To **Greg Wortman**
AMEC Mining and Metals

Project no **TC101510**
Memo # **015**

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Date **October 19, 2010**

Subject **Baffinland Mary River Project - Trucking Feasibility Study**
Tote Road Design Considerations - Rev0

This memo provides preliminary design considerations for the proposed upgraded Tote Road and bridge structure foundation recommendations between Milne Inlet and Mary River as part of the Mary River Project on Baffin Island, Nunavut. The recommendations are based on the following information:

- Knight Piesold Consulting Ltd. (KP) report "Bulk Sampling Program Milne Inlet Tote Road Construction Summary" (Ref. No. NB102-181/13-2 rev 0, February 5, 2009);
- Knight Piesold Consulting Ltd. (KP) report "Mine Site Infrastructure, Pit Overburden and Waste Dumps – 2006 Site Investigation Summary Report, (Ref. No. NB102-00181/3-2), February 28, 2007;
- Knight Piesold Consulting Ltd. (KP) report "Mine Site Infrastructure, Pit Overburden and Waste Dumps – 2007 Site Investigations and Foundations Recommendations Summary Report", (Ref. No. NB102-00181/8-2), December 14, 2007;
- EBA Engineering Consultants Ltd. (EBA) memo "Foundation Recommendations, Mary River Mine Site Infrastructure", (File: E14101009.003), September 9, 2010; and
- AMEC boreholes advanced as part the August 2010 geotechnical investigation.

The purpose of this memo is to provide AMEC Mining and Metals with a basis for road upgrade design and costing for the current feasibility option.

It should be noted that the final location of the Tote Road and bridge structures are not known at this time, and therefore, a site specific geotechnical investigation has not been completed for these proposed structures. General foundation recommendations based on KP's 2006 and 2007 reports will be used in conjunction with the 2010 boreholes advanced at the proposed bridge sites to provide general considerations for feasibility reporting and costing only.

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1.0 Investigation Summary

As part of the geotechnical investigation completed by AMEC in August 2010, eight boreholes (BH10-10, 11, 17, 18, 19, 20, 22 and 23) were advanced in the area of the four existing sea container bridge crossings along the Tote Road. For reference, the borehole plans showing these borehole locations along the Tote Road are provided on Drawings 1 to 4 following the text of this memo.

Boreholes advanced as part of the 2010 investigation were completed by Boart Longyear Drilling using a combination of HQ and NQ diamond drilling. To meet the critical project timelines, diamond drill rigs were used for the investigation as they were available on site and sufficient time did not allow for geotechnical drill rigs to be mobilized to site for the 2010 drilling season. Therefore, the purpose of the 2010 investigation is to provide a general indication of the subsoil's in terms of cohesive and non-cohesive soils, provide an indication of the active zone and identify the presences of bedrock, if encountered. The diamond drilling method is not considered sufficient for proper sample collection and testing of non cohesive soils, while sample recovery within cohesive soils may be evaluated on a per sample basis. Where sufficient recovery of the subsoil's was achieved, soil classification testing has been scheduled and the results will be provided in our final summary report.

In addition to the boreholes advanced at the bridge locations, fifty one (51) test pits were advanced along the existing Tote Road between Milne Inlet and the Mary River Mine Site. These test pits were advanced primarily for borrow sourcing identification; however, these test pits provide an indication of the depth of the active zone along the Tote Road.

For reference, the 2010 draft borehole logs are provided following the text of this memo. A general summary of the test pits advanced in August 2010 between Milne Inlet and the mine site is provided in the following table:

Test Pit	Northings	Eastings	Generic Soil Description	Depth to Permafrost (m)*
TP10-01_1	7,926,432	529,734	Sand, containing cobbles and boulders	2.2
TP10-01_2	7,926,438	529,787	Sand to Sand and Gravel	1.8
TP10-01_3	7,926,449	529,663	Sand, some gravel and cobbles	1.8
TP10-01_4	7,926,465	529,622	Sand and Gravel, containing cobbles	1.8
TP10-02_1	7,925,463	530,801	Silty Sand and Gravel, containing cobbles	1.4
TP10-02_2	7,925,434	530,832	Silty Sand and Gravel, containing cobbles and boulders	1.8
TP10-02_3	7,925,405	530,858	Silty Sand and Gravel, containing cobbles and boulders	1.5
TP10-02_4	7,925,383	530,879	Silty Sand and Gravel, containing cobbles and boulders	1.6
TP10-03_1	7,920,544	534,626	Sand to Silty Sand, containing cobbles and boulders	1.6

TP10-03_2	7,920,480	534,612	Sand, some gravel, containing cobbles and boulders	1.4
TP10-03_3	7,920,447	534,665	Silty Sand, some gravel, containing cobbles and boulders	1.4
TP10-03_4	7,920,625	534,630	Silty Sand, some gravel, containing cobbles	1.5
TP10-04_1	7,920,821	539,028	Sand, some gravel	2.0
TP10-04_2	7,920,847	539,014	Sand, some gravel, containing cobbles and boulders	1.9
TP10-04_3	7,920,861	538,961	Silty Sand, containing cobbles	1.3
TP10-04_4	7,920,836	538,988	Silty Sand, containing cobbles	1.3
TP10-05_1	7,917,721	550,569	Sand, some gravel, containing cobbles and boulders	1.8
TP10-05_2	7,917,762	550,530	Sand, some gravel, containing cobbles and boulders	1.5
TP10-05_3	7,917,737	550,476	Sand, some gravel, containing cobbles and boulders	1.0
TP10-05_4	7,917,762	550,468	Sand, some gravel, containing cobbles	1.8
TP10-05_5	7,917,801	550,465	Sand, containing cobbles	2.1
TP10-06_1	7,916,062	552,007	Sand, some gravel, containing cobbles and boulders	1.8
TP10-06_2	7,916,045	552,058	Sand, some gravel, containing cobbles and boulders	1.7
TP10-06_3	7,916,040	552,036	Sand, some gravel, containing cobbles and boulders	1.6
TP10-06_4	7,916,048	551,949	Sand, trace gravel, containing cobbles and boulders	1.9
TP10-07_1	7,915,299	556,778	Sand, containing cobbles and boulders	1.4
TP10-07_2	7,915,301	556,860	Sand, some gravel	1.8
TP10-07_3	7,915,295	556,703	Sand, some gravel, containing cobbles and boulders	1.9
TP10-07_4	7,915,233	556,698	Sand, some gravel, containing cobbles and boulders	2.2
TP10-08_1	7,975,291	503,758	Sand and Gravel, containing cobbles and boulders	1.4
TP10-08_2	7,975,231	503,752	Sand, containing cobbles and boulders	1.4
TP10-08_3	7,975,117	503,789	Sand, some gravel, containing cobbles and boulders	1.5
TP10-09_1	7,974,997	503,748	Sand, some gravel, containing cobbles and boulders	1.7
TP10-10_1	7,974,840	503,745	Silty Sand, trace gravel, containing cobbles	1.2
TP10-10_2	7,974,768	503,647	Silty Sand, trace gravel, containing cobbles	1.7

TP10-10_3	7,974,685	503,707	Sand, some gravel, containing cobbles and boulders	1.4
TP10-10_4	7,974,613	503,721	Sand, some gravel, containing cobbles and boulders	1.7
TP10-10_5	7,974,531	503,771	Sandy Cobbles and Boulders	2.1
TP10-11_1	7,974,093	504,086	Sandy Cobbles and Boulders	2.1
TP10-11_2	7,974,001	504,141	Silty Sand and Gravel, containing cobbles and boulders	2.0
TP10-11_3	7,973,904	504,182	Sand, some gravel, containing cobbles and boulders	1.7
TP10-12_1	7,972,251	505,513	Silty Sand and Gravel, containing cobbles	1.5
TP10-12_2	7,972,219	505,549	Sand, some gravel, containing cobbles	1.4
TP10-13_1	7,971,637	506,015	Sand, trace gravel	1.4
TP10-13_2	7,971,598	506,027	Sand, trace gravel, containing cobbles	1.7
TP10-13_3	7,971,613	506,224	Sand, some gravel, containing cobbles	1.6
TP10-14_1	7,971,545	506,390	Sand and Gravel, containing cobbles and boulders	1.7
TP10-15_1	7,970,963	506,870	Sand, some gravel, containing cobbles and boulders	1.7
TP10-15_2	7,970,944	506,770	Sand and Gravel, containing cobbles and boulders	1.8
TP10-15_3	7,971,058	506,676	Sand, trace gravel, containing cobbles	1.2
TP10-15_4	7,971,199	506,608	Sand, trace gravel, containing cobbles	1.9

*Depth to permafrost measured during the 2010 geotechnical investigation completed in August 2010

2.0 General Geological Conditions

In general, the overburden soils where encountered along the existing Tote Road consist of alternating deposits of cohesionless soils consisting of sand, sand and gravel and gravel, containing frequent cobbles and boulders. At the time of drilling (August 2010), these materials were noted to be frozen below about 1.0 m and 2.2 m below ground surface, which likely represents the depth of the active zone.

