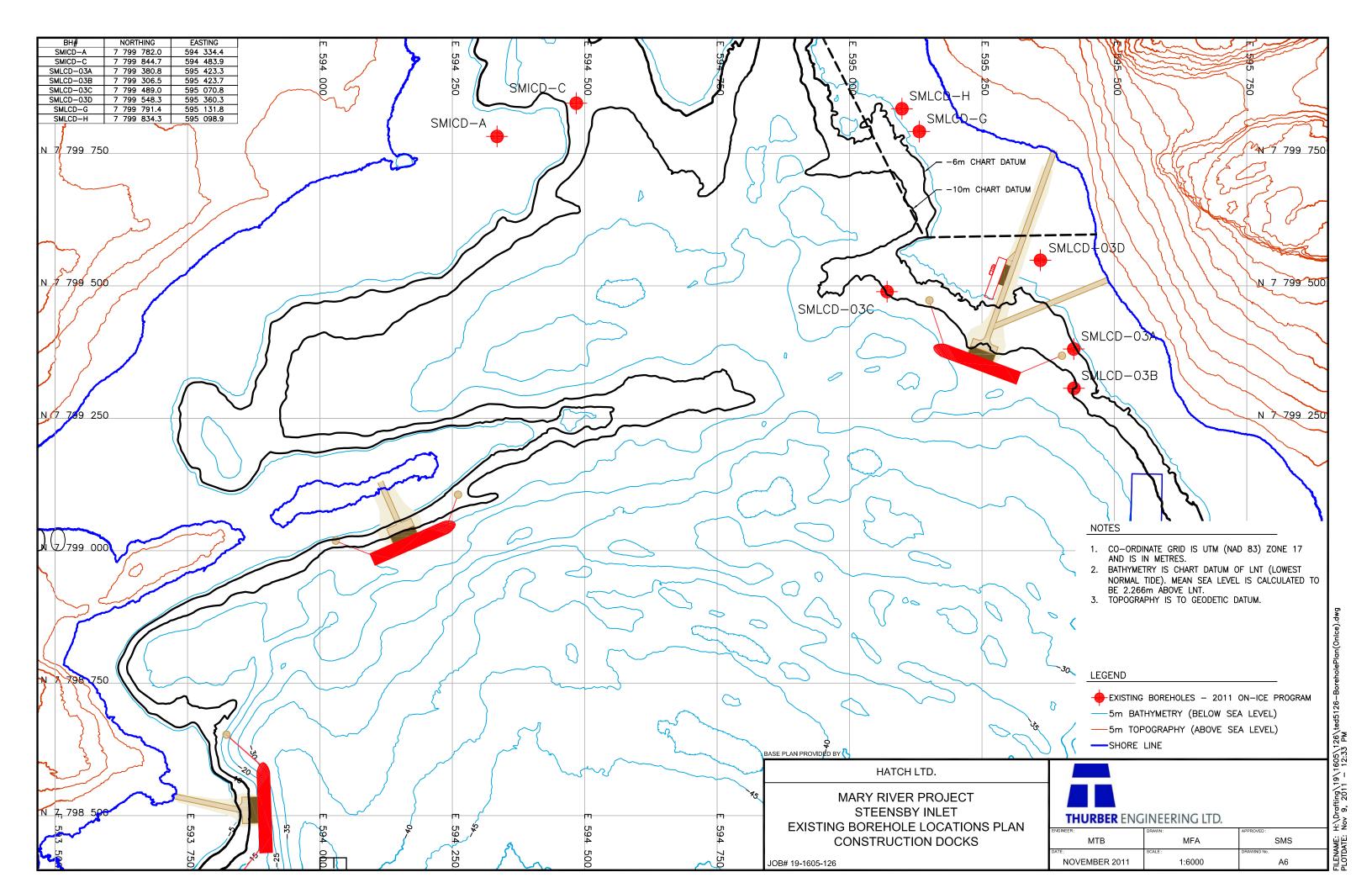


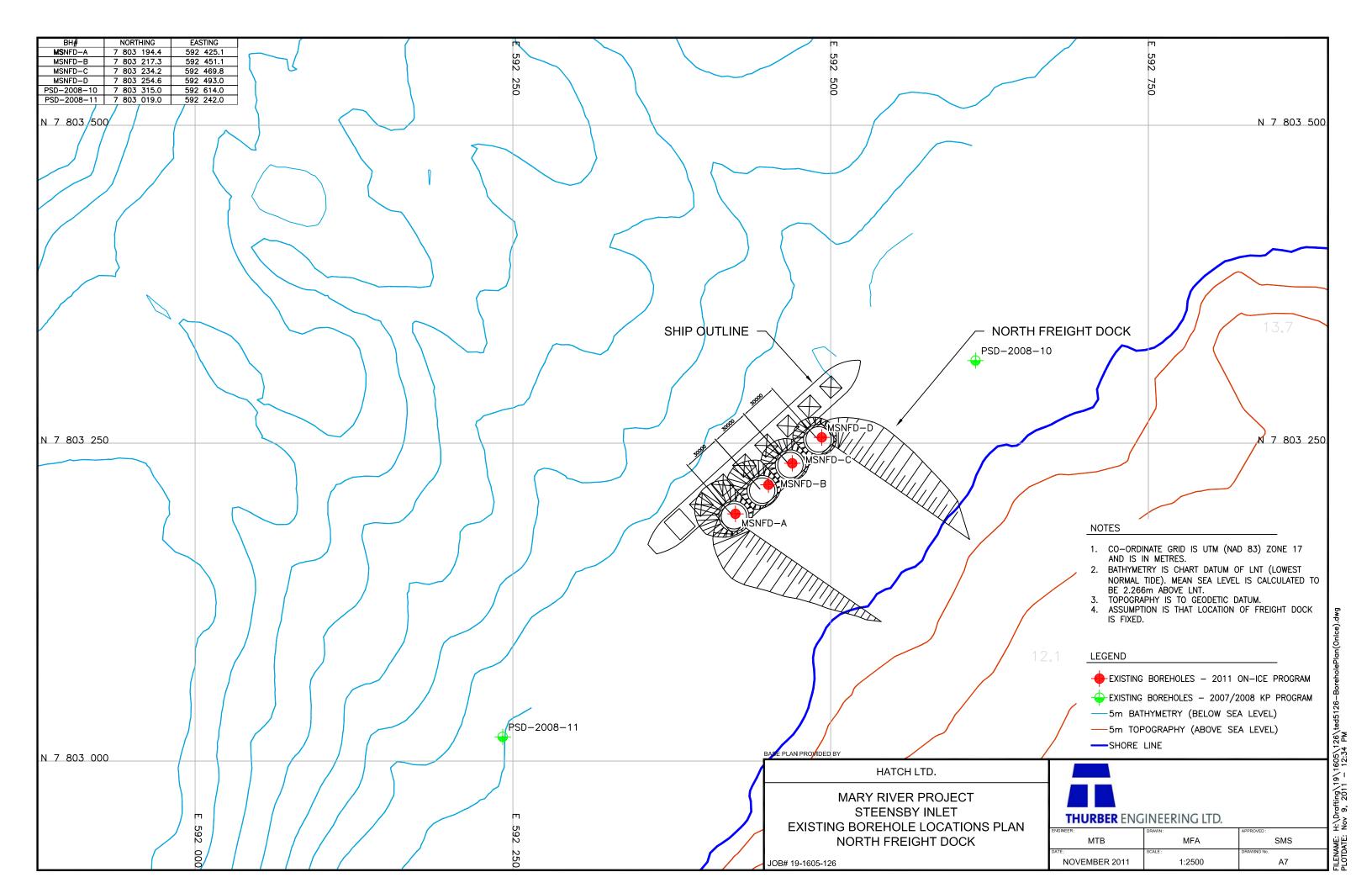


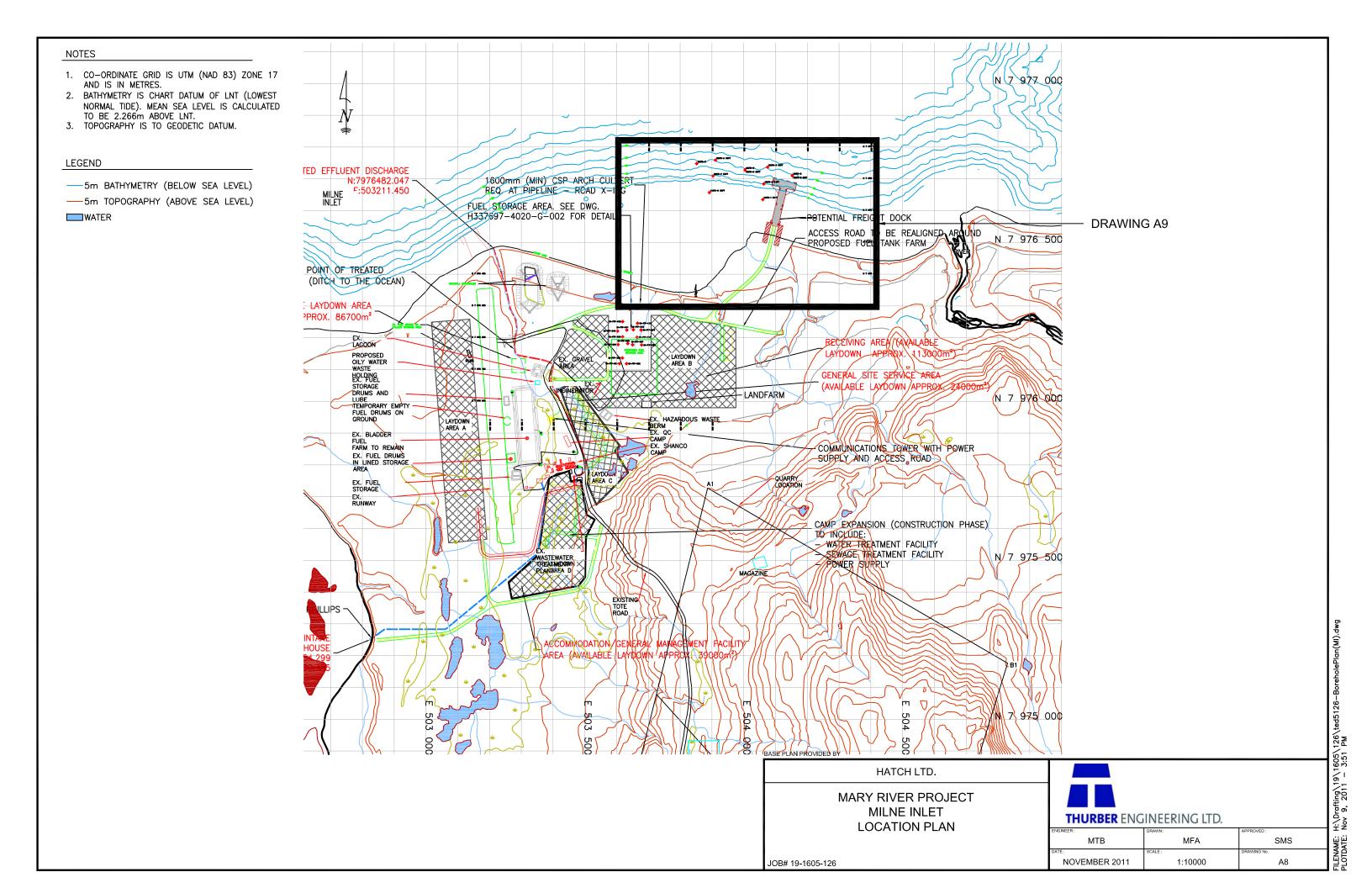


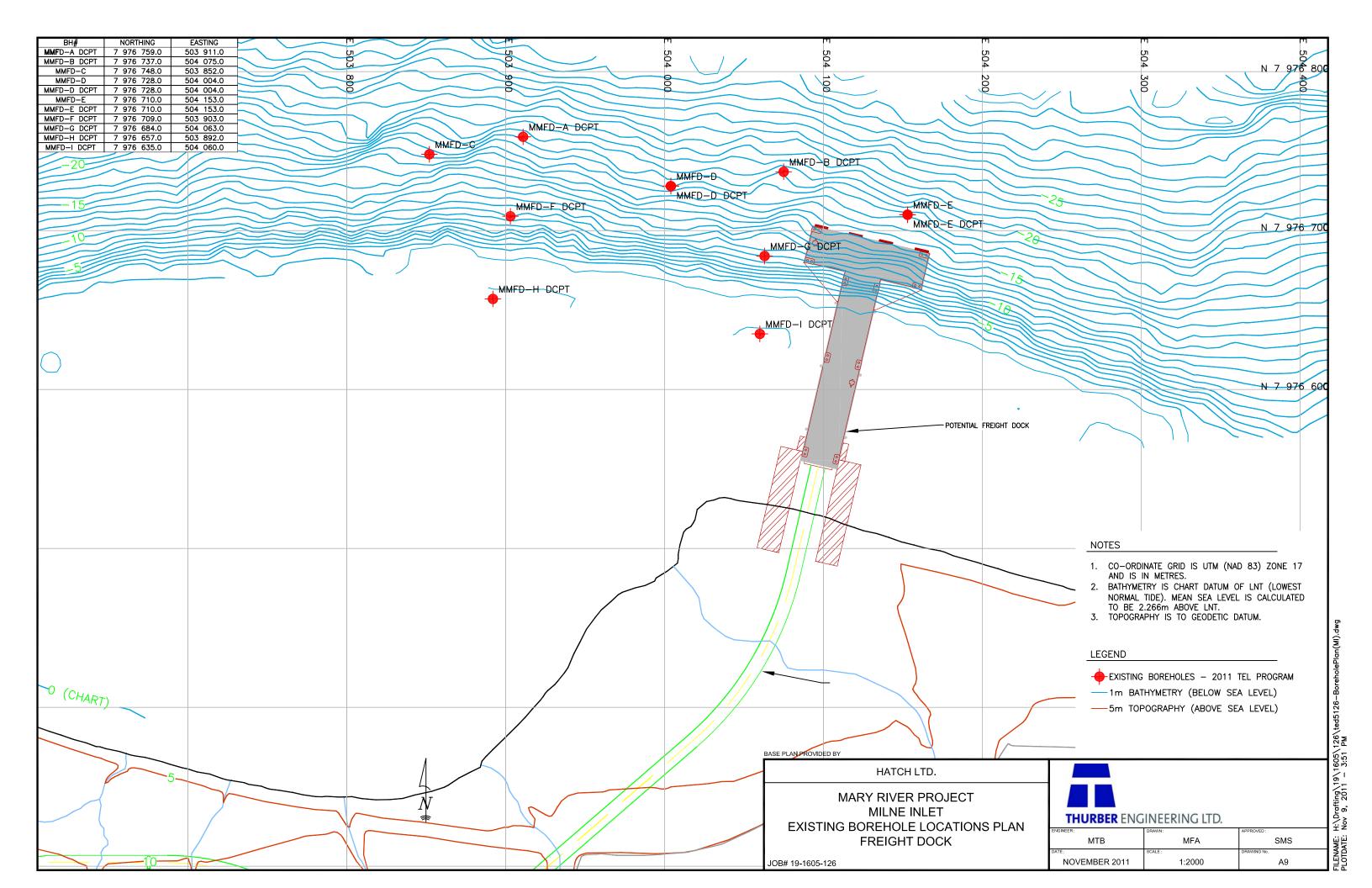














APPENDIX B

BOREHOLE LOGS

Modified Unified Soils Classification

Symbols and Terms used on the Test Hole Logs

Borehole Logs

Core Photographs

SYMBOLS, ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES

1. TEXTURAL CLASSIFICATION OF SOILS

CLASSIFICATION PARTICLE SIZE VISUAL IDENTIFICATION

BouldersGreater than 200mmsameCobbles75 to 200mmsameGravel4.75 to 75mm5 to 75mm

Sand 0.075 to 4.75mm Not visible particles to 5mm
Silt 0.002 to 0.075mm Non-plastic particles, not visible to

the naked eye

Clay Less than 0.002mm Plastic particles, not visible to

the naked eye

COARSE GRAIN SOIL DESCRIPTION (50% greater than 0.075mm)

TERMINOLOGY
Trace or Occasional
Some
10 to 20%
Adjective (e.g. silty or sandy)
And (e.g. sand and gravel)
PROPORTION
Less than 10%
20%
20 to 35%
35 to 50%

3. TERMS DESCRIBING CONSISTENCY (COHESIVE SOILS ONLY)

DESCRIPTIVE TERM UNDRAINED SHEAR APPROXIMATE SPT⁽¹⁾ 'N'

STRENGTH (kPa) **VALUE** Very Soft 12 or less Less than 2 12 to 25 Soft 2 to 4 Firm 25 to 50 4 to 8 Stiff 50 to 100 8 to 15 Very Stiff 100 to 200 15 to 30 Greater than 30 Hard Greater than 200

NOTE: Hierarchy of Soil Strength Prediction 1) Laboratory Triaxial Testing

2) Field Insitu Vane Testing

3) Laboratory Vane Testing

4) SPT value

5) Pocket Penetrometer

4. TERMS DESCRIBING DENSITY (COHESIONLESS SOILS ONLY)

DESCRIPTIVE TERM SPT "N" VALUE
Very Loose Less than 4
Loose 4 to 10
Compact 10 to 30
Dense 30 to 50
Very Dense Greater than 50

5. LEGEND FOR RECORDS OF BOREHOLES

SYMBOLS AND SS Split Spoon Sample WS Wash Sample AS Auger (Grab) Sample ABBREVIATIONS TW Thin Wall Shelby Tube Sample TP Thin Wall Piston Sample

FOR PH Sampler Advanced by Hydraulic Pressure PM Sampler Advanced by Manual Pressure

SAMPLE TYPE WH Sampler Advanced by Self Static Weight RC Rock Core SC Soil Core

Undisturbed Shear Strength

Sensitivity = -----

Remoulded Shear Strength

■ Water Level

C_{pen} Shear Strength Determination by Pocket Penetrometer

(1) SPT 'N' Value Standard Penetration Test 'N' Value – refers to the number of blows from a 63.5kg hammer free falling a height of 0.76m to advance a standard 50 mm outside diameter split spoon sampler for 0.3 m depth into undisturbed ground.

(2) DCPT Dynamic Cone Penetration Test – Continuous penetration of a 50 mm outside diameter, 60° conical steel point attached to "A" size rods driven by a 63.5 kg hammer free falling a height of 0.76 m. The resistance to cone penetration is the number of hammer blows required for each 0.3 m advance of the conical point into undisturbed ground.

UNIFIED SOILS CLASSIFICATION

GROUP SYMBOL

GRAVEL AND GRAVELLY COARSE GRAINED SOILS GRAND SILTS AND FINE GRAINED GRAINED GRAINED GRAINED GRAVELLY SOILS GRAINED SANDY SOILS GRAINED SOILS GRAINED SOILS GRAINED SOILS GRAINED SOILS GRAINED SANDY SOILS GRAINED FINE GRAINED	MAJO	R DIVISIONS	GROUP Symbol	TYPICAL DESCRIPTION
GRAVEL AND GRAVELLY AND GRAVELLY COARSE GRAINED SOILS SOILS GRAINED SANDY SP Poorly-graded sands or gravelly sands, little or no fines. SM Silty gravels, gravel-sand-clay mixtures. Well-graded sands or gravelly sands, little or no fines. SM Silty sands, sand-silt mixtures. Clayes sands, sand-silt mixtures. GC Clayes sands, sand-silt mixtures. Clayes fine sands or gravelly sands, little or no fines. SM Silty sands, sand-silt mixtures. Clayes fine sands or gravelly sands, little or no fines. CLayes fine sands or gravelly sands, little or no fines. GRAINED SILTS AND CLAYS GRAINED SOILS CI Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (WL < 30%). CI Inorganic clays of medium plasticity, silty clays. (30% < WL < 50%). OL Organic silts and organic silty-clays of low plasticity. MH Inorganic silts and organic silty-clays of low plasticity. MH Inorganic clays of high plasticity, fat clays. WL > 50% CLAYS WL > 50% OH Organic clays of medium to high plasticity, organic silts. HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE	IVII IS OF	T		
COARSE GRAINED SOILS GRAINED SILTS AND CLAYS GRAINED SOILS		GRAVEL		
COARSE GRAINED SOILS SOILS GRAINED SOILS SAND AND SANDY SOILS SAND AND SANDY SOILS SAND AND SOILS CLAYSTONE CLAYSTONE		AND	GP	Poorly-graded gravels or gravel-sand mixtures, little
GRAINED SOILS GC Clayey gravels, gravel-sand-clay mixtures. SW Well-graded sands or gravelly sands, little or no fines. SAND AND SANDY SP Poorly-graded sands or gravelly sands, little or no fines. SM Silty sands, sand-silt mixtures. SC Clayey sands, sand-clay mixtures. SC Clayey sands, sand-clay mixtures. ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (WL < 30%). GRAINED SOILS CLAYS WL < 50% CI Inorganic clays of medium plasticity, silty clays. (30% < WL < 50%). OL Organic silts and organic silty-clays of low plasticity. MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. CLAYS WL > 50% OH Organic clays of medium to high plasticity, fat clays. OH Organic clays of medium to high plasticity, organic silts. HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE		GRAVELLY		or no fines.
SOILS SAND AND SANDY SOILS SANDY SOILS SANDY SOILS SANDY SOILS SANDY SOILS SP Poorly-graded sands or gravelly sands, little or no fines. SM Silty sands, sand-silt mixtures. SC Clayey sands, sand-clay mixtures. Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (W _L < 30%). CLAYS (W _L < 30%). OL Organic silts and organic silty-clays of low plasticity. MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. CLAYS W _L > 50% OH Organic clays of medium to high plasticity, organic silts. HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE	COARSE	SOILS	GM	Silty gravels, gravel-sand-silt mixtures.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	GRAINED		GC	Clayey gravels, gravel-sand-clay mixtures.
SANDY SOILS SP Poorly-graded sands or gravelly sands, little or no fines. SM Silty sands, sand-silt mixtures. SC Clayey sands, sand-clay mixtures. ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (W _L < 30%). GRAINED SOILS CLAYS MH Inorganic clays of medium plasticity, silty clays. (30% < W _L < 50%). OL Organic silts and organic silty-clays of low plasticity. MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. CLAYS CH Inorganic clays of high plasticity, fat clays. OH Organic clays of medium to high plasticity, organic silts. HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE	SOILS		SW	Well-graded sands or gravelly sands, little or no
SOILS SM Silty sands, sand-silt mixtures.		SAND AND		fines.
SM Silty sands, sand-silt mixtures. SC Clayey sands, sand-clay mixtures. ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (WL < 30%). CI Inorganic clays of medium plasticity, silty clays. (30% < WL < 50%). OL Organic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. (WL < 30%). CI Inorganic clays of medium plasticity, silty clays. (30% < WL < 50%). OL Organic silts and organic silty-clays of low plasticity. Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. CLAYS CH Inorganic clays of high plasticity, fat clays. OH Organic clays of medium to high plasticity, organic silts. HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE		SANDY	SP	Poorly-graded sands or gravelly sands, little or no
$SC \qquad Clayey sands, sand-clay mixtures. \\ ML \qquad Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity. \\ CL \qquad Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. (W_L < 30\%). \\ GRAINED \qquad W_L < 50\% \qquad CI \qquad Inorganic clays of medium plasticity, silty clays. \\ (30\% < W_L < 50\%). \\ OL \qquad Organic silts and organic silty-clays of low plasticity. \\ MH \qquad Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. \\ CLAYS \qquad CH \qquad Inorganic clays of high plasticity, fat clays. \\ W_L > 50\% \qquad OH \qquad Organic clays of medium to high plasticity, organic silts. \\ HIGHLY \qquad Pt \qquad Peat and other highly organic soils. \\ CLAY SHALE \\ SANDSTONE \\ SILTSTONE \\ CLAYSTONE \\ \\ \\ \\$		SOILS		fines.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			SM	Silty sands, sand-silt mixtures.
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$			SC	Clayey sands, sand-clay mixtures.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			ML	Inorganic silts and very fine sands, rock flour, silty or
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				clayey fine sands or clayey silts with slight plasticity.
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			CL	Inorganic clays of low to medium plasticity, gravelly
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		SILTS AND		clays, sandy clays, silty clays, lean clays.
SOILS (30% < W _L < 50%). OL Organic silts and organic silty-clays of low plasticity. MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. CLAYS CH Inorganic clays of high plasticity, fat clays. W _L > 50% OH Organic clays of medium to high plasticity, organic silts. HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE	FINE	CLAYS		$(W_L < 30\%).$
OL Organic silts and organic silty-clays of low plasticity. MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. CLAYS CH Inorganic clays of high plasticity, fat clays. W _L > 50% OH Organic clays of medium to high plasticity, organic silts. HIGHLY Pt Peat and other highly organic soils. CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE	GRAINED	$W_L < 50\%$	CI	Inorganic clays of medium plasticity, silty clays.
SILTS AND CLAYS W _L > 50% HIGHLY ORGANIC SOILS CLAY SHALE SANDSTONE SILTS CH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. Horganic clays of high plasticity, fat clays. Organic clays of medium to high plasticity, organic silts. Pt Peat and other highly organic soils. CLAY SHALE SANDSTONE CLAYSTONE	SOILS			$(30\% < W_L < 50\%).$
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			OL	Organic silts and organic silty-clays of low plasticity.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			МН	Inorganic silts, micaceous or diatomaceous fine
$W_L > 50\% \hspace{1cm} OH \hspace{1cm} Organic clays of medium to high plasticity, organic silts. \\ HIGHLY \hspace{1cm} Pt \hspace{1cm} Peat and other highly organic soils. \\ ORGANIC SOILS \hspace{1cm} CLAY SHALE \\ SANDSTONE \\ SILTSTONE \\ CLAYSTONE \\ \\ CLAYSTONE \\ \\ OH \hspace{1cm} Organic clays of medium to high plasticity, organic silts. \\ Peat and other highly organic soils. \\ \\ OH \hspace{1cm} Organic clays of medium to high plasticity, organic silts. \\ \\ ORGANIC \\ SOILS \\ CLAY SHALE \\ SANDSTONE \\ \\ OH \hspace{1cm} OH 1c$		SILTS AND		sandy or silty soils, elastic silts.
HIGHLY Pt Peat and other highly organic soils. ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE		CLAYS	СН	Inorganic clays of high plasticity, fat clays.
HIGHLY Pt Peat and other highly organic soils. ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE		$W_L > 50\%$	ОН	Organic clays of medium to high plasticity, organic
ORGANIC SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE				silts.
SOILS CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE			Pt	Peat and other highly organic soils.
CLAY SHALE SANDSTONE SILTSTONE CLAYSTONE				
SANDSTONE SILTSTONE CLAYSTONE	SOILS			
SILTSTONE CLAYSTONE				
CLAYSTONE	SANDSTONE			
	SILTSTONE			
COAL	CLAYSTONE			
	COAL			

EXPLANATION OF ROCK LOGGING TERMS

ROCK WEATHERING	CLASSIFICATION		SYMBOLS	
Fresh (FR)	No visible signs of weathering	ıg.		
Fresh Jointed (FJ)	Weathering limited to the sur discontinuities.	rface of major		CLAYSTONE
Slightly Weathered (SW)	Penetrative weathering devel surfaces, but only slight wear			SILTSTONE
Moderately Weathered (MW)	Weathering extends through rock material is not friable.	out the rock mass, but the		SANDSTONE
Highly Weathered (HW)	Weathering extends through rock is partly friable.	out the rock mass and the		COAL
Completely Weathered (CW)	Rock is wholly decomposed but the rock texture and structure and structure and structure and structure and structure are structured.	-		Bedrock (general)
DISCONTINUITY SPA	CING	STRENGTH CLASSIFIC	ATION	

(CW)	but the rock texture and struc	cture are preserv	ved.	KXXXXI ,	Bedrock (general)			
DISCONTINUITY SPA	ACING		CLASSIFICA					
Bedding	Bedding Plane Spacing	Rock Strength	Approximate Compressive		Field Estimation of Hardness*			
Very thickly bedded	Greater than 2m	Extremely Strong	(MPa) Greater than 250	(psi) Greater than 36,000	Specimen can only be chipped with a			
Thickly bedded	0.6 to 2m	ou ong	230	50,000	geological hammer			
Medium bedded	0.2 to 0.6m	Very Strong	100-250	15,000 to 36,000	Requires many blows of geological			
Thinly bedded	60mm to 0.2m			,	hammer to break			
Very thinly bedded	20 to 60mm	Strong	50-100	7,500 to 15,000	Requires more than one blow of			
Laminated	6 to 20mm				geological hammer to break			
Thinly Laminated	Less than 6mm	Medium Strong	25.0 to 50.0	3,500 to 7,500	Breaks under single blow of			
<u>TERMS</u>					geological hammer.			
Total Core Recovery: (TCR)	Core recovered as a percentage of total core run length.	Weak	5.0 to 25.0	750 to 3,500	Can be peeled by a pocket knife with difficulty			
Solid Core Recovery: (SCR)	Percent Ratio of solid core of full cylindrical shape recovered. Expressed with respect to the total length of core run.	Very Weak	1.0 to 5.0	150 to 750	Can be peeled by a pocket knife, crumbles under firm blows of geological pick.			
Rock Quality Designation: (RQD)	Total length of sound core recovered in pieces 0.1m in length or larger as a percentage of total core run length.	Extremely Weak (Rock)	0.25 to 1.0	35 to 150	Indented by thumbnail			
Uniaxial Compressive Strength (UCS)	Axial stress required to break the specimen							
Fracture Index: (FI)	Frequency of natural fractures per 0.3m of core run.							



STEENSBY INLET - CONSTRUCTION DOCKS

SMICD-A

SMICD-C*

SMICD-C1

SMLCD-03A

SMLCD-03A DCPT

SMLCD-03B DCPT

SMLCD-03C DCPT

SMLCD-03D DCPT

SMLCD-03D(2) DCPT

SMLCD-03D(3) DCPT

SMLCD-G

SMLCD-G DCPT

SMLCD-H



^{*} Core photographs not available.

RECORD OF BOREHOLE SMICD-A

Mary River Project **PROJECT**

Steensby Inlet - Construction Docks LOCATION

Project No. 19-1605-126

STARTED May 8, 2011

DRILLER: BOART LONGYEAR

SHEET 1 OF 1

CC	MPL	ETED : May 8, 2011							99 782 E 594 334		D	ATUM: C	
LE	HOD	SOIL PROFILE			5	SAM	PLE	_		EXCESS ICE CO	ONTENT, PERCEN oice	T J Q	THERMISTER/ GROUND CONE
DEPTH SCALE (metres)	BORING METHOD		PLOT	(E)	3ER	й	,/0.3m	RECOVERY %	COMMENTS	10 20	30 40 L L TENT, PERCENT	ADDITIONAL LAB. TESTING	FROZEN
DEPT (m	SORING	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	ECOVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		→ W W 30 40	ADD	UNFROZEN UNCERTAIN
	Ï	SEA FLOOR		-2.55			Ш	~	50 100 150 200 250	10 20			
		COBBLES and BOULDERS, fines washed out	000										
- 1			000						-no recovery				
		GRANITIC GNEISS, fresh, strong, weakly foliated, grey and pink	()	1.60									1.60
- 2		ioliateu, grey and pink											
- 3					1	RUN	ı		TCR=100% SCR=93% RQD=92%				
- -													
-4 :	ing												
- 5	ing/Cor												
:	NW/NQ Casing/Coring												
-6	NWN				2	RUN	ı		TCR=100% SCR=93% RQD=91%				
- - 7													
-8		Rough irregular vertical joints from -10.65 to -11.22m.											
- 9		-11.22m.											
		Highly fractured from -11.68 to -12.15m. irregular, some rubble			3	RUN			TCR=100% SCR=57% RQD=39%				
-10		becomes strong to very strong		10.65									
- 11		END OF BOREHOLE AT 13.20m. Ice thickness = 0.93m	19//	10.03									
-													
- 12													
- 13													
-14													
· 15													
-16													
· 17													
-18													
- 19													
. 19													
		GROUNDWATER ELE	L VA7	L LIONS	<u>L</u>								
		∇ shallow/single insta			-	Ţ	Z D	EEI	P/DUAL INSTALLATION	LOGGED	: Sivak		
		WATER LEVEL (date)							LEVEL (date)	CHECKED			THURBI



RECORD OF BOREHOLE SMICD-C

Mary River Project PROJECT

Steensby Inlet - Construction Docks

Project No. 19-1605-126

LOCATION STARTED

COMPLETED :

May 6, 2011 May 6, 2011

DRILLER: BOART LONGYEAR N 7 799 845 E 594 484

SHEET 1 OF 1 DATUM: CGVD28

		SOIL PROFILE				SAM			99 845 E 594 484	EXC	ESS ICE	CONTE	NT, PER			THERMISTER
DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE	ΤĘ	1	H`		_				0 0	ice	:	10	ADDITIONAL LAB. TESTING	THERMISTER GROUND CO
a SC etres	ME		STRATA PLOT	ELEV. (m)	Ë	ш	BLOWS/0.3m	RECOVERY %	COMMENTS					10 	TION	FROZEN
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5	BOF		STR,	=	ž	Ĭ.	BLC	REC	50 100 150 200 250	1 1	γp			WI 10	^ ^	UNCERTAIN
		SEA FLOOR		-8.98												
		no recovery														
1																
					1	RUN	1									
2	g l															
	Cori															
3	NW/NQ Casing/Coring		1	3.05												
	ပ္မ	COBBLES and GRAVEL, fines washed out	7.0													
.	Ž		\sim	1												
	z		000													
			00]	2	RUN	1		UCS=237MPa							
5			00													
			60													
;	\perp	END OF DODELIOLE AT 45 07	200	6.10	L											6.10
		END OF BOREHOLE AT 15.07m. Ice thickness = 1.76m Borehole aborted as core barrel was lost.														
.		Boronoic aborted as core patrel was iOSL.														
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		GROUNDWATER ELE	- \/Δ	LIONS	_	_							1		<u> </u>	
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		SHALLOW/SINGLE INSTA	ALLA	HON					P/DUAL INSTALLATION		LOGGE		Sivak			
		WATER LEVEL (date)					vvA	I EK	LEVEL (date)		CHECKE	:ט :	MB/SMS	,		THUR



RECORD OF BOREHOLE SMICD-C1

Mary River Project PROJECT

Steensby Inlet - Construction Docks

Project No. 19-1605-126

LOCATION STARTED

May 6, 2011

DRILLER: WALKER DRILLING N 7 799 845 E 594 484

SHEET 1 OF 1

ųΤ	400	SOIL PROFILE			S	SAMI	PLES			EXCESSI	CE CONTE	NT, PERCENT	J O	THERMISTER GROUND CON
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 WATER wp I—	20 ; CONTENT	30 40 L L PERCENT	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
11 12 23 33 44 55		SEA FLOOR SAND, with some gravel, cobbles, and boulders		-10.68	1	RUN			-rods sank from sea floor to elev20.00m					
8 9 10 11	NW/NQ Casing/Coring	GRANITIC GNEISS , fresh, lightly foliated, subhorizontal joints, coarse grained, pinkish grey		10.44										10.44 _
13 14 15					2	RUN			TCR=100% SCR=100% RQD=88% UCS=251MPa					
16		END OF BOREHOLE AT 27.88m.		17.20_	3	RUN			TCR=100% SCR=86% RQD=88% UCS=161MPa					
18 19														
	ı	GROUNDWATER ELE\			<u> </u>				P/DUAL INSTALLATION LEVEL (date)	LOGO		RH/Sivak MB/SMS	l	THURB



RECORD OF BOREHOLE SMLCD-03A

Mary River Project PROJECT

May 23, 2011

Steensby Inlet - Construction Docks

Project No. 19-1605-126

LOCATION May 22, 2011 STARTED

COMPLETED :

DRILLER: WALKER DRILLING N 7 799 378 E 595 263

SHEET 1 OF 2 DATUM: CGVD28

4	ᄋ	SOIL PROFILE			5	SAM	PLE			EXC	ESS ICE	CONTEN ice	NT, PERCEN	ıτ J⊒⊆	THERMISTE GROUND C
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	W	L ATER C ⁄p ├──	20 3	0 40 PERCENT	ADDITIONAL I AB TESTING	FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR	1222	-12.58											
1 2		CLAY, silty, trace sand, trace gravel, very soft, grey, saturated			1 2	ss	0	100	Grain Size Analysis: Gr 1%/ Sa 2%/ Si 52%/ Cl 45%		ŀ	I	I —⊖I		
4		becoming hard			3	ss	48	100	Grain Size Analysis: Gr 1%/ Sa 0%/ Si 54%/ Cl 45%				9		
5 6		SAND, gravelly, compact to dense		5.20	4	ss	33	46	Grain Size Analysis: Gr 40%/Sa 44%/Si & Cl 16%	()				
7 8					5	ss	17	25	Grain Size Analysis: Gr 20%/Sa 65%/Si & Cl 15%	0					
9	oring				6	SS	40	8	Grain Size Analysis:		0				
11	NW/NQ Casing/Coring	difficulty advancing casement maximum boulder size is approximately 400mm SAND and GRAVEL (inferred), occasional cobbles and boulders		11.20	7	SS	26	17	Gr 29%/Sa 58%/Si & Cl 12%	0					
13		sand in cuttings			1	RC		23							
14					2	RC		26							
16					3	RC		52							
17					5	RC RC		43							
18					6	RC		88							
19					7	RC		61							
!		GROUNDWATER ELE SHALLOW/SINGLE INSTA			ŝ				P/DUAL INSTALLATION LEVEL (date)		LOGGE		Dunstan/Web	oster	



RECORD OF BOREHOLE SMLCD-03A

Mary River Project PROJECT LOCATION

Steensby Inlet - Construction Docks

Project No. 19-1605-126

STARTED COMPLETED :

May 22, 2011 May 23, 2011

DRILLER: WALKER DRILLING N 7 799 378 E 595 263

SHEET 2 OF 2 DATUM: CGVD28

		TED : May 23, 2011							99 378 E 595 263	EVC		CONTE	NT CCC		IVI. C	GVD28
ا پ	BORING METHOD	SOIL PROFILE	1. 1			SAM	PLE	_		EXC	ESS ICE	CONTE	NT, PER	CENT	4.F	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	MET		STRATA PLOT	Œ.	监	l	0.3m	RECOVERY %	COMMENTS		10 2 1			40 	ADDITIONAL LAB. TESTING	FROZEN
(me	RING	DESCRIPTION	ATA F	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		ATER C /p ├──	TNETNC	, PERCE		DDIT AB. TE	UNFROZEN
	BOF		STR,	П	ž		BLC	REC	50 100 150 200 250					wi 40 I	∢ 5	UNCERTAIN
					8	RC		55								
			****		"			33								
21																
		GRANITIC GNEISS, fresh, massive, fine		21.28	9	RC			TCR=82% SCR=50% RQD=55%							21.28
-22	gui	grained, grey and pink														
	NW/NQ Casing/Coring															
23	Casin				10	RC			TCR=94% SCR=52% RQD=76%							
	ğ K															
-24	≨															
					l											
25					11	RC			TCR=100% SCR=100% RQD=100%							
-				25.71												
-26	\top	END OF BOREHOLE AT 38.29m.		23.71												
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		I GROUNDWATER ELE	 ΓΔ\/:	LONS	<u></u>	1		<u> </u>								
		∇ SHALLOW/SINGLE INSTA			,	•	Z -	\	P/DUAL INSTALLATION			_	_			
		WATER LEVEL (date)	≒LLA	IION					LEVEL (date)		LOGGEI CHECKI		Dunstan MB/SMS	/Webster		
									- ()				IVID/OIVIC	,		THURBE



RECORD OF BOREHOLE SMLCD-03A DCPT

Mary River Project **PROJECT**

Steensby Inlet - Construction Docks

LOCATION May 20, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 20, 2011 N 7 799 381 E 595 423 DATUM: CGVD28 COMPLETED

ш	8	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE CONTENT, PERCENT ice	. (1)	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	ЛЕТН		LOT	(F	œ		.3m	% Х	COMMENTO	10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
PTH (ING N	DESCRIPTION	TAP	n) .	MBE	YPE	WS/0	OVER	COMMENTS DYNAMIC CONE PENETRATION	WATER CONTENT, PERCENT	DOTT B. TE	UNFROZEN
씸	BOR		STRA		≥	-	BLO	RECC	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp	₹5	UNCERTAIN
		SEA FLOOR		-9.38								
		Start of DOP 1 at -9.36m.										
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	DESCRIPTION NUMBER NUMBER											
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		END OF DCPT AT -22.64m.		·								
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		GROUNDWATER ELE	1//	LIUNIS	Ļ						Щ	
		\overline{Y} SHALLOW/SINGLE INST			J	•	7 -		O'DITAL INOTALL ATION			
		→ SHALLOW/SINGLE INST WATER LEVEL (date)	ALLA	TION					P/DUAL INSTALLATION LEVEL (date)	LOGGED : Peters		
		TTTLE (date)					/ ((adio)	CHECKED : MB/SMS		THURB



Project No. 19-1605-126

RECORD OF BOREHOLE SMLCD-03B DCPT

Mary River Project PROJECT LOCATION

Steensby Inlet - Construction Docks

May 20, 2011 STARTED May 20, 2011 COMPLETED :

DRILLER: WALKER DRILLING N 7 799 307 E 595 424

SHEET 1 OF 1 DATUM: CGVD28

Project No. 19-1605-126

		1							20 007 12 000 121	EXCESS IO	CE CONTE			
(metres)	HOL	SOIL PROFILÉ	ı		_	SAM!	_	_			oice		₽ P P	GROUND CON
res)	MET		LOT	Ê	jς		.3m	%	COMMENTO	10 I			NON/	FROZEN
(met	NG	DESCRIPTION	IA P	<u>></u>	MBE	YPE	NS/0	VER	DYNAMIC CONE PENETRATION	WATER	CONTENT	, PERCENT	一覧 。	UNFROZEN
_	ORII		IRA	EF	Ē	F	LOV	ECO	RESISTANCE PLOT	wp —	20 °		LAB LAB	UNCERTAIN [
+	<u>m</u>	SEA FLOOR	S				М	~	50 100 150 200 250	10	20	+0	+	
+	+	Start of DCPT at -13.42m.		-13.42					-rods sank under the weight of the			 	+	
									hammer from elev13.42 to -17.10m					
,														
2	SEA FLOOR -13-42 SEA FLOOR -13-42													
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	SULPROPILE SULPROPILE DESCRIPTION SEA PLOOR Start of DCPT at -13.42m. SIANG COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT THE PROPILE PROPIL													
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		$^{ u}$ shallow/single inst	ALLA	TION					P/DUAL INSTALLATION	LOGG	ED :	Peters		
		WATER LEVEL (date)				1	WA٦	ΓER	LEVEL (date)	CHEC	KED :	MB/SMS		THURB



RECORD OF BOREHOLE SMLCD-03C DCPT

Mary River Project PROJECT

Steensby Inlet - Construction Docks

Project No. 19-1605-126

LOCATION STARTED

May 20, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

CO	MPLE	TED : May 20, 2011					N	7 79	99 489 E 595 071				ATUM: C	
4		SOIL PROFILE			5	SAM	PLE			EXCESS IC	E CONTEN	IT, PERCEN	T J S	THERMISTE GROUND CO
(metres)	BORING METHOD		STRATA PLOT	Œ	H.		BLOWS/0.3m	RECOVERY %	COMMENTS	10 	20 3		ADDITIONAL LAB. TESTING	FROZEN
E e	SING	DESCRIPTION	ATA F	ELEV. (m)	NUMBER	TYPE)/S/(OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		CONTENT,	PERCENT	DDIT IN THE	UNFROZEN
5	BOR		STR/	ᆸ	ž	ľ	BLO	REC	50 100 150 200 250	10	20 30	0 40		UNCERTAIN
		SEA FLOOR Start of DCPT at -11.52m.		-11.52					-rods sank under the weight of the					
									-rods sank under the weight of the hammer from elev11.52 to -14.30m					
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5	\perp	END OF DODT AT 40 00	\perp	5.37	-									5.37
6		END OF DCPT AT -16.89m. Ice thickness = 1.60m												
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		GROUNDWATER ELE	 -\/∆⊺	IONS	<u></u>									
		∇ SHALLOW/SINGLE INST			,	_	Z	EE	P/DUAL INSTALLATION					
		WATER LEVEL (date)	ALLA	HON					LEVEL (date)	LOGG! CHEC		Holmes MB/SMS		THUR



RECORD OF BOREHOLE SMLCD-03D DCPT

Mary River Project PROJECT Project No. 19-1605-126

Steensby Inlet - Construction Docks LOCATION

May 20, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 20, 2011 N 7 799 547 E 595 364 DATUM: CGVD28 COMPLETED :

	NIPLE	ETED : May 20, 2011					IN	1 1	99 547 E 595 364		IVI: C	GVD28
щ	100	SOIL PROFILE			,	SAM	PLE			EXCESS ICE CONTENT, PERCENT	_ 0	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		STRATA PLOT	<u></u>	<u>س</u>		3m	RECOVERY %	00111171170	10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
TH (200	DESCRIPTION	IA PI	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	VER	COMMENTS DYNAMIC CONF PENETRATION	WATER CONTENT, PERCENT	E E	UNFROZEN
DEF.	ORII		IRA	ELE	Ž	É	Po	000	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp	A B	UNCERTAIN
	<u> </u>	SEA FLOOR	S		_	<u> </u>		₩.	50 100 150 200 250	10 20 30 40	 	
-		Start of DCPT at -7.08m		-7.08								1 -
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- 3		END OF DCPT AT -9.92m.							·			
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 $\overline{\ }$ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Peters CHECKED : MB/SMS



RECORD OF BOREHOLE SMLCD-03D(2) DCPT

PROJECT : Mary River Project No. 19-1605-126

LOCATION : Steensby Inlet - Construction Docks

 STARTED
 :
 May 20, 2011
 DRILLER:
 WALKER DRILLING
 SHEET 1 OF 1

 COMPLETED
 :
 May 20, 2011
 N 7 799 548 E 595 360
 DATUM: CGVD28

CC	MPLE	ETED : May 20, 2011					Ν	7 7	99 548 E 595 360		ATUM: C	GVD28
ш	ОО	SOIL PROFILE			,	SAM	IPLE	s		EXCESS ICE CONTENT, PERCEN	٦ . رئ	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		P.	_			Æ	%		10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
TH S	Ω	DESCRIPTION	APL	. (m	1BEF	TYPE	\$/0.3	Æ	COMMENTS DYNAMIC CONF DENETRATION	WATER CONTENT, PERCENT	- 돌 변	UNFROZEN
DEP	ORIN	BESOK!! HOW	STRATA PLOT	ELEV. (m)	NUMBER	=	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp	ADI	UNCERTAIN
	<u> </u>	SEA FLOOR	S				В	2	50 100 150 200 250	10 20 30 40	$+\!\!-\!\!\!-$	
-		Start of DCPT at -6.65m		-6.65							+	
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,		END OF DCPT AT -9.83m.	H	3.18	ł							3.18
		Ice thickness = 1.62m										:
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☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Holmes
CHECKED : MB/SMS



RECORD OF BOREHOLE SMLCD-03D(3) DCPT

PROJECT : Mary River Project No. 19-1605-126

LOCATION : Steensby Inlet - Construction Docks

 STARTED
 :
 May 20, 2011
 DRILLER:
 WALKER DRILLING
 SHEET 1 OF 1

 COMPLETED
 :
 May 20, 2011
 N 7 799 549 E 595 356
 DATUM: CGVD28

CC	MPLE	ETED : May 20, 2011					IN	/ /:	99 549 E 595 356				UM: C	GVD28
щ	ОО	SOIL PROFILE				SAM	PLE	S		EXCESS IC	E CONTEI	NT, PERCENT	٥٫١	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		LOT	<u></u>	~		3m	% ∖		10	20 3	80 40	ADDITIONAL LAB. TESTING	FROZEN
TH (NG N	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	VS/0.	VER	COMMENTS DYNAMIC CONE PENETRATION		CONTENT	, PERCENT	1 E E	UNFROZEN 💹
DEF.	30RI		STRATA PLOT	ä	Ž	F	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp ⊢ 10	⊖ <mark>W</mark>		A 3	UNCERTAIN
	Ť	SEA FLOOR	S	-7.23			-	2	30 100 130 200 230		Ť		+	
-		Start of DCPT at -7.23m		7.20										
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- 3	+	END OF DCPT AT -10.16m.		2.93										2.93
Ē.		Ice thickness = 1.62m]
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SHALLOW/SINGLE INSTALLATION
 WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Holmes
CHECKED : MB/SMS



RECORD OF BOREHOLE SMLCD-G

Mary River Project **PROJECT**

Steensby Inlet - Construction Docks

Project No. 19-1605-126

LOCATION STARTED

May 11, 2011 May 12, 2011

DRILLER: WALKER DRILLING N 7 799 791 E 595 132

SHEET 1 OF 2

		SOIL PROFILE			Τ.	SAMI			99 791 E 595 132	EXCE	SS ICE		NT, PER		M: C	THERMISTE GROUND C
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER		BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250		ATER CO	DNTENT	30 4 L , PERCE		ADDITIONAL LAB. TESTING	GROUND C FROZEN UNFROZEN UNCERTAIN
\dashv		SEA FLOOR SAND, silty, fine to medium grained, some gravel, trace clay, trace organics and sea		-5.75	1	ss	25	50	Grain Size Analysis: Gr 0%/ Sa 77%/ Si 20%/ Cl 3%							
		gravel, trace clay, trace organics and sea shells, compact, grey, wet							Grain Size Analysis:							
					2	SS	31	50	Gr 21%/Sa 54%/ Si 22%/ Cl 3%		0					
2					3	ss	12	50								
					4	SS	40	25	Grain Size Analysis: Gr 15%/Sa 58%/ Si 24%/ Cl 3%	0						
		SAND (inferred), gravelly, some cobbles	* * * * * * * * * * * * * * * * * * *	5.00	Ή_											
,						RUN		20								
,						IVON		20								
	oring				2	RUN		28								
0	NW/NQ Casing/Coring		, o . o .													
	W/NQ C	granitic boulders to 700mm			3	RUN		45								
1	z															
2					4	RUN		100								
3		occasional cobbles														
					5	RUN		25								
4					6	RUN		33								
5				15.30	1	RUN RUN		23 0								
6		advance casing, no recovery														
7																
8		SAND and GRAVEL (inferred), occasional	9.9.8	18.22	<u> </u>											
19		cobbles (interred), occasional			۵	RUN		47								
						LOIN		-T/								
		GROUNDWATER ELE			S	_	_					I		1	<u> </u>	
		SHALLOW/SINGLE INST WATER LEVEL (date)	ALLA	TION					P/DUAL INSTALLATION LEVEL (date)		OGGEI		Kromer/I	Dunstan		THUR



RECORD OF BOREHOLE SMLCD-G

Mary River Project **PROJECT** LOCATION

Steensby Inlet - Construction Docks

STARTED

COMPLETED :

May 11, 2011 May 12, 2011

DRILLER: WALKER DRILLING N 7 799 791 E 595 132

SHEET 2 OF 2 DATUM: CGVD28

Project No. 19-1605-126

		SOIL PROFILE			Τ.	SAM	DIF	S		EXC	ESS ICE	CONTE	NT, PER	CENT		THERMISTE
DEPTH SCALE (metres)	BORING METHOD	SUIL PROFILE	Τ <u></u>		T		_	_				oice	9	40	ADDITIONAL LAB. TESTING	THERMISTE GROUND CO
IH SC netres	G ME	DECODIDEION	STRATA PLOT	ELEV. (m)	NUMBER	밁	BLOWS/0.3m	RECOVERY %	COMMENTS				, PERCE		TEST	FROZEN UNFROZEN
EPT T	SRIN	DESCRIPTION	RAT	ELEV	NOM	TYPE	o.	COV	DYNAMIC CONE PENETRATION RESISTANCE PLOT	W	rp			wl	ADD ABB.	UNCERTAIN
_	<u> </u>		ST		<u> </u>		В	뿞	50 100 150 200 250	1	0 2	0	30	10 	_	0.102.117
			* * * * * * * * * * * * * * * * * * * *													
					10	RUN	1	29								
21																
			* * * *													
22					11	RUN	1	30								
23		grey sandy silt pieces (possible till)			12	RUN	ı	20								
24	p P															
	2/50				13	RUN	1	15								
25 .	Jasınç															
ا م	NW/NQ Casing/Coring															
6	Ž	GRANITIC GNEISS, moderately		26.21	14	RUN		80								26.21
,		weathered, highly fractured, greyish red, jointed at 30° and 45°			15	RUN	1		TCR=100% SCR=43% RQD=26%							
27		slightly weathered, foliated, amethyst			_											
28		nodules, pinkish grey														
٠					16	RUN	1		TCR=100% SCR=69% RQD=76%							
29		forth course and to the China														
		fresh, coarse grained, lightly foliated, pink/white/grey														
30					17	RUN	1		TCR=100% SCR=100% RQD=100% UCS=235MPa							
	\perp	END OF DODELIOLE : Total		30.53	<u></u>											
31		END OF BOREHOLE AT 36.28m.														
32																
33																
34																
35																
36																
37																
38																
39																
_]												L	
		GROUNDWATER ELE	VAT	TION:	S											
		$\overline{igspace}$ shallow/single inst.	ALLA	TION		Ţ	Z D	EEI	P/DUAL INSTALLATION		LOGGEI) :	Kromer/	Dunstan		
		WATER LEVEL (date)							LEVEL (date)							

RECORD OF BOREHOLE SMLCD-G DCPT

PROJECT Mary River Project LOCATION May 12, 2011

STARTED

Steensby Inlet - Construction Docks

DRILLER: WALKER DRILLING SHEET 1 OF 1

Project No. 19-1605-126

CC	MPLI	ETED : May 12, 2011					Ν	7 7	99 791 E 595 132	DATE	JM: C	GVD28
щ	00	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE CONTENT, PERCENT	٥٦	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		LOT	(u	~		.3m	% ≿	001415150	10 20 30 40	ONAL	GROUND COND. FROZEN UNFROZEN UNCERTAIN
PTH (NG N	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	VER	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, PERCENT	1 三 三 三 二 三 二	UNFROZEN 🏻
DE	BORI		STRATA PLOT	E E	₽	-	BLO/	RECOVERY %	RESISTANCE PLOT	wp	\$ §	UNCERTAIN
		SEA FLOOR	0,	-5.47					, , , , , , , , , , , , , , , , , , , 			
		Start of DCPT at -5.47m.										
<u> </u>									/			
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- 5 -									/]
,												
-6 -												
<u> </u>				7.11								7.11
- 7 -		END OF DCPT AT -12.58m.		7.11					/			'.''
ļ.												
-8 -]
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- 9 []
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-10												
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-16												
[
- 17												
-18												
<u> </u>												
- 19												
		GROUNDWATER ELE	VA ⁻	LIONS	<u></u>				l	1 1 1		
		$\frac{\nabla}{2}$ SHALLOW/SINGLE INSTA				3	Zr)EE	P/DUAL INSTALLATION	LOCCED : Dunatan/Latta		

THURBER2S(5126) 5126.GPJ 11/9/11

¥ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan/Letts CHECKED : MB/SMS



RECORD OF BOREHOLE SMLCD-H

Mary River Project **PROJECT**

Steensby Inlet - Construction Docks

Project No. 19-1605-126

STARTED COMPLETED

LOCATION

May 9, 2011 May 11, 2011 DRILLER: WALKER DRILLING N 7 799 834 E 595 099

SHEET 1 OF 2 DATUM: CGVD28

<u>,</u>	- - -	SOIL PROFILE			5	SAM	PLE	_		EXCE	SS ICE	CONTE	NT, PER	CENT	وَدِ	THERMISTE GROUND CO	ER O
(metres)	BORING METHOD		STRATA PLOT	Ê	ĸ).3m	RECOVERY %	COMMENTS	1	0 :			10 	ADDITIONAL LAB. TESTING	FROZEN	
(met	NG	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	VS/0)VEF	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT			ONTENT	, PERCE] E =	UNFROZEN	ı
1	30RI		TRA	ä	₽	-	BLOWS/0.3m	ECC	RESISTANCE PLOT	w _l) ——)	0 0 3		vl IO	¥ ₹	UNCERTAIN	٧
\dashv		SEA FLOOR	S	-6.28	\vdash			12	30 100 130 200 230 			 		 	\vdash		-
		SILT, sandy, some clay, trace gravel, compact, grey		3.20	1	SS	23	25	Grain Size Analysis: Gr 1%/ Sa 39%/ Si 47%/ Cl 12%			0					Ī
							H	Ė									
1									-easy casing advancement								
2					-	-	-	\vdash									
		SAND and CDAVEL (informed) accessing a		2.63	2	SS	87					Р					
3		SAND and GRAVEL (inferred), occasional cobbles and boulders, compact to very dense															
		delibe			3	SS	100		-difficult casing advancement	0							
1									announ casing advantentions								
					L	L	L	L									
5			, , ,		1	RC		0									
3					_			1,0									
					2	RC		40	-sand/silt washed away								
7			***					-									
8			, , ,					-									
					3	RC		50	Grain Size Analysis								
9	<u>ا</u>				4	SS	34	50	Grain Size Analysis: Gr 37%/Sa 42%/Si & Cl 21%	0							
	Corir				5	ss	53	5									
10	NW/NQ Casing/Coring	boulder, granitic, fresh, pinkish grey (1.06m)			-	.		450									
	۵ م				4	RC		100									
11	NN N				5	RC		100									
· ·			*, *,														
12			, , ,		6	RC		55	-sand/silt washed away								
-																	
13			* * * * * * * * * * * * * * * * * * * *														
۱ ۱																	
14								\vdash									
'*			*, *,														
15			, , ,		7	RC		30									
١ ١																	
16								T									
10									-difficult casing advancement								
,																	
17					8	RC		45									
,					9	RC		35									
18																	
					10	RC		50									
19		boulder (250mm)			11	RC		50									
		GROUNDWATER ELE	VA٦	LIONS	12	RC		67				1					ļ
		$\overline{\lor}$ SHALLOW/SINGLE INSTA				3	Z r)EE	P/DUAL INSTALLATION	-	000-		D	0.4			į
		WATER LEVEL (date)	'LL'	IIIOIN					LEVEL (date)		.OGGE		Dunstan/ MB/SMS			THUR	

RECORD OF BOREHOLE SMLCD-H

PROJECT : Mary River Project

Steensby Inlet - Construction Docks

Project No. 19-1605-126

LOCATION : STARTED : COMPLETED :

May 9, 2011 May 11, 2011 DRILLER: WALKER DRILLING N 7 799 834 E 595 099 SHEET 2 OF 2 DATUM: CGVD28

CC	MPL	ETED : May 11, 2011					IN	/ /:	99 834 E 595 099				DATU	M: C	GVD28
щ	dob	SOIL PROFILE				SAM	PLE	S		EXCESS ICE	E CONTE		ENT	L G	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		LOT	n)	æ		.3m	% X	COMMENTS	10		30 40)	ADDITIONAL LAB. TESTING	FROZEN
PTH (met	ING I	DESCRIPTION	TA P	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVER	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT		CONTENT	, PERCEN		DDITI B. TE	UNFROZEN 🔛
씸	BOR		STRATA PLOT		Į₹	[BLO	RECOVERY %	50 100 150 200 250	wp				₹₹	UNCERTAIN
															, ,-
•		GRANITE. slightly weathered, strong.		20.37		RC			TCR=100% SCR=68% RQD=50%						20.37 †
- 21		GRANITE, slightly weathered, strong, coarse grained, greyish pink, black on joint surfaces, jointed 0°, 45°, and 60°													
Ė		fresh			14	RC			TCR=100% SCR=100% RQD=100% UCS=259MPa]
- -22		slightly weathered			15	RC			TCR=100% SCR=46% RQD=0% UCS=263MPa						-
-					16	RC			TCR=100% SCR=63% RQD=53%						
- 23	ing				17	RC			TCR=100% SCR=61% RQD=44% UCS=196MPa						-
F	NW/NQ Casing/Coring				Ľ.	110			UCS=196MPa]
- -24	Sasin	subhorizontal joints			100	RC			TCR=100% SCR=100% RQD=100% UCS=241MPa						-
[ON/				10	RC			UCS=241MPa]
25	Ž]
-					19	RC			TCR=100% SCR=85% RQD=79% UCS=243MPa						
-26															-
		fresh													
- 27					20	RC			TCR=100% SCR=100% RQD=100% UCS=207MPa						
•				07.04					2071111 4						
-28		END OF BOREHOLE AT 34.19m.	Y//	27.91											-
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-30															-
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-36															
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- 37															1
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- 38															
20															-
- 39															1
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<u> </u>		GROUNDWATER ELE	VĀĪ	rions	3										

GROUNDWATER ELEVATIONS

THURBER2S(5126) 5126.GPJ 11/9/11

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan/Kromer CHECKED : MB/SMS



Borehole SMICD-A



Photo 1: Core Box #1 of 3 (Runs 1-2, 4.2m – 8.3m)



Photo 2: Core Box #2 of 3 (Runs 2-3, 8.3m – 12.8m)



Photo 3: Core Box #3 of 3 (Run 3, 12.8m – 13.2m)



Borehole SMICD-C1

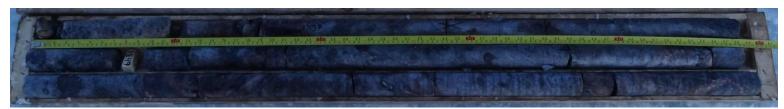


Photo 1: Core Box #1 of 2 (Runs 1-2, 10.7m – 21.1m)



Photo 2: Core Box #2 of 2 (Runs 2-3, 21.1m – 24.4m)



Borehole SMLCD-03A



Photo 1: Core Box #1 of 2 (Runs RC-1 to RC-8, 11.2m – 20.6m)



Photo 2: Core Box #2 of 2 (Runs RC-9 to RC-11, 20.6m – 25.7m)



Borehole SMLCD-G



Photo 1: Core Box #1 of 4 (Runs 1-5, 5.0m – 14.2m)



Photo 2: Core Box #2 of 4 (Runs 6-13, 14.2m – 24.7m)



Photo 3: Core Box #3 of 4 (Runs 13-16, 24.7m – 28.9m)



Photo 4: Core Box #4 of 4 (Runs 16-17, 28.9m - 30.5m)



Borehole SMLCD-H



Photo 1: Core Box #1 of 4 (Runs RC-2 to RC-6, 7.0m - 11.0m)



Photo 2: Core Box #2 of 4 (Runs RC-7 to RC-13, 13.5m - 20.9m)



Photo 3: Core Box #3 of 4 (Runs RC-14 to RC-18, 20.9m – 24.6m)



Photo 4: Core Box #4 of 4 (Runs RC-18 to RC-20, 24.6m – 27.9m)



STEENSBY INLET - SOUTH FREIGHT DOCK

MSFD-B DCPT	MSFD-N DCPT
MSFD-C	MSFD-P*
MSFD-D	MSFD-P1*
MSFD-D DCPT	MSFDP-06 DCPT
MSFD-E DCPT	MSFDP-07 DCPT
MSFD-G	MSFDP-08 DCPT
MSFD-G DCPT	MSFDP-10 DCPT
MSFD-J DCPT	MSFDP-11 DCPT
MSFD-L	SI-FD-002
MSFD-M*	SI-FD-004*
DCPT 04	DCPT 11
DCPT 05	DCPT 12
DCPT 06	DCPT 13
DCPT 07	DCPT 14
DCPT 08	DCPT 15
DCPT 09	DCPT 16
DCPT 10	DCPT 17
	DCPT 18



^{*} Core photographs not available.

RECORD OF BOREHOLE MSFD-B DCPT

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 18, 2011 May 18 2011

DRILLER: WALKER DRILLING N 7 798 914 F 595 532

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	TED : May 18, 2011			_	_	N	7 7	98 914 E 595 532			DATU	M: C0	GVD28
щ	dot	SOIL PROFILE				SAM	IPLE	s		EXCESS ICE (ONTENT, PE	RCENT	٦٥	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	BORING METHOD		LOT	(u	2		.3m	% ≻	0011117170	10 20		40	ADDITIONAL LAB. TESTING	FROZEN
metr (NG	DESCRIPTION	IA PI	ELEV. (m)	NUMBER	TYPE	VS/0	VER	COMMENTS DYNAMIC CONE PENETRATION	WATER CO	NTENT, PERC	ENT	OITI 3. TE	UNFROZEN
Ä	30RII		STRATA PLOT	EE	Ž	1	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp ⊢ 10 20	30	wl 40	AD	UNCERTAIN
	Ť	SEA FLOOR	S	-9.66			H	<u>«</u>	50 100 130 200 230	l ĨĨ	- 	Ť		
		Start of DCPT at -9.66m.		0.00										
1														
-2														
									{					
3														
H	+	END OF DCPT AT -13.10m. Ice thickness = 1.60m		3.44										3.44
-4		Ice thickness = 1.60m												
5														
-6														
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19														
		GROUNDWATER ELE	=\/^¬	LIUNIC	<u></u>									
					J	•	,							
19		SHALLOW/SINGLE INST WATER LEVEL (data)	ALLA	TION					P/DUAL INSTALLATION	LOGGED				
		WATER LEVEL (date)					ννΑ	ıEK	LEVEL (date)	CHECKE) : MB/SM	S		THURBE



RECORD OF BOREHOLE MSFD-C

Mary River Project **PROJECT**

Project No. 19-1605-126

LOCATION Steensby Inlet - Freight Dock

May 15, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 16, 2011 N 7 798 974 E 595 550 DATUM: CGVD28 COMPLETED :

ш	BORING METHOD	SOIL PROFILE				SAM	PLE	S		EXCESS ICE CONTENT, PERCENT	THERMISTER/ GROUND CON
DEPTH SCALE (metres)		DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 20 30 40 10 10 10 10 10 20 30 40 10 20 30 40 10 10 20 30 40 10 10 10 10 10 10 10	FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR		-13.68							
1 .2		no recovery, casing advanced by washing only.									
3		Coring started at elevation -17.30m which was the top of competent soil. COBBLES and BOULDERS, fine material		3.62							
4 5		washed from core	0000								
6	Ď.		0000								
7 8	NW/NQ Casing/Coring				1	RC					
9	N/MZ		0000								
10 11			0000								
12		GRANITE, fresh to slightly weathered, strong, massive, fine grained, quartzite inlays, dark grey to black with pink crystalline specks		11.80	2	RC			TCR=82% SCR=59% RQD=63%		11.80
13 14		o, johanni o openio			3	RC			TCR=94% SCR=44% RQD=44%		
15				15.56	4	RC			TCR=98% SCR=68% RQD=68%		
16		END OF BOREHOLE AT -29.24m.									
17 18											
19											
		GROUNDWATER ELE			<u> </u> 				P/DUAL INSTALLATION LEVEL (date)	LOGGED : Dunstan/Webster CHECKED : MB/SMS	THURE



RECORD OF BOREHOLE MSFD-D

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

May 14, 2011 May 16, 2011

DRILLER: WALKER DRILLING N 7 798 913 E 595 489

SHEET 1 OF 1 DATUM: CGVD28

щ	00	SOIL PROFILE			S	SAM	PLE	S		EXCESS IC	E CONTEI	NT, PERCEN	ן י	THERMISTER GROUND CON
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp ⊢	20 3 CONTENT	80 40 	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
_	<u> </u>	SEA ELOOP	STI		$ar{\bot}$		В	RE	50 100 150 200 250	10	20 3	30 40	\perp	222
\dashv		SEA FLOOR no recovery, all material washed.	+	-23.04									+	
1														
2														
3														
~														
4														
5														
6														
,														
7	<u>p</u>													
8	/Corin													
	Sasing													
9	NW/NQ Casing/Coring													
	Ž													
10														
,														
11														
12														
-				12.73										12.73
13		GRANITE, fresh to slightly weathered, strong to very strong, massive, fine grained, dark grey to black	M	, 0										.2.,0
		dark grey to black			1	RUN			TCR=97% SCR=78% RQD=73%					
14														
_					2	RUN			TCR=94% SCR=81% RQD=73%					
15								Н						
16					2	RUN			TCR=97% SCR=84% RQD=76%					
.					٥	NON			1011-31/0 30R-04/0 KQD=1070					
17		END OF BOREHOLE AT 39.92m.	M	16.88				\vdash						
		Ice thickness =												
18														
19														
		GROUNDWATER ELE			}					•			•	
		$\overline{igspace}$ shallow/single insta	ALLA	TION					P/DUAL INSTALLATION	LOGGE	≣D :	Dunstan/Web	ster	
		WATER LEVEL (date)				1	WAT	ΓER	LEVEL (date)	CHEC	KED :	MB/SMS		THURB



RECORD OF BOREHOLE MSFD-D DCPT

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION

DDILLED: MALKED DDILLING

CHEET 1 OF 1

	ARTED MPLET	May 16, 2011 May 16, 2011		DRILLER: N 7 79	WALKER DRILLING 98 911 E 595 494		: I 1 OF 1 JM: CGVD28
Щ	Q P	SOIL PROFILE		SAMPLES		EXCESS ICE CONTENT, PERCENT ice	THERMISTER/ GROUND COND.
H SCAL etres)	3 MET		(m)	3ER PE /0.3m	COMMENTS	10 20 30 40	FROZEN

SEAR PLOOR					THERMISTER/ GROUND COND.										
DESCRIPTION Hample Description Descr			.3m	У %		10			ONAL	FROZEN					
	PTH (NG	DESCRIPTION	TA PI	n) .	MBE	YPE	NS/0	VER	COMMENTS DYNAMIC CONE PENETRATION		R CONTENT	, PERCENT	3. H	UNFROZEN
	Ξ	BORI		TRA	ELE	₹	-	BLO\	SECC	RESISTANCE PLOT		0	——I wl 30 40	43	UNCERTAIN
H		Ŧ	SEA FLOOR	0)	-22.96	\vdash			<u> </u>	00 100 100 200 200				+	
F			Start of DCPT at -22.96m.												
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ŀ	-8														-
F										$ \rangle$					
ŀ	9														-
ŀ					0.73										9.73
Ŀ	-10		END OF DCPT AT -32.69m.		9.13					1					9.73
ŧ			Ice thickness = 1.60m]
E	. 11]
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F	15]
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ŀ	-16														
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ŀ	17														
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/9/11	-18														-
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517															;
5126			GROUNDWATER ELE	<u>Ι</u>	IONS	<u></u>									
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JRBE				LLA	HON										
Ĭ										: (~~~)	CHE	UNLD .	OIVIOIGIVI		THURBER