Bedrock was encountered between a depth of 6 m and 13.5 m of the ground surface at three of the bridge locations (BH10-10, 11, 17, 18, 22 and 23).

No temperature readings have been obtained along the Tote Road; however, based on our understanding of the site conditions and the depth of permafrost measured at the borehole and test pit locations, it may be assumed that the active zone within these deposits is about 2 m below ground surface.

Geotechnical information has been collected sporadically along the existing Tote Road alignment at critical locations only. Therefore the general geological conditions described above are based on limited data and our understanding of the geology, at the time of detailed design, additional information should be obtained to confirm the geological conditions at all sensitive design areas along the Tote Road. In addition, at the time of detailed design, temperature readings should be obtained to confirm the depth of the active zone near all critical structures (i.e. bridge locations).

3.0 Existing Tote Road Upgrade

The existing Tote Road from the mine site to Milne Inlet follows a winter road built in the 60's by dozer. This road was upgraded in 2007-2008 to allow for the shipment of bulk samples to Milne Inlet. The road is also used to transport fuel and supplies to the Mary River site.

As part of this feasibility study, the Tote Road upgrade will require minor realignment as well as minor profile and cross section changes. Near large water crossings, structures will be required to replace the temporary box culvert crossings. It is proposed to upgrade the road in 2012 for transportation of ore between the mine site and Milne Inlet. As part of the trucking option for transporting ore from the mine site to Milne Inlet, it is anticipated that the upgrade road will be in use for 20-years, accommodating haul truck traffic approximately 300 days per year.

It is anticipated that the upgraded road crest width will be in the order of about 11 metres to accommodate the proposed transport trucks. The road will be maintained, graded and snow cleared as required.

During our July 2010 site visit, the road was observed to be competent for traffic generally. However, some culverts had to be replaced. In order to accommodate the proposed crest width and new grades, many culverts need to be lengthened and additional culverts will be required. Some minor realignment will be carried out but the road will in essence follow the existing alignment.

It is noted that the road base and fills consist of essentially two (2) types, as follows:

- Mixed granular materials consisting of sand and gravel sometimes with silt and generally containing numerous cobbles and boulders. In this section, filling over the base consisted of similar materials from the pits on either side of the alignment. This sector is roughly half the road length on the Milne Inlet end; and
- Sand base was encountered in approximately half the length on the Mary River end of the road. The road was built up with sand from local pits and granular sand and gravel toppings obtained from other areas. Without the sand and gravel topping, serious traction problems occur.

4.0 Road Foundations on Permafrost

The foundation for the road consists of generally an active zone ranging from 1 to 2 metres in thickness overlying permafrost which is sometimes ice-rich. The road upgrade in 2007 and 2008 generally consisted of adding various amounts of sand and sand and gravel fills over the active layer. This generally was accomplished without incident. An exception occurred in part of the sand zone where the sand was observed to be saturated and could not support the direct placement of fill. This is attributed to free ice melting in the active zone and/or precipitation with melting snow. To overcome this, geotextile fabric was placed on the sand before filling.

The placement of the road fill protects a portion of the active layer from thawing. The net result is that the permafrost level rises below these fills. The load imposed by a 1 to 6-metre road fill on the permafrost is in the order of 0.2 to 1.2 kPa. This load presents no bearing capacity problems and/or insignificant long term creep. Long term creep has little effect on roads as grade maintenance compensates for any slight movements.

There can however be a toe bearing capacity issue. This can occur when the toe sits on a considerably reduced bearing capacity active zone during thaw. To compensate for this, the slopes are generally flattened to 3 or 4 horizontal to 1 vertical to reduce the toe loading to an acceptable level. In culvert areas with designed rip-rap aprons and slope armour, the slope can be steepened to 2 horizontal to 1 vertical.

5.0 Erosion Protection

In order to prevent erosion of fines and their transport to nearby water bodies, it is essential to provide sufficient lining of ditches and slopes.

All side hill cuts should be provided with cut side ditches lined with geotextile and appropriate rock protection. This is especially important for sand areas.

All sand side slopes should be protected with appropriate rock armour possibly with geotextile. This is important because road grading maintenance leaves small hills along both crests of the fill. These hills result in surface runoff being trapped until it breaks through the hills producing concentrated runoff down the slope, resulting in erosion.

When the sand downstream slope is too long to allow practical armouring, the road top should be sloped 2 to 3 percent toward the armoured cut side ditch.

6.0 Safety Berm Considerations

Where safety berms are required and the road width is not sufficient, modifications may consist of road widening or, if road widening requires massive earthworks, it may be cost effective to provide a post and guardrail structural solution.

7.0 Major Water Crossings

The Knight Piésold report on the Milne Inlet Tote Road Construction Summary (Ref. No. NB102-181/13-2), dated February 5, 2009, describes the four (4) extra large water crossings designated as VC128, BG50, CV217 and CV223. These crossings consist of sea containers with both ends open. These sea containers measuring 2.4 metres wide by 2.7 metres high were set side by side with a structural deck to produce these crossings. The crossings are briefly described below:

CV128	20 sea containers with 2 bin wall abutments At about chainage A17+100 (KP P/A No. NB102-181/10, Drawing 441 Rev. 2

CV50	13 sea containers with 2 bin wall abutments At about chainage 62+50 (KP P/A No. NB102-181/10, Drawing 442 Rev. 2
CV217	14 sea containers with 2 bin wall abutments At about chainage 79+950
CV223	18 sea containers with 2 bin wall abutments At about chainage A96+900

It is proposed to replace these temporary crossings with pile supported bridges or concrete box culverts immediately upstream or downstream of the temporary crossings. These bridges will consist of pile bents with caps supporting standard spans with integral guardrails. Follow-through abutments and approach slabs would likely be used. The existing approach fills would have to be realigned.

8.0 Deep Foundation Piles

Preliminary pile design for adfreeze piles or piles socketed into bedrock can follow EBA's design provided for the Mary River Mine Site. This design should assume that no adfreeze will take place within the upper 5 metres of pile penetration zone, which also allows for some scour and a deeper active zone underwater at the bridge locations.

Lateral loads perpendicular to the road alignment will be provided by batter piles upstream and downstream at each pile bent.

Lateral capacity parallel to the road access will consist of the following elements:

- Passive pressure in the active zone ignoring the top metre using a passive pressure coefficient of 2.8 and a unit weight of 10 kN/m^3 applied over 3 times the pile width;
- The pile is fixed in the permafrost at a depth of 5 metres below the stream bed; and
- Horizontal and rotational structural fixity provided at the top of the pile bent.

There should be no horizontal creep effect due to transient loads.

Allowable axial bearing capacities for a single adfreeze pile ranging between 101 mm to 304 mm in diameter are presented on Figure 1 of EBA's memo, while the allowable axial bearing capacities for a single pile socketed into bedrock for the same diameter range are presented on Figure 5 of EBA's memo. These figures are attached for reference following the test of this memo.

If the concrete box culvert option is considered, then the culvert base should be imbedded sufficiently into the stream bed to allow unobstructed flow. Lateral stability is provided by base friction below the concrete in contact with the granular stream bottom. A coefficient of friction of 30° should be used. Additional resistance could be obtained with battered piles.

We trust this is sufficient for the present. Please feel free to contact the undersigned for any further elaboration you may require.

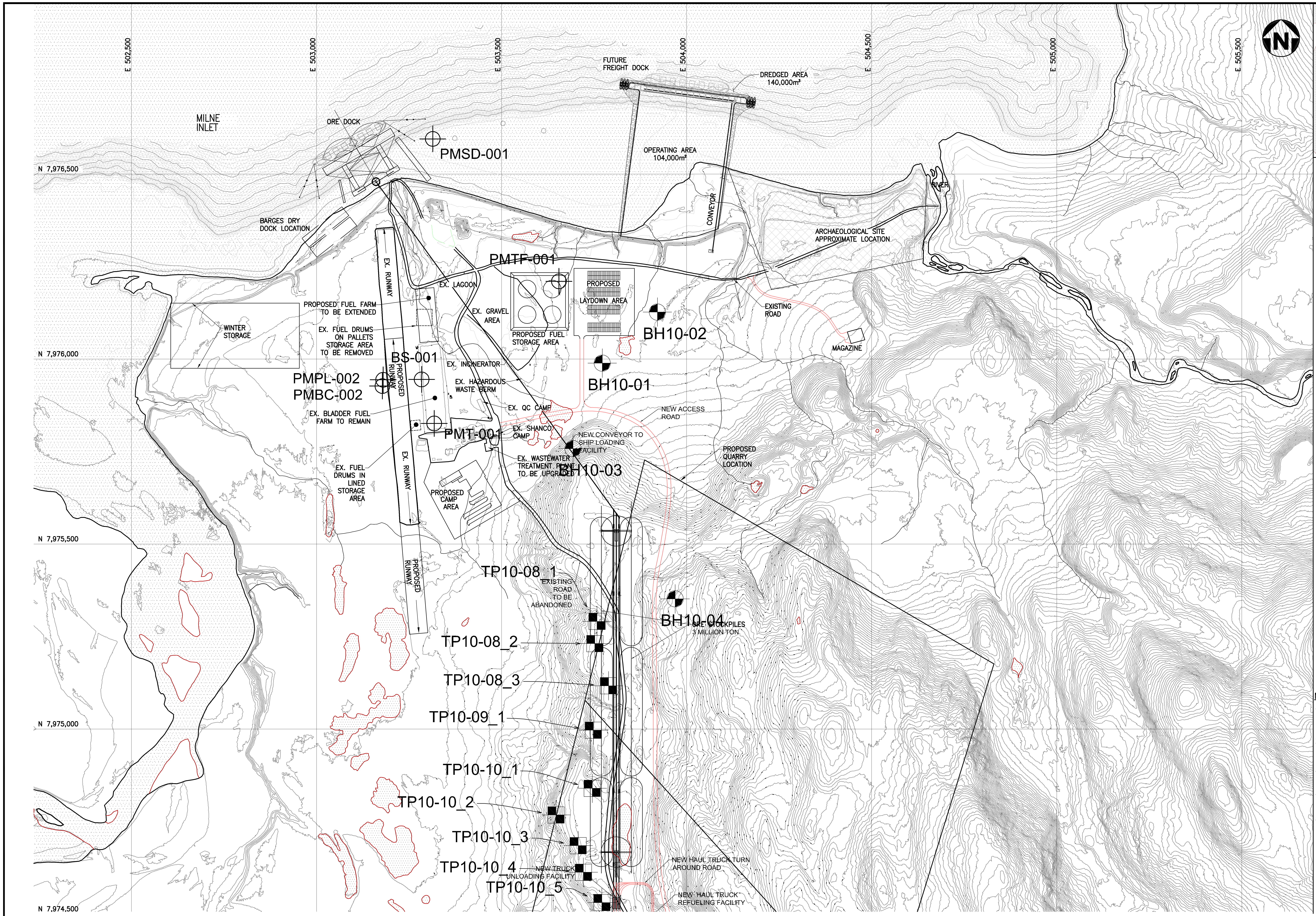
Sincerely,

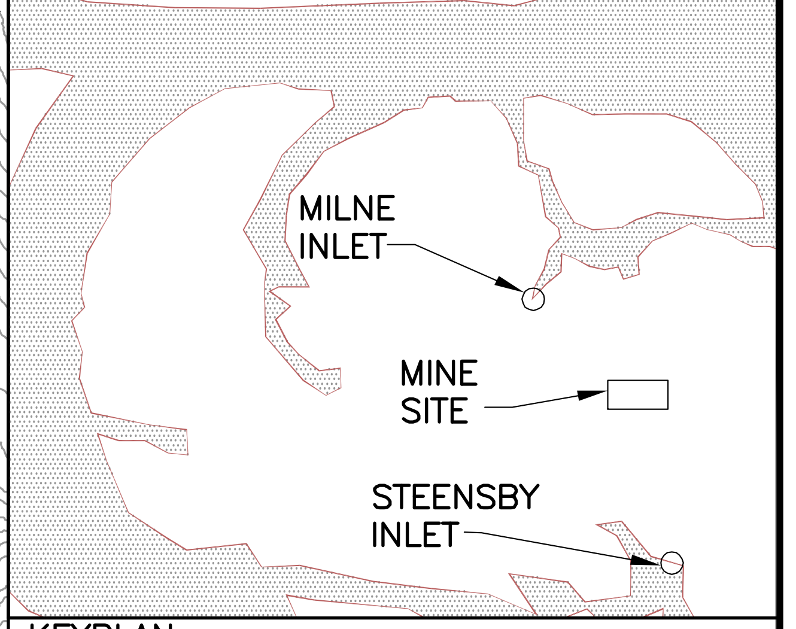
AMEC EARTH AND ENVIRONMENTAL

Robert Wiseman, eng (Quebec)	Brian Lapos, M.Sc., P.Eng.
Senior Geotechnical Engineer	AMEC E&E Project Manager

Reviewed by: Claude Bedard
BW/BML/CB/dl/bml

Attachments:
Drawing 1 – Borehole Location Plan – Milne Inlet
Drawing 2 – Borehole Location Plan – Tote Road STA. 0+000 to 36+500
Drawing 3 – Borehole Location Plan – Tote Road STA. 36+500 to 74+000
Drawing 4 – Borehole Location Plan – Tote Road STA. 74+000 to 99+838
2010 Borehole Logs (BH10-10, 11, 17, 18, 19, 20, 22 and 23)
Figure 1 – Mary River – Mine Site Foundations – Required Embedment Length vs. Applied Axial Load for Adfreeze Piles – EBA Engineering Consultants Ltd. File: E14101009.001.
Figure 5 – Mary River – Mine Site Foundations – Allowable Grouted Rock Socketed Pile Capacities – EBA Engineering Consultants Ltd. File: E14101009.001.





KEYPLAN

LEGEND

A1 PERIMETER POINT

2010 BOREHOLE LOCATION

BOREHOLE COORDINATES		
BH-NO	NORTHING	EASTING
BH10-01	7,975,989	503,772
BH10-02	7,976,127	503,921
BH10-03	7,975,758	503,693
BH10-04	7,975,352	503,969

2010 TEST PIT LOCATION

TEST PIT COORDINATES		
TP-NO	NORTHING	EASTING
TP10-08_1	7,975,291	503,758
TP10-08_2	7,975,231	503,752
TP10-08_3	7,975,117	503,789
TP10-09_1	7,974,997	503,748
TP10-10_1	7,974,840	503,745
TP10-10_2	7,974,768	503,647
TP10-10_3	7,974,685	503,707
TP10-10_4	7,974,613	503,721
TP10-10_5	7,974,531	503,771

HISTORICAL BOREHOLE LOCATION (KNIGHT PIESOLD)

EXISTING BOREHOLE COORDINATES		
BH-NO	NORTHING	EASTING
BS-001	7,975,945	503,284
PMBC-002	7,975,927	503,178
PMPL-002	7,975,944	503,180
PMSD-001	7,976,595	503,314
PMT-001	7,975,826	503,318
PMTF-001	7,976,210	503,655

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES
2. CONTOURS PROVIDED BY TERRAPOINT CANADA INC. CONTOURS AT 0.3m INTERVALS
3. AS-BUILT INFO FROM GENIVAR, TIMMINS ONTARIO.
4. QUARRY LOCATION PROVIDED BY KNIGHT PIESOLD CONSULTING.
5. MILNE INLET BASE MAPPING PROVIDED BY AMEC MINING AND METALS ON OCTOBER 6, 2010.