RECORD OF BOREHOLE MSFD-E DCPT

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

May 16, 2011 May 16, 2011

DRILLER: BOART LONGYEAR N 7 798 943 E 595 510

SHEET 1 OF 1 DATUM: CGVD28

		TED : May 16, 2011 SOIL PROFILE			c	SAMI			98 943 E 595 510	EXCESS		NT, PERCE	DATUM: C	THERMISTER
DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE	T _E			االاندر					•ic	е	ADDITIONAL LAB. TESTING	THERMISTER/ GROUND CON
etres	3 ME		STRATA PLOT	ELEV. (m)	Ä	ш	BLOWS/0.3m	RECOVERY %	COMMENTS	10		30 40	TION TEST	FROZEN
Ĕ	RING	DESCRIPTION	ATA	EV.	NUMBER	TYPE)WS	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER wp I—	CONTEN	T, PERCENT ————I wl	T.B.	UNFROZEN
į	BOF		STR	ш	Ż		BLC	REC	50 100 150 200 250	10		30 40	^ _	UNCERTAIN
		SEA FLOOR		-18.56										
		Start of DCPT at -18.56m.							-rods sank under the weight of the hammer from elev18.56 to -19.17 and					
.									from -20.08 to -22.37m					
1														
2														
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6														
7														
8														
9									/					
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10									\					
									\					
11				11.00										11.00
'' [END OF DCPT AT -29.56m.							-					
,														
12														
13														
14														
15														
16														
.														
17														
''														
_														
18														
19														
\perp		ODOLINDA/ATED ELE			Щ									<u> </u>
		GROUNDWATER ELE)	_	,							
		$\overline{igspace}$ shallow/single insta	ALLA	TION					P/DUAL INSTALLATION	LOG	GED :	Peters		
		WATER LEVEL (date)				١	WAT	ΓER	LEVEL (date)	CHE	CKED :	MB/SMS		THURB



RECORD OF BOREHOLE MSFD-G

Mary River Project **PROJECT**

May 14, 2011

Steensby Inlet - Freight Dock

LOCATION May 13, 2011 STARTED

COMPLETED :

DRILLER: WALKER DRILLING N 7 798 997 E 595 527

SHEET 1 OF 2 DATUM: CGVD28

Project No. 19-1605-126

ا ب	무	SOIL PROFILE				SAM	IPLE	_		EXC	ESS ICE	E CONTI	ENT, PER :e	RCENT	٥٦	THERMISTER GROUND CO
(metres)	BORING METHOD		STRATA PLOT	(E)	띪		BLOWS/0.3m	RECOVERY %	COMMENTS			20	30	40 	ADDITIONAL LAB. TESTING	FROZEN
(me	SING	DESCRIPTION	ATA	ELEV. (m)	NUMBER	TYPE	/SM	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		ATER C /p ├──	ONTEN O	T, PERCI		DDI T.B.	UNFROZEN
i	BOR		STR/	🗓	Įź	'	BLO	REC	50 100 150 200 250			20		wi 40	4 5	UNCERTAIN
		SEA FLOOR	ļ.,.	-18.2	3											
		SAND and SILT, clayey, trace gravel, very loose, grey			1	ss	0	25	Grain Size Analysis:							
, I				1.0	ال				Gr 4%/ Sa 37%/ Si 35%/ Cl 24%				0			
,		CLAY, silty, trace sand, trace gravel, very soft, grey			2	ss	1	100	Grain Size Analysis:							
					F	+		+	Gr 9%/ Sa 4%/ Si 48%/ Cl 39%			-	+0-1			
2																
3																
				4.0												
١		GRAVEL, sandy, trace silt, compact, drak grey, saturated	- (X/V	4.0	٦											
		grey, saturated	• • •													
5																
3																
				_	3	ss	18	33								
		SAND and GRAVEL (inferred), occasional	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	7.0	1											
		cobbles and boulders	• • •													
3					4	ss	.125									
			0.00			DUA		66								
)	oring			•	1	RUN	1	66								
	NW/NQ Casing/Coring					-		-	Note:							
0	Casi		* ° °						At the completion of Run 1, approximately							
	N/N/O				5	RUN	١		casing. Runs 2, 3, and 4 cored out the material that blew up the casing.							
1	ź					-										
			0.00	}												
2																
13			• •	1	6	RUN	١									
			0 0	1												
14			*.*													
				1	7	RUN	١									
15					\vdash	+	-									
					8	RUN	١	L								
16			• • •													
					9	RUN	١									
17			* * * *		H	+										
			• • •	•	10	RUN	J									
18					"											
			* * *			-	-	-								
19				1	11	RUN	J									
					''	IZOľ	۱									
		I GROUNDWATER ELE	,**; -\/∆	LION	<u></u>			_								
		∇ shallow/single inst.			J	•	7 -	\	P/DUAL INSTALLATION							
		→ SHALLOW/SINGLE INSTA WATER LEVEL (date)	ALLA	HON					P/DUAL INSTALLATION LEVEL (date)		LOGGE			/MSD/W	ebster	
		····· L. · LL · LL (date)					, \	' `			CHECK	LV .	MB/SMS	,		THUR



RECORD OF BOREHOLE MSFD-G

PROJECT : Mary River Project No. 19-1605-126

LOCATION : Steensby Inlet - Freight Dock

 STARTED
 :
 May 13, 2011
 DRILLER:
 WALKER DRILLING
 SHEET 2 OF 2

 COMPLETED
 :
 May 14, 2011
 N 7 798 997 E 595 527
 DATUM: CGVD28

	JIVIFLE	ETED : May 14, 2011					IN	1 1;	96 997 E 595 527						IVI. C	3VD28
щ	IOD	SOIL PROFILE			5	SAM	PLE	S		EXC	ESS ICE	CONTE		CENT	L G	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		LOT	n)	8		.3m	% ≿	001415150		10 2			0	ADDITIONAL LAB. TESTING	FROZEN
TH (NG N	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	NS/0	VER	COMMENTS DYNAMIC CONE PENETRATION		ATER CO		PERCE		OTT 3. TE	UNFROZEN
DEF	30RI		STRATA PLOT	ELE	₹	-	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	v.	/p	.0 3		vl O	A A	UNCERTAIN
	Ī		0)					IL.	100 130 200 230							
		END OF BOREHOLE AT -38.31m.		20.08	12	RUN										20.08
																-
- 21		Note:														-
		Borehole abandoned before bedrock was found as casing sheared off and approximately 25m was lost.														-
-22																-
•																
- 23																-
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-24																_
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25																-
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-26																-
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-34																
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- 37]
- 38																<u> </u>
- 39																-
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		GROUNDWATER ELE	VA٦	TIONS	<u> </u>		<u> </u>				1	<u> </u>		l		

GROUNDWATER ELEVATIONS

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan/MSD/Webster
CHECKED : MB/SMS



RECORD OF BOREHOLE MSFD-G DCPT

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 16, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

CO	MPLE	ETED : May 16, 2011					Ν	7 79	98 995 E 595 525	L =\(\alpha = \cdot \)	OOLITEL III	DATU	IM: CO	GVD28
	QOH,	SOIL PROFILE	L			SAM	PLE	_			CONTENT, PEI		NG NG	THERMISTER GROUND CO
DEPTH SCALE (metres)	BORING METHOD		STRATA PLOT	Œ	Ä	ш	BLOWS/0.3m	RECOVERY %	COMMENTS		0 30	40 	ADDITIONAL LAB. TESTING	FROZEN
취 토	RING	DESCRIPTION	3ATA	ELEV. (m)	NUMBER	TYPE	OWS,	COVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp I——	ONTENT, PERC	wl	ADDI AB. T	UNFROZEN UNCERTAIN
_	8	054 51 00D	STF				В	Ä	50 100 150 200 250	10 2	0 30	40		ONOLIVIAIN
		SEA FLOOR Start of DCPT at -18.76m.		-18.76										
1														
2														
-														
3														
4														
5														
3														
,														
3		END OF DCPT AT -26.76m.	+	8.00	-									8.00
		Ice thickness = 1.58m												
9														
١٨														
10														
11														
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16														
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		GROUNDWATER ELI			3	_	_							
		✓ SHALLOW/SINGLE INST WATER LEVEL (date)	TALLA	TION					P/DUAL INSTALLATION	LOGGE				
		WATEN FEACT (ngie)					vvA	יבת	LEVEL (date)	CHECKE	D : MB/SM	S		THUR



RECORD OF BOREHOLE MSFD-J DCPT

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 16, 2011

DRILLER: BOART LONGYEAR N 7 798 969 F 595 484

SHEET 1 OF 1 DATUM: CGVD28

COI	MPLE	TED : May 16, 2011					N	7 7	98 969 E 595 484	DATUM: CGVD28	
щ	QO	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE CONTENT, PERCENT THERMIS	TER/ CON
DEPTH SCALE (metres)	BORING METHOD		то-	Ē	~		3m	% X		10	
H H	2 0 ≥	DESCRIPTION	A PI	E	/BEF	TYPE	/8/0	/ER	COMMENTS DYNAMIC CONE PENETRATION	WATER CONTENT, PERCENT UNFROZE	N 🖁
OEP O	ORIN	BEGGINI HOIV	STRATA PLOT	ELEV. (m)	NUMBER	~	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp	
\dashv	<u> </u>	SEA FLOOR	S				М	~	50 100 150 200 250	10 20 30 40	_
		Start of DCPT at -20.57m.		-20.57					-rods sunk under the weight of the hammer from elev20.57 to -22.10m		Т
									nammer from elev20.57 to -22.10m		
1											
2									\		
3									1		
									K		
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4)		
5											
3)		
,											
									/		
3									/		
		END OF DODT AT 20.01m	_	9.44						9.	14
0		END OF DCPT AT -30.01m. Ice thickness = 1.60m									
Ĭ											
1											
2											
13											
14											
15											
16											
17											
8											
19											
		GROUNDWATER ELE	-VA	LIONS	<u></u>	<u> </u>	<u> </u>		<u> </u>		
		∇ SHALLOW/SINGLE INST				1	7 -		P/DUAL INSTALLATION	_	
		WATER LEVEL (date)	ALLA	TION					P/DUAL INSTALLATION LEVEL (date)	LOGGED : Peters CHECKED : MB/SMS	
		······································							(Gato)	CHECKED : MB/SMS THU	RE



RECORD OF BOREHOLE MSFD-L

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 16, 2011 May 17, 2011

DRILLER: WALKER DRILLING N 7 799 082 E 595 528

SHEET 1 OF 2 DATUM: CGVD28

,	НОР	SOIL PROFILE	1. 1			SAM		_		LXOL	.00 ICL	ic	e e	RCENT	불호	THERMISTER GROUND CO
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250 50 100 150 200 250		ATER C	20 ONTEN	30 T, PERC	40 ENT wl 40	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR CLAY, SILT, and SAND, trace gravel, very		-17.83	1	SS	4	100	Grain Size Analysis: Gr 4%/ Sa 40%/ Si 32%/ Cl 24%				0			
		soft, grey no recovery, refusal on possible		0.67	1				GI 470/ 3d 4070/ 3I 3270/ CI 2470							
1		no recovery, refusal on possible cobbles/boulders			2	SS	57/ .100	0								
2																
-																
3																
4																
5					3	SS	2	21								
					Ļ		_	-'								
6				6.37	4	ss	50/ .100									
.		SAND, trace silt, very loose, grey, saturated		6.87	5	SS	7	25								
7		SAND, gravelly, coarse grained, compact, grey			2	RUN		2								
3																
		grinding on probable boulder dark brown wash water with fine sand particles														
9	oring	loose														
10	Casing/Coring				3	RUN		27								
10	NO Ca	SAND and GRAVEL (inferred), occasional cobbles and boulders, fines washed out	* * * * *	10.37												
11	N///N	cobbles and boulders, fines washed out														
					4	RUN		23								
12																
13																
					5	RUN		30								
14																
_					_ 	RUN		38								
15		fine grained, some clayey soil, reddish grey to dark grey/black			°	IZUN	'	30								
16		boulder (200mm)			7	RUN		53								
17		cobble (100mm)			8	RUN		30								
18					9	RUN		35								
'0		some possible quartzite pieces, black to greyish black														
19					10	RUN		27								
		GROUNDWATER ELE	VAT	IONS	<u></u>		<u> </u>					[1	
		abla shallow/single insta	ALLA ⁻	TION		1	Z n		P/DUAL INSTALLATION		.OGGE	_		er/Dunsta	_	



RECORD OF BOREHOLE MSFD-L

Mary River Project PROJECT

> Steensby Inlet - Freight Dock May 16, 2011 DRILLER: WALKER DRILLING

Project No. 19-1605-126

STARTED COMPLETED :

LOCATION

May 17, 2011

N 7 799 082 E 595 528

SHEET 2 OF 2 DATUM: CGVD28

ш	0	SOIL PROFILE				SAM	PLE	S		EX	CESS ICE	CONTE		RCENT	. (2)	THERMISTE GROUND CO	=R
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250		VATER C	20 L ONTEN	30 Ι Γ, PERCI		ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN	1 8
_			(0)														T
					11	RUN	1	32									
21					-	L											
22					12	RUN		75									
			, , ,														
23	<u>B</u>				13	RUN	ı	39									
	NW/NQ Casing/Coring	boulder (350mm)															
24	Casir				14	RUN	ı	85									
25	N/N/N				15	RUN		55									
26			****		16	RUN	ı	20									
27					17	RUN		22									
28				28.14												28.14	
		END OF BOREHOLE AT -45.97m.															
29		Note: Borehole abandoned before bedrock was															
30		found as casing sheared off. Approximately 7.5m of casing was lost.															
31																	
32																	
33																	
34																	
35																	
55																	
36																	
37																	
38																	
-																	
39																	
	-	GROUNDWATER ELE			3					•	•	•	•	•	•		Ī
		SHALLOW/SINGLE INSTA	ALLA [.]	TION					P/DUAL INSTALLATION		LOGGE			r/Dunstan			
		WATER LEVEL (date)					۷۷A	IEK	LEVEL (date)		CHECK	ED :	MB/SMS	5		THUR	ď



RECORD OF BOREHOLE MSFD-M

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

STARTED

LOCATION

SHEET 1 OF 2

May 19, 2011 DRILLER: WALKER DRILLING May 20, 2011 N 7 799 012 E 595 581 DATUM: CGVD28 COMPLETED

ų	00	SOIL PROFILE			L	SAM	PLE	S		EXCE	SS ICE	: CON	ΓΕΝΤ, ice	PERC	ENT	_, ത	THERMISTE GROUND CO
(metres)	BORING METHOD		LOT	(E	ik.		.3m	% .≿	COMMENTS	10)	20	30 	40 I)	ADDITIONAL LAB. TESTING	FROZEN
(met	NG	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	NS/0	VER	COMMENTS DYNAMIC CONE PENETRATION	WA	TER C	ONTE	NT, PE	RCE	NT	3. TE	UNFROZEN
	30RI		STRATA PLOT	EFE	Į	-	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp 10	<u> </u>	 ⊖	w 30	—I w		[FE A	UNCERTAIN
\dashv	T	SEA FLOOR	S	-13.73	\vdash		٣	Ľ	- 50 100 130 200 230 -	 		1	Ť	$\stackrel{\circ}{-}$			
\dashv		CLAY, silty, trace sand, trace gravel, saturated, organics, shells, very soft, dark		10.73													
		grey with black staining															
1																	
2					1	ss	0	63									
				2.74					Grain Size Analysis:								
3		SAND (inferred), some gravelly zones, compact, dark grey/pink, granitic		2.14					Gr 4%/ Sa 43%/ Si 31%/ Cl 22%		ŀ		H				
		compact, dark grey/pink, granitic			_												
4					2	SS	18	25									
·					_		_		Grain Size Analysis: Gr 60%/Sa 34%/ Si & Cl 6%								
					3	ss	50/ .050	0	-no recovery due to gravel or cobble	[
5																	
٦																	
					L			L									
7		(inferred from wash return), some gravel pieces, occasional cobbles and boulders			1	RC		68	-coarse sand in flush return								
3																	
					2	RC		15									
9	<u>B</u>																
	J.Co.																
10	NW/NQ Casing/Coring																
	ğ				3	RC		0	-sand in flush return								
11	Ž				ľ			"									
12					4	RC		0									
`~																	
13					5	RC											
'																	
,					4	SS	54/ .075	0									
14		havidara ta 200			6	RC											
<u>, </u>		boulders to 300mm			L_												
15					7	RC											
					8	RC											
16		boulders to 300mm			9	RC											
					-												
17						RC											
		GRANITE, strong, fine grained, dark grey		17.60	1	RC			TCR=80% SCR=86% RQD=47%								17.60
18					Ľ												
		numerous diagonal joints															
19					12	RC			TCR=16% SCR=100% RQD=0%								
		horizontal joint with clay infill			L												
		GROUNDWATER ELE	<u> </u>	I ON C	$\dot{\Box}$												
					,		,	_									
		∑ SHALLOW/SINGLE INSTA	ALLA	TION					P/DUAL INSTALLATION	L	OGGE	D :	We	bster/[Dunstan		
		WATER LEVEL (date)					VVA٦	ıER	LEVEL (date)	C	HECK	ED :	MB	/SMS			THU

RECORD OF BOREHOLE MSFD-M

Mary River Project **PROJECT** Project No. 19-1605-126

Steensby Inlet - Freight Dock LOCATION

May 19, 2011 DRILLER: WALKER DRILLING STARTED SHEET 2 OF 2 May 20, 2011 N 7 799 012 E 595 581 DATUM: CGVD28 COMPLETED :

	8	SOIL PROFILE				SAM	PLE	S		EXCE	SS ICE	CONTE		CENT	(1)	THERMISTER GROUND CO
(metres)	BORING METHOD		LOT	(u	~		.3m	% ≿	COMMENTS	1	0 2	20 3		40 I	ADDITIONAL LAB. TESTING	FROZEN
(metr	ING N	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT			TMETNC - W			B. TE	UNFROZEN
5	BOR		STRA		₹	-	BLO	RECC	RESISTANCE PLOT	w 1	p	0 3		wl 40	43	UNCERTAIN
			\													
		weathered zone, numerous closed sub-vertical joints			13	RC			TCR=36% SCR=18% RQD=58%							
21				21.22	14	RC			TCR=100% SCR=18% RQD=18%							
		END OF BOREHOLE AT -34.95m.														
22																
23																
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24																
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27																
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29																
30																
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35																
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37																
38																
39																
		GROUNDWATER ELI			3	_	_									
		∑ SHALLOW/SINGLE INST	ΓALLA	TION					P/DUAL INSTALLATION		LOGGEI			/Dunstar	ı	
		WATER LEVEL (date)				_	WA ⁻	I'ER	LEVEL (date)		CHECKE	D :	MB/SMS	<u> </u>		THURI



RECORD OF BOREHOLE MSFD-N DCPT

PROJECT : Mary River Project

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION : STARTED :

May 19, 2011 May 19, 2011 DRILLER: WALKER DRILLING N 7 798 792 E 595 531 SHEET 1 OF 1 DATUM: CGVD28

	MPLE	ETED : May 19, 2011				חט			98 792 E 595 531					JM: C	GVD28
	8	SOIL PROFILE				SAM	IPLE	S		EXCESS	ICE CONTI		RCENT	. (1)	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		TO.	<u> </u>	~		3m	% ×		10			40	ADDITIONAL LAB. TESTING	FROZEN
PTH (NG	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION	WATER	R CONTEN	T, PERC	ENT	3. E	UNFROZEN 💹
Ä	BORI		TRA		₹	-	BLOV	RECC	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp ⊢ 10	20 OW	30	wl 40	A 3	UNCERTAIN
		SEA FLOOR	+"	-12.21				-			+			\vdash	
		Begin DCPT at -12.21m.													
															:
1															
															:
-2									\						
- 3															-
-															
-4															-
ŀ		END OF DCPT AT -16.9m.	+	4.69					_						4.69
- 5		Ice thickness = 1.70m													-
ŀ]
-6															-
•]
- 7															-
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-8															-
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-10															-
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18															-
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19															
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÷		GROUNDWATER ELE	VA	TIONS	3										

GROUNDWATER ELEVATIONS

THURBER2S(5126) 5126.GPJ 11/9/11

☐ SHALLOW/SINGLE INSTALLATION
WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Holmes
CHECKED : MB/SMS



RECORD OF BOREHOLE MSFD-P

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 20, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

CO	MPL	ETED : May 20, 2011					Ν	7 7	98 813 E 595 481		JM: CGVD28
щ	ДОР	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE CONTENT, PERCENT	THERMIST
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 20 30 40 WATER CONTENT, PERCENT wp	GROUND C GROUND C FROZEN UNFROZEN UNCERTAI
-	H	SEA FLOOR CLAY, silty, some sand, trace gravel, grey, very soft to soft, saturated		-24.46	1	SS	0	100	Grain Size Analysis:		
		very soft to soft, saturated			-	55	0	100			
1		layer of gravelly sand			2	ss	14	100	Grain Size Analysis: Gr 4%/ Sa 41%/ Si 30%/ Cl 25%		
2											
	oring										
3	NW/NQ Casing/Coring										
	NQ Ca			3.84	3	SS	6	100	Grain Size Analysis:		
4	//N	SAND, gravelly, trace silt, grey		4.54				100	Gr 30%/ Sa 63%/ Si & Cl 6%		
5		CLAY, silty, some sand, trace gravel, grey							Grain Size Analysis:		
		SAND, some gravel, grey		5.54	4	ss	11	80	Gr 1%/ Sa 24%/ Si 48%/ Cl 26%		
6		SAND, some graver, grey		640			65/		Grain Size Analysis:		6.40
Ì		END OF BOREHOLE AT -30.86m. Hole abandoned after SS#5. Approximately 20m of casing was lost. New borehole (MSFD-P1) started about 4m south of this	<u> </u>	0.40	5	SS	.025	5	Grain Size Analysis: Gr 43%/Sa 54%/ Si & Cl 3% -casing broke		0.40
7		20m of casing was lost. New borehole (MSFD-P1) started about 4m south of this borehole.									
8		bordriote.									
9											
10											
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.,											
18											
19											
		GROUNDWATER ELE			3		,				
		SHALLOW/SINGLE INSTA	٩LLA	TION					P/DUAL INSTALLATION	LOGGED : Dunstan/Webste	
		WATER LEVEL (date)					vvA	ı EK	LEVEL (date)	CHECKED : MB/SMS	THUE



RECORD OF BOREHOLE MSFD-P1

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

May 21, 2011 May 21, 2011

DRILLER: WALKER DRILLING N 7 798 809 E 595 481

SHEET 1 OF 1 DATUM: CGVD28

	٥	SOIL PROFILE			Т	SAM	PLE	s		EXCE	SS ICE		NT, PER	CENT		THERMISTE GROUND C
DEPTH SCALE (metres)	BORING METHOD	JOILTROFFLE	5		+		_			1	0 3	o ^{ice}		40	ADDITIONAL LAB. TESTING	l
H S.	G ME	DECODIDATION	STRATA PLOT	ELEV. (m)	NUMBER	<u>ا</u> ۳	BLOWS/0.3m	RECOVERY %	COMMENTS				, PERCE	1	ESE.	FROZEN UNFROZEN
౼	R	DESCRIPTION	ZAT/	ELEV	₽	TYPE	0.0	COV	DYNAMIC CONE PENETRATION RESISTANCE PLOT	w	o ——		———I v	wl	AB.	UNCERTAIN
	B		STF		\bot	_	В	RE	50 100 150 200 250	1	0 2	20 :	30 4	40 		SNOLKIAIN
_		SEA FLOOR CLAY, silty, trace gravel, with interbedded	1220	-25.3	0											
		sand zones, soft, grey														
1																
2																
3	ס															
- 1	Corin															
4	sing/															
	တ တ			4.6	0 1	ss	44	400				ш		0		
5	NW/NQ Casing/Coring	SAND, some gravel, very loose to compact, light brown, wet			ŀ	33	11	100	Grain Size Analysis: Gr 5%/ Sa 83%/Si & Cl 11%			þ				
`	-				2	88	70/ .050									
6							.000									
					1	RC		8	-sand in flush return							
7																
8		occasional cobbles		8.1	7 2	RC		13	-sand heave into casing							8.17
	+	END OF BOREHOLE AT 33.47m. Casing broke off, hole ended.		".	\top	T										0.17
9		Sasing broke on, note chaca.														
10																
11																
12																
'-																
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14																
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15																
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18																
10																
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19																
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		GROUNDWATER ELE	VA٦	ΓΙΟΝ	S											
		$\overline{igspace}$ shallow/single insta	ALLA	TION		Ī	Z D	EEF	P/DUAL INSTALLATION	I	.OGGEI) :	Webster	/Dunstan		
		WATER LEVEL (date)							LEVEL (date)		CHECKE		MB/SMS			THUR

RECORD OF BOREHOLE MSFDP-06 DCPT

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 19, 2011 May 19, 2011

DRILLER: WALKER DRILLING N 7 799 055 E 595 540

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	ETED : May 19, 2011							99 055 E 595 540			ATUM: C	GVD28
<u>.</u> T	dob	SOIL PROFILE			5	SAM	PLE	_		EXCESS ICE CC	NTENT, PERCEI	ت Tv	THERMISTE GROUND CO
DEPTH SCALE (metres)	BORING METHOD		STRATA PLOT	(m)	똢		0.3m	RECOVERY %	COMMENTS	10 20	30 40	ADDITIONAL LAB. TESTING	FROZEN
e l	RING	DESCRIPTION	RATA	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	COVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONT	TENT, PERCENT	ADDIT AB. TI	UNFROZEN
,	8		STF				B	REC	50 100 150 200 250	10 20	30 40		UNCERTAIN
		SEA FLOOR Start of DCPT at -16.76m.		-16.76					-rods sunk under the weight of the hammer from elev16.76 to -20.88m				
									Tiaminer from elev10.70 to -20.66m				
1													
2													
3													
4													
_									$ \rangle$				
5				E ^~									
3		END OF DCPT AT -22.43m. Ice thickness = 1.68m		5.67									5.67
7													
3													
9													
10													
11													
12													
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14													
15													
16													
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<i>'</i>													
8													
19													
		GROUNDWATER ELE	EVAT	IONS	5			ı		1	1 1	!	
		$\overline{egin{array}{c} egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} arra$	ALLA	TION					P/DUAL INSTALLATION	LOGGED	: Holmes		
		WATER LEVEL (date)				,	WA٦	ΓER	LEVEL (date)	CHECKED	: MB/SMS		THUR



RECORD OF BOREHOLE MSFDP-07 DCPT

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 19, 2011

DRILLER: WALKER DRILLING N 7 799 043 E 595 590

SHEET 1 OF 1 DATUM: CGVD28

, T	ф	SOIL PROFILE			S	AMI	PLES			EXCES	S ICE (ice	NT, PERC	ENT	ا ق لــ	THERMISTER GROUND COM
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 WAT wp I		NTENT,	60 46 	O NT I O	DDITIONA .B. TESTIN	FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR Start of DCPT at -14.15m.		-14.15					-rods sunk under the weight of the hammer from elev14.15 to -17.68m							
1									Hammer Horn elev14.13 to -17.00m							
'																
2																
3																
4																
5																
6																
7																
3									\							
9]							
10	+	END OF DCPT AT -23.87m. Ice thickness = 1.62m	+	9.72					_							9.72
11																
12																
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16																
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,																
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19																
		GROUNDWATER ELE	EVAT	IONS	 }									ļ		
		$\overline{igspace}$ shallow/single inst	ALLA [.]	TION		Ţ	7 D	FFF	P/DUAL INSTALLATION		GGED	: 1	Holmes			



RECORD OF BOREHOLE MSFDP-08 DCPT

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 20, 2011 May 20, 2011

DRILLER: WALKER DRILLING N 7 799 034 E 595 631

SHEET 1 OF 1 DATUM: CGVD28

		-											DATU		
	ДОН	SOIL PROFILE			5	SAM	_	_		EXCESS ICE			CENT	7 S	THERMISTE GROUND CO
tres)	MET		PLOT	(E)	띪	ш	'0.3m	RY %	COMMENTS		20 :	30 4 1	L	TION/	FROZEN
m m	RING	DESCRIPTION	RATA	LEV.	NUMB	TYP	/SMO	COVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER C	ONTENT	, PERCE		ADDI AB. T	UNFROZEN
,	8	05451000	STF				B	REC	50 100 150 200 250	10	20 :	30 4	10	ָר.	UNCERTAIN
		Start of DCPT at -11.65m.		-11.65					-rods sunk under the weight of the						
		SOIL PROFILE													
1	### MAY 20, 2011 N. 7.79 GO 34 E 595 631 SOUL PROPRIES May 20, 2011 SAMPLES S														
2	SOUL PROPRIES May 20, 2011 N 7 799 034 E 595 631 EACH COVIDED FOR 1990 FOR 1														
	SOUL PROPRIES May 20, 2011 N 7 799 034 E 595 631 EACH COVIDED FOR 1990 FOR 1														
3	SOUL PROFILE SAMPLES														
	SOL PROFILE N 7799 034 E 595 631 DATUM CONDET														
1									\rangle						
5									$ \rangle$						
,															
,	_	END OF DORT AT 18 82m	\perp	7.17	-										7.17
		Ice thickness = 1.80m													
3															
,			SAUL PROFILE												
´															
10															
		SOIL PROPER SAMPLES SAMPLES SOIL PROPERTY SAMPLES SOIL PROPERTY SAMPLES SOIL PROPERTY SAMPLES SOIL PROPERTY SOIL PROPERT													
11		SOIL PROFILE SOIL PROFILE SAMPLES COMMENTS DOUBLE SAMPLES COMMENTS DOUBLE COMMENTS DOUB													
		SOIL PROFILE													
12		### SOL PROPILE SOL PROPILE SAMPLES													
13			NA 20, 2011 N 7789 034 E 595 631 EXCRESS CE CONTENT, PRICES 10, 20, 30, 40 10, 30, 30, 40 10, 30, 30, 30, 40 10, 30, 30, 30, 30, 30, 30, 30, 30, 30, 3												
4															
5		Start of CCPT at 11.66 and surface the weight of the harmest from oliver. 11.65 to -12.5 time. END OF DOPT AT -18.50m. Res thickness = 1.50m. Triff GROUNDWATER ELEVATIONS													
16		Start of DCPT at -1185m. END OF DCPT AT -18 82m. Ince thickness = 1,50m. GROUNDWATER ELEVATIONS													
۱ ۱			DESCRIPTION The state of the latter of th												
17		SEA PLOOP SIND OF DOPT AT -18 Rom. Ten environess = 1 80m TAT SEND OF DOPT AT -18 Rom. The environess = 1 80m TAT SEND OF DOPT AT -18 Rom. The environess = 1 80m TAT TAT SEND OF DOPT AT -18 Rom. THE environess = 1 80m TAT TAT TAT THE ENVIRONMENT OF THE ELEVATIONS SEND OF DOPT AT -18 Rom. THE ENVIRONMENT OF THE ELEVATIONS SEND OF DOPT AT -18 Rom. THE ENVIRONMENT OF THE ELEVATION SEND OF THE ENVIRONMENT OF THE ELEVATION SEND OF THE ELEVATIO													
18															
	SOURTH S														
19	SOURCE S														
					3	_	_								
			TALLA	TION											
		WATER LEVEL (Date)					ννΑl	ΙEΚ	LEVEL (date)	CHECKI	ED :	MB/SMS	5		THUI



RECORD OF BOREHOLE MSFDP-10 DCPT

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 19, 2011 May 19 2011

DRILLER: WALKER DRILLING N 7 798 873 F 595 494

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	TED : May 19, 2011					N	7 7	98 873 E 595 494		DATUM: C	GVD28
щ	ОО	SOIL PROFILE			,	SAM	PLE	S		EXCESS ICE CONTENT, PERCE	VT U	THERMISTER/ GROUND CONE
DEPTH SCALE (metres)	BORING METHOD		то-		~		3m	٧ %		10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
met 1	δĀ	DESCRIPTION	A PI). E	/BEF	TYPE	.0/S	Æ	COMMENTS	WATER CONTENT, PERCENT		UNFROZEN
	ORIN	BEOOK!! HOW	STRATA PLOT	ELEV. (m)	NUMBER	~	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp ⊢ ⊖ ^W I wl	API	UNCERTAIN
	<u>m</u>	SEA FLOOR	S			_	В	22	50 100 150 200 250	10 20 30 40	$-\!$	
		Start of DCPT at -22.26m.		-22.26							-	
1												
-2									\			
									/			
3												
٦l												
4												
									\			
5)			
-6				6.32								6.32
		END OF DCPT AT -28.58m. Ice thickness = 1.75		0.02	1							0.02
7		1.75										
.8												
ا ر												
9												
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18												
19												
13												
		GROUNDWATER ELE	ĒVΑ	TIONS	3							
		$\overline{egin{array}{c} igsep}$ shallow/single inst				1	Z n)FF	P/DUAL INSTALLATION	LOGGED : Holmes		
18		WATER LEVEL (date)							LEVEL (date)	LOGGED : Holmes CHECKED : MB/SMS		THURSE
		·/							, ,			THURB

RECORD OF BOREHOLE MSFDP-11 DCPT

Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 20, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

COI	MPLE	TED : May 20, 2011					N	7 79	98 867 E 595 544			DATU	M: CO	GVD28
<u>.</u>	무	SOIL PROFILE			5	SAM	PLE	_		EXCESS ICE CO	ONTENT, PER	CENT	J S	THERMISTER GROUND CO
res)	MET		LOT	ε	ıκ		.3m	٧٤ %	COMMENTS	10 20	30 4	40 	STIN	FROZEN
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CON		ENT	ADDITIONAL LAB. TESTING	UNFROZEN
5	BOR		STR/	日	ĭ	'-	BLO	REC(50 100 150 200 250	wp I——— 10 20		wl 40 1	⋖	UNCERTAIN
		SEA FLOOR Start of DCPT at -10.59m.		-10.59										
1														
2														
3														
,														
"														
5														
3														
7									\					
				7.80										7.80
3		END OF DCPT AT -18.39m. Ice thickness = 1.68m												
9														
10														
11														
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19														
_		GROUNDWATER ELE	 =\/_\	I ON S	<u></u>									
		∇ SHALLOW/SINGLE INST			,	_	Zn	EE	P/DUAL INSTALLATION					
		WATER LEVEL (date)	ALLA	IION					LEVEL (date)	LOGGED CHECKED	: Holmes : MB/SMS			THUR

RECORD OF BOREHOLE SI-FD-002

PROJECT : Mary River Project

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION : STARTED : COMPLETED :

August 11, 2011 August 11, 2011 DRILLER: WALKER DRILLING, D-50 N 7 798 836 E 595 693 SHEET 1 OF 1 DATUM: CGVD28

CC	JIVIPL	ETED : August 11, 2011					IN	/ /:	98 836 E 595 693					DATU	M: C	GVD28
ш	90	SOIL PROFILE			5	SAM	PLE	s		EXC	SS ICE	CONTEI oice	NT, PERO	CENT	. (1)	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		F	_			Ε	%		1	0 2		0 4	0	ADDITIONAL LAB. TESTING	FROZEN
H S(3 ME		STRATA PLOT	ELEV. (m)	NUMBER	Щ	BLOWS/0.3m	RECOVERY %	COMMENTS				, PERCE		ITIO TES	
ĒPT (N N	DESCRIPTION	₹AT	LEV	Ĭ	TYPE	SMC	SOVI	DYNAMIC CONE PENETRATION RESISTANCE PLOT		р —	OW OW	, FLIXOL		ADD AB.	UNFROZEN W
	B B		STF	ш	_		B	REC	50 100 150 200 250				0 4		, L	UNCERTAIN
		GROUND SURFACE		15.67												, ,-
ŀ		no recovery														
ŀ																
† 1				1.22												-
•		GRAVEL , granitic, fine material washed out	••••		1	RUN		23								
-2		SILT, clayey, some sand, grey, moist: (Nf)	ĺй	1.91					Grain Size Analysis: Gr 9%/ Sa 22%/ Si 51%/ Cl 18%			0				1.90
ŀ			ľW	1		RUN		100	GI 976/ 3d 2276/ 313176/ CI 1676							
- 3		GRAVEL, COBBLES and BOULDERS,		2.80												2.80
[°		granitic, subangular to subrounded, grey, pink, fines washed out	$[\circ \bigcirc$	}												
ŀ		pink, nines washed out	0		3	RUN		61								
-4			20													-
•			0													
- 5			Õ		4	RUN		63								
ļ	_		$^{\circ}$													
1	Diamond Drill		00													
-6	uo l		$^{\circ}$													-
F	۵		200	1	5	RUN		58								
- 7			°Ó													
ŀ			60	1												
-8			00		۵	RUN		21								
ŀ			$[\circ \cap$	ļ	0	RUN		21								
ŀ) O	9.00											FI	9.00
- 9		GRANITIC GNEISS, moderately		9.00											0	9.00
•		GRANITIC GNEISS, moderately weathered, weak, jointed (rough, planar, silt coated), black with pink and white patches	\gg		7	RUN			TCR=93% SCR=89% RQD=68%						1	
-10			\mathbb{K}												>10	<u>-</u>
F		sandy silt layer at 10.35 to 10.40m													>10 6	
11			X	1					TOD 4000/ OOD 400/ DOD 400/						>10	
ļ''		becoming strong, fresh clay infill at 11.00m			8	RUN			TCR=100% SCR=49% RQD=49%						5 0	
ŀ			\otimes		Ļ										0	
-12		clayey silt layer at 11.95m	Y//	12.10	9	RUN			TCR=100% SCR=33% RQD=33%						>10	-
•		END OF BOREHOLE AT 12.10m.														
- 13																- -
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-14																
F 14																
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- 15																-
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ō [6] -																
(0710)0		GROUNDWATER ELE	VA	TIONS	<u> </u>											