PROGRESS PRINT
12/12/08

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PROJECT:
MARY RIVER PROJECT
TRUCKING FEASIBILITY OPTION

TITLE:
BOREHOLE LOCATION PLAN
MILNE INLET

PROJECT NO.:	TC101510
REVISION NO.	A
DATE:	AUGUST 2010
SCALE:	1:25,000
DRAWING NO.:	001

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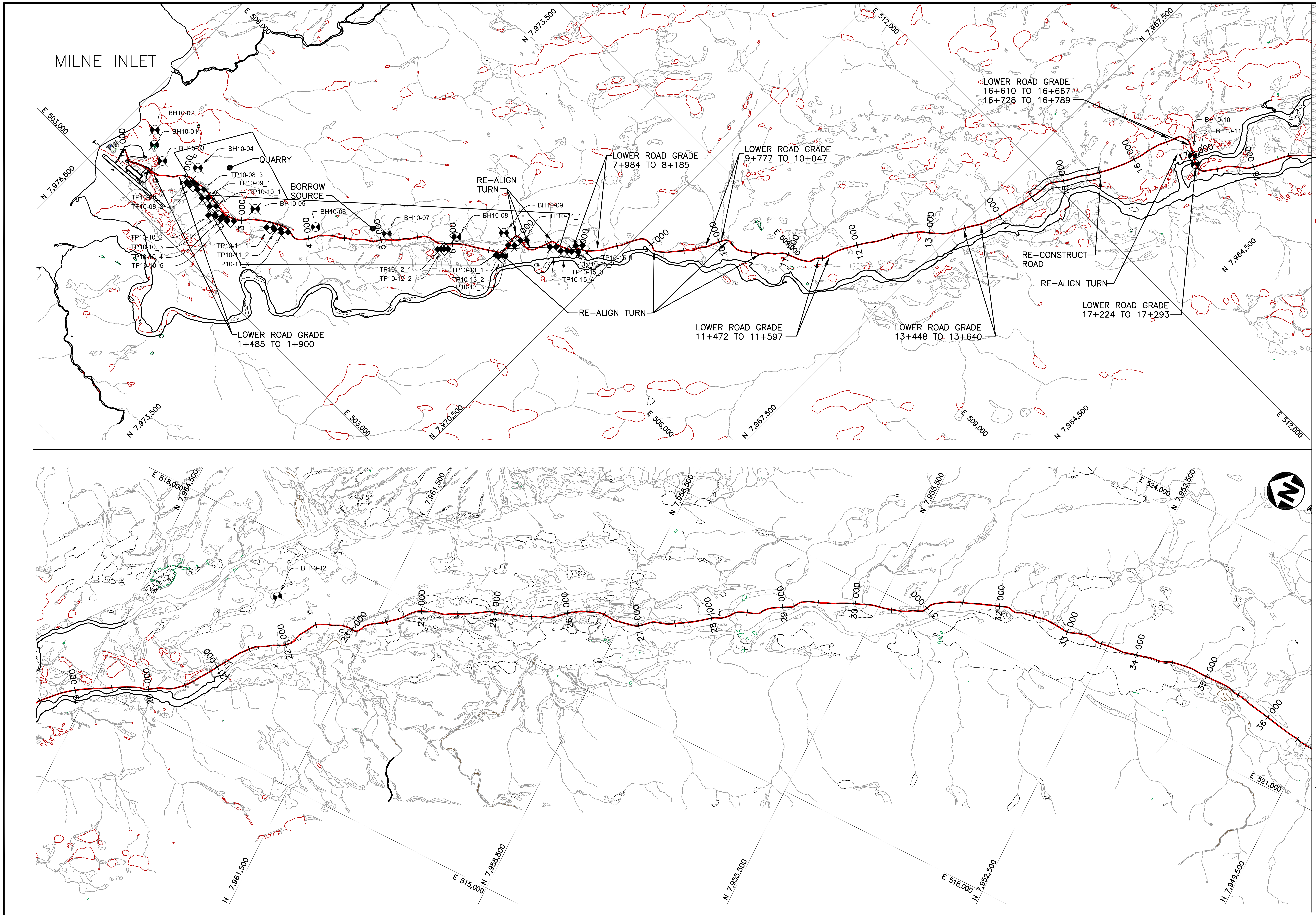

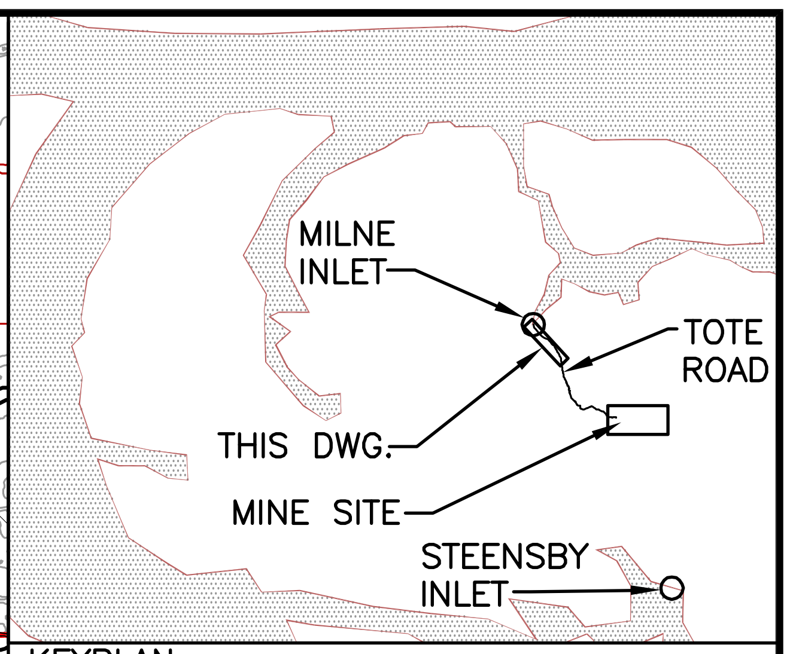

KEYPLAN

LEGEND

EXISTING CENTERLINE AT ROAD

WATERCOURSE

2010 BOREHOLE LOCATION

BOREHOLE COORDINATES		
BH-NO	NORTHING	EASTING
BH10-01	7,975,989	503,772
BH10-02	7,976,127	503,921
BH10-03	7,975,758	503,693
BH10-04	7,975,352	503,969
BH10-05	7,974,412	504,123
BH10-06	7,973,659	504,528
BH10-07	7,972,916	505,147
BH10-08	7,972,214	505,782
BH10-09	7,971,804	506,274
BH10-10	7,965,955	513,598
BH10-11	7,965,850	513,542
BH10-12	7,962,806	517,227

2010 TEST PIT LOCATION

TEST PIT COORDINATES		
TP-NO	NORTHING	EASTING
TP10-08_1	7,975,291	503,758
TP10-08_2	7,975,231	503,752
TP10-08_3	7,975,117	503,789
TP10-09_1	7,974,997	503,748
TP10-10_1	7,974,840	503,745
TP10-10_2	7,974,768	503,647
TP10-10_3	7,974,685	503,707
TP10-10_4	7,974,613	503,721
TP10-10_5	7,974,531	503,771
TP10-11_1	7,974,093	504,086
TP10-11_2	7,974,001	504,141
TP10-11_3	7,973,904	504,182
TP10-12_1	7,972,251	505,513
TP10-12_2	7,972,219	505,549
TP10-13_1	7,971,637	506,015
TP10-13_2	7,971,598	506,027
TP10-13_3	7,971,613	506,224
TP10-14_1	7,971,545	506,390
TP10-15_1	7,970,963	506,870
TP10-15_2	7,970,944	506,770
TP10-15_3	7,971,058	506,676
TP10-15_4	7,971,199	506,608

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES
2. TOTE ROAD AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR.

PROGRESS PRINT
04/12/08

DRAFT

REF NUMBER TITLE
REFERENCES

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Client:

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APPROVED BY:

PROJECT:
MARY RIVER PROJECT
TRUCKING FEASIBILITY OPTION

TITLE:
BOREHOLE LOCATION PLAN
TOTE ROAD STA 0+000 TO 36+500

PROJECT NO.: TC101510
REVISION NO. A
DATE: JULY 2010
SCALE: 1:25,000
DRAWING NO.: 002

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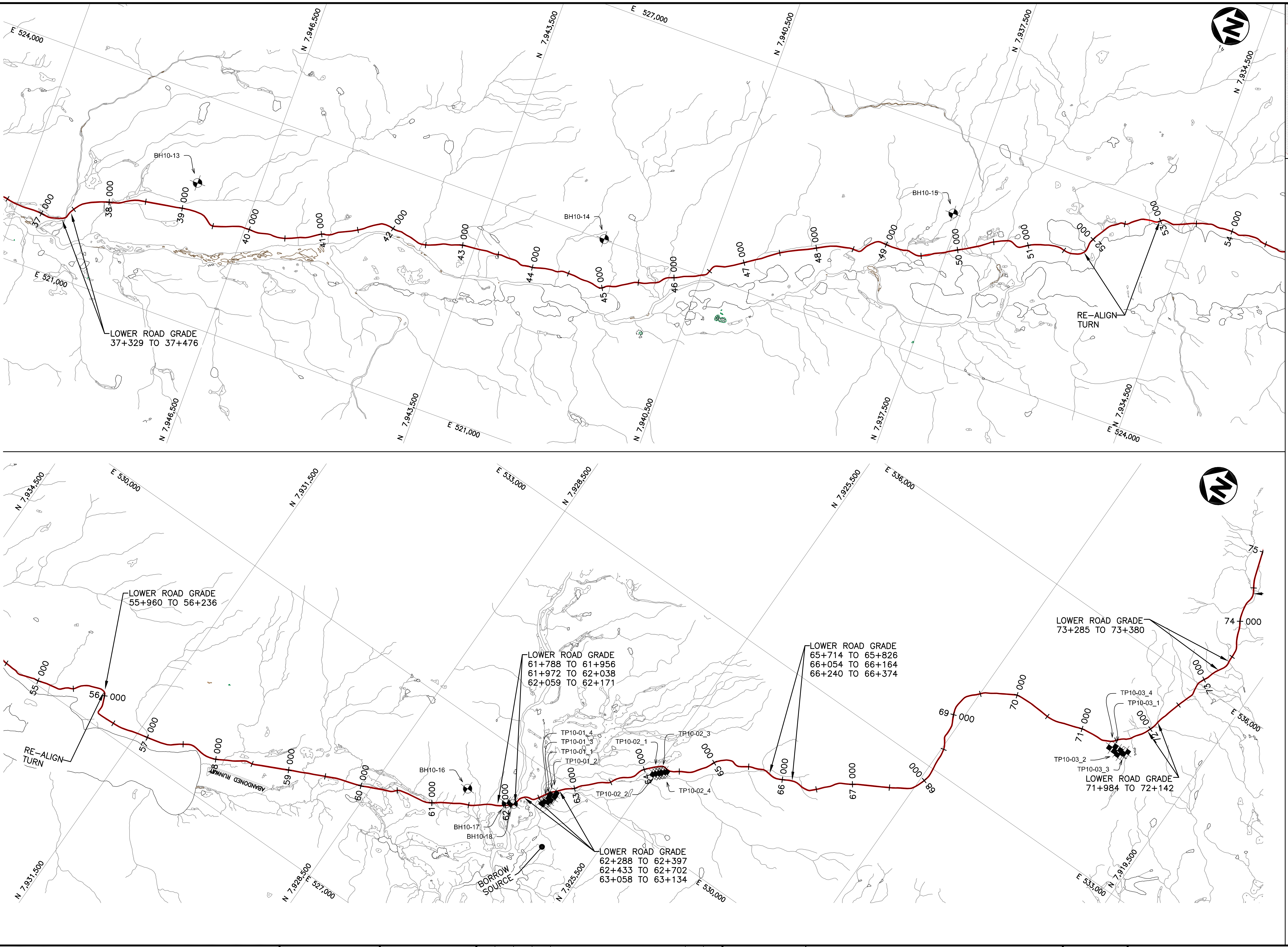

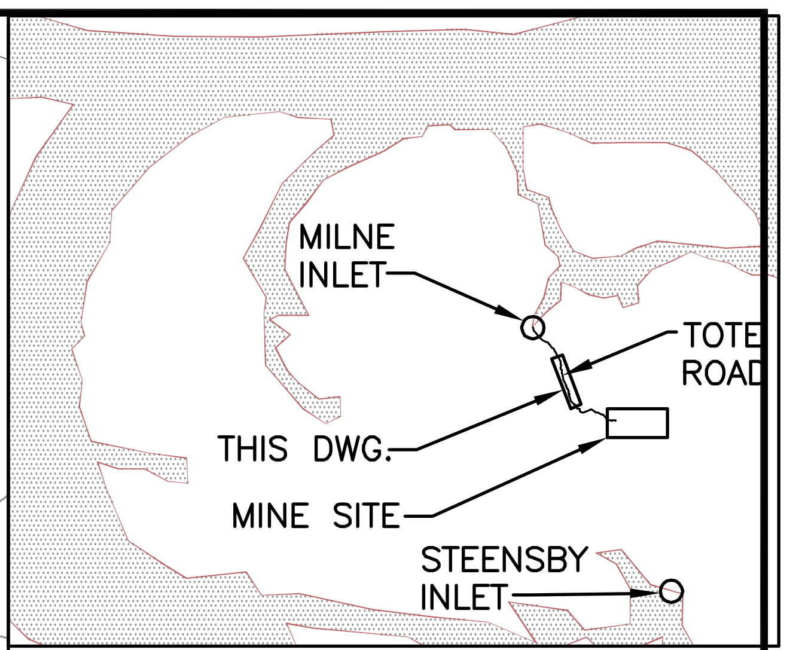

KEYPLAN

LEGEND

🟥 EXISTING CENTERLINE AT ROAD

🟥 WATERCOURSE

⌖ 2010 BOREHOLE LOCATION

BOREHOLE COORDINATES		
BH-NO	NORTHING	EASTING
BH10-13	7,947,309	522,850
BH10-14	7,941,896	524,015
BH10-15	7,937,592	525,949
BH10-16	7,927,426	529,182
BH10-17	7,926,886	529,321
BH10-18	7,926,803	529,365

⌖ 2010 TEST PIT LOCATION

TEST PIT COORDINATES		
TP-NO	NORTHING	EASTING
TP10-01_1	7,926,432	529,734
TP10-01_2	7,926,438	529,787
TP10-01_3	7,926,449	529,663
TP10-01_4	7,926,465	529,622
TP10-02_1	7,925,463	530,801
TP10-02_2	7,925,434	530,832
TP10-02_3	7,925,405	530,858
TP10-02_4	7,925,383	530,879
TP10-03_1	7,920,544	534,626
TP10-03_2	7,920,480	534,612
TP10-03_3	7,920,447	534,665
TP10-03_4	7,920,625	534,630

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES
2. TOTE ROAD AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR.

PROGRESS PRINT
12/12/08

DRAFT

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A	DD	MM	YYYY	ISSUED FOR REVIEW	X.X.	X.X.
REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.