GROUNDWATER ELEVATIONS

THURBER2S(5126) 5126.GPJ 11/9/11

SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Ramos CHECKED : KS

RECORD OF BOREHOLE SI-FD-004

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

August 13, 2011

DRILLER: WALKER DRILLING, D-50 August 13, 2011 N 7 798 844 E 595 703

SHEET 1 OF 1 DATUM: CGVD28

		D : August 13, 2011 TED : August 13, 2011			_		Ν	7 79	WALKER DRILLING, D-50 98 844 E 595 703	EVA	00.105	CONT	NT DES	DATU	T 1 OF IM: C	GVD28
(metres)	BORING METHOD	SOIL PROFILE	,LOT	Ê	\vdash	SAM	_	_	COMMENTS -	EXCE		oice		CENT I0	ADDITIONAL LAB. TESTING	THERMISTE GROUND CO FROZEN
(met	BORING	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250		·	$-\circ^{w}$			ADDIT LAB. TE	UNFROZEN UNCERTAIN
\dashv		GROUND SURFACE limited recovery, minor gravel, granitic, fines		16.23												1
		washed out			1	RUN		10								
2						RUN		17								
3		CLAY, silty, some sand, some gravel, occasional cobbles, light grey, wet		2.95 _.		RUN		93			0					
.				4.45												
5		GRAVEL and BOULDER (<630mm), subangular to subrounded, dark grey, pink, white		F.0-		RUN		60								
		SAND, gravelly, some silt to silty, trace clay, with cobbles (<100mm), light grey		5.95 _.		RUN		22								
	Diamond Drill				5	KUN		22	Courts Circ. Acrel.							
					6	RUN		45	Grain Size Analysis: Gr 28%/ Sa 49%/ Si & Cl 23%	0						
0		GRANITIC GNEISS, slightly to moderately weathered, weak to medium strong, fractured, pink, black, grey		9.85	7	RUN		96							FI 2	9.85
1 2					8	RUN			TCR=97% SCR=89% RQD=48%						>10 6	
^		clay filled fracture at 12.10m														
3		slightly weathered		40 =-		RUN			TCR=100% SCR=100%							
4		END OF BOREHOLE AT 13.75m.	-V//	13.75												
5																
6																
7																
8																
9																
		GROUNDWATER ELE	 VA1	L FIONS	 }											
		SHALLOW/SINGLE INSTA WATER LEVEL (date)							P/DUAL INSTALLATION LEVEL (date)		OGGED		Young KS			THUR



Mary River Project PROJECT

Steensby Inlet - Freight Dock May 24, 2011 DRILLER: WALKER DRILLING, D-50 Project No. 19-1605-126

STARTED COMPLETED

LOCATION

May 24, 2011

N 7 799 025 E 595 464

SHEET 1 OF 1 DATUM: CGVD28

	QC	SOIL PROFILE			5	SAMI	PLES	S		EXCESS ICE C		(1)	THERMISTER/ GROUND CON
DEPTH SCALE (metres)	BORING METHOD		ТО	_	Ī.,		Æ	%		10 20		ADDITIONAL LAB. TESTING	FROZEN
H S	Σ S	DECODIDATION	A PL	E) .	BER	밆	3/0.3	ERY	COMMENTS	WATER COL	TENT PERCENT	15E	UNFROZEN
필드	N N	DESCRIPTION	SAT/	ILEV	Σ	₽	OW	200	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp I	→ W I wl	AB.	UNCERTAIN
	BO		STF	3	_		BL	RE	50 100 150 200 250	10 20	30 40		UNCERTAIN
\Box		SEA FLOOR		-22.16									
		Start of DCP1 at -22.16m.							-rods sunk under the weight of the hammer from elev22.16 to -26.37m				
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9				9.18]								9.18
		END OF DCPT AT -31.34m.							•				
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10		SOIL PROPILE DESCRIPTION SEA FILOOR SEA				1							
		SOIL PROFILE DESCRIPTION THE STANCE PLANT AND THE											
11			SOIL PROFILE DESCRIPTION THE STANDARD CONTROL OF THE										
			SOIL PROFILE SAMPLES							1			
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18													
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19												1	
-		SOIL PROFILE DESCRIPTION SEA FLOOR Sear Fl											
			SOIL PROFILE DESCRIPTION A FLOOR 1 of DCPT at -22.16m. OF DCPT AT -31.34m. 9.18									1	
		GROUNDWATER FI F	VA٦	IONS	5								
					-	•	7 _		7/DIIAI INIOTAI (AT: 5: :				
		→ SHALLOW/SINGLE INSTA	ALLA	ITON			- D	EEI	P/DUAL INSTALLATION	LOGGED	: Holmes		
		WATER LEVEL (date)							LEVEL (date)	CHECKED	: MB/SMS		

Mary River Project PROJECT

> Steensby Inlet - Freight Dock DRILLER: WALKER DRILLING, D-50

Project No. 19-1605-126

STARTED COMPLETED :

LOCATION

May 24, 2011 May 24, 2011

N 7 798 896 E 595 485

SHEET 1 OF 1 DATUM: CGVD28

	_	TED : May 24, 2011			_				98 896 E 595 485	FYC	ESS ICE	CONTE	NT, PER	DATU		
<u> </u>	BORING METHOD	SOIL PROFILE			5	SAM	PLE	_		EAU	_UU IUE	ice	9	OLINI	₽ S S	THERMISTER GROUND CON
(metres)	MET		,LOT	Ê	ĸ).3m	RECOVERY %	COMMENTS	1	10 :			10 	ADDITIONAL LAB. TESTING	FROZEN
E a	Ŋ	DESCRIPTION	TAF	ELEV. (m)	NUMBER	TYPE	NS/C	VEF	DYNAMIC CONE PENETRATION RESISTANCE PLOT				, PERCE		DDIT B. TE	UNFROZEN
4	BOR		STRATA PLOT	E	≥	-	BLOWS/0.3m	SECC	RESISTANCE PLOT		/p	0 ×		wl 40	ΖĒ	UNCERTAIN [
+	Ť	SEA FLOOR	()	-24.10	\vdash		Ë	Ľ.	100 100 200 200							
\top		Start of DCPT at -24.10m.		20												
1																
2																
				2.60												2.60
3		END OF DCPT AT -26.70m. Ice thickness = 1.83m							-integrity of rods lost, deflecting -test not valid							
									-rods bent upon retrieval							
4		Note: When rods were removed at the end of the test it was noted that the bottom														
١		16.8m of rods were bent. The results of the DCPT may not be representative of actual														
		conditions.														
5		Casing not available.														
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		GROUNDWATER ELE			3	_	_									
		abla shallow/single insta	LLA	TION		Ī	Z D	EEF	P/DUAL INSTALLATION		LOGGE	D :	Peters			
		WATER LEVEL (date)					WA	ΓER	LEVEL (date)		CHECKI	ED :	MB/SMS	3		THUR



Mary River Project **PROJECT**

Steensby Inlet - Freight Dock LOCATION

STARTED

COMPLETED :

May 24, 2011 DRILLER: WALKER DRILLING May 24, 2011 N 7 798 936 E 595 493

Project No. 19-1605-126

SHEET 1 OF 1 DATUM: CGVD28

y T	90	SOIL PROFILE			5	SAM	PLE	_		EXCESS ICE CONTENT	, PERCENT	ا ا	THERMISTER/ GROUND CON
(metres)	BORING METHOD		PLOT	(E)	띪	ш	'0.3m	RY %	COMMENTS	10 20 30	40	TION	FROZEN
<u></u> E	RING	DESCRIPTION	ATA	LEV.	UMB	ΙΨ	/SMC	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, P		AB. T	UNFROZEN
\perp	B B		STR	Ш	Ĺ		BLC	REC	50 100 150 200 250	10 20 30	40	\ <u>`</u>	UNCERTAIN
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9													
10		END OF DCPT AT -35.80m.		9.86									9.86
11		Casing not available.											
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		SOL PROFILE SAMPLES COMMENTS COMM		<u> </u>									
		SOIL PROFILE SAMPLES COMMENTS 10 20 30 40 O 20											
		SOIL PROFILE DESCRIPTION DESCRIPTION DESCRIPTION SEA PLOOF DESCRIPTION DESCRI											
		SCIL PROPRIETE DESCRIPTION O			THURE								



Mary River Project **PROJECT**

Project No. 19-1605-126

Steensby Inlet - Freight Dock LOCATION

May 24, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 24, 2011 N 7 798 965 E 595 498 DATUM: CGVD28 COMPLETED

Т	_	SOIL PROFILE				SAM	DI E	0						EXC	ESS ICE	CONTE	NT, PER	CENT	Г	THERMIST	ER
DEPTH SCALE (metres)	BORING METHOD	30IL FROI ILL	—		_`											eice			ADDITIONAL LAB. TESTING	THERMISTI GROUND C	OC
res)	M		.FO.	Ê	ĸ	l	.3m	% ≿		CO	MMEI	NITO		1	10 2 1	20 3 I	30 4 1	40 	NO I	FROZEN	
met	9	DESCRIPTION	ΑF	> -	/BE	TYPE	0/S/	Ϋ́Ε	DYN	OO) OIMAI	ONE P	NIO	RATION	W	ATER C	ONTENT	, PERCE	ENT	1등등	UNFROZEN	N
] [SISI		STRATA PLOT	ELEV. (m)	NUMBER	-	BLOWS/0.3m	RECOVERY %	RES	ISTAN	CE PLO	ıΤ 🚬	RATION >		/p —	- OW	<u> </u>		A B	UNCERTAI	
_	ă		ST				В	꿆	50	100	150	200	250		10 2	20 3	30 4	40			'
_		SEA FLOOR		-21.08																	_
		Start of DCPT at -21.08m.																			
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16				16.32																16.32	2
ſ		END OF DCPT AT -37.40m. Rods deflecting.																			
17		END OF DCPT AT 37.4Um. Rods deflecting. Casing not available. Note: Rods removed from hole at elev37.40 to check condition. The bottom 3.0m had snapped off and 19.8m of rods were bent. Results of DCPT may not be representative of actual conditions.																			
		-37.40 to check condition. The bottom 3.0m																			
		had snapped off and 19.8m of rods were bent. Results of DCPT may not be																			
18		representative of actual conditions.																			
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		GROUNDWATER ELE			Š		_														
19		$\overline{igspace}$ shallow/single insta	LLA	TION		Ž	Z D	EEI	P/DUAL	. INST	ΓALLA	ATION	١		LOGGEI) :	Peters				
		WATER LEVEL (date)							LEVEL (CHECKE		MB/SMS	3		7111	
		/							ν.	,							, 51410			THUR	٨



Mary River Project **PROJECT** Project No. 19-1605-126

Steensby Inlet - Freight Dock LOCATION

May 24, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 24, 2011 N 7 798 990 E 595 504 DATUM: CGVD28 COMPLETED

		TED : May 24, 2011			_				98 990 E 595 504	EXCESS ICE CONTENT, PERCENT	UM: C	
<u>ا</u> لِا	BORING METHOD	SOIL PROFILE	1.		5	SAM	_	_		ice	4 S	THERMISTER/ GROUND CON
DEPTH SCALE (metres)	MET,		STRATA PLOT	Ê	ik.		BLOWS/0.3m	RECOVERY %	COMMENTS	10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
(met	NG	DESCRIPTION	TAF	ELEV. (m)	NUMBER	TYPE	NS/0	VEF	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, PERCENT	B. H	UNFROZEN
i	BOR		TRA	ELE	₽	-	BLO	ECC	50 100 150 200 250	wp	₹ <u>₹</u>	UNCERTAIN [
\dashv	Ť	SEA FLOOR	0)	-21.19			F	LE.	30 100 130 200 230		+	
		Start of DCPT at -21.19m.										
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13	_	END OF DODT AT 24 20m	\perp	13.10					\			13.10
		END OF DCPT AT -34.29m. Ice thickness = 1.32m										
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19												
		GROUNDWATER ELE	-\/^¬	LIUNIC	Ļ							
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18		SHALLOW/SINGLE INST WATER LEVEL (data)	ALLA	TION					P/DUAL INSTALLATION	LOGGED : Peters		
		WATER LEVEL (date)					VVΑ	ΙEΚ	LEVEL (date)	CHECKED : MB/SMS		THURB



Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 22, 2011 May 22, 2011

DRILLER: WALKER DRILLING N 779 891 E 595 507

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	D : May 22, 2011 TED : May 22, 2011							WALKER DRILLING '9 891 E 595 507					T 1 OF	GVD28
ų T	dob	SOIL PROFILE			5	SAM	PLE	_		EXCESS ICE	CONTE		CENT	ا ا	THERMISTI GROUND C
DEPTH SCALE (metres)	BORING METHOD		LOT	(i	ıκ		.3m	RECOVERY %	COMMENTS	10 2			10 	ADDITIONAL LAB. TESTING	FROZEN
met (met	ING I	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVER	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER C	ONTENT	, PERCE		DOTT B. TE	UNFROZEN
3	BOR		STRATA PLOT	ELI	≥	-	BLO	RECC	50 100 150 200 250	wp ⊢ 10 2	0 3		wl 10	\[\]	UNCERTAI
		SEA FLOOR	0,	-18.94											
		Start of DCPT at -18.94m.							/						
1															
'				1.47					<u> </u>						1.47
2		END OF DCPT AT -20.41m. Ice thickness = 1.83m							-rods flexing under hammer						
-															
3		Casing not available.													
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		GROUNDWATER ELE			3	_	_								
		$\overline{igspace}$ shallow/single inst.	ALLA [.]	TION					P/DUAL INSTALLATION	LOGGE) :	Peters			
		WATER LEVEL (date)				,	WA	ΓER	LEVEL (date)	CHECKE	D:	MB/SMS	;		THU



Mary River Project **PROJECT** LOCATION

Steensby Inlet - Freight Dock

DRILLER: WALKER DRILLING

Project No. 19-1605-126

STARTED COMPLETED :

May 22, 2011 May 22, 2011

N 7 798 909 E 595 510

SHEET 1 OF 1 DATUM: CGVD28

щT	dot	SOIL PROFILE			5	SAM	PLE	_		EXCESS ICE CON	TENT, PERCENT	ق بــ	THERMISTER GROUND CO
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	4 PLOT	ELEV. (m)	BER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS	10 20 I I WATER CONT	30 40	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN
- E	BORIN	DESCRIPTION	STRATA PLOT	ELEV	NUMBER	Σ.	BLOW	RECOV	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp I 20	30 40	ADD LAB.	UNCERTAIN
		SEA FLOOR		-17.09									
		Start of DCPT at -17.09m.											
1													
2				2.44									2.44
F		END OF DCPT AT -19.53m. Ice thickness = 1.83m		1									2
3		ice ulickiess – 1.00m											
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19													
		GROUNDWATER ELE	VA	LIONS	<u></u>							1	
		∇ SHALLOW/SINGLE INSTA				3	Zr		P/DUAL INSTALLATION	100000	5.4		
			~LLA	IIOIN						LOGGED :	Peters MR/SMS		
		WATER LEVEL (date)					WA	ľER	LEVEL (date)	CHECKED :	MB/SMS		THU



Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 22, 2011

DRILLER: WALKER DRILLING, D-50

SHEET 1 OF 1

COI	MPLE	TED : May 24, 2011							98 932 E 595 513					M: C	GVD28
y T	90	SOIL PROFILE			-5	SAM	PLE	_		EXCESS ICE	CONTE		CENT	ır 16	THERMISTER GROUND CO
DEPTH SCALE (metres)	BORING METHOD		LOT	(E	ik.		.3m	% ኢ≀	COMMENTS	10 :		30 40	0	ADDITIONAL LAB. TESTING	FROZEN
met L	ING	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m)VER	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER C			NT	DDITI. B. TE	UNFROZEN
4	BOR		STRATA PLOT	ELE	≥		BLO	RECOVERY %	RESISTANCE PLOT	wp ⊢—— 10 :	<u>→</u>		/I O	P	UNCERTAIN
		SEA FLOOR Start of DCPT at -16.58m.	-	-16.58											
		Start of DCP1 at -10.56m.													
1															
									(
2									$ \rangle$						
3)						
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5]						
}	+	END OF DCPT AT -22.13m.		5.55											5.55
3		Ice thickness = 1.68m													
7															
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		GROUNDWATER ELE	=\/^¬		Ļ										
					J	•	7 -		D/DIIAL INCTALLATION						
		SHALLOW/SINGLE INST WATER LEVEL (date)	ALLA	HUN					P/DUAL INSTALLATION LEVEL (date)	LOGGE CHECKI		Peters/Ho MB/SMS	olmes		
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Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 24, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

COI	MPLE	TED : May 24, 2011					N	7 79	98 962 E 595 519				ATUM: C	
4		SOIL PROFILE				SAM	PLE			EXCESS ICE	CONTEN	NT, PERCE	۾ آ آ	THERMISTER GROUND COM
DEPTH SCALE (metres)	BORING METHOD		STRATA PLOT	E	쏪).3m	RECOVERY %	COMMENTS		20 3 	0 40 L L	ADDITIONAL LAB. TESTING	FROZEN
mel (mel	SING	DESCRIPTION	YTA F	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVEF	DYNAMIC CONE PENETRATION RESISTANCE PLOT	1	ONTENT,	PERCENT	DOIT B. TE	UNFROZEN
	BOR		STR/	日日	ĭ	'	BLO	REC	50 100 150 200 250	wp I	20 3	——I wl 0 40	₹ ጟ	UNCERTAIN
4		SEA FLOOR Start of DCPT at -17.92m.		-17.92										
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۱ ۱		END OF DCPT AT -26.95m.	+	9.03	1				\					9.03
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		GROUNDWATER ELE			3									
		$\overline{igspace}$ shallow/single inst	ALLA	TION					P/DUAL INSTALLATION	LOGGE	D : I	Holmes		
		WATER LEVEL (date)					WA٦	ΓER	LEVEL (date)	CHECK	ED : 1	MB/SMS		THURI

Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 24, 2011 May 24, 2011

DRILLER: WALKER DRILLING N 7 798 987 E 595 525

SHEET 1 OF 1 DATUM: CGVD28

	۵	TED : May 24, 2011 SOIL PROFILE				SAM	DI E	S		EXCESS ICE		ERCENT		THERMISTER
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 2 L WATER C	ice 0 30 L L DNTENT, PEF	40	ADDITIONAL LAB. TESTING	THERMISTER GROUND CO FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR Start of DCPT at -18.50m.	+	-18.50										
1 2		Start of DGF 1 at -10.30m.												
3														
1														
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3														
10		END OF DCPT AT -28.58m.		10.08										10.08
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18														
19														
18		GROUNDWATER ELE SHALLOW/SINGLE INSTA			<u></u> S	<u> </u>	<u> </u>) EEF	P/DUAL INSTALLATION	LOGGEI) : Holm	as a	<u> </u>	

Mary River Project PROJECT LOCATION

Steensby Inlet - Freight Dock

Project No. 19-1605-126

STARTED

May 22, 2011 May 22 2011

DRILLER: WALKER DRILLING N 7 798 890 F 595 516

SHEET 1 OF 1 DATUM: CGVD28

CC	MPLE	ETED : May 22, 2011					Ν	7 7	98 890 E 595 516			IM: C	GVD28
ш	OO	SOIL PROFILE				SAM	PLE	S		EXCESS ICE CONT		. (1)	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		Ю	_			Ë	%		10 20	30 40	ADDITIONAL LAB. TESTING	FROZEN
TH S	_ნ	DESCRIPTION	A PL	/. (m	IBER	TYPE	S/0.3	E.S.	COMMENTS	WATER CONTEN	IT. PERCENT	EE	UNFROZEN
EP.) RIN	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	}	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp ⊢ → V	v wl	APE LAB.	UNCERTAIN
	B		ST				岡	쮼	50 100 150 200 250	10 20	30 40		
-		SEA FLOOR Start of DCPT at -14.68m.	1	-14.68					\				<u> </u>
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ļ _				1.95									1.95
-2 [END OF DCPT AT -16.63m. Ice thickness = 1.83m]
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GROUNDWATER ELEVATIONS

 \overline{Y} SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)



Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 22, 2011 May 22 2011

DRILLER: WALKER DRILLING N 7 798 908 F 595 520

SHEET 1 OF 1 DATUM: CGVD28

COI	MPLE	TED : May 22, 2011					Ν	7 79	98 908 E 595 520				JM: C	GVD28
щ	QO	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE	CONTENT oice	, PERCENT	ں ا	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	ÆTH		LOT	(-	2		.3m	Υ%	0011117170	10 2	20 30	40	ADDITIONAL LAB. TESTING	FROZEN
TH (NG N	DESCRIPTION	ΓAΡΙ	ELEV. (m)	NUMBER	TYPE	VS/0.	VER	COMMENTS DYNAMIC CONE PENETRATION	WATER CO	ONTENT, P	PERCENT	Ę H.	UNFROZEN
H	BORING METHOD		STRATA PLOT		Š	-	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp ⊢ 10 2	0 30	——I wl 40	A A	UNCERTAIN
\dashv	Ť	SEA FLOOR	S	-13.50	\vdash			2	50 100 130 200 230				\vdash	
		Start of DCPT at -13.50m.												
.		END OF DCPT AT -14.29m.		0.79										0.79
1		Ice thickness = 1.83m												
-2														
3														
4														
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		I GROUNDWATER ELE	\/^¬	LIUNIS	Ļ								<u> </u>	
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-18 -19		SHALLOW/SINGLE INSTA	LLA	TION					P/DUAL INSTALLATION LEVEL (date)	LOGGE		eters		
		VVAILIN LLVLL (udle)					v v / \	_IX	LL VLL (uaic)	CHECKE	: ME	B/SMS		THURBE



PROJECT : Mary River Project No. 19-1605-126

LOCATION : Steensby Inlet - Freight Dock

 STARTED
 :
 May 22, 2011
 DRILLER:
 WALKER DRILLING
 SHEET 1 OF 1

 COMPLETED
 :
 May 22, 2011
 N 7 798 930 E 595 525
 DATUM: CGVD28

		- Way 22, 2011			_					=======					101. 0	
щ	0	SOIL PROFILE				SAM	PLE	S		EXCESS	S ICE (CONTEN ice		CENT	ن ا	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		ТО				Ë	%		10	20	3	0 4	0	AN E	GROUND COND. FROZEN UNFROZEN UNCERTAIN
H S	Ξ		Į,	ELEV. (m)	NUMBER	М	/0.3	ER/	COMMENTS				PERCE		ESE	FROZEN W
m)	N N	DESCRIPTION	₽¥	<u>Е</u>] 	TYPE	NS NS	S S	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATE	ER CO	W OW	PERCE V		9 9	UNFROZEN 🔯
B	BOF		STRATA PLOT		ž	ļ ·	BLOWS/0.3m	RECOVERY %	50 100 150 200 250	10	20) 3	0 4	vi -0	4 5	UNCERTAIN
	Ť	SEA FLOOR	100	40.00	\vdash		-	LE.	30 100 130 230 230	+ +					_	
	-	Start of DCPT at -13.30m.	-	-13.30												
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l I																
-2																
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ŀ				3.38						1						3.38
ł I		END OF DCPT AT -16.68m. Ice thickness = 1.52m														
-4		1.02.11														-
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GROUNDWATER ELEVATIONS

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)



Mary River Project PROJECT

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

May 22, 2011 May 22, 2011

DRILLER: WALKER DRILLING N 7 798 959 E 595 530

SHEET 1 OF 1 DATUM: CGVD28

	_				г			_	98 959 E 595 530	EXCESS ICE	CONTE	VT. PFP	DATU		THEDRAIOTA	
إ	BORING METHOD	SOIL PROFILE			Ľ	SAM	_	_			oice			AL NG	THERMISTE GROUND C	:OI
(metres)	MET		STRATA PLOT	Œ.	H.		J.3m	RECOVERY %	COMMENTS		20 3	80 4 I	10 	ADDITIONAL LAB. TESTING	FROZEN	-
me .	SING	DESCRIPTION	ATA F	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER C	ONTENT			DDIT	UNFROZEN	
5	BOF		STR/	П	ž		BLO	REC(50 100 150 200 250	wp ⊢ 10			wl 10	Y	UNCERTAIN	N
		SEA FLOOR		-15.04												_
		Start of DCPT at -15.04m.														
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3		END OF DODT AT 04 07	\square	6.23											6.23	, [
		END OF DCPT AT -21.27m.														
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		GROUNDWATER ELE			3											ĺ
		$\overline{igspace}$ shallow/single insta	LLA	TION		7	Z D	EEF	P/DUAL INSTALLATION	LOGGE	D :	Holmes				
		WATER LEVEL (date)							LEVEL (date)	CHECK		MB/SMS	;		THUR	,



Mary River Project **PROJECT**

Steensby Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 21, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

CO	MPLE	TED : May 21, 2011					Ν	7 79	98 983 E 595 538			IM: C	GVD28
] [НОР	SOIL PROFILE	1, 1		5	SAM		_			NTENT, PERCENT ice	AL VG	THERMISTE GROUND CO
DEPTH SCALE (metres)	MET		PLOT	(E)	띪	ш	0.3m	RY %	COMMENTS	10 20	30 40	TION	FROZEN
# # H	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONT wp I———	ENT, PERCENT Э ^W	ADDITIONAL LAB. TESTING	UNFROZEN UNCERTAIN
_	8		STF	Ш	_		BL	REC	50 100 150 200 250	10 20	30 40		UNCERTAII
		SEA FLOOR Start of DCPT at -15.19m.		-15.19									
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									>				
3													
9													
10				10.40									10.40
_ [END OF DCPT AT -25.59m.		_					,				
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,													
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19													
		GROUNDWATER ELE	VAT	IONS	<u></u>								
		$\overline{egin{array}{c} egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} arra$	ALLA [.]	TION		7	Z D	EEF	P/DUAL INSTALLATION	LOGGED	: Holmes		
		WATER LEVEL (date)							LEVEL (date)	CHECKED	: MB/SMS		THUR



Borehole MSFD-C



Photo 1: Core Box #1 of 2 (Runs 1-2, 0.0m – 12.3m)



Photo 2: Core Box #2 of 2 (Runs 2-4, 12.3m – 15.6m)



Borehole MSFD-D



Photo 1: Core Box #1 of 2 (Runs 1-3, 0.0m – 16.1m)



Photo 2: Core Box #2 of 2 (Run 3, 16.1m – 16.9m)



Borehole MSFD-G



Photo 1: Core Box #1 of 3 (Runs 1-6, 6.6m - 12.4m)



Photo 2: Core Box #2 of 3 (Runs 6-10, 12.4m - 17.8m)



Photo 3: Core Box #3 of 3 (Runs 10-12, 17.8m – 20.1m)



Borehole MSFD-L



Photo 1: Core Box #1 of 2 (Runs 1-10, 6.0m – 19.7m)



Photo 2: Core Box #2 of 2 (Runs 11-17, 19.7m – 28.1m)



Borehole SI-FD-002



Photo 1: Core Box #1 of 2 (Runs 1-5, 0.0m - 7.3m)





STEENSBY INLET - NORTH FREIGHT DOCK

MSNFD-A DCPT

MSNFD-B DCPT

MSNFD-C DCPT

MSNFD-D DCPT



RECORD OF BOREHOLE MSNFD-A DCPT

PROJECT : Mary River Project

Steensby Inlet - North Freight Dock

Project No. 19-1605-126

LOCATION : STARTED :

May 25, 2011 May 25, 2011 DRILLER: WALKER DRILLING N 7 803 194 E 592 425 SHEET 1 OF 1
DATUM: CGVD28

	ARTE OMPLE	ED : May 25, 2011 ETED : May 25, 2011				DF			WALKER DRILLING 03 194 E 592 425		EET 1 OI TUM: C	
щ	0	SOIL PROFILE				SAM	PLE	S		EXCESS ICE CONTENT, PERCENT	T , o	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 20 30 40 WATER CONTENT, PERCENT wp I————————————————————————————————————	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR	$oxed{\bot}$	-18.73								
1		Start of DCPT at -18.73m.							\rangle			
: -2												
- 3												
-4												
- 5		END OF DCPT AT -23.58m.	igdash	4.85	<u>.</u>				\ \ \			4.85
-6		Ice thickness = 1.52m] -
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19												
2		GROUNDWATER ELE	VA	TIONS	3							

☐ SHALLOW/SINGLE INSTALLATION
WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Peters
CHECKED : MB/SMS

THURBER

RECORD OF BOREHOLE MSNFD-B DCPT

Mary River Project **PROJECT**

STARTED

COMPLETED :

Steensby Inlet - North Freight Dock LOCATION

May 25, 2011

May 25, 2011

DRILLER: WALKER DRILLING N 7 803 217 E 592 451

Project No. 19-1605-126

SHEET 1 OF 1 DATUM: CGVD28

		TED : May 25, 2011			_				03 217 E 592 451	EXC	ESS ICE	CONTF	NT. PER			GVD28
DEPTH SCALE (metres)	BORING METHOD	SOIL PROFILE				SAM	PLE	_		LAO		oice)	OLIVI	NG A	THERMISTER/ GROUND CON
SC/	MET		STRATA PLOT	(m)	띪	l	BLOWS/0.3m	RECOVERY %	COMMENTS			l		40 	ADDITIONAL LAB. TESTING	FROZEN
<u>#</u> ₩	SING	DESCRIPTION	ATA	ELEV. (m)	NUMBER	TYPE	/SMC	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		VATER CO	TNETNC			TOO!	UNFROZEN
ວັ	BOF		STR	П	Ž		BLC	REC	50 100 150 200 250	`	10 2			40 1	4 1	UNCERTAIN
		SEA FLOOR		-15.27												
		Start of DCPT at -15.27m.)							
₁																
'																
]							
2																
F		END OF DCPT AT -17.99m.		2.72												2.72
3		Ice thickness = 1.52m														
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		GROUNDWATER ELE	// 7	LIUNIC	Ļ											
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18		☐ SHALLOW/SINGLE INSTA	LLA	TION					P/DUAL INSTALLATION		LOGGE		Peters			
		WATER LEVEL (date)					ννA	EK	LEVEL (date)		CHECKE	D :	MB/SMS	S		THURE



RECORD OF BOREHOLE MSNFD-C DCPT

Mary River Project **PROJECT**

Steensby Inlet - North Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 25, 2011 May 25 2011

DRILLER: WALKER DRILLING N 7 803 234 F 592 470

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	TED : May 25, 2011					N	7 8	03 234 E 592 470					GVD28
щ	ДO	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE O	ONTENT, F	PERCENT	_ o	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	BORING METHOD		LOT	(ر	2		.3m	У %	001111717	10 20		40	I≤≤	FROZEN
TH.	NG N	DESCRIPTION	ΓAΡ	ELEV. (m)	NUMBER	TYPE	VS/0	VER	COMMENTS DYNAMIC CONE PENETRATION	WATER CO	NTENT, PER	RCENT	OH TE	UNFROZEN
点	30RII		STRATA PLOT	EE	Ž	-	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp I——— 10 20	→ W 30	⊣ wl 40	LAB LAB	UNCERTAIN
\dashv	Ť	SEA FLOOR	S	-16.62			_	2	50 100 130 200 230	l Ĩ	- Î -			
		Start of DCPT at -16.62m.		-10.02										
1				1.45										1.45
ŀ		END OF DCPT AT -18.07m. Ice thickness = 1.52m		1.45										1.45
-2		1.02m												
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		GROUNDWATER ELE			•	_	,							
19		∑ SHALLOW/SINGLE INSTA	ALLA	TION					P/DUAL INSTALLATION	LOGGED	: Peter			
		WATER LEVEL (date)				,	WA٦	ER	LEVEL (date)	CHECKE	: MB/S	SMS		THURBE



RECORD OF BOREHOLE MSNFD-D DCPT

Mary River Project **PROJECT**

Steensby Inlet - North Freight Dock

Project No. 19-1605-126

LOCATION STARTED

May 25, 2011

DRILLER: WALKER DRILLING N 7 803 255 E 592 493

SHEET 1 OF 1 DATUM: CGVD28

	ARTE MPLE	D : May 25, 2011 ETED : May 25, 2011							WALKER DRILLING 03 255 E 592 493			DATU	T 1 OF JM: C	GVD28
	НОБ	SOIL PROFILE				SAM	PLE:			EXCESS ICE	CONTENT, I	PERCENT	ے و لـ	THERMISTE GROUND C
tres)	METI		PLOT	Œ.	监	l	0.3m	RY %	COMMENTS	10 2 		40 	TIONA	FROZEN
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CC	NTENT, PE	RCENT —I wi	ADDITIONAL LAB. TESTING	UNFROZEN
,	<u>8</u>		STR	В	Z		BL(REC	50 100 150 200 250	10 2		40		UNCERTAI
		SEA FLOOR Start of DCPT at -16.07m.		-16.07										
1														
				4.00										4.00
2		END OF DCPT AT -18.03m. Ice thickness = 1.52m		1.96										1.96
		iso anomics instan												
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		GROUNDWATER ELI			s ·		,							
		SHALLOW/SINGLE INST WATER LEVEL (data)	ALLA	TION					P/DUAL INSTALLATION	LOGGED				
		WATER LEVEL (date)					vvAl	ĽΚ	LEVEL (date)	CHECKE	D : MB/s	SMS		THU



STEENSBY INLET - ISLAND BRIDGE

MSIB-A

MSIB-A1

MSIB-A2*

MSIB-B

MSIB-B DCPT

MSIB-C

MSIB-C DCPT

MSIB-D

MSIB-D DCPT

MSIB-P1(2)

SI-RL-004

SI-MHS-008



^{*} Core photographs not available.