Client Logo:

Client:

Baffinland
Iron Mines Corporation

AMEC Earth & Environmental
160 Traders Boulevard East
Mississauga, Ontario, Canada L4Z 3K7

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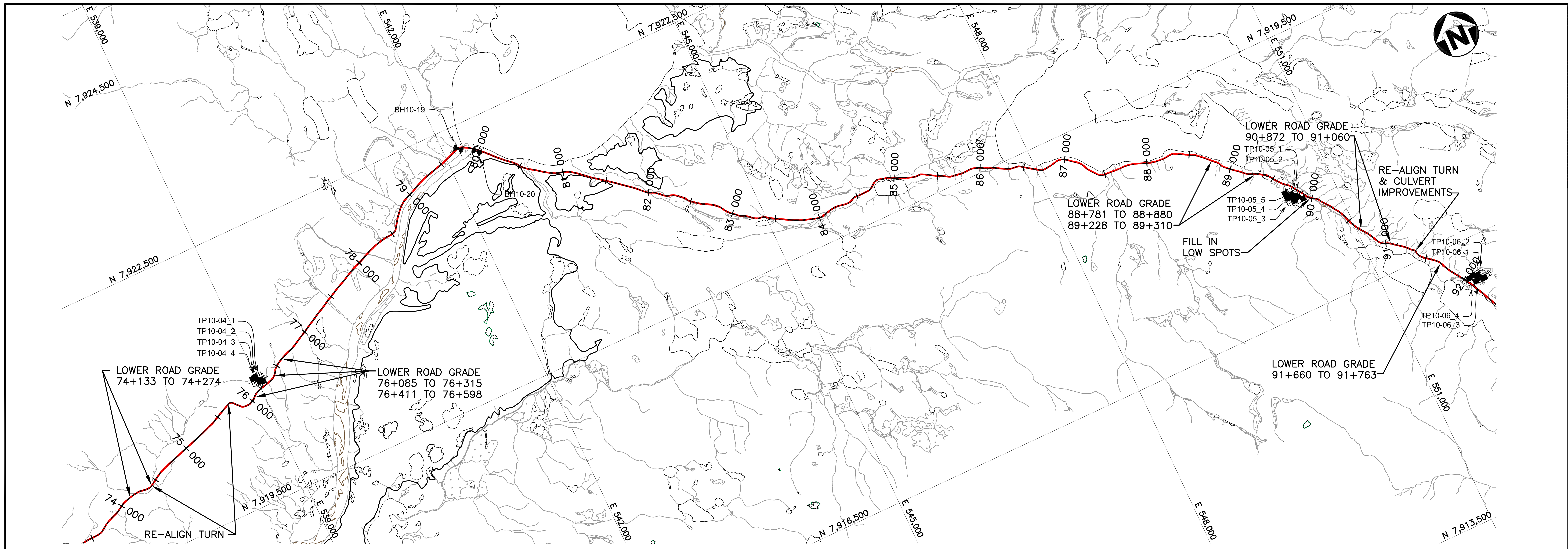
www.amec.com/earthandenvironmental

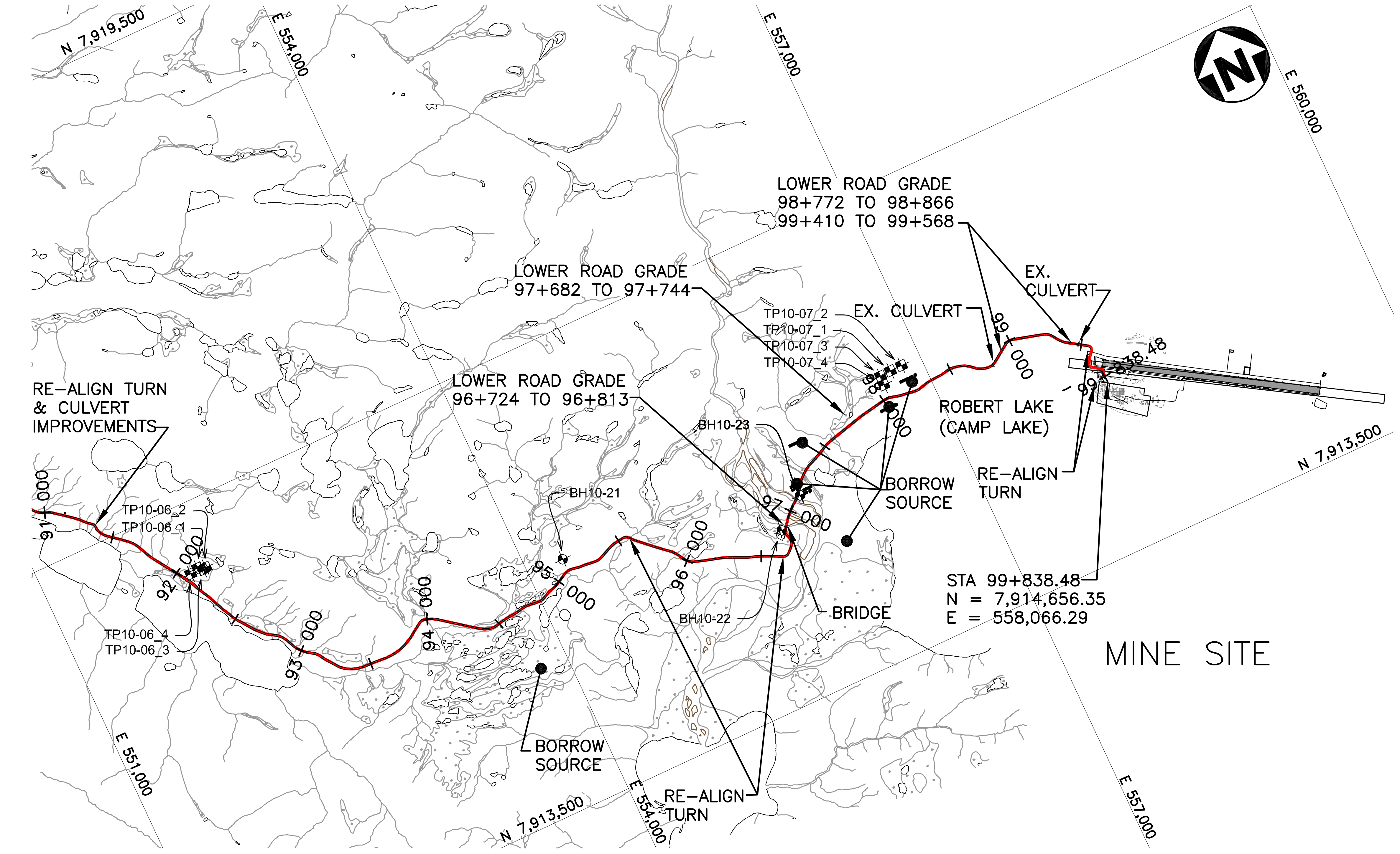
DRAWN BY:	M.M.
DESIGNED BY:	
CHECKED BY:	B.M.L.
REVIEWED BY:	
APPROVED BY:	

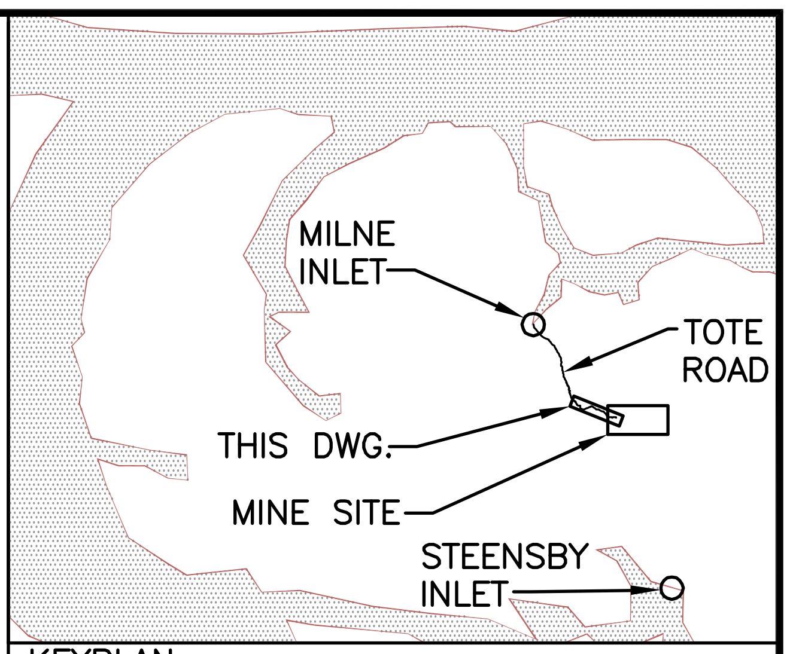
PROJECT:
MARY RIVER PROJECT
TRUCKING FEASIBILITY OPTION

TITLE:
BOREHOLE LOCATION PLAN
TOTE ROAD STA 36+500 TO 74+000

PROJECT NO.:	TC101510
REVISION NO.	A
DATE:	JULY 2010
SCALE:	1:25,000
DRAWING NO.:	003







KEYPLAN

LEGEND

EXISTING CENTERLINE AT ROAD

WATERCOURSE

2010 BOREHOLE LOCATION

BOREHOLE COORDINATES		
BH-NO	NORTHING	EASTING
BH10-19	7,922,241	542,169
BH10-20	7,922,127	542,346
BH10-21	7,915,082	554,252
BH10-22	7,914,637	555,665
BH10-23	7,914,798	555,877

2010 TEST PIT LOCATION

TEST PIT COORDINATES		
TP-NO	NORTHING	EASTING
TP10-04_1	7,920,821	539,028
TP10-04_2	7,920,847	539,014
TP10-04_3	7,920,836	538,988
TP10-04_4	7,920,836	538,988
TP10-05_1	7,917,721	550,569
TP10-05_2	7,917,762	550,530
TP10-05_3	7,917,737	550,476
TP10-05_4	7,917,762	550,468
TP10-05_5	7,917,801	550,465
TP10-06_1	7,916,062	552,007
TP10-06_2	7,916,045	552,058
TP10-06_3	7,916,040	552,036
TP10-06_4	7,916,048	551,949
TP10-07_1	7,915,299	556,778
TP10-07_2	7,915,301	556,860
TP10-07_3	7,915,295	556,703
TP10-07_4	7,915,233	556,698

NOTES:

1. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES
2. TOTE ROAD AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR.

PROGRESS PRINT
12/12/08

DRAFT

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△	DD	MM	YYYY	ISSUED FOR REVIEW	X.X.	X.X.
REV	D	M	Y	ISSUE/REVISION DESCRIPTION	ENG.	APPR.

Client Logo:

Client:
Baffinland
Iron Mines Corporation

AMEC Earth & Environmental
160 Traders Boulevard East
Mississauga, Ontario, Canada L4Z 3K7
amec

www.amec.com/earthandenvironmental

DRAWN BY: M.M.
DESIGNED BY:
CHECKED BY: B.M.L.
REVIEWED BY:
APPROVED BY:

PROJECT:
MARY RIVER PROJECT
TRUCKING FEASIBILITY OPTION

TITLE:
BOREHOLE LOCATION PLAN
TOTE ROAD STA 74+000 TO 99+838

PROJECT NO.: TC101510
REVISION NO. A
DATE: JULY 2010
SCALE: 1:25,000
DRAWING NO.: 004

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RECORD OF BOREHOLE No. BH10-10

PAGE 1 OF 1

PROJECT Mary River Project Trucking Feasibility Study
ENGINEER
PROJECT NO. TC101510
DRILLER
BORING METHOD
LOGGED BY
CLIENT Baffinland Iron Mines Corp.
LOCATION 7965955m N 513598m E
COMPILED BY NM
ELEVATION m
COORD.
BORING DATE Start: Aug 24, 10 End: Aug 24, 10
CHECKED BY BL

SAMPLE TYPES
AU Auger
BU Bulk
GS Grab
RC Rock Core
SS Split Spoon
TW Thin Walled Open (Shelby)
WS Wash Sample
GS Grab

ABBREVIATIONS
P.P. Pocket Penetrometer
U.W. Wet Unit Weight
PT Standard Proctor Test
P.L. Point Load Strength Index (I_{50})
RQD Rock Quality Designation
SCR Solid Core Recovery
k Permeability
C Consolidation
DS Direct Shear
GS Grain Size Analysis

SOIL PROFILE		SAMPLES											
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	DEPTH (m)	ELEVATION (m)	DYNAMIC CONE PENETRATION RESISTANCE PLOT ─×─ 20 40 60 80 100 MTO VANE ☐ INTACT ■ REMOULDED NILCON VANE △ INTACT ▲ REMOULDED UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100	PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L WATER CONTENT (%) 10 20 30	PERMEABILITY (cm/s)	REMARKS
0.0	HQ casing advanced to 6m with no sampling, observations of drill cuttings indicates that overburden soils are comprised of sand to silty sand, likely frozen below a depth of about 3m.			NR	86			1 2 3 4 5					
6.0	Reddish Brown **SAND AND GRAVEL,** containing frequent cobbles and boulders, some well graded silty sand seams, likely frozen Note: Fines washed from core		1	NQ	113			6 7 8					
			2	NQ	123			9 10 11					
	Gneissic boulder from 11.7 to 12.0m.		3	NQ				12 13					
13.5	**GNEISSIC BEDROCK** See Rock Log for detailed logging							14 15					
15.0	**End of Borehole due to loss of drill water circulation.**												

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RECORD OF BOREHOLE No. BH10-11

PAGE 1 OF 1

PROJECT Mary River Project Trucking Feasibility Study
ENGINEER
PROJECT NO. TC101510
DRILLER
BORING METHOD
LOGGED BY
CLIENT Baffinland Iron Mines Corp.
LOCATION 7965850m N 513542m E
COMPILED BY NM
ELEVATION m
COORD.
BORING DATE Start: Aug 22, 10 End: Aug 24, 10
CHECKED BY BL

SAMPLE TYPES					
AU	Auger	RC	Rock Core	GS	Grab
BU	Bulk	SS	Split Spoon		
GS	Grab	TW	Thin Walled Open (Shelby)		
		WS	Wash Sample		

ABBREVIATIONS					
P.P.	Pocket Penetrometer	P.L.	Point Load Strength Index (I_{50})	C	Consolidation
U.W.	Wet Unit Weight	RQD	Rock Quality Designation	DS	Direct Shear
PT	Standard Proctor Test	SCR	Solid Core Recovery	GS	Grain Size Analysis
		k	Permeability		

SOIL PROFILE		SAMPLES											
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	DEPTH (m)	ELEVATION (m)	DYNAMIC CONE PENETRATION RESISTANCE PLOT —×— 20 40 60 80 100 MTO VANE ☐ INTACT ■ REMOULDED NILCON VANE △ INTACT ▲ REMOULDED UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100	PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L WATER CONTENT (%) 10 20 30	PERMEABILITY (cm/s)	REMARKS
0.0	Greyish brown, **ROAD BASE FILL**, fine to coarse gravel		1	HQ	33			1					
1.5 1.6	Brown **ORGANICS**, containing rootlets. Greyish brown to brown **SAND AND GRAVEL**, containing frequent cobbles and boulders, likely frozen below about 2m. Note: Fines washed from core		2	HQ	36			2 3					
			3	HQ	57			4					
			4	HQ	35			5 6					
			5	HQ	116			7					
7.5	No Sampling between a depth of 7.5m and 9 m. Changed drilling practice. Switched from HQ to HQ casing with NQ coring.							8 9					
9.5	**GNEISSIC BEDROCK,** See Rock Log for detailed logging		6	NQ	80			10 11 12					
			7	NQ	48			13 14 15					
15.0	**End of Borehole.**												

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RECORD OF BOREHOLE No. BH10-17

PAGE 1 OF 1

PROJECT	Mary River Project Trucking Feasibility Study			ENGINEER	
PROJECT NO.	TC101510	DRILLER	BORING METHOD	LOGGED BY	
CLIENT	Baffinland Iron Mines Corp.	LOCATION	7926886m N 529321m E	COMPILED BY	NM
ELEVATION	m	COORD.	BORING DATE Start: Aug 25, 10 End: Aug 25, 10	CHECKED BY	BL

SAMPLE TYPES

AU	Auger	RC	Rock Core	GS	Grab
BU	Bulk	SS	Split Spoon		
GS	Grab	TW	Thin Walled Open (Shelby)		
		WS	Wash Sample		

ABBREVIATIONS

P.P.	Pocket Penetrometer	P.L.	Point Load Strength Index (I_{50})	C	Consolidation
U.W.	Wet Unit Weight	RQD	Rock Quality Designation	DS	Direct Shear
PT	Standard Proctor Test	SCR	Solid Core Recovery	GS	Grain Size Analysis
		k	Permeability		

SOIL PROFILE		SAMPLES											
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	DEPTH (m)	ELEVATION (m)	DYNAMIC CONE PENETRATION RESISTANCE PLOT —×— 20 40 60 80 100 MTO VANE ☐ INTACT ■ REMOULDED NILCON VANE △ INTACT ▲ REMOULDED UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100	PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT w LIQUID LIMIT W_L WATER CONTENT (%) 10 20 30	PERMEABILITY (cm/s)	REMARKS
0.0 0.1	Brown **ORGANICS,** contains rootlets, wet.												
	Greyish brown **SAND AND GRAVEL,** containing frequent cobbles and boulders, likely frozen below a depth of about 2m. Note: Fines washed from core.		1	NQ	10			1 2 3					
			2	NQ	51			4 5 6					
7.1	Carbonate **BEDROCK,** See Rock Log for detailed logging		3	NQ	100			7 8 9					
			4	NQ	100			10 11 12					
12.0	**End of Borehole.**												

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RECORD OF BOREHOLE No. BH10-18

PAGE 1 OF 1

PROJECT Mary River Project Trucking Feasibility Study

ENGINEER

PROJECT NO. TC101510

DRILLER

BORING METHOD

LOGGED BY

CLIENT Baffinland Iron Mines Corp.