RECORD OF BOREHOLE MSIB-A

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION

May 2, 2011 STARTED May 4, 2011 COMPLETED :

DRILLER: BOART LONGYEAR N 7 800 340 E 594 348

SHEET 1 OF 1 DATUM: CGVD28

		TED : May 4, 2011			Γ.	24.			00 340 E 594 348	EXCES	SICE	CONTF	NT, PER		50	GVD28	P
	BORING METHOD	SOIL PROFILE	 		Ľ	SAM	PLE	_				oice	:		AL NG	THERMISTE GROUND CO	7. 1C
DEPTH SCALE (metres)	MET		STRATA PLOT	(m)	띪	וט	BLOWS/0.3m	RECOVERY %	COMMENTS	10	2			10 	ADDITIONAL LAB. TESTING	FROZEN	
부)	RING	DESCRIPTION	ATA.	ELEV. (m)	NUMBER	TYPE	/SMC	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WAT wp I		NTENT	, PERCE		VDDI.	UNFROZEN	- 5
5	BOF		STR,	Ш	ž		BLC	REC	50 100 150 200 250	10	2	0 :	30 4	WI 10	Δ,	UNCERTAIN	ı
		SEA FLOOR	\Box	-12.37													,
		wei															
		granitic boulder (230 mm)															I
1																	
- 1			***		1	RUN	1	35									
2																	
3		frequent cobbles and boulders, grey															
	<u>ق</u>	Squarit condition and bounders, grey															
,	Sol:																
[asing,				2	RUN	1	93									
5	NW/NQ Casing/Coring				٦												
' [Z																
	_																
6																	
,			,,,,,														
		D. W. DEDDGGG		7.70	3	RUN	1		TCR=62% SCR=39% RQD=26%							7.70	
:		Possible BEDROCK															
,		END OF BOREHOLE AT -21.37m.	NX	9.00		-	-										
		Casing lost. Borehole abandoned and restarted (MSIB-A1) 1m to the west.															
10		Ice thickness = 2.10m															
1		Note: Bottom of borehole elevation and top of															
' '		bedrock elevation unconfirmed as survey of bottom of hole could not be performed after															
		casing lost.															
2																	
13																	
14																	
15																	
6																	
7																	
'																	
8																	
9																	
\perp		I GROUNDWATER ELE	 \/^¬	I ON C	Ļ												
)		,	_									
		SHALLOW/SINGLE INSTA SHALLOW/SING	LLA	TION					P/DUAL INSTALLATION		GGED			rte/Fleury	/		
		WATER LEVEL (date)					WA	IER	LEVEL (date)	CH	IECKE	D :	MB/SMS	3		THUR	

RECORD OF BOREHOLE MSIB-A1

Mary River Project **PROJECT**

Project No. 19-1605-126

Steensby Inlet - Island Bridge LOCATION

May 4, 2011 DRILLER: BOART LONGYEAR STARTED SHEET 1 OF 1 May 5, 2011 N 7 800 340 E 594 348 DATUM: CGVD28 COMPLETED

DESCRIPTION	ш	8	SOIL PROFILE				SAM	PLE	S		EXCESS ICE CONTENT, PERCENT	. (2)	THERMISTER/ GROUND CON
SEA ELCOW, The wested out more precise of general cables, and boulders (SOOmm nax.) 1 Rum 10	scAL es)	ĒŢ		TO-	ē	~		3m	% ×		ice 10 20 30 40	STINC	FROZEN
SEA ELCOW, The wested out more precise of general cables, and boulders (SOOmm nax.) 1 Rum 10	metr	2 0 ≥	DESCRIPTION	IA PI	V. (n	MBEF	/PE	/S/0	VER	COMMENTS DYNAMIC CONF PENETRATION	WATER CONTENT, PERCENT	ĮĘĘ.	UNFROZEN
SEAR COCK		30RII		TRAI	ELE	Ž	Ĺ	3LOV	ECO	RESISTANCE PLOT		88	UNCERTAIN [
New Content of the	\dashv	Ť	SEA FLOOR	S	-12 37	\vdash			ď	50 100 130 200 230		╁	
3 4 7 7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1		minor pieces of gravel, cobbles, and		12.01								
1 RUN 10 Figure	2												
Section Sect						1	RUN		10				
Reserve	5												
9 Pink 2 RUN TCR=100% SCR=67% RQD=46% 10 3 RUN TCR=100% SCR=43% RQD=34% 12 4 RUN TCR=100% SCR=70% RQD=65% 5 RUN TCR=100% SCR=46% RQD=29% 14.63 5 RUN TCR=100% SCR=46% RQD=29% 16 17 18 18 18 18 10 10 10 10	6	oring											
9 Pink 2 RUN TCR=100% SCR=67% RQD=46% 10 3 RUN TCR=100% SCR=43% RQD=34% 12 4 RUN TCR=100% SCR=70% RQD=65% 5 RUN TCR=100% SCR=46% RQD=29% 14.63 5 RUN TCR=100% SCR=46% RQD=29% 16 17 18 18 18 18 10 10 10 10	7	NQ Casing/C	GRANITE, slightly weathered to fresh,		7.67								7.67
3 RUN TCR=100% SCR=43% RQD=34% 4 RUN TCR=100% SCR=70% RQD=65% 5 RUN TCR=100% SCR=46% RQD=29% END OF BOREHOLE AT 27.00m. Ice thickness = 2.10m TCR=100% SCR=43% RQD=34% TCR=100% SCR=46% RQD=29%	9	N N	medium to coarse grained, pink to greyish			2	RUN			TCR=100% SCR=67% RQD=46%			
12	10												
13 4 RUN TCR=100% SCR=70% RQD=65% TCR=100% SCR=46% RQD=29% TCR=100%	11					3	RUN			TCR=100% SCR=43% RQD=34%			
14 5 RUN TCR=100% SCR=46% RQD=29% TCR=100%	12					4	RUN			TCR=100% SCR=70% RQD=65%			
15 END OF BOREHOLE AT 27.00m. 14.63 16 17 18 18 18 19 19 19 19 19	14					5	RUN			TCR=100% SCR=46% ROD=29%			
17 18	15		END OF BOREHOLE AT 27.00m. Ice thickness = 2.10m	<u> </u>	14.63								
	16												
	17												
			GROUNDWATER ELI			Ó				P/DUAL INSTALLATION LEVEL (date)	LOGGED : Sivak/Harte/Fleur CHECKED : MB/SMS	у	THURB



RECORD OF BOREHOLE MSIB-A2

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION STARTED

May 7, 2011 May 11, 2011 DRILLER: WALKER DRILLING N 7 800 340 E 594 349

SHEET 1 OF 1 DATUM: CGVD28

		TED : May 11, 2011 SOIL PROFILE				SAMI			00 340 E 594 349	EXCESS ICE		NT, PERC	DATU		THERMISTE
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	WATER C	20 3 ONTENT, W 20 3	PERCEN	NT I	ADDITIONAL LAB. TESTING	GROUND CO FROZEN UNFROZEN UNCERTAIN
1		SEA FLOOR SAND, trace clay, trace silt, trace organic matter, loose, grey, wet		-12.41	1	ss	8	21	Grain Size Analysis: Gr 0%/ Sa 94%/ Si & Cl 6%		0				
2					2	ss	2	5							
	Casing/Coring	GRAVEL, some sand, some silt, dense, grey, wet	8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	3.70		SS RUN	32	43	Grain Size Analysis: Gr 80%/Sa 19%/ Si & Cl 1%	Φ					
5	NW/NQ	SAND, silty, trace clay, trace gravel pieces, compact, grey, wet		4.99	2	SS RUN		17	Grain Size Analysis: Gr 69%/Sa 24%/ Si & Cl 7%	0					
7		COBBLES and BOULDERS		6.40		RUN		39	Grain Size Analysis: Gr 77%/Sa 21%/ Si & Cl 1%	0					
9	+	END OF BOREHOLE AT -21.27m. Hole abandoned at 21.27m. Possible bedrock at 21.27m, unable to continue	2004	8.86	l	RUN									8.86
10		bedrock at 21.27ff, unable to continue coring to prove bedrock. lce thickness =													
12															
13															
15															
16 17															
18															
19		GROUNDWATER ELE													
		☐ SHALLOW/SINGLE INSTA	ALLA	TION					P/DUAL INSTALLATION LEVEL (date)	LOGGE CHECK		Peters/Ho MB/SMS	olmes		THUR



RECORD OF BOREHOLE MSIB-B

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION STARTED

April 29, 2011 April 29 2011

DRILLER: BOART LONGYEAR N 7 800 364 F 594 390

SHEET 1 OF 1 DATUM: CGVD28

	MPLE	TED : April 29, 2011					N	7 80	00 364 E 594 390			JM: C	GVD28
щ	ДOР	SOIL PROFILE			5	SAM	PLE	S		EXCESS ICE CON	TENT, PERCENT ice	٥٦	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10 20 UNATER CONTE	30 40	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
1		SEA FLOOR CLAY, silty, some sand, very soft, grey		-9.20	1	ss	0		-limited recovery	0			
·2 3 ·4 5		SAND, trace gravel, trace silt		4.00	2	SS			Grain Size Analysis: Gr 1%/ Sa 97%/ Si & Cl 2%	0			
6 7	ing/Coring								-casing filled with sediments, advanced casing to 16.2m				
9	NW/NQ Casing/coring								-SPT abondoned, advanced casing to 19.2m				
11		GRANITIC GNEISS, slightly weathered, strong, foliated, coarse grained		11.42		RUN	ı		TCR=100% SCR=97% RQD=77%				11.42
13 14 15		fractures at 45° and 60°			2	RUN	ı		TCR=100% SCR=79% RQD=76%				
16		END OF BOREHOLE AT -25.57m. Ice thickness = 1.80m		16.37									
17													
19		GROUNDWATER ELE			 }	<u> </u>	Z D	EE	P/DUAL INSTALLATION	LOGGED :	Gilarski/McFarlar	ne/Krome	er/Hol

RECORD OF BOREHOLE MSIB-B DCPT

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION STARTED

May 17, 2011 May 17, 2011

DRILLER: WALKER DRILLING N 7 800 366 E 594 389

SHEET 1 OF 1 DATUM: CGVD28

COI									JU 366 E 594 389	EVOESS !	CE CONTE	NT DED			
لِـ	HOD	SOIL PROFILE	.		5	SAM	_			EXCESS I			CENI	ا دُو ا	THERMISTEI GROUND CO
res)	MET.		,LOT	Ê	ĸ.).3m	% 从	COMMENTS	10 			40 	NOI STIN	FROZEN
met .	NG	DESCRIPTION	ITAF	EV. (.	IMBE	ΓΥPE	WS/C	OVEF	DYNAMIC CONE PENETRATION		CONTEN	Γ, PERCE		DDIT B. TE	UNFROZEN
5	BOR		STRA	ELI	₹		BLO	3ECC	50 100 150 200 250	wp — 10	20	30 4		₹5	UNCERTAIN
\Rightarrow		SEA FLOOR	37	-9.36				Ë	1 1 1						
		Start of DCP1 at -9.36m.													
1															
	0 DESCRIPTION SEA FLOOR Sea FLOOR														
2	SOUNDWATER ELEVATIONS SAMPLES														
SOULPROFILE May 17, 2011 SAMPLES SAMPL															
SCALOGO South Propriet South Propr															
DESCRIPTION															
SOIL PROFILE SAMPLE SAMP															
SOIL PROFILE SAMPLES SAMPLES SOIL PROFILE SOIL PROFILE SAMPLES SOIL PROFILE															
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SOLINOPILE SOL															
SOLIPROPILE SAMPLES SOLIPROPILE SAMPLES SOLIPROPILE SAMPLES SOLIPROPILE SAMPLES SOLIPROPILE SAMPLES SOLIPROPILE SOLIPR															
SOLUPROPIES May 17, 2011 SAMPLES SAMPL															
7									\						
SOL PROPIED : May 17, 2011 SAMPLES SAMP															
SALE CONTROL SALE PROPRIE SAL															
SOLUTION SOLUTION SAMPLES SOLUTION															
9															.
Description South Converged South Converge					9.54										
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			'ALLA	TION											
		WAIER LEVEL (date)					vvA	IER	LEVEL (date)	CHEC	KED :	MB/SMS	<u> </u>		THUR

RECORD OF BOREHOLE MSIB-C

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge DRILLER: BOART LONGYEAR

Project No. 19-1605-126

STARTED COMPLETED

LOCATION

May 1, 2011 May 1, 2011

N 7 800 389 E 594 428

SHEET 1 OF 2 DATUM: CGVD28

ш	9	SOIL PROFILE			,	SAM	PLE	S		EXCESS I	CE CONTE		CENT	. (7)	THERMISTER GROUND CO	الار الار
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	. (m)	BER	, 등	3/0.3m	RECOVERY %	COMMENTS	10 L WATER		30 4 	0 L NT	ADDITIONAL LAB. TESTING	FROZEN	
DEP1	BORIN	DESCRIPTION	TRAT/	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOV	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp —	o <u>w</u>	——— v		ADD LAB.	UNCERTAIN	=
	Ī	SEA FLOOR	0)	-7.45				ш	1 10 100 200 200							-
1		little recovery, occasional gravel, cobbles, and boulders			1	RUN	I	10								
3 4 5 6					2	RUN		10								
7					3	RUN	ı	10								
9 10 11	NW/NQ Casing/Coring				4	RUN		10								
12 13		GRANITE , highly weathered to fresh, massive, coarse grained, red/grey/white		12.55					-heaving sand						12.55	
14 15					5	RUN			TCR=100% SCR=64% RQD=47%							
16 17		horizontal to subvertical joints			6	RUN	I		TCR=100% SCR=49% RQD=16%							
18 19					7	RUN	I		TCR=100% SCR=78% RQD=62%							
		GROUNDWATER EL							P/DUAL INSTALLATION LEVEL (date)	LOGG		Kromer MB/SMS			THUE	RE



RECORD OF BOREHOLE MSIB-C

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION STARTED

May 1, 2011

DRILLER: BOART LONGYEAR

SHEET 2 OF 2

CC	MPLETED :	May 1, 2011		N 7 80	00 389 E 594 428	DATU	JM: CGVD28
щ	GOI	SOIL PROFILE		SAMPLES		EXCESS ICE CONTENT, PERCENT ice	THERMISTER/ GROUND COND.
DEPTH SCAL (metres)	SORING METH	DESCRIPTION	TRATA PLOT ELEV. (m)	NUMBER TYPE SLOWS/0.3m ECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	10 20 30 40 WATER CONTENT, PERCENT WP	PROJECT FROZEN UNFROZEN UNCERTAIN

DEPTH SCA (metres)	BORING MET	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	V	⊥ ′ATER CC vp ├──	DNTENT	I , PERCE ——— I v	ADDITION/ LAB. TESTII	FROZEN UNFROZEN UNCERTAIN
		END OF BOREHOLE AT 27.44m. Ice thickness = 2.20m													
- 21															
-22															
23															
-24															
25															
-26															
27															
-28															
- 29															
-30															
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-32 -															
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35															
-36															
37															
-38															
39															
- 39		GROUNDWATER ELE			S		<u> </u>		P/DUAL INSTALLATION						
		* SHALLOW/SINGLE INSTA	1LLA	TION					LEVEL (date)		LOGGED		Kromer MB/SMS		THURBER



RECORD OF BOREHOLE MSIB-C DCPT

Mary River Project **PROJECT**

Project No. 19-1605-126

Steensby Inlet - Island Bridge LOCATION

May 17, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 17, 2011 N 7 800 378 E 594 417 DATUM: CGVD28 COMPLETED :

	ОО	SOIL PROFILE			S	AMI	PLE	S		EXCESS ICE CONTENT, PERCENT	. (1)	THERMISTER GROUND COM
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	10 20 30 40 10 10 10 10 10 10 10		FROZEN UNFROZEN UNCERTAIN
\dashv	M	SEA FLOOR	ST		Щ		BI	R	50 100 150 200 250	10 20 30 40	<u> </u>	
\dashv	+	Start of DCPT at -8.44m.		-8.44					<u> </u>			
1									\			
									1			
2												
,												
3												
4)			
5									/			
6									}			
				6.95								6.95
7		END OF DCPT AT -15.39m. Ice thickness = 1.67m		2.00					•			0.00
3												
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9												
10												
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19												
\perp		CDOLINDWATER ELE			Щ							
		GROUNDWATER ELE			•	•	7 _					
		SHALLOW/SINGLE INSTA	\LLA	HON					P/DUAL INSTALLATION LEVEL (date)	LOGGED : - CHECKED : MB/SMS		THURE



RECORD OF BOREHOLE MSIB-D

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

April 23, 2011

DRILLER: BOART LONGYEAR April 28, 2011

N 7 800 408 E 594 410

SHEET 1 OF 1 DATUM: CGVD28

<u>.</u>	ᄋ	SOIL PROFILE			,	SAM	PLE			EX	CESS IC		ice	T, PER	CENT	٦ <u>٥</u>	THERMISTE GROUND CO	:R/ ON
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250		10 VATER wp I— 10	20	30 L ENT, F	PERCE		ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN	
		SEA FLOOR	1,,,,	-7.92														_
1		CLAY (inferred), some gravel (inferred), occasional cobbles and boulders 320 mm granite boulder			1	RUN	I	25										
3		boulders, no fines recovered			2	RUN		10										
4				5.00														
6	oring	minor gravel, subrounded, subangular, no fines recovered			3	RUN	ı	2										
7 8	NW/NQ Casing/Coring				4	RUN	l											
	Ž	200 mm boulder, no fines recovered		8.67	5	RUN	ı		TCR=60% SCR=31% RQD=0% UCS=156MPa								8.67	
9 10 11 12		GRANITIC GNEISS, fresh, massive, medium grained, pinkish grey			6	RUN	ı		TCR=100% SCR=83% RQD=70% UCS=211MPa									
13					7	RUN			TCR=100% SCR=75% RQD=65%									
_																		
15 <u> </u>		END OF BOREHOLE AT -23.07m. BOREHOLE CAVED TO -9.60m. Ice thickness = 2.50m		15.15														
17																		
18																		
19																		
		GROUNDWATER ELE	EVAT	IONS	<u></u>			1			1	ı			I			ĺ
		SHALLOW/SINGLE INST WATER LEVEL (date)	'ALLA	TION					P/DUAL INSTALLATION LEVEL (date)		LOGG	ED :		arte/Gila			THUR	

RECORD OF BOREHOLE MSIB-D DCPT

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge

Project No. 19-1605-126

LOCATION STARTED

May 17, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

CO	MPLE	TED : May 17, 2011							00 408 E 594 410				JM: C	GVD28
4	HOD	SOIL PROFILE				SAM	PLE			EXCESS ICE	CONTENT, P	ERCENT	و د	THERMISTER GROUND COM
(metres)	BORING METHOD		STRATA PLOT	Œ.	监		J.3m	RECOVERY %	COMMENTS	10 2	30	40 	ADDITIONAL LAB. TESTING	FROZEN
me!	SING	DESCRIPTION	ATA F	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVEF	DYNAMIC CONE PENETRATION RESISTANCE PLOT		NTENT, PER	CENT -I wl	DDIT B. TE	UNFROZEN
	BOF		STR/	П	ž	ľ	BLC	REC	50 100 150 200 250	10 2	30	40	4 5	UNCERTAIN
		SEA FLOOR Start of DCPT at -7.97m.		-7.97										
		Start G. D. G. T.												
1														
									>					
2														
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5									\					
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'														
,									\					
,									(
				8.73										8.73
,		END OF DCPT AT -16.81m. Ice thickness = 1.68m		3.70	1									0.75
0														
1														
2														
3														
4														
15														
Ĭ														
6														
17														
8														
19														
		I GROUNDWATER ELI	EVA1	ION:	<u></u>									
		∇ SHALLOW/SINGLE INST			-	3	<u>_</u> _	FFI	P/DUAL INSTALLATION	100055	, 11=6	00		
		WATER LEVEL (date)	,,LL/1						LEVEL (date)	LOGGED CHECKE				THURI

RECORD OF BOREHOLE MSIB-P1(2)

Mary River Project **PROJECT**

Steensby Inlet - Island Bridge LOCATION

May 6, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 7, 2011 N 7 800 359 E 594 331 COMPLETED DATUM: CGVD28

щ	ОО	SOIL PROFILE				SAM	PLE	S		EXC	ESS ICE	CONTE		CENT	ں ا	THERMISTER/ GROUND CON
DEPTH SCALE (metres)	BORING METHOD		LOT	<u></u>	~		3m	% /			10 2	20 3		10	ADDITIONAL LAB. TESTING	FROZEN
TH (NG N	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONF PENETRATION	V	ATER C	ONTENT	PERCE	NT	E E	UNFROZEN
	ORII		IRA]	ELE	Ž	←	P	0	DYNAMIC CONE PENETRATION RESISTANCE PLOT		vp	0 3		vl IO	AB	UNCERTAIN
_		SEA FLOOR	S		_		М	~	50 100 150 200 250		10 2	1	10 4	-		
-		very little recovery, fines washed out minor pieces of gravel, cobbles, and		-9.97					-total recovery within overburden = 2.10m							
		minor pieces of gravel, cobbles, and boulders														
1																
.2																
3																
٦																
4																
								40								
5								19								
6																
7																
8	ring															
	g/Co															
9	Sasin															
Ŭ	NW/NQ Casing/Coring															
10	Ň	GRANITIC GNEISS slightly weathered to		9.76												9.76
10		GRANITIC GNEISS slightly weathered to fresh, weakly foliated, coarse grained, subhorizontal to subvertical joints, pinkish	M		1	RUN	1		TCR=100% SCR=58% RQD=21%							
, ,		grey	M													
11																
.			\bowtie		2	RUN	1		TCR=100% SCR=80% RQD=51%							
12			M													
13			M													
					3	RUN	1		TCR=100% SCR=84% RQD=64%							
14			\gg													
			M		4	RUN	1		TCR=100% SCR=100% RQD=64%							
15																
			M													
16			M													
					5	RUN	1		TCR=100% SCR=95% RQD=94%							
17			M													
				17.70												
18		END OF BOREHOLE AT 27.67m. Ice thickness = 1.65m	ľ	17.70												
		100 allomicas – 1.00III														
19		Note: Borehole MSIB-P1 was abandoned.														
וט		Note: Borehole MSIB-P1 was abandoned. New borehole (MSIB-P1(2)) was drilled 1m from the original location.														
		GROUNDWATER ELE	VAT	IONS	<u></u>							•				
		$\overline{egin{array}{c} egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} arra$				7	Z n	EFI	P/DUAL INSTALLATION		LOGGEI	· ·	Kromer/H	Hossain		
		WATER LEVEL (date)	, \						LEVEL (date)		CHECKE		MB/SMS			THURS
		()									JOI\L					THURE



Project No. 19-1605-126

RECORD OF BOREHOLE SI-RL-004

PROJECT : Mary River Project

Steensby Inlet - Railway Loop

Project No. 19-1605-126

LOCATION : Steensby Inlet - Rail
STARTED : August 13, 2011

COMPLETED :

August 13, 2011

DRILLER: WALKER DRILLING, D-50 N 7 800 424 E 594 482 SHEET 1 OF 1 DATUM: CGVD28

C	JIVIP	LETED : August 13, 2011					IN	1 0	00 424 E 594 462					DATE	IIVI. C	3VD28
.E	QQ	SOIL PROFILE			;	SAM	PLE	s		EXC	ESS ICE	CONTE oice	NT, PER	CENT	ں ا	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		LOT	Ê	œ.		.3m	% ኢ≀	COMMENTO	1	10			10 I	ADDITIONAL LAB. TESTING	FROZEN
TH (NG N	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	NS/0	VER	COMMENTS DYNAMIC CONE PENETRATION			ONTENT	, PERCE		三二。	UNFROZEN 💹
DEF	80 N		STRATA PLOT		₹	-	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	W 1	/p	0 ₩		wl 40	A A	UNCERTAIN
	H	GROUND SURFACE	10	1.71	\vdash		+-	IK.	30 100 130 200 230				1		-	
-		no recovery		1.71												
						RUN	J	0								
- 1					']									-
-		COBBLES and BOULDERS, granitic, fines		1.60	-											
-2		washed out	0	1												-
ŀ	$ _{-} $				2	RUN	1	33								
- 3	d D		100													
	NQ Diamond Drill		000													
- -4	2 Dis		60		3	RUN	1	50								-
	Ž		20	4.55												
- 5		no recovery			١.]									
					4	RUN	1									
: -6																
					5	RUN	١	64								
				7.10												7.10
- 7	H	END OF BOREHOLE AT 7.10m. BOREHOLE ABANDONED AS TIDE WAS		1 7.10												7.10
		RISING AND LOCATION WOULD SOON BE UNDER WATER.														
-8 [BE GNDER WATER.														-
- 9 -																
- 10																-
-																
- 11																•
12																-
- - 13																
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- 17																•
− 18																-
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-																
-	ш	GROUNDWATER ELE	VA	TIONS	_				<u>I</u>			1		1	<u> </u>	
l			, \		_	_	_									

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Selman CHECKED : MB



RECORD OF BOREHOLE SI-MHS-008

Mary River Project **PROJECT**

Project No. 19-1605-126

Steensby Inlet - Material Handling and Storage LOCATION

August 14, 2011 DRILLER: BOART LONGYEAR, LM-55 STARTED August 14, 2011 N 7 800 290 E 594 224 COMPLETED :

SHEET 1 OF 1 DATUM: CGVD28

$\overline{}$		TED : August 14, 2011			г	0.4		_	00 290 E 594 224	EXCE	SS ICF	CONTF	NT, PER			GVD28	EP/
A L F	BORING METHOD	SOIL PROFILE	Τ μ	1	Ľ	SAM	1					ice	:		NG AL	THERMISTE GROUND C	ON
DEPTH SCALE (metres)	ME		STRATA PLOT	Œ)	Ä	سِ ا	BLOWS/0.3m	RECOVERY %	COMMENTS	10				10 	ADDITIONAL LAB. TESTING	FROZEN	12
# E	RING	DESCRIPTION	RATA	ELEV. (m)	NUMBER	TYPE)WS	SOVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WA		ONTENT OW	, PERCE		ADDI AB. T	UNFROZEN	500
٥	8 8		STR	Ш	Z		BL(REC	50 100 150 200 250	10				10	, ,	UNCERTAIN	<u>ч</u> Г
		GROUND SURFACE SAND/SILT (INFERRED), some gravel to		6.39													_
		SAND/SILT (INFERRED), some gravel to gravelly, with cobbles and boulders (<590mm), granitic, fines washed out, subrounded, beige, grey, pink															
1		subrounded, beige, grey, pink															
					1	RUN	1	17									
.2																	
3																	
4					,	RUN		21									
					_	KUN	•	21									
5	_																
	d Dri																
6	NQ Diamond Drill																
!	g g																
7					3	RUN	1	34									
8																	
9				9.41											FI		
		GRANITIC GNEISS, slightly weathered, strong, closely spaced joints, grey with pink and light grey sub-horizontal foliations		3.41											1 0		
10		and light grey sub-horizontal foliations			4	RUN	1	89	TCR=100% SCR=100% RQD=85%						0		
															2		
11															2 1		
				11.92	5	RUN			TCR=100% SCR=100% RQD=100%						1 3	11.92	
12		END OF BOREHOLE AT 11.92m.														-	
.																	
13																	
14																	
<u>, </u>																	
15																	
,																	
16																	
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ופו																	
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		GROUNDWATER ELE			3												
		$\overline{igspace}$ shallow/single insta	ALLA	TION					P/DUAL INSTALLATION	Lo	OGGED) :	Dunstan				١
		WATER LEVEL (date)					WA	ΓER	LEVEL (date)	С	HECKE	D :	KS			THUR	R



Borehole MSIB-A



Photo 1: Core Box #1 of 2 (Runs 1-3, 0.0m – 6.2m)



Photo 2: Core Box #2 of 2 (Run 3, 6.2m – 9.0m)



Borehole MSIB-A1



Photo 1: Core Box #1 of 2 (Runs 1-3, 0.0m – 11.3m)



Photo 2: Core Box #2 of 2 (Runs 3-5, 11.3m – 14.6m)



Borehole MSIB-B



Photo 1: Core Box #1 of 2 (Runs 1-2, 11.4m – 13.4m)



Photo 2: Core Box #2 of 2 (Run 2, 13.4m – 16.4m)



Borehole MSIB-C



Photo 1: Core Box #1 of 3 (Runs 1-5, 0.0m – 15.2m)



Photo 2: Core Box #2 of 3 (Runs 6-7, 15.2m – 19.6m)



Photo 3: Core Box #3 of 3 (Run 7, 19.6m – 20.0m)



Borehole MSIB-D



Photo 1: Core Box #1 of 3 (Runs 1-4, 0.0m – 7.9m)



Photo 2: Core Box #2 of 3 (Runs 5-6, 7.9m – 12.4m)



Photo 3: Core Box #3 of 3 (Run 7, 12.4m – 15.2m)



Borehole MSIB-P1(2)



Photo 1: Core Box #1 of 3 (Runs 1-2, 0.0m – 12.0m)



Photo 2: Core Box #2 of 3 (Runs 2-5, 12.0m - 16.0m)



Photo 3: Core Box #3 of 3 (Run 5, 16.0m – 17.7m)



Borehole SI-RL-004



Photo 1: Core Box #1 of 1 (Runs 1-4, 0.0m – 7.1m)



Borehole SI-MHS-008



Photo 1: Core Box #1 of 2 (Runs 1-4, 0.0m – 11.0m)



Photo 2: Core Box #2 of 2 (Runs 4-5, 11.0m – 14.7m)



STEENSBY INLET - BASE CASE ORE DOCK

MSOD-F DCPT

MSOD-I DCPT

MSOD-J DCPT

MSOD-K DCPT

MSOD-L DCPT

MSOD-S DCPT

MSOD-V DCPT

MSODP-9*

MSODP-9(2)



^{*} Core photographs not available.

RECORD OF BOREHOLE MSOD-F DCPT

Mary River Project **PROJECT**

Steensby Inlet - Base Case Ore Dock

Project No. 19-1605-126

LOCATION

May 14, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 14, 2011 N 7 799 325 E 592 849 DATUM: CGVD28 COMPLETED :

щ	Q Q	SOIL PROFILE			5	SAM	PLE			EXCESS ICE CONTENT, PERCENT THERM	IISTER/ ND CONI
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	10	N □ DZEN ③
		SEA FLOOR Start of DCPT at -34.28m.		-34.28							
1 2 3									-rods sank under weight of the hammer from elev34.28 to -38.40m		
4											
5 6											
7											
8 9		END OF DCPT AT -42.36m. Ice thickness = 1.20m		8.08 _.							8.08
10											
11											
13											
14											
15											
16 17											
19											
18		GROUNDWATER ELE			<u>L</u> S				P/DUAL INSTALLATION LEVEL (date)	LOGGED : Peters CHECKED : MB/SMS	IURB



RECORD OF BOREHOLE MSOD-I

Mary River Project **PROJECT**

Project No. 19-1605-126

Steensby Inlet - Base Case Ore Dock LOCATION

May 14, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 May 14, 2011 N 7 799 333 E 592 734 DATUM: CGVD28 COMPLETED :

		,,											
	ac	SOIL PROFILE				SAM	PLE	S		EXCESS ICE CONTENT, P	ERCENT		THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		15				Ε	%	1	10 20 30	40	ADDITIONAL LAB. TESTING	GROUND COND.
1 SC	ME		STRATA PLOT	ELEV. (m)	NUMBER	ш	BLOWS/0.3m	RECOVERY %	COMMENTS				FROZEN
E E	<u> </u>	DESCRIPTION	Α	≥.	MB	TYPE	WS/	Š	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, PER		O O	UNFROZEN 🔯
씸	l %		TR/		z	-	310	EC	50 100 150 200 250	wp	→ wl 40	₹5	UNCERTAIN
\vdash	H	SEA FLOOR	- S	-	-		ш	2	50 100 150 200 250		$\overset{\cdot }{+}$	+-	
			1000	-31.06								+-	
•		CLAY, silty, with sand, some gravel, low sea floor plasticity, grey											
ļ.													
<u> 1</u>													-
ŀ				1					rada contrundos visight of the hammer				
ŀ									-rods sank under weight of the hammer from elev31.06 to -33.40m				-
-2	ρ												
ŀ	NW/NQ Casing/Coring				1	ss	48		Grain Size Analysis: Gr 12%/Sa 31%/ Si 34%/ Cl 22%	' '	9		
- 3)/gu				\vdash		H						
1	Casi	Start of DCDT at 24 40m	_ <i>POS</i> 2	3.34	-				,				1
ŀ	ğ	Start of DCPT at -34.40m.							[(
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-6													<u> </u>
ŀ				6.44									6.44
F		END OF DCPT AT -37.50m. Ice thickness = 1.60m		1	1				1				
7		ice thickness = 1.60m											-
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4		GROUNDWATER ELE	-VA7	TIONS	3								

 \overline{Y} SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Holmes CHECKED : MB/SMS



RECORD OF BOREHOLE MSOD-J DCPT

Mary River Project **PROJECT**

Steensby Inlet - Base Case Ore Dock

Project No. 19-1605-126

LOCATION STARTED

May 13, 2011

DRILLER: WALKER DRILLING May 13 2011 N 7 799 253 F 592 696

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	ETED : May 13, 2011					N	7 7	99 253 E 592 696		UM: CO	GVD28
щ	ДO	SOIL PROFILE			5	SAM	PLE	s		EXCESS ICE CONTENT, PERCENT ice	ا ن	THERMISTER/ GROUND COND
DEPTH SCALE (metres)	BORING METHOD		LOT	n)	2		.3m	% ∖.	COMMENTO	10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
met (met	NG	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	VER	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, PERCENT		UNFROZEN
	BORI		STRATA PLOT	ELE	N	-	BLO/	RECOVERY %	RESISTANCE PLOT	wp	\(\frac{1}{2}\)	UNCERTAIN
		SEA FLOOR		-28.20				Ē				
		CLAY , silty, with sand, low plasticity, very soft, grey		0.60	1	ss	3		Grain Size Analysis: Gr 2%/ Sa 55%/ Si 20%/ Cl 23%	 		
. 1		Start of DCPT at -28.80m.	1/2//	0.00					1 /			
!												
-2												
-									[]			
. 3												
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. 5				5.20								5.20
-		END OF DCPT AT -33.40m. Ice thickness =		0.20	1							0.20
-6												
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		GROUNDWATER ELE	VA	IONS	<u></u>							
		$\overline{egin{array}{c} egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} \egin{array}{c} arra$				7		EE	P/DUAL INSTALLATION	LOGGED : Holmes		
-18 · 19		WATER LEVEL (date)	- •						LEVEL (date)	CHECKED : MB/SMS		THURBE
												moki



RECORD OF BOREHOLE MSOD-K DCPT

Mary River Project **PROJECT**

Steensby Inlet - Base Case Ore Dock

Project No. 19-1605-126

LOCATION STARTED

May 13, 2011

DRILLER: WALKER DRILLING

SHEET 1 OF 1

COI	MPLE	TED : May 13, 2011			_				99 090 E 592 620	EV0506 105 0	ONITE		JM: C	GVD28
<u> </u>	НОО	SOIL PROFILE	<u> </u>			SAM				EXCESS ICE C	oice	, PERCENI	405	THERMISTEI GROUND CO
(metres)	MET.		2LOT	Œ	H.		J.3m	% X>	COMMENTS	10 20	30	40 	NOI!	FROZEN
me (me	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CON	ITENT, P	PERCENT wl	ADDITIONAL LAB. TESTING	UNFROZEN
i	BOF		STR,	Ш	ž	Ĺ	BLC	REC	50 100 150 200 250	10 20	30	40	< 5	UNCERTAIN
\exists		SEA FLOOR Start of DCPT at -30.89m.	\blacksquare	-30.89					-rods sank under the weight of the					
									-rods sank under the weight of the hammer from elev30.89 to -33.38m					
1														
2														
3														
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4									/					
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^									\rangle					
3		END OF DCPT AT -36.70m.	+	5.81										5.81
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		GROUNDWATER ELI	 F\/∆7	IONS	<u></u>			<u> </u>						
		∇ shallow/single inst			-	3	<u> </u>)	P/DUAL INSTALLATION	100055		lm a a		
		WATER LEVEL (date)	ALLA	· IOIN					LEVEL (date)	LOGGED CHECKED		olmes B/SMS		



RECORD OF BOREHOLE MSOD-L DCPT

PROJECT : Mary River Project

Steensby Inlet - Base Case Ore Dock

Project No. 19-1605-126

LOCATION : Steensby II
STARTED : May 15, 20

May 15, 2011 DRILLER: WALKER DRILLING
May 15, 2011 N 7 799 008 E 592 581

SHEET 1 OF 1 DATUM: CGVD28

	OMPLE	ETED : May 15, 2011				٥.,			99 008 E 592 581						JM: C	GVD28
ш	8	SOIL PROFILE			5	SAM	PLES	S		EXC	ESS IC	E CONTE		CENT	. (2)	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	BORING METHOD		TO_	Ē	~		3m	%			10	20 ice		40	ADDITIONAL LAB. TESTING	FROZEN
PTH (N S N	DESCRIPTION	TAPI	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	VER	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	V	ATER (CONTENT	, PERCI		E E	UNFROZEN 🔛
핌	BORI		STRATA PLOT	ELE	₽	-	BLO/	RECOVERY %	RESISTANCE PLOT	'	vp	20 W		wl 40	4 3	UNCERTAIN
		SEA FLOOR		-27.43												
-		Start of DCPT at -27.43m. Note: When rods were pulled from the hole they were bent. Results are not likely representative of actual conditions. Ice thickness = 1.88m							-no resistance							
1		representative of actual conditions. lce thickness = 1.88m														
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GROUNDWATER ELEVATIONS

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Holmes
CHECKED : MB/SMS



RECORD OF BOREHOLE MSOD-S DCPT

Mary River Project **PROJECT**

Project No. 19-1605-126

Steensby Inlet - Base Case Ore Dock LOCATION

May 11, 2011 STARTED COMPLETED : May 11, 2011

DRILLER: WALKER DRILLING N 7 799 152 E 592 710

SHEET 1 OF 1 DATUM: CGVD28

		TED : May 11, 2011			_				99 152 E 592 710 I	EXC	ESS ICE	CONTE	NT. PEF		JM: CO	
لٍ	된	SOIL PROFILE	<u></u>		5	SAM	_	_				oice	9		NG A	THERMISTER GROUND COI
DEPTH SCALE (metres)	ME		PLO.	Œ	Ä	ш	.0.3m	RY %	COMMENTS				1	40 	TION ESTI	FROZEN
Ĕ	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT		ATER C /p ├──				ADDITIONAL LAB. TESTING	UNFROZEN
1	9 8		STR	Ш			BLC	REC	50 100 150 200 250		10 :			40		UNCERTAIN
-		SEA FLOOR SAND, silty, trace clay, trace gravel,	4.47	-23.44					Grain Size Analysis:							
		dense, grey, wet			1	ss	40	38	Gr 27%/Sa 45%/ Si 21%/ Cl 6%		φ					
				1.20												
		Start of DCPT at -24.64m.														
.									/							
,																
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3)							
									(
									1/							
-	+	END OF DCPT AT -31.88m.	+	8.44												8.44
0																
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9		GROUNDWATER ELE)	•	,									
		SHALLOW/SINGLE INST. WATER LEVEL (data)	ALLA	TION					P/DUAL INSTALLATION		LOGGE		Peters	_		
		WATER LEVEL (date)					٧٧A	ı ck	LEVEL (date)		CHECK	-D :	MB/SMS	S		THUR



RECORD OF BOREHOLE MSOD-V DCPT

Mary River Project **PROJECT**

Steensby Inlet - Base Case Ore Dock

Project No. 19-1605-126

LOCATION STARTED

May 14, 2011 May 14, 2011

DRILLER: WALKER DRILLING N 7 799 194 E 592 586

SHEET 1 OF 1 DATUM: CGVD28

		TED : May 14, 2011 SOIL PROFILE				SAM			99 194 E 592 586 	EXCESS ICE	CONTE	NT, PERO	DATU		
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	10 2 L WATER CC wp L	0 3 L ONTENT	80 4 , PERCE	0 	DDITIONA B. TESTIN	THERMISTE GROUND CO FROZEN UNFROZEN UNCERTAIN
\dashv	<u>ш</u>	SEA FLOOR	S.	-21.18			ш	22	50 100 150 200 250			-	Ĭ		
		Start of DCPT at -21.18m.		21.10					/						
1		END OF DCPT AT -22.71m.		1.53											1.53
2		Ice thickness = 2.13m													
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19		GROUNDWATER ELE	=\/^+	IONIC	Ĺ										
		GROUNDWATER ELE)				P/DUAL INSTALLATION LEVEL (date)	LOGGED CHECKE		Holmes MB/SMS			THUR



Mary River Project **PROJECT**

Steensby Inlet - Base Case Ore Dock

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

May 24, 2011 May 24, 2011

DRILLER: WALKER DRILLING N 7 799 011 E 592 577

SHEET 1 OF 1 DATUM: CGVD28

		SOIL PROFILE			-	SAM	PLE	S		EXC	ESS ICE					THERMISTER/ GROUND COND
DEPTH SCALE (metres)	BORING METHOD		Ю.	_			_	_			10 :	oice 20 3		10	ADDITIONAL LAB. TESTING	GROUND CONE
TH S	Ğ	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION	v	/ATER C		, PERCE	L :NT	DITIO	UNFROZEN
	ORIN	DECORU HON	TRAT	ELE	N	}	LOW	ECO	DYNAMIC CONE PENETRATION RESISTANCE PLOT	,	wp			vl IO	ADI	UNCERTAIN
	<u> </u>	SEA FLOOR	S.	-27.83			<u> </u>	~	50 100 150 200 250		10 /					
		SILT, clayey, some sand, trace black gravel, very soft, medium grey, saturated	m		1	ss	50/	80								
		END OF BOREHOLE AT 28.50m.	Ш	0.67			.250	,								0.67
1		Note: Borehole abandoned as casing sheared off.														
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		∇ SHALLOW/SINGLE INSTA			-	_	Z r)FE	P/DUAL INSTALLATION		10005		Durs-1			
		WATER LEVEL (date)	\LLA	IION					LEVEL (date)		LOGGE		Dunstan MB/SMS			THURST
		·/							· , ,				, 51410			THURBE



RECORD OF BOREHOLE MSODP-9(2)

PROJECT : Mary River Project

LOCATION : Steensby Inlet - Base Case Ore Dock

 STARTED
 :
 May 25, 2011
 DRILLER:
 WALKER DRILLING

 COMPLETED
 :
 May 25, 2011
 N 7 799 047 E 592 606

SEA FLOOR	THERMISTER/ GROUND COND. FROZEN UNFROZEN UNCERTAIN
SEA FLOOR -30.19 CLAY, gravelly, stiff, grey, moist to wet	UNFROZEN UNFROZEN UNCERTAIN
SEA FLOOR -30.19 CLAY, gravelly, stiff, grey, moist to wet	UNCERTAIN .
SEA FLOOR -30.19 CLAY, gravelly, stiff, grey, moist to wet	
CLAY, gravelly, stiff, grey, moist to wet	
SAND medium to coope grained	
SAND, medium to coarse grained, compact, grey, wet SAND, medium to coarse grained, compact, grey, wet 2.40 COBBLES, BOULDERS, and GRAVEL, population of the project of t	
COBBLES, BOULDERS, and GRAVEL, P 2.40	
3 With pinkish segments 0 1 2.91 2 83 32 100	
boulders	3.35
END OF BOREHOLE AT -33.54m. Borehole abandoned as rods and casing	
· broke.	
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GROUNDWATER ELEVATIONS	

GROUNDWATER ELEVATIONS

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Webster CHECKED : MB/SMS



Project No. 19-1605-126

SHEET 1 OF 1

DATUM: CGVD28

Borehole MSODP-9(2)



Photo 1: Core Box #1 of 1 (Run 1, 2.9m – 3.4m)



STEENSBY INLET - ALTERNATE ORE DOCK

MSOOD-A (no log)

Sea Floor Elevation -35.35 m. Hole ended when casing broke off.

SI-OLD-004

SI-OLD-005

SI-OLD-006

SI-OLD-007

SI-OLD-008



Mary River Project **PROJECT**

AZIMUTH: INCLINATION: Steensby Inlet - Ore Loading Dock

LOCATION STARTED

August 8, 2011

DRILLER: BOART LONGYEAR, LM-55 August 8, 2011

SHEET 1 OF 2 DATUM CGVD28

Project No. 19-1605-126

(metres)	BORING METHOD	DESCRIPTION	SYMBOLIC LOG	ELEV. (m)	UN No.	PENETRATRATION RATE (m/min)	H COLOUR WRETURN	CL SH VN	-CLEA -SHE -VEIN	ERY	R.Q.D.	J-JO P-PC S-SL	ULT INT DLISHE ICKEN RACT. NDEX	ISIE		SM-SMOOTH FO-FOLIATED R-ROUGH UE-UNEVEN ST-STEPPED W-WAVY PL-PLANAR C-CURVED DISCONTINUITY DATA	poorfined	Compressive Strength (Mpa)	FIELD/LABORATO TESTING RESULTS Point Load Test Diametral Point Load Test Axial
ק ק	BORII		SYM	Ш	LE.	PENETF	FLUSH	CORE		SOLID ORE %	8848	PE	R.3 m	C	OIP wrt ore Axis	TYPE AND SURFACE DESCRIPTION		366	Axial ■ Laboratory UCS Test
		GROUND SURFACE		4.54						11230212		Ĭ	Щ	Ĭ	I	L (05) in	1	Ť	
1 2		GRANITIC GNEISS, faintly weathered, moderately wide horizontal foliation, strong, pink with dark and light grey foliations			1											J, open (25mm), irregular J, closed, planar, horizontal J, planar, diagonal J, planar, horizontal J, closed, planar, horizontal			
3		slightly weathered			2											J, closed, irregular, horizontal J, closed, irregular, horizontal, weather J, closed, diagonal, black staining J, closed, black crystalline intrusion J, closed, black crystalline intrusion	ed		
5																J, closed, irregular, diagonal, black staining			
6												1 1				J, open, sub-vertical, weathered (5.48 t 5.69m) J, open, diagonal, weathered	o		
7					3											J, closed, sub-horizontal, black staining			
3								_								J, closed, sub-horizontal J, 2mm aperture, stepped, vertical, silt (8.23 to 10.36m)	infill		
9 10 11	NQ Diamond Drill	becoming coarse grained			4														
12 13		strong to very strong, wide spacing			5											J, closed, horizontal, weathered J, sub-vertical, weathered (12.06 to 12.25m)			
14												a				J, closed, horizontal, black staining J, closed, horizontal, black staining			
15					6														
16 17																			
18																			
19					7														
		GROUNDWATER ELI	EVAT	IONS	<u></u>	<u> </u>			10	160161666		1	111	Ш		<u> </u>			
		SHALLOW/SINGLE INST WATER LEVEL (date)	'ALLA	ΓΙΟΝ						JAL I EL (da	NSTA	LL	ATI	10	1	LOGGED : Dunstan/	Hill		



RECORD OF BOREHOLE SI-OLD-004 Mary River Project **PROJECT** Project No. 19-1605-126 INCLINATION: AZIMUTH: Steensby Inlet - Ore Loading Dock LOCATION DRILLER: BOART LONGYEAR, LM-55 STARTED August 8, 2011 SHEET 2 OF 2 August 8, 2011 N 7 798 314 E 592 879 COMPLETED DATUM CGVD28 FIELD/LABORATORY TESTING RESULTS Point Load Test FR-FRACTURE CL-CLEAVAGE F-FAULT J-JOINT SM-SMOOTH R-ROUGH FO-FOLIATED UE-UNEVEN BORING METHOD DEPTH SCALE (metres) SYMBOLIC LOG SH-SHEAR VN-VEIN P-POLISHED S-SLICKENSIDED ST-STEPPED PL-PLANAR W-WAVY ENETRATRATION ELEV. (m) Š C-CURVED DESCRIPTION RUNI Diametral FRACT INDEX PER .3 RECOVERY DISCONTINUITY DATA ▲ Point Load Test Axial TOTAL SOLIC TYPE AND SURFACE DESCRIPTION ■ Laboratory UCS Test 50 150 8848 8848 2242 ୦ ନିତ୍ରର GROUND SURFACE 21 23 100mm white silt/sandy silt infill at 23.23m J, 100mm of white sandy silt infill 24 25 27 10 28 29 30 31 32 END OF BOREHOLE AT 32.23m. 32.23 33 34 35 36 37 38 39

GROUNDWATER ELEVATIONS

☐ SHALLOW/SINGLE INSTALLATION
WATER LEVEL (date)

5126.GPJ 11/9/11

ROCKM(5126)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan/Hill CHECKED : MB



PROJECT : Mary River Project

Steensby Inlet - Ore Loading Dock

INCLINATION: AZIMUTH:

Project No. 19-1605-126

LOCATION : STARTED :

August 9, 2011

DRILLER: BOART LONGYEAR, LM-55

SHEET 1 OF 2

	MPLE	ETED : August 10, 2011		L	71 \11		. вод 17798 :				-101-00				I CGVD28
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	SYMBOLIC LOG	ELEV. (m)	RUN No.	(m/min) COLOUR	CL-CLE SH-SHI VN-VEI	N VERY	J. P S	FAULT JOINT -POLISHE -SLICKEN FRACT. INDEX PER .3 m	ISIDED	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR DISCONTINUIT		Unconfined Compressive Strength (Mpa)	FIELD/LABORATORY TESTING RESULTS Point Load Test Diametral Point Load Test Axial
DEF	BORI		SYN	"		PENETRA r	TOTAL CORE %	SOLID SOLID	8848	PER .3 m	DIP wrt Core Axis	TYPE ANI DESC	D SURFACE RIPTION	50 100 150	-1-6
- 1		GROUND SURFACE GRANITIC GNEISS, faintly weathered, closely spaced sub-horizontal foliation, strong, pink, white and grey		4.05	1							J, closed, sub-vertic (0.12 to 0.24m) J, 3 parallel, closed 0.84m) J, open, 4mm silty ii		ТП	
-2 - 3 - 4					2							J, open, 3mm, diago J, closed, diagonal, J, closed, diagonal, J, closed, irregular, weathering	black staining black staining		
- 5 - 6 - 7		becoming strong to very strong, widely spaced foliation			3					Fr		J, closed, horizonta			-
- - - - - - - - - - - - - - - - - - -	d Drill	becoming very coarse grained moderately weathered			4							J, closed, horizonta J, closed, horizonta J, closed, horizonta J, closed, vertical, r 9.36m)	I to sub-horizontal I to sub-horizontal I to sub-horizontal	D	-
-10 -11	NQ Diamond Drill			-								J, closed, vertical, r 10.39m) J, closed, horizonta	ed weathering (9.98 to	o l	-
- 13					5							J, closed, horizonta J, open, 2mm, horiz			-
15		becoming fresh			6							J, closed, horizonta J, open, 3mm, horiz J, open, 2mm, irreg	contal		-
- 17 - 18		biotite schist, dark grey banding (150mm) at 16.6m			7							J, open, 2mm, irreg J, closed, sub-horiz	ular, horizontal	37	
- 19												J, closed, planar, di			-

GROUNDWATER ELEVATIONS

ROCKM(5126) 5126.GPJ 11/9/11

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan/Hill
CHECKED : MB

THURBER

Mary River Project **PROJECT**

Steensby Inlet - Ore Loading Dock

AZIMUTH: INCLINATION:

Project No. 19-1605-126

STARTED

LOCATION

August 9, 2011

DRILLER: BOART LONGYEAR, LM-55

SHEET 2 OF 2 August 10, 2011 COMPLETED N 7 798 331 E 592 860 DATUM CGVD28 FIELD/LABORATORY
TESTING
RESULTS
Point Load Test FR-FRACTURE CL-CLEAVAGE F-FAULT J-JOINT SM-SMOOTH R-ROUGH FO-FOLIATED UE-UNEVEN BORING METHOD SYMBOLIC LOG SH-SHEAR VN-VEIN P-POLISHED S-SLICKENSIDED ST-STEPPED PL-PLANAR DEPTH SCAL W-WAVY ENETRATRATION (metres) ELEV. (m) Š C-CURVED DESCRIPTION RUN Diametral FRACT INDEX PER .3 RECOVERY DISCONTINUITY DATA ▲ Point Load Test Axial TOTAL SOLID TYPE AND SURFACE DESCRIPTION ■ Laboratory UCS 50 150 8848 8848 2458 ୦ ନିତ୍ରର GROUND SURFACE J, closed, planar, vertical (20.23 to 20.46m) 21 23 24 J, closed, planar, sub-vertical, black 25 weathering (24.90 to 25.02m) J, closed, planar, diagonal, grey and black weathering (25.89 to 25.96m) J, sub-vertical, 70° J, sub-vertical, 70° 27 10 J, sub-vertical, 70° J, horizontal J, horizontal 28 J, sub-vertical, 70° 29 J. horizontal 30 J, horizontal J, sub-vertical J, sub-vertical 31 J, sub-vertical 32 END OF BOREHOLE AT 31.96m. 31.96 33 34 35 36 37 38 39

GROUNDWATER ELEVATIONS

 \overline{Y} SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

5126.GPJ 11/9/11

ROCKM(5126)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan/Hill CHECKED MB



Mary River Project **PROJECT**

AZIMUTH: INCLINATION:

LOCATION

Steensby Inlet - Ore Loading Dock August 10, 2011 DRILLER: BOART LONGYEAR, LM-55 STARTED SHEET 1 OF 2 August 11, 2011 N 7 798 409 E 592 876 DATUM CGVD28 COMPLETED :

		ETED : August 11, 2011			_	ш		7 798 409 E						SW SWOOTH EO EOLIATED			т	CGVD28
DEPTH SCALE (metres)	BORING METHOD		SYMBOLIC LOG	Œ.	9	PENETRATRATION RATE (m/min)	COLOUR S RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN		F-FAU J-JOIN P-POU S-SLI	NT LISHE		ED.	SM-SMOOTH FO-FOLIATED R-ROUGH UE-UNEVEN ST-STEPPED W-WAVY PL-PLANAR C-CURVED		Unconfined Compressive	ith (Mpa)	FIELD/LABORATO TESTING RESULTS • Point Load Test
metre	NG M	DESCRIPTION	BOLL	ELEV. (m)	RUN No.	RATRA'	را ا	RECOVERY	R.Q.D.		ACT. DEX R .3 m			DISCONTINUITY DATA		Unconf	Strengt	Diametral ▲ Point Load Test
5	30RII		SYM	ш	۳ ا	ENETF	LUS	TOTAL SOLID CORE %	%	- 1		1	P wrt e Axis	TYPE AND SURFACE DESCRIPTION	- 1			Axial Laboratory UCS Test
\dashv	"	GROUND SURFACE	$\vdash \vdash$	9.09	\vdash	Δ.	Щ.	8848 8848	8848	₹ 20 1	11	0.5	888		-	100	15	Test
\dashv		GRANITIC GNEISS, slightly weathered, fine to medium grained foliation, strong,	M	5.08							\parallel	\parallel	$\parallel \parallel$			$\parallel \parallel$	$\dagger \dagger$	
		pinkish grey to black															$\ $	
1					1													
2														J, sub-horizontal J, sub-vertical, 80°				
		heavily fractured zone from 2.3m to 2.6m moderately weathered, sub-vertical foliation												J, Sub-vertical, 60				
3																		
4					2					33				J, closed, sub-vertical, rusty weatherin (3.97 to 4.18m)	g			
														J, closed, sub-vertical, rusty weatherin (4.45 to 4.64m)	g			
5		becoming grey biotite schist at 4.89 to 5.38m															$\ $	
		0.0011																
6														J, sub-vertical J, sub-vertical				
														J, sub-vertical				
7					3												$\ $	
														J, horizontal				
8														J, horizontal			$\ $	
					\vdash	\vdash											$\ $	
9	_																$\ $	
														J, sub-vertical				
10	NQ Diamond Drill				4													
i	<u> </u>																	
11	2													J, sub-vertical				
					\vdash	\vdash	<u> </u>											
12														J, sub-vertical, 60°				
-																		
13					5												$\ $	
٠٠																		
14																	$\ $	
'4																		
15																	$\ $	
انا		100mm white silty sand seam at 15.35m																
,		mile sity band boall at 10.0011			6													
16																		
_		fractures have silty sand infill from 16.6m to																
17		17.3m																
		most fractures have trace silty sand infill from 17.38 to 20.38m																
18																	$\ $	
					_													
19					7												$\ $	
		GROUNDWATER ELE	<u>K//1</u> Vat	IONS	<u></u>	<u> </u>					Ш	Ш	Ш		!	Ш	Ш	
		∇ SHALLOW/SINGLE INSTA				•	<u> </u>	EEP/DUAL I	NOT!	\ I I -	\ T 1/	יאר						
		WATER LEVEL (date)	ALLA I	ION				EEP/DUAL I ER LEVEL (da		\LL/	4 I I (JΝ		LOGGED : Hill CHECKED : MB				
		**************************************					/ ۱۱	, , ua	,					CHECKED . IVIB				THUR



Project No. 19-1605-126

RECORD OF BOREHOLE SI-OLD-006 Mary River Project **PROJECT** Project No. 19-1605-126 INCLINATION: AZIMUTH: Steensby Inlet - Ore Loading Dock LOCATION August 10, 2011 DRILLER: BOART LONGYEAR, LM-55 STARTED SHEET 2 OF 2 August 11, 2011 N 7 798 409 E 592 876 COMPLETED DATUM CGVD28 FIELD/LABORATORY TESTING RESULTS Point Load Test FR-FRACTURE CL-CLEAVAGE F-FAULT J-JOINT SM-SMOOTH R-ROUGH FO-FOLIATED UE-UNEVEN BORING METHOD DEPTH SCALE (metres) SYMBOLIC LOG SH-SHEAR VN-VEIN P-POLISHED S-SLICKENSIDED ST-STEPPED PL-PLANAR W-WAVY ENETRATRATION ELEV. (m) Š C-CURVED RUN DESCRIPTION Diametral RECOVERY DISCONTINUITY DATA ▲ Point Load Test Axial TOTAL SOLID TYPE AND SURFACE DESCRIPTION ■ Laboratory UCS Test 50 150 150 8848 8848 2458 ୦ ନିତ୍ରର GROUND SURFACE 21 23 24 25 26 27 10 28 29 30 31 32 33 12 34 35 36 13 37 38 END OF BOREHOLE AT 38.38m. 38.38 39 **GROUNDWATER ELEVATIONS** \overline{Y} SHALLOW/SINGLE INSTALLATION ▼ DEEP/DUAL INSTALLATION LOGGED : Hill WATER LEVEL (date) WATER LEVEL (date) CHECKED : MB

5126.GPJ 11/9/11

ROCKM(5126)

Mary River Project **PROJECT**

INCLINATION: AZIMUTH:

LOCATION STARTED

August 11, 2011

Steensby Inlet - Ore Loading Dock

DRILLER: BOART LONGYEAR, LM-55

SHEET 1 OF 2

Project No. 19-1605-126

August 11, 2011 COMPLETED

N 7 798 424 E 592 840

DATUM CGVD28

DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	SYMBOLIC LOG	ELEV. (m)	N No.	RATION RATE v/min)	COLOUR % RETURN	FR-FRA CL-CLE SH-SHE VN-VEIN	AVAGE AR I	J- P- S-	FAUL JOINT POLIS SLICE	T SHED KENS)	SM-SMOOTH FO-FOLIATED R-ROUGH UE-UNEVEN ST-STEPPED W-WAVY PL-PLANAR C-CURVED	onfined	Compressive Strength (Mpa)	FIELD/LABORATO TESTING RESULTS Point Load Test Diametral
UEP II	BORING	·	SYMBC	ELE	RUN No.	PENETRAT (m	FLUSH		SOLID CORE %	R.Q.D. %	FRA IND PER	EX .3 m	DIP Core	Axis	DISCONTINUITY DATA TYPE AND SURFACE DESCRIPTION	1	100 Con 150 Stre	-1-6
		GROUND SURFACE	\top	2.93		П					ŤΤ	Ì	ΤÏ	Ĭ		Ť	Ť	1000
1 2		GRANITIC GNEISS, moderately weathered, closely spaced sub-horizontal foliation, strong, pinkish grey highly fractured at 0.45m to 0.64m			1										J, open, fresh (0.84 to 0.91m) J, closed, sub-vertical, white weathering (0.95 to 2.10m) J, closed, diagonal, fresh			
3 4 5		highly fractured, some sand infill in open joints, sub-vertical joint running through 80% of run			2													
6					3										J, open, diagonal, black weathering J, open, diagonal, black weathering J, open, diagonal, black weathering J, closed, vertical, weathered (6.80 to 6.90m) J, closed, vertical, weathered (7.11 to 7.20m) J, open, vertical, weathering and infill (7.32 to 8.40m)			
9	Diamond Drill	dark grey biotite schist zones, slightly weathered			4										J, closed, irregular, diagonal, weathered			
11	ON	highly fractured biotite schist at 10.43m to 10.56m becoming slightly weathered, moderately spaced foliation													J, closed, diagonal, brown weathering			
13 14 15					5										J, open, irregular, vertical, brown weathering (12.98 to 13.23m) J, closed, diagonal J, closed, sub-vertical, black weathering (14.29 to 14.40m) J, closed, planar, vertical, brown weathering (14.62 to 14.87m)			
16					6										J, closed, diagonal, weathered			
17 18		becoming very coarse grained													J, closed, diagonal, weathered (17.52 to 17.78) J, closed, diagonal, black weathering			
19		biotite seam with diagonal closed joint at 18.74 to 18.89m			7										J, closed, diagonal, black weathering J, closed, sub-vertical, black weathering (19.50 to 19.60m)			
		GROUNDWATER ELE			5	_	,											
		$\stackrel{ extstyle op}{=}$ SHALLOW/SINGLE INSTA	ALLAT	ΓΙΟΝ				EEP/DI			_LA	TIC	NC		LOGGED : Dunstan CHECKED : MB			THURE



PROJECT : Mary River Project

Steensby Inlet - Ore Loading Dock

INCLINATION: AZIMUTH:

Project No. 19-1605-126

LOCATION : STARTED :

August 11, 2011

DRILLER: BOART LONGYEAR, LM-55

SHEET 2 OF 2

DESCRIPTION Available Point L Axial	CON	MPLE	TED : August 11, 2011						7	798	42	4 E	Ξ 5	92	840)						DAT	ΓUΜ	CGVD28
21	DEPTH SCALE (metres)	30RING METHOD	DESCRIPTION	SYMBOLIC LOG	ELEV. (m)	RUN No.	ENETRATRATION RATE (m/min)	LUSH COLOUR WRETURN	TO	CL-CL SH-SH VN-VE RECO OTAL ORE %	EAV. HEAR EIN OVER	RY OLID	R	.Q.D.	FR IN PEI	LISHE CKEN ACT. DEX R .3 m	NSID Co	IP wri	- 1	R-ROUGH ST-STEPPED PL-PLANAR DISCONTINUIT TYPE ANI	UE-UNEVEN W-WAVY C-CURVED Y DATA D SURFACE	- 1		FIELD/LABORATORY TESTING RESULTS Point Load Test Diametral Point Load Test Axial Laboratory UCS Test
21 white crystaine infit from 21.5 m to 21.5 m to 21.5 m to 22.5 m to 25.5 m to 25.5 m to 22.5 m to 25.5 m	\vdash	Ť	GROUND SURFACE	\vdash		_	_	-	188	348	188	348	18	848	11	 	P	888 	3			- 1	111 356	Test
24 E E E E E E E E E	-22		white crystaline infill from 21.3m to 21.5m			8														J, closed, vertical, b to 20.48m) J, closed, horizontal J, open, 3mm, white weathered (21.34 to	lack weathering (20 , black weathering e crystalline infill, (21.55m)).40		-
27 -28 -29 -30 -31 -32 -33 -34 -35 -36 -36 -37 -38	- 25	NQ Diamond Drill	becoming faintly weathered			9														J, closed, irregular, J, closed, irregular,	horizontal, fresh			-
biotite schist banding (<300mm) 11 32 END OF BOREHOLE AT 32.40m. 32.40 END OF BOREHOLE AT 32.40m. 32.40 33 34 35 36 37	-28					10													Н					
-34 -35 -36 -37 -38	-30 -31		biotite schist banding (<300mm)			11														J, closed, irregular, J, closed, sub-vertice				
-36 -37 -38	-34		END OF BOREHOLE AT 32.40m.		32.40																			
39																								
GROUNDWATER ELEVATIONS	- 39																							

GROUNDWATER ELEVATION

ROCKM(5126) 5126.GPJ 11/9/11

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan
CHECKED : MB



Mary River Project PROJECT

INCLINATION: AZIMUTH: Steensby Inlet - Ore Loading Dock

LOCATION STARTED

August 12, 2011

DRILLER: BOART LONGYEAR, LM-55

SHEET 1 OF 2

Project No. 19-1605-126

August 12, 2011 COMPLETED

N 7 798 489 E 592 891

DATUM CGVD28

(metres)	METHOD	DESCRIPTION	IC LOG	· (m)	No.	ATION RATE	COLOUR % RETURN	FR-FRACTURE CL-CLEAVAGE SH-SHEAR VN-VEIN	,	F-FAUI J-JOIN P-POLI S-SLIC	T ISHEI		SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR	FO-FOLIATED UE-UNEVEN W-WAVY C-CURVED	Unconfined Compressive	gth (Mpa)	FIELD/LABORATO TESTING RESULTS Point Load Test
(metr	BORING METHOD	DESCRIPTION	SYMBOLIC LOG	ELEV. (m)	RUN	PENETRATRATION R (m/min)	_	RECOVERY TOTAL SOLID CORE % CORE % 8898 8898		PER	CT. 3 m	DIP wri	DESCI	/ DATA D SURFACE RIPTION	50 Uncor 100 Comp	- 1	Diametral ▲ Point Load Test Axial ■ Laboratory UCS Test
\dashv	\top	GROUND SURFACE	\Box	5.80			_	8040 8040	8040	1 5 -	<u> </u>	111			15	T	rest
1		GRANITIC GNEISS, moderately weathered, medium grained, closely spaced foliation, strong, pink with grey			1								J, closed, planar, su weathering (0.00 to	b-vertical, black 0.34m)			
3		heavily weathered zones, frequent black biotite schist seams, frequent sub-vertical bands			2												
4		slightly weathered															
5		dark grey biotite schist zones, highly			3								J, closed, horizontal J, closed, horizontal J, heavily fractured, (5.80 to 6.15m)				
7		fractured zones			4								J, closed, diagonal, to 6.71m)	black weathering (6.52 al, heavily weathered black weathering			
10					5								J, closed, irregular, J, closed, planar, dia weathering (9.31 to J, open, 2mm, sub- weathering (10.75 to	agonal, black 9.47m) vertical, dark brown			
13					6								J, closed, planar, ho weathering J, closed, planar, ho weathering J, closed, irregular, vertical, brown weat 13.16m) J, closed, planar, dia weathering (13.59 ta	rizontal, red neavily fractured, nering (12.93 to			
15		dark grey biotite schist banding broken schist seam, irregular and horizontal			7								J, closed, diagonal, (14.73 to 14.86m)	black weathering			
17		fractured zone some coarse grained zones															
18		Some coalse grained 20165			8								J, open, 2mm, steps weathering J, closed, irregular, weathering (19.57 to	-			
		GROUNDWATER ELE $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$			<u></u> }	<u> </u>		EEP/DUAL	INSTA	LLA	TIC	LIII DN	LOGGE			Ш	



PROJECT : Mary River Project

Steensby Inlet - Ore Loading Dock

INCLINATION: AZIMUTH:

Project No. 19-1605-126

LOCATION : STARTED :

August 12, 2011

DRILLER: BOART LONGYEAR, LM-55

SHEET 2 OF 2

	OMPLI	ETED : August 12, 2011						7 7	98 4														M	CGVD28
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	SYMBOLIC LOG	ELEV. (m)	RUN No.	ENETRATRATION RATE (m/min)	-USH COLOUR % RETURN	F C S	R-FRA CL-CLE CH-SHE N-VEIN RECOV TAL RE %	AVAC AR N /ERY SOL	GE ' .ID E %	R.Q.	J-, P- S- 2.D.	SLIC		SIDE	ED IP wrt re Axi	is	SM-SMOOTH R-ROUGH ST-STEPPED PL-PLANAR DISCONTINUIT' TYPE AND DESCR	FO-FOLIATED UE-UNEVEN W-WAVY C-CURVED Y DATA D SURFACE RIPTION	- 1	Unconfined Compressive	Streng	FIELD/LABORATORY TESTING RESULTS Point Load Test Diametral Point Load Test Axial
	<u> </u>	GROUND SURFACE	+			<u> </u>	<u> </u>	88	348	888	₹8 	88	48	92	11	08	388 	8			\dashv	7 2 2 2 2 2 2 2 2 2	135	■ Laboratory UCS Test
- 21		medium grained with dark grey diagonal foliations			9														J, closed, diagonal, J, closed, sub-vertic (21.41 to 21.52m) J, closed, diagonal, J, closed, diagonal,	al, red weathering				
- 23 - 24 - 25 - 26	NQ Diamond Drill	coarse grained, massive, occasional biotite schist banding			10																			-
-~	1Q Dia																							• •
27		very coarse grained																						-
-28		300mm biotite schist band at 27.75m			11														J, closed, irregular, oweathering (27.45 to J, closed, irregular, oweathering (28.12 to J, closed, irregular, oweathering (28.54 to					<u>-</u>
: - 29 : - -30																			J, closed, planar, su					
- 31		medium grained, with fine seams of dark grey biotite schist bands			12														(30.04 to 31.34m)	b-vertical, iresii				
-32 -33		dark grey biotite schist from 32.61m to 32.24m																	J, closed, planar, dia 32.04m) J, closed, diagonal, (32.15 to 32.35m)	agonal, fresh (31.9 black weathering	7 to			-
-34		fractured zone, weathered at 33.20 to 33.90m			13														J, closed, diagonal, weathering (33.37 to J, closed, sub-vertic (34.45 to 34.80m)	33.50m)	ng			-
- - 35																			(34.43 to 34.6611)					<u>-</u>
: -36 :		END OF BOREHOLE AT 35.61m.		35.61						OKAKA	esA/A													-
37																								<u>.</u> - -
-38 -																								-
- 39																								- - -
\vdash		GROUNDWATER ELE	LLL VAT	IONS	 }			111	Ш	Ш	Ш	Ш	Ш	Ш	11	Ш	Ш	Ц					Ц	

GROUNDWATER ELEVATION

☐ SHALLOW/SINGLE INSTALLATION
WATER LEVEL (date)

ROCKM(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Dunstan
CHECKED : MB





Photo 1: Core Box #1 of 8 (Runs 1-2, 0.0m - 4.2m)



Photo 2: Core Box #2 of 8 (Runs 2-3, 4.2m – 8.2m)



Photo 3: Core Box #3 of 8 (Runs 4-5, 8.2m - 12.0m)





Photo 4: Core Box #4 of 8 (Runs 5-6, 12.0m - 16.5m)



Photo 5: Core Box #5 of 8 (Runs 6-8, 16.5m - 20.9m)



Photo 6: Core Box #6 of 8 (Runs 8-9, 20.9m - 25.2m)



Photo 7: Core Box #7 of 8 (Runs 9-10, 25.2m - 29.2m)





Photo 8: Core Box #8 of 8 (Run 11, 29.2m - 32.2m)





Photo 1: Core Box #1 of 8 (Runs 1-2, 0.0m – 4.3m)



Photo 2: Core Box #2 of 8 (Runs 2-4, 4.3m – 8.4m)

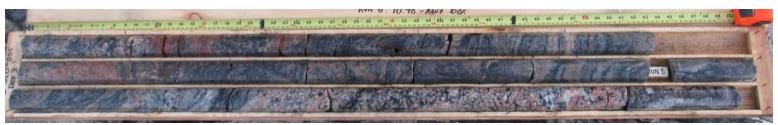


Photo 3: Core Box #3 of 8 (Runs 4-5, 8.4m – 12.6m)





Photo 4: Core Box #4 of 8 (Runs 5-6, 12.6m - 16.9m)



Photo 5: Core Box #5 of 8 (Runs 6-8, 16.9m - 20.8m)



Photo 6: Core Box #6 of 8 (Runs 8-9, 20.8m – 25.1m)





Photo 7: Core Box #7 of 8 (Runs 9-10, 25.1m – 29.0m)



Photo 8: Core Box #8 of 8 (Run 11, 29.0m – 32.0m)





Photo 1: Core Box #2 of 9 (Runs 2-3, 4.1m – 8.4m)



Photo 2: Core Box #3 of 9 (Runs 4-5, 8.4m – 12.7m)

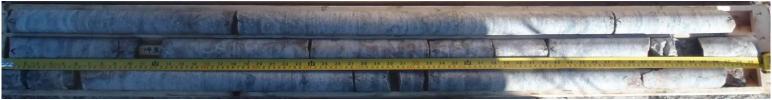


Photo 3: Core Box #4 of 9 (Runs 5-6, 12.7m - 16.9m)



Photo 4: Core Box #5 of 9 (Runs 6-8, 16.9m – 21.1m)





Photo 5: Core Box #6 of 9 (Runs 8-9, 21.1m - 25.4m)

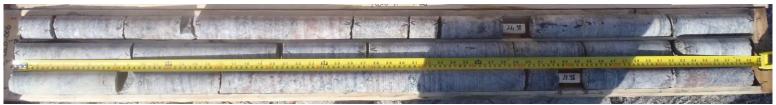


Photo 6: Core Box #7 of 9 (Runs 9-11, 25.4m – 29.7m)



Photo 7: Core Box #8 of 9 (Runs 11-12, 29.7m - 34.1m)



Photo 8: Core Box #9 of 9 (Runs 12-13, 34.1m – 38.4m)





Photo 1: Core Box #1 of 8 (Runs 1-2, 0.0m - 3.9m)



Photo 2: Core Box #2 of 8 (Runs 2-3, 3.9m – 7.3m)



Photo 3: Core Box #3 of 8 (Runs 3-4, 7.3m - 11.4m)





Photo 4: Core Box #4 of 8 (Runs 5-6, 11.4m - 15.6m)



Photo 5: Core Box #5 of 8 (Runs 6-7, 15.6m - 19.8m)



Photo 6: Core Box #6 of 8 (Runs 7-9, 19.8m – 24.0m)





Photo 7: Core Box #7 of 8 (Runs 9-10, 24.0m - 28.1m)

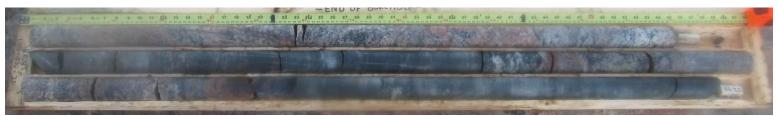


Photo 8: Core Box #8 of 8 (Runs 10-11, 28.1m – 32.4m)





Photo 1: Core Box #1 of 9 (Run 1-2, 0.0m - 4.2m)



Photo 2: Core Box #2 of 9 (Runs 2-4, 4.2m – 8.5m)

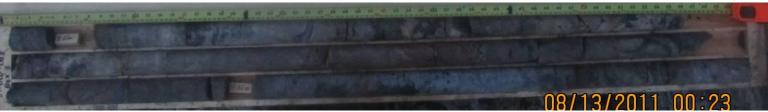


Photo 3: Core Box #3 of 9 (Runs 4-6, 8.5m - 12.6m)





Photo 4: Core Box #4 of 9 (Runs 6-7, 12.6m - 17.0m)



Photo 5: Core Box #5 of 9 (Runs 7-9, 17.0m - 21.2m)



Photo 6: Core Box #6 of 9 (Runs 9-10, 21.2m – 25.3m)



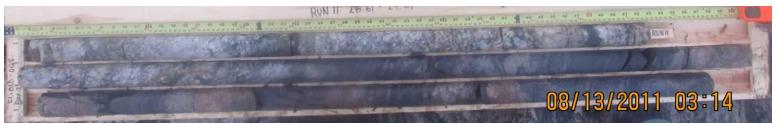


Photo 7: Core Box #7 of 9 (Runs 10-11, 25.3m – 29.3m)



Photo 8: Core Box #8 of 9 (Runs 11-13, 29.3m – 33.7m)



Photo 9: Core Box #9 of 9 (Run 13, 33.7m – 35.6m)



MILNE INLET - FREIGHT DOCK

MMFD-A DCPT

MMFD-B DCPT

MMFD-C*

MMFD-D*

MMFD-D DCPT

MMFD-E*

MMFD-E DCPT

MMFD-F DCPT

MMFD-G DCPT

MMFD-H DCPT

MMFD-I DCPT



^{*} Core photographs not available.

RECORD OF BOREHOLE MMFD-A DCPT

PROJECT Mary River Project

Project No. 19-1605-126

LOCATION Milne Inlet - Freight Dock

STARTED

June 6, 2011 DRILLER: WALKER DRILLING, D-50 N 7 976 759 E 503 911 June 6, 2011

SHEET 1 OF 1 DATUM: CGVD28

CO	MPLE	TED : June 6, 2011							76 759 E 503 911			DATU	JM: CO	
H H	9	SOIL PROFILE			5	SAM	PLE			EXCESS ICE	CONTENT, P	ERCENT	IL IG	THERMISTE GROUND CO
DEPTH SCALE (metres)	BORING METHOD		STRATA PLOT	(E)	띪		0.3m	RECOVERY %	COMMENTS		20 30	40	ADDITIONAL LAB. TESTING	FROZEN
(me	RING	DESCRIPTION	ATA	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER C wp I——	ONTENT, PEF	RCENT —I wl	ADDI1	UNFROZEN
_	8		STF	Ш	_		BL	REC	50 100 150 200 250		20 30	40		UNCERTAIN
		SEA FLOOR Start of DCPT at -22.86m.		-22.86										
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10	-	END OF DCPT AT -32.92m.		10.06					>					10.06
		Ice thickness = 1.60m												
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18		GROUNDWATER ELE			•	•	7 -		D/DIIAL INICTALLATION					
		SHALLOW/SINGLE INSTA WATER LEVEL (date)	ALLA	HON					P/DUAL INSTALLATION LEVEL (date)	LOGGE				
		WATER LEVEL (date)				,	WA٦	ΓER	LEVEL (date)	CHECKI	ED : MB/S	SMS		TH



RECORD OF BOREHOLE MMFD-B DCPT

PROJECT : Mary River Project

Project No. 19-1605-126

LOCATION : Milne Inlet - Freight Dock

STARTED

COMPLETED :

June 6, 2011 June 6, 2011 DRILLER: WALKER DRILLING N 7 976 737 E 504 075 SHEET 1 OF 1 DATUM: CGVD28

	IVIPLE	ETED : June 6, 2011					IN	7 9	9/6/3/ E 304 0/3	DATO	IVI: CC	GVD28
Щ	BORING METHOD	SOIL PROFILE			,	SAM	PLE	_		EXCESS ICE CONTENT, PERCENT	J S	THERMISTER/ GROUND COND.
DEPTH SCALE (metres)	ΛĒΤ		STRATA PLOT	<u> </u>	<u>س</u>		.3m	RECOVERY %	3	10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
TH (√ 10 10 10 10 10 10 10 10 10 10 10 10 10	DESCRIPTION	AP	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	VER	COMMENTS DYNAMIC CONE PENETRATION	WATER CONTENT, PERCENT	E E	UNFROZEN 📉
DEP (JRI]	RAT		Į	←	NO.	000	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp ⊢ → W I wl	PB P	UNCERTAIN
Ш	- M		ST		_	_	面	22	50 100 150 200 250	10 20 30 40	igsqcut	
-		SEA FLOOR Start of DCPT at -23.39m.		-23.39					1,			
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F		END OF DCPT AT -37.00m.	-	13.61	-							13.61]
-14		Ice thickness = 1.75m										-
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+		GROUNDWATER ELE	VA	TIONS	3							
1		Z SHALLOW/SINGLE INSTA		TION		7	7		ED/DITAL INSTALLATION			

THURBER2S(5126) 5126.GPJ 11/9/11

SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

DEEP/DUAL INSTALLATION
WATER LEVEL (date)

LOGGED : Santos
CHECKED : MB/SMS

THURBER

RECORD OF BOREHOLE MMFD-C

Mary River Project PROJECT

Milne Inlet - Freight Dock

Project No. 19-1605-126

STARTED

LOCATION

June 3, 2011 June 5, 2011 DRILLER: WALKER DRILLING N 7 976 748 E 503 852

SHEET 1 OF 2 DATUM: CGVD28

ų	0	SOIL PROFILE			5	SAME	PLES	3		EXC	ESS ICE	CONTE		RCENT	ان	THERMISTE GROUND CO
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	W.	L ATER CO /p I——	0 ; L DNTENT	30 L , PERCI	40 ENT wl 40	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR no recovery		-19.59	1	ss	0	0								
1				1.62	1	55	0									
2		SAND, silty, fine to medium grained, trace gravel, compact, brown, wet		1.02	2	SS	11	77			0					
3		SAND and GRAVEL, coarse grained, compact, brown, wet	***	3.12	3	SS	14	25	Grain Size Analysis: Gr 66%/Sa 33%/ Si & Cl 1% grinding							
4 5		medium to coarse grained, loose, brown to red			4	ss	9	17		0						
5																
7		compact			5	SS	10	25	grinding							
3		SAND, fine to medium grained, some gravel, trace silt, compact, brown, wet	9,9,8	7.62 _.	6	SS	17	75			0					
9	ng/Coring	SAND, fine to medium grained, silty, trace gravel, compact, brown, wet		9.12	7	SS	12	17			0					
10	NW/NQ Casing/Coring	SAND, fine to coarse grained, trace silt,		10.62	8	ss	27	83	Grain Size Analysis: Gr 1%/ Sa 91%/ Si & Cl 8%		0					
11		trace gravel, compact, brown, wet				- 50	-1	3	JO 01 070							
13		occasional cobbles			9	SS	14	0	casing grinding							
14					10	SS	34	100		C	}					
15					11	ss	34	0	casing grinding							
16									. 33							
17 18		coarse grained, very dense			12	ss	59	67			0					
19																
		GROUNDWATER ELE	- ΛΑΤ	IONS												
		SHALLOW/SINGLE INST WATER LEVEL (date)			,				P/DUAL INSTALLATION LEVEL (date)		LOGGE) :	Santos/	Gilarski		f



RECORD OF BOREHOLE MMFD-C

PROJECT : Mary River Project No. 19-1605-126

LOCATION : Milne Inlet - Freight Dock

 STARTED
 :
 June 3, 2011
 DRILLER:
 WALKER DRILLING
 SHEET 2 OF 2

 COMPLETED
 :
 June 5, 2011
 N 7 976 748 E 503 852
 DATUM: CGVD28

		LIED : Gaile 3, 2011					.,		70 740 E 303 032						····· •	0VD20
щ Ё		SOIL PROFILE	lce lce									CENT	٦ Ş	THERMISTER/ GROUND COND.		
DEPTH SCALE (metres)	BORING METHOD		TO.	<u> </u>	~		3m	۲%			0		30 4	40	ADDITIONAL LAB. TESTING	FROZEN
TH 8	2 ≥	DESCRIPTION	A PL	V. (m	NUMBER	TYPE	.0/S/	ÆR	COMMENTS	W	ATER C		, PERCE		ĔĔ.	UNFROZEN
DEP (ORI	22001 1.0.1	STRATA PLOT	ELEV. (m)	Ž	←	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	W	rp I—— 0	O <u>W</u>			AB LAB	UNCERTAIN
<u> </u>	ă		ST				В	R	50 100 150 200 250		-	20	30 4	40	<u> </u>	
-		fine grained sand			13	SS	43	33			0				1	
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21																-
ŀ	ρ															
-22	NW/NQ Casing/Coring															-
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- 23	Ž Ž				14	ss	54	0								
ŀ																
-24																-
ŀ		dense			15	ss	34	25			0					
25		END OF BOREHOLE AT -44.60m.	\vdash	25.01			-									25.01
ŀ		Ice thickness = 1.74m														
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GROUNDWATER ELEVATIONS

SHALLOW/SINGLE INSTALLATION
 WATER LEVEL (date)

THURBER2S(5126) 5126.GPJ 11/9/11

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Santos/Gilarski CHECKED : MB/SMS



RECORD OF BOREHOLE MMFD-D

Mary River Project **PROJECT**

Milne Inlet - Freight Dock

Project No. 19-1605-126

LOCATION STARTED COMPLETED :

June 3, 2011 June 3, 2011

DRILLER: WALKER DRILLING, D-50

N 7 976 728 E 504 004

SHEET 1 OF 1 DATUM: CGVD28

- 1		TED : June 3, 2011			_				76 728 E 504 004	EXC	SS ICE	CONT	NT, PEF		JM: CO	
<u> </u>	HOD	SOIL PROFILE	ļ. I		5	SAM	_			EXCE	.oo ICE	CONTE		NOEINI		THERMISTER GROUND CON
DEPTH SCALE (metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT	W	L ATER Co p I——	20 L DNTEN	30 T, PERC	wl	ADDITIONAL LAB. TESTING	FROZEN UNFROZEN UNCERTAIN
	M	OFA FLOOD	STI		_	_	B	뀖	50 100 150 200 250	1	0 2	20	30	40	$ar{\Box}$	
+	+	SEA FLOOR SAND, silty, some clay, trace gravel, very		-20.39	1	ss	5	100	Grain Size Analysis:		н					
		loose, dark grey to black			<u>'</u>	33	5	100	Gr 3%/ Sa 47%/ Si 35%/ Cl 14%			ľ				
1		SAND, fine to medium grained, trace silt,	Ш	1.26					Grain Size Analysis:							
		trace gravel, very loose, grey, wet			2	SS	4	8	Gr 4%/ Sa 91%/ Si & Cl 6%		0					
2																
,		SAND, medium to coarse grained, trace to		2.76	3	ss	4	5	Grain Size Analysis: Gr 15%/Sa 83%/ Si & Cl 2%		0					
		some gravel, very loose, grey, wet			Ľ		Ė									
1		Jana			4	ss	9	67	Grain Size Analysis: Gr 9%/ Sa 90%/ Si & Cl 1%		0					
		loose														
5																
<u>, </u>																
5	Bull								-casing broke -borehole restarted							
,	Casing/Coring															
	Casil															
8	N/N/N															
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12																
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14									-sand heaving into casing, unable to sample							
'				14.61												14.61
15		END OF BOREHOLE AT -35.00m. Ice thickness = 1.80m														
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		I GROUNDWATER ELE	Ш VA1	L TIONS	<u></u>	1										
		∇ SHALLOW/SINGLE INSTA				Ž	Z D	EEI	P/DUAL INSTALLATION		LOGGEI) :	Gilarski			
		WATER LEVEL (date)							LEVEL (date)		CHECKE		MB/SM	S		THURE



RECORD OF BOREHOLE MMFD-D DCPT

Mary River Project **PROJECT** Project No. 19-1605-126

LOCATION Milne Inlet - Freight Dock

DRILLER: WALKER DRILLING, D-50 STARTED June 4, 2011 N 7 976 728 E 504 004 June 4, 2011 COMPLETED :

SHEET 1 OF 1 DATUM: CGVD28

	٥	SOIL PROFILE				SAM	PLE:	S		EXCESS ICE CONTENT, PERCENT	THERMISTER GROUND COI
DEPTH SCALE (metres)	BORING METHOD	33.211(01)	F					_		10 20 30 40 PA	GROUND COLUMN FROZEN UNFROZEN UNCERTAIN
H SC etres	3 ME	_	PLC	Œ	ЗËR	Й	/0.3r	ERY	COMMENTS	10 20 30 40 20 00 10 10 10 10 10 10 10 10 10 10 10 10	FROZEN
<u> </u>	RING	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, PERCENT wp	UNFROZEN
	B		STR	Ш	Ľ		BLC	REC	50 100 150 200 250	10 20 30 40	UNCERTAIN
		SEA FLOOR		-19.52							
		Start of DCPT at -19.52m.									
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-	+	END OF DCPT AT -36.03m.	+	16.51							16.51
17		END OF DCPT AT -36.03m. Ice thickness = 1.81m									
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19											
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			1	L							
		GROUNDWATER ELE			3					<u> </u>	
		$\overline{igspace}$ shallow/single inst	ALLA	TION		1	Z D	EEF	P/DUAL INSTALLATION	LOGGED : Santos	
		WATER LEVEL (date)							LEVEL (date)	CHECKED : MB/SMS	THURI

RECORD OF BOREHOLE MMFD-E

PROJECT : Mary River Project

Milne Inlet - Freight Dock

Project No. 19-1605-126

STARTED : COMPLETED :

LOCATION

June 5, 2011 June 5, 2011 DRILLER: WALKER DRILLING, D-50

N 7 976 710 E 504 153

SHEET 1 OF 1 DATUM: CGVD28

. I	OD	SOIL PROFILE			S	SAME	PLES	S		EXC	ESS IC		TENT, I ice	PERCENT	່ ຸ ຫ	THERMISTER/ GROUND CON
(metres)	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. (m)	NUMBER	TYPE	BLOWS/0.3m	RECOVERY %	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	W	0 L ATER (p —	20	30 L NT, PE	40 RCENT —I wl 40	ADDITIONAL LAB. TESTIN	GROUND CON FROZEN UNFROZEN UNCERTAIN
		SEA FLOOR		-20.70												
1		SAND, coarse grained, loose to compact, brown, wet			1	SS	12	17			(
2					2	SS	10	0								
3																
		medium grained, trace gravel, loose			3	ss	9	100			0					
5																
,	Coring	coarse grained			4	SS	6	33			0					
,	NW/NQ Casing/Coring				5		_	50								
9	NW				5	SS	,	50			0					
0		compact			6	SS	10	0								
11					7	00	44	0								
2						SS	11	U								
3					8	SS	12	0								
14																
15																
16		END OF BOREHOLE AT -36.50m. Ice thickness = 1.50m	<u> </u>	15.80 _.					-casing broke							15.80
17																
8																
19																

GROUNDWATER ELEVATIONS

☐ SHALLOW/SINGLE INSTALLATION WATER LEVEL (date)

▼ DEEP/DUAL INSTALLATION WATER LEVEL (date)

LOGGED : Gilarski CHECKED : MB/SMS



RECORD OF BOREHOLE MMFD-E DCPT

Mary River Project **PROJECT** Project No. 19-1605-126

Milne Inlet - Freight Dock LOCATION

June 6, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 June 6, 2011 N 7 976 710 E 504 153 DATUM: CGVD28 COMPLETED :

		TED : June 6, 2011			-	.		_	6 710 E 504 153 DATUM: EXCESS ICE CONTENT, PERCENT	
لٍـ	BORING METHOD	SOIL PROFILE	, ,		_ 5	SAM	PLES	_	ice de	THERMISTER GROUND CON
DEP IN SCALE (metres)	MET		107	Ê	<u>ب</u> ي		.3m	% ≿	10 20 30 40 Z	FROZEN [
met (NG	DESCRIPTION	TA P	ELEV. (m)	NUMBER	TYPE	NS/0	VER	COMMENTS DYNAMIC CONE PENETRATION RESISTANCE PLOT 10 20 30 40 WATER CONTENT, PERCENT Wp W W W W W W W W W	UNFROZEN
j _	30RI		STRATA PLOT	ELE	Ñ	<u> </u>	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250 10 20 30 40	UNCERTAIN
\dashv		SEA FLOOR	S				В	ਕੌ	50 100 150 200 250 10 20 30 40	1
\dashv	+	Start of DCPT at -20.98m.	H	-20.98						
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17		END OF DCPT AT -37.75m. Ice thickness = 1.79m								
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		GROUNDWATER ELE	↓ \\∆⊺		<u></u>				I	
18		∇ SHALLOW/SINGLE INSTA			•	•	,		P/DUAL INSTALLATION LOGGED : Santos	
		→ SHALLOW/SINGLE INSTA WATER LEVEL (date)	ALLA	HUN						
		WAILN LEVEL (udle)				,	v v A I	LK.	LEVEL (date) CHECKED: MB/SMS	THURI



RECORD OF BOREHOLE MMFD-F DCPT

Mary River Project **PROJECT** Project No. 19-1605-126

LOCATION Milne Inlet - Freight Dock

June 6, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 N 7 976 709 E 503 903 June 6, 2011 DATUM: CGVD28 COMPLETED :

1		TED : June 6, 2011							76 709 E 503 903	DATUM: CGVD28 EXCESS ICE CONTENT, PERCENT THERMISTE
<u> </u>	BORING METHOD	SOIL PROFILE	1.		_ 5	SAM	PLE	_		EXCESS ICE CONTENT, PERCENT ice ice ice ice ice ice ice ic
DEPTH SCALE (metres)	MET.		LOT	(E	k:		1.3m	%	COMMENTS	10
(met	NG	DESCRIPTION	TAP	ELEV. (m)	NUMBER	TYPE	NS/0	VEF	DYNAMIC CONE PENETRATION	WATER CONTENT, PERCENT
7	30RI		STRATA PLOT	ELE	₹	-	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT 50 100 150 200 250	wp W W Y UNCERTAIN
\dashv	<u> </u>	SEA FLOOR	S	-11.89	\vdash		-	<u>«</u>	- JO 100 130 200 230 -	
\dashv		Start of DCPT at -11.89m.		11.00						
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		GROUNDWATER ELE	VA٦	TIONS	-					
		$\overline{igspace}$ shallow/single inst				Ţ	Z n)FFI	P/DUAL INSTALLATION	LOGGED : Gilarski
		WATER LEVEL (date)	/ \						LEVEL (date)	
		(,							()	CHECKED : MB/SMS THUR



RECORD OF BOREHOLE MMFD-G DCPT

Mary River Project **PROJECT**

DRILLER: WALKER DRILLING

LOCATION Milne Inlet - Freight Dock STARTED

June 6, 2011 June 6, 2011

SHEET 1 OF 1 DATUM: CGVD28

Project No. 19-1605-126

COI	MPLE	TED : June 6, 2011					N	7 9	76 684 E 504 063				UM: C	GVD28
ĮŢ	ПООН	SOIL PROFILE			5	SAMI	_	_			ice	IT, PERCENT	AP NG	THERMISTER GROUND CO
(metres)	BORING METHOD		STRATA PLOT	(m) .	3ER	^щ	BLOWS/0.3m	RECOVERY %	COMMENTS		0 3	0 40 	ADDITIONAL LAB. TESTING	FROZEN
<u>ا</u> ج	ORING	DESCRIPTION	RATA	ELEV. (m)	NUMBER	TYPE	LOWS	COVI	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp I		I wl	ADD LAB.	UNFROZEN UNCERTAIN
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		Start of DCPT at -13.29m.		10.20										
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19		GROUNDWATER ELE			>	•	7 _		P/DUAL INSTALLATION					
		✓ SHALLOW/SINGLE INSTA WATER LEVEL (date)	ALLA	HUN					P/DUAL INSTALLATION LEVEL (date)	LOGGEI		Santos MB/SMS		



RECORD OF BOREHOLE MMFD-H DCPT

Mary River Project **PROJECT**

Project No. 19-1605-126

LOCATION Milne Inlet - Freight Dock

June 6, 2011 DRILLER: WALKER DRILLING STARTED SHEET 1 OF 1 N 7 976 657 E 503 892 June 6, 2011 DATUM: CGVD28 COMPLETED :

پ	ПООН	SOIL PROFILE	1.		5	SAM	_			EXCESS ICE CONTENT, PERCENT	는 무무	THERMISTER/ GROUND CON
(metres)	BORING METHOD		STRATA PLOT	(m)	띪	ш	BLOWS/0.3m	RECOVERY %	COMMENTS	10 20 30 40	ADDITIONAL LAB. TESTING	FROZEN
: E	RING	DESCRIPTION	'ATA	ELEV. (m)	NUMBER	TYPE	/SMC	OVE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	WATER CONTENT, PERCENT wp I————————————————————————————————————	ADDIī AB. T	UNFROZEN
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ļ		END OF DCPT AT -16.92m. Ice thickness = 1.59m			1							
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	-	GROUNDWATER ELE	VA٦	TIONS	3			•			•	
		abla shallow/single inst	ALLA	TION		7	Z D	EEF	P/DUAL INSTALLATION	LOGGED : Gilarski		
		WATER LEVEL (date)							LEVEL (date)	CHECKED : MB/SMS		THURB



RECORD OF BOREHOLE MMFD-I DCPT

Mary River Project **PROJECT**

DRILLER: WALKER DRILLING

STARTED COMPLETED :

LOCATION

June 6, 2011 June 6, 2011

Milne Inlet - Freight Dock

N 7 976 635 E 504 060

SHEET 1 OF 1 DATUM: CGVD28

Project No. 19-1605-126

COI	MPLE	TED : June 6, 2011					N	7 9	76 635 E 504 060		JM: C	GVD28
щŢ	QQ	SOIL PROFILE			-5	SAM	PLE	S		EXCESS ICE CONTENT, PERCENT	ں ا	THERMISTER GROUND COM
DEPTH SCALE (metres)	ÆT.		LOT	ر (ď		3т	% ×		10 20 30 40	ONA	FROZEN
metr .	<u>≥</u>	DESCRIPTION	A PI	V. (n	ABE!	TYPE	/S/0	VER.	COMMENTS DYNAMIC CONE PENETRATION	WATER CONTENT PERCENT	1 Ĕ Ë !	UNFROZEN
<u> </u>	BORING METHOD		STRATA PLOT	ELEV. (m)	NUMBER	F	BLOWS/0.3m	RECOVERY %	DYNAMIC CONE PENETRATION RESISTANCE PLOT	wp	AB LAB	GROUND COI FROZEN UNFROZEN UNCERTAIN
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19		END OF DCPT AT -20.67m. Ice thickness = 1.68m							,			
		I GROUNDWATER ELE	 -\/∆⊺	LIONS	<u></u>	_				<u> </u>		
		SHALLOW/SINGLE INSTA			,	1	7 _		P/DUAL INSTALLATION			
		→ SHALLOW/SINGLE INSTA WATER LEVEL (date)	ALLA	TION					P/DUAL INSTALLATION LEVEL (date)	LOGGED : Gilarski CHECKED : MB/SMS		
		= = . (53.6)							\/	OFFICINED . IVID/OVIO		THUR



APPENDIX C

LABORATORY TEST RESULTS

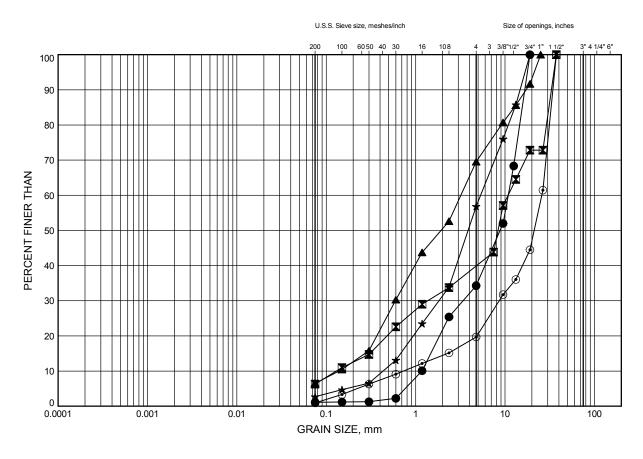
Geotechnical Laboratory Test Results

Point Load Test Results

Analytical Laboratory Test Results (MSFD-P, SS#1)

Mary River Project GRAIN SIZE DISTRIBUTION

Sand & Gravel



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND		GRA	VEL	SIZE

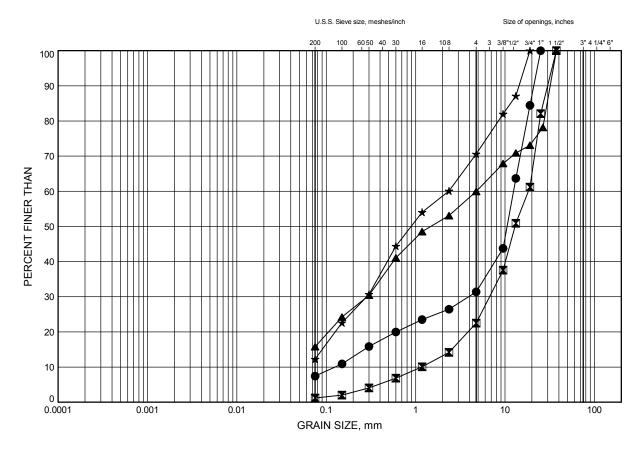
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MMFD-C	3.42	-23.01
	MSFD-M	4.41	-18.14
A	MSFD-P	4.00	-28.46
*	MSFD-P	6.33	-30.79
•	MSIB-A2	3.96	-16.37



Mary River Project **GRAIN SIZE DISTRIBUTION**

Sand & Gravel



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND		GRA	VEL	SIZE

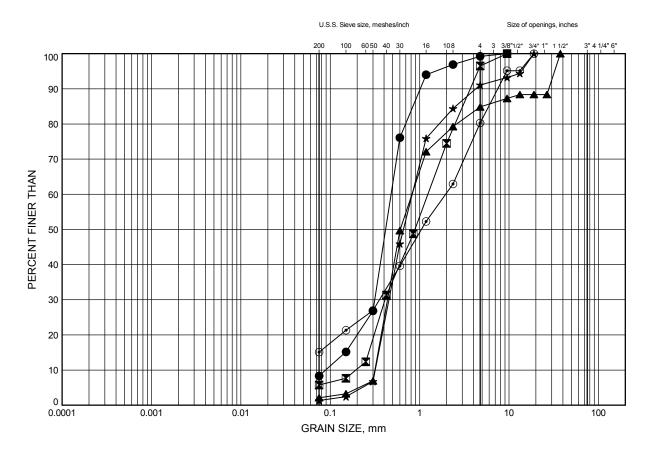
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MSIB-A2	5.49	-17.90
	MSIB-A2	6.86	-19.27
A	SMLCD-03A	5.65	-18.23
*	SMLCD-03A	9.57	-22.15



Mary River Project GRAIN SIZE DISTRIBUTION

Sand



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND		GRA	VEL	SIZE	

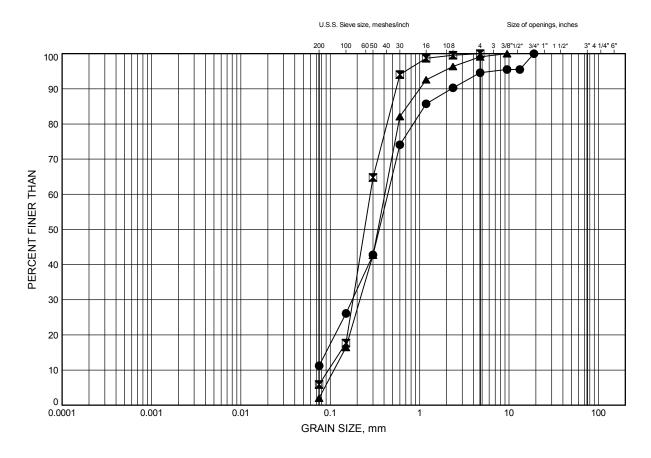
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MMFD-C	10.92	-30.51
	MMFD-D	1.56	-21.95
A	MMFD-D	3.06	-23.45
*	MMFD-D	3.96	-24.35
•	SMLCD-03A	7.05	-19.63



Mary River Project **GRAIN SIZE DISTRIBUTION**

Sand



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND		GRA	VEL	SIZE	

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MSFD-P1	4.89	-30.19
	MSIB-A2	0.42	-12.83
A	MSIB-B	4.30	-13.50

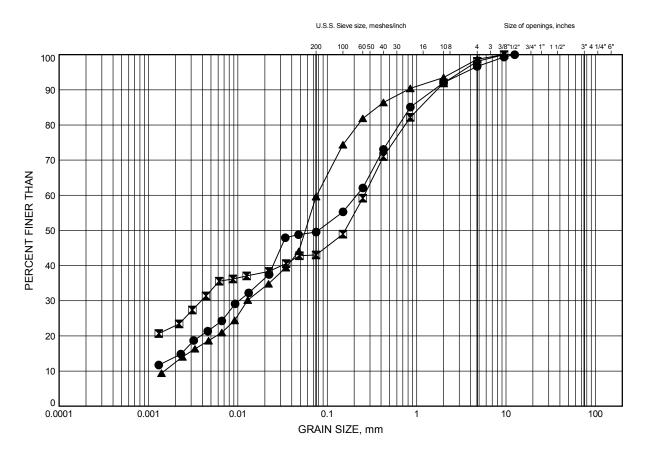
19-1605-126 Prepared By MFA Checked By MTB



W.P.#

Mary River Project GRAIN SIZE DISTRIBUTION

Sandy Silt to Silty Sand



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND		GRA	VEL	SIZE	

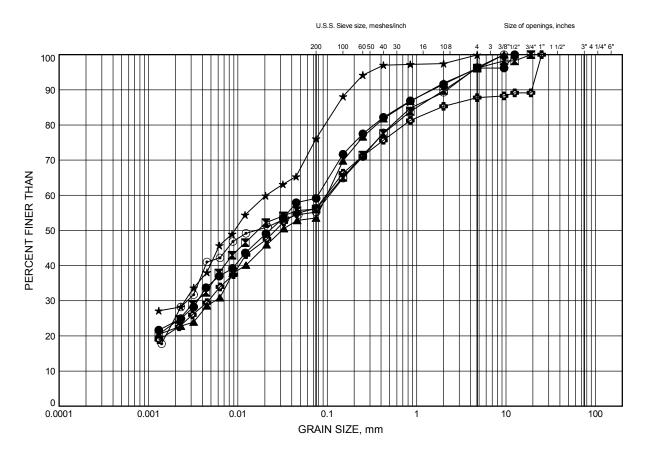
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MMFD-D	0.30	-20.69
	MSOD-J DCPT	0.30	-28.50
A	SMLCD-H	0.19	-6.47



Mary River Project GRAIN SIZE DISTRIBUTION

Silty Clay with Sand



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND		GRA	VEL	SIZE	

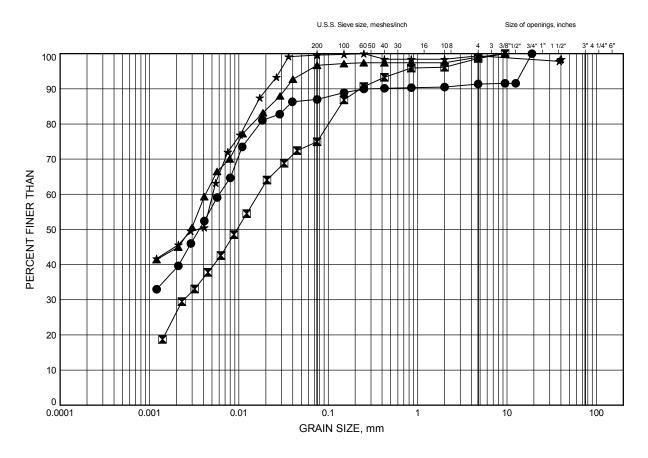
LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MSFD-G	0.70	-18.93
	MSFD-L	0.26	-18.09
A	MSFD-M	2.65	-16.38
*	MSFD-P	0.30	-24.76
\odot	MSFD-P	1.18	-25.64
۰	MSOD-I	2.64	-33.70



Mary River Project GRAIN SIZE DISTRIBUTION

Silty Clay



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND		GRA	VEL	SIZE	

LEGEND

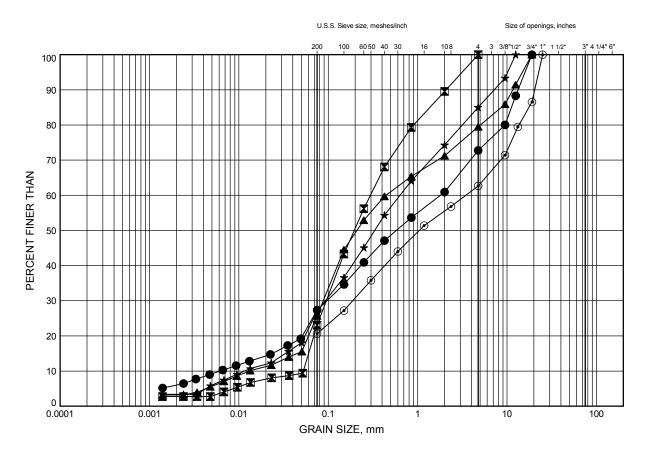
SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MSFD-G	1.61	-19.84
	MSFD-P	5.24	-29.70
A	SMLCD-03A	1.98	-14.56
*	SMLCD-03A	3.74	-16.32





Mary River Project **GRAIN SIZE DISTRIBUTION**

Silty Sand, Gravelly to some Gravel



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND		GRA	VEL	SIZE	

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
•	MSOD-S DCPT	0.30	-23.74
\blacksquare	SMLCD-G	0.30	-6.05
A	SMLCD-G	1.20	-6.95
*	SMLCD-G	3.68	-9.43
•	SMLCD-H	8.81	-15.09

19-1605-126 Prepared By MFA Checked By MTB

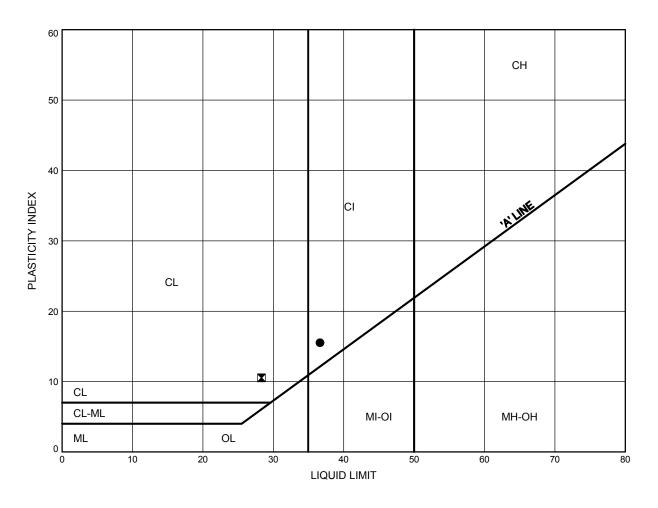


W.P.#

Mary River Project ATTERBERG LIMITS TEST RESULTS

FIGURE C9

Silty Clay



SYMBOL	ВН	DEPTH (m)	ELEV. (m)
•	MSFD-G	1.61	-19.84
\blacksquare	MSFD-M	2.65	-16.38

Date November 2011

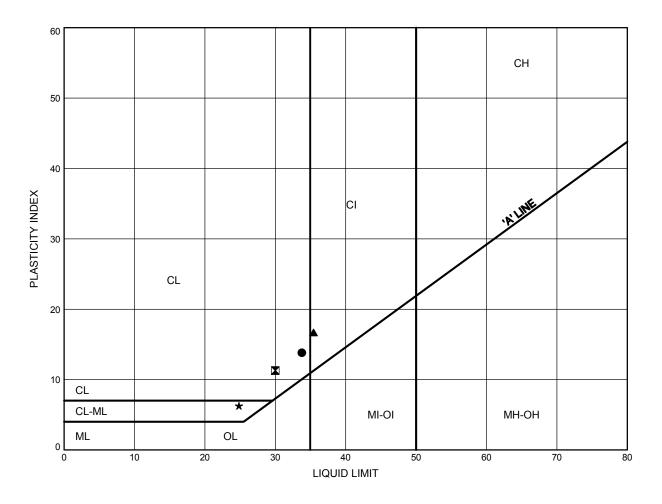
Project 19-1605-126



Mary River Project ATTERBERG LIMITS TEST RESULTS

FIGURE C10

Silty Clay



SYMBOL	BH	DEPTH (m)	ELEV. (m)
•	MSFD-P	0.30	-24.76
	MSFD-P	1.18	-25.64
A	MSFD-P	3.50	-27.96
*	MSFD-P	5.24	-29.70

Date November 2011

Project 19-1605-126

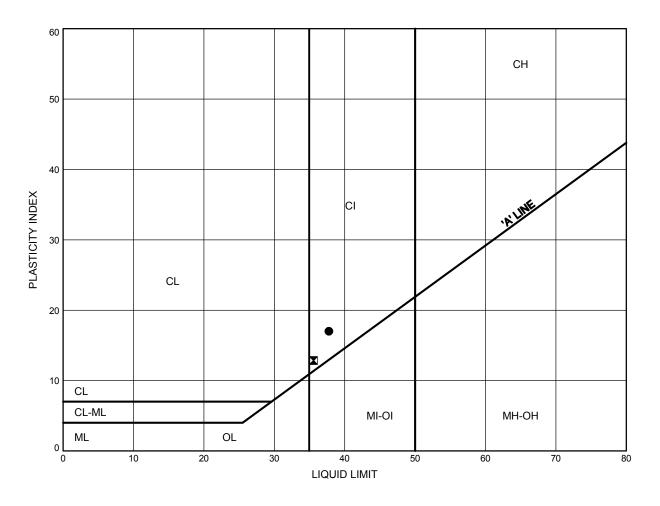


Prep'd MFA Chkd. MTB

Mary River Project ATTERBERG LIMITS TEST RESULTS

FIGURE C11

Silty Clay



SYMBOL	BH	DEPTH (m)	ELEV. (m)
•	SMLCD-03A	1.98	-14.56
	SMLCD-03A	3.74	-16.32

Date November 2011

Project 19-1605-126



Prep'd MFA Chkd. MTB



Job No :		19-1605-126	Client :	HATCH
			Date Drilled :	5/15/2011
Project Name :	Mary River Proje	ct - Geotechnical Investigation	Date Tested :	8/29/2011
Core Size :	NQ3 BH No:	MSFD-C	Tester :	AS/MD

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1		12.1	D	1.0	47.3	100.9	10.5	gneiss	Weak
2		12.7	D	13.0	47.2	101.5	136.3	gneiss	Very Strong
3		13.7	D	18.0	47.2	112.0	189.3	gneiss	Very Strong
4		15.0	D	18.0	47.2	110.3	189.1	gneiss	Very Strong
5		15.5	D	3.0	47.2	164.0	31.5	gneiss	Medium Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 \pm 0.1 Long pieces of core can be tested diametrically to produce suitable lengths for axial testing * Diametral Test should have 0.7 x D on either side of test point.



Job No :	19	-1605-126	Client :	HATCH
_			Date Drilled :	5/15/2011
Project Name :	Mary River Project -	Geotechnical Investigation	Date Tested :	8/29/2011
Core Size :	NQ3 BH No:	MSFD-D	Tester :	AS/MD

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	2	14.5	D	10.0	47.2	116.5	104.9	gneiss	Very Strong
2	2	14.6	D	18.5	47.3	151.2	193.6	gneiss	Very Strong
3	3	16.0	D	17.5	47.1	141.9	184.2	gneiss	Very Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :		19-1605-	126	Client :	HATCH
_				Date Drilled :	5/4/2011
Project Name :	Mary River	Project - Geote	chnical Investigation	Date Tested :	5/28/2011
Core Size :	NQ BH I	No :	MSIB-A1	Tester :	

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	2	8.8	D	29.5	47.0	87.0	311.7	granitic gneiss	Extremely Strong
2	3	11.0	Α	19.5	47.0	48.0	168.1	granitic gneiss	Very Strong
3	3	11.1	D	29.0	47.0	71.0	306.4	granitic gneiss	Extremely Strong
4	3	11.9	D	18.5	47.0	95.0	195.5	granitic gneiss	Very Strong
5	4	12.9	D	24.0	47.0	119.0	253.6	granitic gneiss	Extremely Strong
6	5	13.8	D	25.0	47.0	73.0	264.2	granitic gneiss	Extremely Strong
7	5	14.1	Α	25.0	47.0	48.0	215.5	granitic gneiss	Very Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1 Long pieces of core can be tested diametrically to produce suitable lengths for axial testing * Diametral Test should have 0.7 x D on either side of test point.



Job No :			19-1605-126	Client :	Hatch
_				Date Drilled :	5/2/2011
Project Name :			Baffinland	Date Tested :	5/28/2011
Core Size :	NQ	BH No :	MSIB-A	Tester :	ВТ

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	2	4.8	D	24.5	47.0	87.0	258.9	Granitic Gneiss	Extremely Strong
2	2	4.8	D	27.0	47.0	100.0	285.3	Granitic Gneiss	Extremely Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :			19-1605-126		Client :	Hatch
					Date Drilled :	4/29/2011
Project Name :			Baffinland		Date Tested :	5/29/2011
Core Size :	NQ	BH No:	MS	SIB-B	Tester :	BT

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	11.5	D	25.0	47.0	85.0	264.2	Granitic Gneiss	Extremely Strong
2	1	11.5	Α	23.0	47.0	47.0	201.5	Granitic Gneiss	Very Strong
3	1	11.8	D	31.0	47.0	90.0	327.6	Granitic Gneiss	Extremely Strong
4	2	13.6	D	24.0	47.0	80.0	253.6	Granitic Gneiss	Extremely Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :	1	9-1605-126	Client :	HATCH	
_			Date Drilled :	5/1/2011	
Project Name :	Mary River Projec	t - Geotechnical Investigation	Date Tested :	8/26/2011	
Core Size :	NQ3 BH No:	MSIB-C	Tester :	AS	

Test	Run No.	Depth	Axial or	Force	Diameter	Length	UCS	Rock Type	Notes
No.		(m)	Diametral	(kN)	(mm)	(mm)	(MPa)		
1	5	12.6	D	26.0	47.7	88.7	268.9	granitic gneiss	Extremely Strong
2	5	12.6	D	29.0	47.7	106.9	299.5	granitic gneiss	Extremely Strong
3	5	12.7	Α	35.0	47.7	51.4	282.7	granitic gneiss	Extremely Strong
4	6	14.9	D	21.0	47.7	98.0	217.0	granitic gneiss	Very Strong
5	6	15.1	D	25.0	47.7	92.1	257.9	granitic gneiss	Extremely Strong
6	6	15.1	Α	38.0	47.7	448.9	57.2	granitic gneiss	Strong
7	7	18.1	D	25.0	47.7	88.4	258.5	granitic gneiss	Extremely Strong
8	7	18.1	Α	24.0	47.7	37.9	245.7	granitic gneiss	Very Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1 Long pieces of core can be tested diametrically to produce suitable lengths for axial testing * Diametral Test should have 0.7 x D on either side of test point.



Job No :			19-1605-126	Client :	Hatch
_				Date Drilled :	4/23/2011
Project Name :			Baffinland	Date Tested :	5/28/2011
Core Size :	NQ	BH No :	MSIB-D	Tester :	ВТ

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	5	8.8	Α	21.5	47.0	47.0	188.4	Gneiss	Very Strong
2	5	8.8	D	15.0	47.0	100.0	158.5	Gneiss	Very Strong
3	5	9.4	D	17.0	47.0	83.0	179.6	Gneiss	Very Strong
4	5	9.4	Α	19.5	47.0	47.0	170.9	Gneiss	Very Strong
5	5	9.5	D	8.0	47.0	90.0	84.5	Gneiss	Strong
6	6	10.0	D	14.5	47.0	80.0	153.2	Gneiss	Very Strong
7	6	10.0	Α	16.0	47.0	50.0	133.6	Gneiss	Very Strong
8	6	11.0	D	23.5	47.0	102.0	248.3	Gneiss	Very Strong
9	6	11.0	D	24.5	47.0	117.0	258.9	Gneiss	Extremely Strong
10	6	12.0	Α	30.0	47.0	47.0	262.9	Gneiss	Extremely Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :			19-1605-126	Client :	Hatch
_				Date Drilled :	5/7/2011
Project Name :			Baffinland	Date Tested :	5/30/2011
Core Size :	NQ	BH No :	MSIBP-1(2)	Tester :	BT

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	10.4	D	15.0	47.0	100.0	158.5	Quartz	Very Strong
2	1	10.5	Α	6.5	47.0	50.0	54.3	Granitic Gneiss	Strong
3	2	11.5	Α	16.0	47.0	50.0	133.6	Granitic Gneiss	Very Strong
4	2	12.7	D	12.0	47.0	68.0	126.8	Granitic Gneiss	Very Strong
5	3	13.5	Α	25.5	47.0	49.0	216.3	Granitic Gneiss	Very Strong
6	3	14.1	D	14.0	47.0	72.0	147.9	Granitic Gneiss	Very Strong
7	4	14.8	D	19.5	47.0	88.0	206.0	Granitic Gneiss	Very Strong
8	5	15.9	Α	16.5	47.0	48.0	142.2	Granitic Gneiss	Very Strong
9	5	16.5	Α	27.5	47.0	42.0	262.9	Granitic Gneiss	Extremely Strong
10	5	17.0	D	26.5	47.0	53.0	280.0	Granitic Gneiss	Extremely Strong
11	5	17.7	D	20.0	47.0	62.0	211.3	Granitic Gneiss	Very Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :	19	9-1605-126	Client :	HATCH
			Date Drilled :	8/14/2011
Project Name :	Mary River Project	- Geotechnical Investigation	Date Tested :	8/27/2011
Core Size :	NQ3 BH No:	SI-MHS-008	Tester :	AS

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	4	9.6	D	10.0	47.7	93.5	103.4	granitic gneiss	Very Strong
2									
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1 Long pieces of core can be tested diametrically to produce suitable lengths for axial testing * Diametral Test should have 0.7 x D on either side of test point.



Job No :	1	9-1605-126	Client :	HATCH	
<u>-</u>			Date Drilled :	8/8/2011	
Project Name :	Mary River Project	- Geotechnical Investigation	Date Tested :	8/26/2011	
Core Size :	NQ BH No:	SI-OLD-004	Tester :	AS/TH/BW	

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	0.4	D	17.0	47.3	170.0	178.0	granitic gneiss	Very Strong
2	2	2.2	D	19.0	47.3	160.0	198.5	granitic gneiss	Very Strong
3	2	5.1	D	25.0	47.2	130.0	262.1	granitic gneiss	Extremely Strong
4	3	7.8	D	19.0	47.5	163.0	197.8	granitic gneiss	Very Strong
5	5	11.3	D	15.0	46.9	185.0	159.0	granitic gneiss	Very Strong
6	6	14.1	D	0.5	47.4	190.0	5.2	granitic gneiss	Weak
7	7	15.7	D	17.0	47.5	195.0	177.0	granitic gneiss	Very Strong
8	10	23.4	D	17.0	47.5	115.0	176.5	granitic gneiss	Very Strong
9	11	28.7	D	16.0	47.5	190.0	166.2	granitic gneiss	Very Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :	19	-1605-126	Client :	HATCH
_			Date Drilled :	8/9/2011
Project Name :	Mary River Project -	Geotechnical Investigation	Date Tested :	8/26/2011
Core Size :	NQ3 BH No:	SI-OLD-005	Tester :	AS/TH/BW

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	1.8	D	16.5	47.5	95.0	171.7	granitic gneiss	Very Strong
2	1	1.8	D	15.5	47.5	120.4	161.1	granitic gneiss	Very Strong
3	2	3.7	D	18.0	47.4	110.0	187.9	granitic gneiss	Very Strong
4	3	5.0	D	18.5	47.5	111.8	192.2	granitic gneiss	Very Strong
5	3	5.8	D	18.3	47.5	184.0	189.5	granitic gneiss	Very Strong
6	4	7.8	D	22.0	47.3	105.0	230.2	granitic gneiss	Very Strong
7	4	8.5	D	22.0	47.2	66.9	231.0	granitic gneiss	Very Strong
8	5	10.9	D	8.0	47.4	170.0	83.5	granitic gneiss	Strong
9	6	13.9	D	19.0	47.3	143.0	198.6	granitic gneiss	Very Strong
10	7	16.9	D	19.0	47.6	114.3	197.2	granitic gneiss	Very Strong
11	8	19.9	D	14.0	47.4	110.0	146.2	granitic gneiss	Very Strong
12	9	23.7	D	24.5	47.5	111.0	254.8	granitic gneiss	Extremely Strong
13	10	28.9	D	28.0	47.6	171.0	290.0	granitic gneiss	Extremely Strong
14	11	31.8	D	25.5	47.4	1050.0	266.0	granitic gneiss	Extremely Strong
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^{*} It is ideal to perform axial test on core specimens with D/L ratio of 1.1 ± 0.1

Long pieces of core can be tested diametrically to produce suitable lengths for axial testing

* Diametral Test should have 0.7 x D on either side of test point.



Job No :	19	-1605-126	Client :	HATCH
_			Date Drilled :	8/11/2011
Project Name :	Mary River Project -	Geotechnical Investigation	Date Tested :	8/26/2011
Core Size :	NQ3 BH No:	SI-OLD-006	Tester :	AS/TH/BW

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	0.1	D	17.5	47.1	125.0	184.1	granitic gneiss	Very Strong
2	2	3.8	D	19.0	47.2	117.0	199.6	granitic gneiss	Very Strong
3	2	5.3	D	19.3	47.4	110.0	201.1	granitic gneiss	Very Strong
4	3	8.3	D	12.0	48.0	115.0	122.8	granitic gneiss	Very Strong
5	4	8.8	D	0.0	48.0	98.0	0.5	granitic gneiss	Extremely Weak
6	5	12.7	D	24.5	47.6	130.0	254.0	granitic gneiss	Extremely Strong
7	13	35.4	D	19.0	47.8	80.0	195.8	granitic gneiss	Very Strong
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Job No :	19	-1605-126	Client :	HATCH
_			Date Drilled :	8/11/2011
Project Name :	Mary River Project -	Geotechnical Investigation	Date Tested :	8/26/2011
Core Size :	NQ3 BH No:	SI-OLD-007	Tester :	AS/TH/BW

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	1	0.0	D	17.5	47.5	145.0	182.2	granitic gneiss	Very Strong
2	2	5.0	D	26.0	47.5	135.0	270.5	granitic gneiss	Extremely Strong
3	3	5.4	D	19.0	47.6	110.0	196.9	granitic gneiss	Very Strong
4	4	8.4	D	15.5	47.6	70.0	160.4	granitic gneiss	Very Strong
5	4	11.8	D	15.0	47.5	120.0	155.9	granitic gneiss	Very Strong
6	5	14.0	D	11.5	47.4	150.0	119.8	granitic gneiss	Very Strong
7	6	15.3	D	22.5	47.7	155.0	232.4	granitic gneiss	Very Strong
8	6	16.9	D	20.0	47.5	116.0	208.1	granitic gneiss	Very Strong
9	7	17.4	D	30.0	47.9	85.2	308.1	granitic gneiss	Extremely Strong
10	9	23.0	D	22.5	47.4	130.0	234.6	granitic gneiss	Very Strong
11	9	23.8	D	19.0	47.5	87.9	197.5	granitic gneiss	Very Strong
12	10	26.4	D	18.0	47.6	107.4	186.6	granitic gneiss	Very Strong
13	10	26.7	D	23.0	47.4	135.0	239.7	granitic gneiss	Very Strong
14	10	29.0	D	14.0	47.4	86.0	146.2	granitic gneiss	Very Strong
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Job No :	1	9-1605-126	Client :	HATCH
			Date Drilled :	8/12/2011
Project Name :	Mary River Project	: - Geotechnical Investigation	Date Tested :	8/26/2011
Core Size :	NQ3 BH No:	SI-OLD-008	Tester :	AS/TH

Test No.	Run No.	Depth (m)	Axial or Diametral	Force (kN)	Diameter (mm)	Length (mm)	UCS (MPa)	Rock Type	Notes
1	2	2.4	D	1.5	47.1	99.0	15.8	granitic gneiss	Weak
2	2	3.9	D	25.0	47.1	170.0	263.3	granitic gneiss	Extremely Strong
3	4	8.5	D	23.2	47.1	105.0	244.3	granitic gneiss	Very Strong
4	6	14.5	D	14.4	47.1	111.0	151.7	granitic gneiss	Very Strong
5	8	17.6	D	22.5	49.1	240.0	222.2	granitic gneiss	Very Strong
6	9	22.8	D	23.5	47.1	134.0	247.5	granitic gneiss	Very Strong
7	10	26.5	D	24.1	47.1	180.0	253.8	granitic gneiss	Extremely Strong
8	13	32.6	D	15.2	47.1	125.0	160.1	granitic gneiss	Very Strong
9	13	35.6	D	22.5	47.1	101.0	237.0	granitic gneiss	Very Strong
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CLIENT NAME: THURBER ENGINEERING LTD

SUITE 103, 2010 WINSTON PARK DRIVE

OAKVILLE, ON L6H5R7

ATTENTION TO: Mathew Boucher

PROJECT NO: 19-1605-126

AGAT WORK ORDER: 11T513778

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

TRACE ORGANICS REVIEWED BY: Jacky Takeuchi, BScH (Chem Eng), BSc (Bio), C.Chem, Laboratory

Manager

DATE REPORTED: Aug 05, 2011

PAGES (INCLUDING COVER): 9

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712 5100, or at 1-800-856-6261

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.



CLIENT NAME: THURBER ENGINEERING LTD

Certificate of Analysis

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2

ATTENTION TO: Mathew Boucher

O. Reg. 153 Metals & Inorganics in Soil								
DATE SAMPLED:		DATE REC	CEIVED: Jul 27, 2011	DATE REPORTED: Aug 05, 2011	SAMPLE TYPE: Soil			
			MSFD-P SS#1					
Parameter	Unit	G/S RDL	2572051					
Antimony	µg/g	0.8	<0.8					
Arsenic	µg/g	1	5					
Barium	μg/g	2	43					
Beryllium	μg/g	0.5	<0.5					
Boron	μg/g	5	22					
Boron (Hot Water Extractable)	μg/g	0.10	6.16					
Cadmium	μg/g	0.5	<0.5					
Chromium	μg/g	2	24					
Cobalt	μg/g	0.5	4.6					
Copper	μg/g	1	8					
∟ead	μg/g	1	7					
Molybdenum	μg/g	0.5	2.0					
Nickel	μg/g	1	12					
Selenium	μg/g	0.4	0.6					
Silver	μg/g	0.2	<0.2					
Γhallium	μg/g	0.4	<0.4					
Jranium	ug/g	0.5	1.5					
/anadium	μg/g	1	36					
Zinc	μg/g	5	46					
Chromium VI	μg/g	0.2	<0.2					
Cyanide	μg/g	0.05	<0.05					
Mercury	μg/g	0.01	<0.01					
Electrical Conductivity	mS/cm	0.002	10.3					
Sodium Adsorption Ratio	N/A	N/A	24.1					
pH, 2:1 CaCl2 Extraction	pH Units		7.81					

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

2572051 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By:

Stony Mach



Certificate of Analysis

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: THURBER ENGINEERING LTD

ATTENTION TO: Mathew Boucher

Soil Analysis - Total Organic Carbon (W-B Wet Oxidation)										
DATE SAMPLED:			DATE RE	ECEIVED: Jul 27, 2011	DATE REPORTED: Aug 05, 2011	SAMPLE TYPE: Soil				
				MSFD-P SS#1						
Parameter	Unit	G/S	RDL	2572051						
Total Organic Carbon % 0.15 0.64										

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

Story Thanh



CLIENT NAME: THURBER ENGINEERING LTD

Certificate of Analysis

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

ATTENTION TO: Mathew Boucher

OLILIAT NAME. THORDER L	LITORITEERING	OLID		ATTENTION TO: Matthew Bodeller					
O. Reg. 153 - PAHs in Soil									
DATE SAMPLED:		DATE RE	CEIVED: Jul 27, 2011	DATE REPORTED: Aug 05, 2011	SAMPLE TYPE: Soil				
			MSFD-P SS#1						
Parameter	Unit	G/S RDL	2572051						
Naphthalene	μg/g	0.03	<0.03						
Acenaphthylene	μg/g	0.02	<0.02						
Acenaphthene	μg/g	0.03	<0.03						
Fluorene	μg/g	0.02	<0.02						
Phenanthrene	μg/g	0.02	<0.02						
Anthracene	μg/g	0.02	<0.02						
Fluoranthene	μg/g	0.02	<0.02						
Pyrene	μg/g	0.02	<0.02						
Benzo(a)anthracene	μg/g	0.02	<0.02						
Chrysene	μg/g	0.02	<0.02						
Benzo(b)fluoranthene	μg/g	0.02	<0.02						
Benzo(k)fluoranthene	μg/g	0.02	<0.02						
Benzo(a)pyrene	μg/g	0.02	<0.02						
Indeno(1,2,3-cd)pyrene	μg/g	0.02	<0.02						
Dibenz(a,h)anthracene	μg/g	0.02	<0.02						
Benzo(g,h,i)perylene	μg/g	0.02	<0.02						
2-and 1-methyl Naphthalene	μg/g	0.05	<0.05						
Moisture Content	%	0.1	25.7						
Surrogate	Unit	Acceptable Limits							
Chrysene-d12	%	60-130	75						

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

2572051 Results are based on the dry weight of the soil.

Certified By:

Joshy Tokurchi



Certificate of Analysis

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

ATTENTION TO: Mathew Boucher

CLIENT NAME: THURBER	RENGINEERIN	G LTD		ATTENTION TO: Mathew Boucher						
				PCBs (soil)						
DATE SAMPLED:			DATE RE	CEIVED: Jul 27, 2011	DATE REPORTED: Aug 05, 2011	SAMPLE TYPE: Soil				
				MSFD-P SS#1						
Parameter	Unit	G/S	RDL	2572051						
PCBs	μg/g		0.1	<0.1						
Surrogate	Surrogate Unit Acceptable Limits									
Decachlorobiphenyl	%	60-130		122						

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard 2572051 Results are based on the dry weight of soil extracted.

Certified By:



Quality Assurance

CLIENT NAME: THURBER ENGINEERING LTD

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

ATTENTION TO: Mathew Boucher

				Soi	l Ana	alysis	3								
RPT Date: Aug 05, 2011	С	UPLICATI	 E		REFEREN	NCE MA	ATERIAL	METHOD	BLAN	SPIKE	MATRIX SPIKE				
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acceptable Limits		Recovery		ptable nits	Recovery		ptable
		ld					Value	Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153 Metals & Inorganics	in Soil														
Antimony	1		< 0.8	< 0.8	0.0%	< 0.8	110%	90%	110%	91%	90%	110%	91%	70%	130%
Arsenic	1		2	2	0.0%	< 1	109%	90%	110%	98%	90%	110%	98%	70%	130%
Barium	1		56	54	3.6%	< 2	105%	90%	110%	101%	90%	110%	103%	70%	130%
Beryllium	1		< 0.5	< 0.5	0.0%	< 0.5	99%	90%	110%	94%	90%	110%	92%	70%	130%
Boron	1		7	6	15.4%	< 5	74%	70%	130%	98%	90%	110%	97%	70%	130%
Boron (Hot Water Extractable)	1		0.17	0.17	0.0%	< 0.10	109%	80%	120%	105%	90%	110%	102%	70%	130%
Cadmium	1		< 0.5	< 0.5	0.0%	< 0.5	99%	90%	110%	104%	90%	110%	95%	70%	130%
Chromium	1		14	14	0.0%	< 2	100%	90%	110%	99%	90%	110%	97%	70%	130%
Cobalt	1		5.2	5.1	1.9%	< 0.5	104%	90%	110%	96%	90%	110%	93%	70%	130%
Copper	1		12	12	0.0%	< 1	100%	90%	110%	99%	90%	110%	91%	70%	130%
Lead	1		5	5	0.0%	< 1	103%	90%	110%	100%	90%	110%	92%	70%	130%
Molybdenum	1		< 0.5	< 0.5	0.0%	< 0.5	99%	90%	110%	94%	90%	110%	98%	70%	130%
Nickel	1		10	10	0.0%	< 1	106%	90%	110%	96%	90%	110%	91%	70%	130%
Selenium	1		< 0.4	< 0.4	0.0%	< 0.4	113%	80%	120%	95%	90%	110%	95%	70%	130%
Silver	1		< 0.2	< 0.2	0.0%	< 0.2	85%	80%	120%	97%	90%	110%	94%	70%	130%
Thallium	1		< 0.4	< 0.4	0.0%	< 0.4	94%	90%	110%	94%	90%	110%	89%	70%	130%
Uranium	1		< 0.5	< 0.5	0.0%	< 0.5	102%	90%	110%	99%	90%	110%	94%	70%	130%
Vanadium	1		22	22	0.0%	< 1	105%	90%	110%	95%	90%	110%	94%	70%	130%
Zinc	1		26	26	0.0%	< 5	94%	90%	110%	101%	90%	110%	95%	70%	130%
Chromium VI	1		< 0.2	< 0.2	0.0%	< 0.2	103%	80%	120%	106%	90%	110%	114%	70%	130%
Cyanide	1		< 0.05	< 0.05	0.0%	< 0.05	95%	80%	120%	110%	90%	110%	92%	70%	130%
Mercury	1		0.03	0.03	0.0%	< 0.01	96%	80%	120%	98%	90%	110%	100%	70%	130%
Electrical Conductivity	1		0.244	0.216	12.2%	< 0.002	99%	80%	120%						
Sodium Adsorption Ratio	1		0.786	0.734	6.8%	N/A									
pH, 2:1 CaCl2 Extraction	1		6.74	7.66	12.8%	<	97%	90%	110%						
Soil Analysis - Total Organic Car	bon (W-B V	Vet Oxidat	tion)												
Total Organic Carbon	6577	5178	1.01	1.12	10.3%	< 0.15	88%	80%	120%				116%	80%	120%

Certified By:

Story Maah

AGAT QUALITY ASSURANCE REPORT (V1)

Page 6 of 9



Quality Assurance

CLIENT NAME: THURBER ENGINEERING LTD

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

ATTENTION TO: Mathew Boucher

Trace Organics Analysis															
RPT Date: Aug 05, 2011			DUPLICAT	E,		REFERE	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MATRIX SPIKE			
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured	Acceptable Limits		Recovery	1 1 11	eptable mits	Recovery	1 :-	ptable nits
		ld					Value	Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153 - PAHs in Soil															
Naphthalene	1		< 0.03	< 0.03	0.0%	< 0.03	110%	60%	130%	87%	60%	130%	83%	60%	130%
Acenaphthylene	1		< 0.02	< 0.02	0.0%	< 0.02	112%	60%	130%	88%	60%	130%	83%	60%	130%
Acenaphthene	1		< 0.03	< 0.03	0.0%	< 0.03	113%	60%	130%	90%	60%	130%	85%	60%	130%
Fluorene	1		< 0.02	< 0.02	0.0%	< 0.02	106%	60%	130%	88%	60%	130%	83%	60%	130%
Phenanthrene	1		< 0.02	< 0.02	0.0%	< 0.02	100%	60%	130%	86%	60%	130%	83%	60%	130%
Anthracene	1		< 0.02	< 0.02	0.0%	< 0.02	99%	60%	130%	85%	60%	130%	81%	60%	130%
Fluoranthene	1		< 0.02	< 0.02	0.0%	< 0.02	108%	60%	130%	90%	60%	130%	94%	60%	130%
Pyrene	1		< 0.02	< 0.02	0.0%	< 0.02	110%	60%	130%	90%	60%	130%	94%	60%	130%
Benzo(a)anthracene	1		< 0.02	< 0.02	0.0%	< 0.02	102%	60%	130%	87%	60%	130%	94%	60%	130%
Chrysene	1		< 0.02	< 0.02	0.0%	< 0.02	108%	60%	130%	87%	60%	130%	90%	60%	130%
Benzo(b)fluoranthene	1		< 0.02	< 0.02	0.0%	< 0.02	109%	60%	130%	97%	60%	130%	98%	60%	130%
Benzo(k)fluoranthene	1		< 0.02	< 0.02	0.0%	< 0.02	98%	60%	130%	85%	60%	130%	84%	60%	130%
Benzo(a)pyrene	1		< 0.02	< 0.02	0.0%	< 0.02	98%	60%	130%	86%	60%	130%	87%	60%	130%
Indeno(1,2,3-cd)pyrene	1		< 0.02	< 0.02	0.0%	< 0.02	90%	60%	130%	89%	60%	130%	90%	60%	130%
Dibenz(a,h)anthracene	1		< 0.02	< 0.02	0.0%	< 0.02	95%	60%	130%	85%	60%	130%	89%	60%	130%
Benzo(g,h,i)perylene	1		< 0.02	< 0.02	0.0%	< 0.02	96%	60%	130%	84%	60%	130%	88%	60%	130%
2-and 1-methyl Naphthalene	1		< 0.05	< 0.05	0.0%	< 0.05	113%	60%	130%	90%	60%	130%	84%	60%	130%
PCBs (soil)															
PCBs	1		< 0.1	< 0.1	0.0%	< 0.1	117%	60%	140%	96%	60%	140%	90%	60%	140%

Certified By:

Joshy Takwehi



Method Summary

CLIENT NAME: THURBER ENGINEERING LTD

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

ATTENTION TO: Mathew Boucher

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE						
Soil Analysis									
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Boron (Hot Water Extractable)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES						
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Thallium	MET-93-1003	EPA SW 846 3050B & 6020A	ICP-MS						
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS						
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER						
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER						
Mercury	MET-93-6101	EPA SW 846 7471A 245.5	CVAAS						
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER						
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES						
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER						
Total Organic Carbon	SOIL 0480; SOIL 0110; SOIL 0120	NELSON 1996; SHEPPARD 2007	COLOR						



Method Summary

CLIENT NAME: THURBER ENGINEERING LTD

AGAT WORK ORDER: 11T513778

PROJECT NO: 19-1605-126

ATTENTION TO: Mathew Boucher

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE							
Trace Organics Analysis	•		•							
Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Acenaphthylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Acenaphthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Fluorene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Phenanthrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Benzo(a)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Chrysene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Benzo(b)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Benzo(k)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Benzo(a)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Indeno(1,2,3-cd)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Dibenz(a,h)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Benzo(g,h,i)perylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
2-and 1-methyl Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
Moisture Content	Org 5506	EPA SW-846 3540 & 8270	BALANCE							
Chrysene-d12	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS							
PCBs	ORG-91-5113	EPA SW-846 3541 & 8082	GC/ECD							
Decachlorobiphenyl	ORG-91-5113	EPA SW-846 3541 & 8082	GC/ECD							





CHAIN AGAT Laboratories

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LABORATORY USE ONLY

Arrival Condition:

20 C AGAT W0 #: 11T513778

Samples velinquisted by (Print Jame & Sign)	11/10/2	2d By (print name & sign)								1105 1-11-101	Sampled Sampled Marrix	Sample	rnone:rax:	-	Address:	Contact:		Invoice To Same as Above? (Yes) No (circle)	riedse note, it quotation number is not provided, client will be billed full price for analysis.	AGAT Quotation #:	% 106 PO:	Phone: 405-829-81066 Fax: 405 829-1166	Ockville Lett SR7	Address #1/13-2010 1/2015 Dicho	Company: 1 MULTING CAMINACCINA	Information	CHAIN OF CUSTODY RECORD
Date/ Time							-			***		# of		is this a grink		Prov. Wa	Coarse	Soil Textu		(Indic	Regulation 153	Regul	Email:	2. Name:	1. Name:	Report	
Samples keceived by (print name & sign)	Memplous July	Samples Received By (print name & sign)								X	Site/ Sample Information	M M	etals a etal Sco	an (ex	dud. Hg) (CS , B, Cr6)	e ☐ Med/Fine	riculture (check one)	Res/Park Storm Other (indicate)	Indicate one) (Indicate one) CCME	on 153 Sewer Use Regulation 558	Regulatory Requirements			in pour per les tructes	Information - reports to	Notes:
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112889	01 7	\											LAB SAMPLE TO	USE ONLY	LABORATORY			tatutory holidays	2	DATE REOUIRED (Bush surcharges may apply):	g Day	3 to 5 Working Days 1 to 3 Working Days	ges Apply	(please provide prior notification)	The David	Turnaround Time (TAT) Required*	