LOCATION 7926803m N 529365m E

COMPILED BY NM

ELEVATION m

COORD.

BORING DATE Start: Aug 25, 10 End: Aug 25, 10

CHECKED BY BL

SAMPLE TYPES					
AU	Auger	RC	Rock Core	GS	Grab
BU	Bulk	SS	Split Spoon		
GS	Grab	TW	Thin Walled Open (Shelby)		
		WS	Wash Sample		

ABBREVIATIONS					
		P.L.	Point Load Strength Index (I_{50})		
P.P.	Pocket Penetrometer	RQD	Rock Quality Designation	C	Consolidation
U.W.	Wet Unit Weight	SCR	Solid Core Recovery	DS	Direct Shear
PT	Standard Proctor Test	k	Permeability	GS	Grain Size Analysis

ELEV DEPTH (m)	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	DEPTH (m)	ELEVATION (m)	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / MTO VANE ☐ INTACT ■ REMOULDED / NILCON VANE △ INTACT ▲ REMOULDED / UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100	PLASTIC LIMIT W_P / NATURAL MOISTURE CONTENT W / LIQUID LIMIT W_L / WATER CONTENT (%) 10 20 30	PERMEABILITY (cm/s)	REMARKS
0.0	Greyish brown **SAND AND GRAVEL,** containing frequent cobbles and boulders, likely frozen below a depth of about 2m. Note: Fines washed form core		1	NQ	18			1 2 3					
			2	NQ	60			4 5 6					
7.1	Carbonate **BEDROCK,** See Rock Log for detailed logging		3	NQ	100			7 8 9					
			4	NQ	100			10 11 12					
			5	NQ	100			13 14 15					
15.0	**End of Borehole.**												

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RECORD OF BOREHOLE No. BH10-19

PAGE 1 OF 1

PROJECT	Mary River Project Trucking Feasibility Study			ENGINEER	
PROJECT NO.	TC101510	DRILLER	BORING METHOD	LOGGED BY	
CLIENT	Baffinland Iron Mines Corp.	LOCATION	7922241m N 542169m E	COMPILED BY	NM
ELEVATION	m	COORD.	BORING DATE Start: Aug 26, 10 End: Aug 26, 10	CHECKED BY	BL

SAMPLE TYPES

AU	Auger	RC	Rock Core	GS	Grab
BU	Bulk	SS	Split Spoon		
GS	Grab	TW	Thin Walled Open (Shelby)		
		WS	Wash Sample		

ABBREVIATIONS

		P.L.	Point Load Strength Index (I_{50})		
P.P.	Pocket Penetrometer	RQD	Rock Quality Designation	C	Consolidation
U.W.	Wet Unit Weight	SCR	Solid Core Recovery	DS	Direct Shear
PT	Standard Proctor Test	k	Permeability	GS	Grain Size Analysis

DYNAMIC CONE PENETRATION RESISTANCE PLOT —×— 20 40 60 80 100

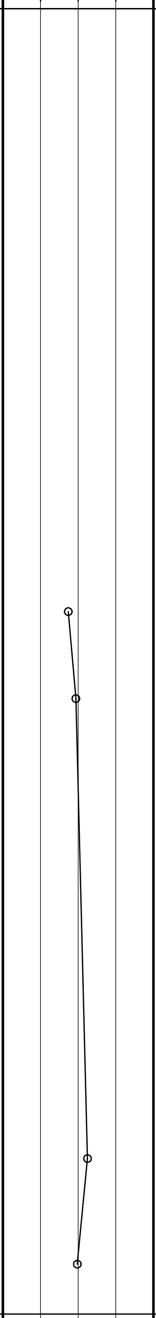
MTO VANE ☐ INTACT ■ REMOULDED; NILCON VANE △ INTACT ▲ REMOULDED

UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100

PLASTIC LIMIT W_P — NATURAL MOISTURE CONTENT W — LIQUID LIMIT W_L; WATER CONTENT (%) 10 20 30

ELEV DEPTH (m)	SOIL PROFILE DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	ELEVATION (m)	PERMEABILITY (cm/s)	REMARKS
0.0	Brown **Silty SAND to SAND,** , trace gravel containing cobbles & boulders. Note: Sample description based on drill cutting observations from ground surface to a depth of about 9m, likely frozen below a depth of about 2m.		1	NQ	0					Between 0 to 9m loss of soil recovery due to drilling water.
			2	NQ	0					
6.0	Brown fine to medium **SAND,** trace silt, trace gravel, Frozen.		3	NQ	0					
			4	NQ	48					Gr, Sa, Si, Cl 5 94 1 0
			5	NQ	100					
			6	NQ	106					
			7	NQ	108					Gr, Sa, Si, Cl 0 95 5 0
21.0	**End of Borehole.**									

DEPTH (m) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21



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RECORD OF BOREHOLE No. BH10-20

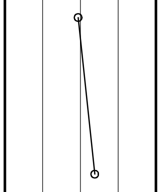
PAGE 1 OF 1

PROJECT Mary River Project Trucking Feasibility Study
ENGINEER
PROJECT NO. TC101510
DRILLER
BORING METHOD
LOGGED BY
CLIENT Baffinland Iron Mines Corp.
LOCATION 7922127m N 542346m E
COMPILED BY NM
ELEVATION m
COORD.
BORING DATE Start: Aug 26, 10 End: Aug 26, 10
CHECKED BY BL

SAMPLE TYPES					
AU	Auger	RC	Rock Core	GS	Grab
BU	Bulk	SS	Split Spoon		
GS	Grab	TW	Thin Walled Open (Shelby)		
		WS	Wash Sample		

ABBREVIATIONS					
P.P.	Pocket Penetrometer	P.L.	Point Load Strength Index (I_{50})	C	Consolidation
U.W.	Wet Unit Weight	RQD	Rock Quality Designation	DS	Direct Shear
PT	Standard Proctor Test	SCR	Solid Core Recovery	GS	Grain Size Analysis
		k	Permeability		

SOIL PROFILE		SAMPLES											
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	DEPTH (m)	ELEVATION (m)	DYNAMIC CONE PENETRATION RESISTANCE PLOT —×— 20 40 60 80 100 MTO VANE ☐ INTACT ■ REMOULDED NILCON VANE △ INTACT ▲ REMOULDED UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100	PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L WATER CONTENT (%) 10 20 30	PERMEABILITY (cm/s)	REMARKS
0.0	Brown **SAND,** trace gravel Note: Sample description based on drill cutting observations from ground surface to a depth of about 7.5 m, like ly frozen below a depth of about 2m.							1 2 3 4 5 6 7					
7.5	Brown fine to medium **SAND,** trace silt, frozen. Note: Sample description based on drill cutting observations between depths 9.0m and 12.0m.		1	NQ	90			8 9					
			2	NQ	0			10 11 12					
			3	NQ	87			13 14 15					Gr, Sa, Si, Cl 0 97 3 0
15.0	**End of Borehole.**												



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RECORD OF BOREHOLE No. BH10-22

PAGE 1 OF 1

PROJECT	Mary River Project Trucking Feasibility Study					ENGINEER	
PROJECT NO.	TC101510	DRILLER		BORING METHOD		LOGGED BY	
CLIENT	Baffinland Iron Mines Corp.	LOCATION	7914637m N		555665m E	COMPILED BY	NM
ELEVATION	m	COORD.		BORING DATE	Start: Aug 26, 10 End: Aug 26, 10	CHECKED BY	BL

SAMPLE TYPES

AU	Auger	RC	Rock Core	GS	Grab
BU	Bulk	SS	Split Spoon		
GS	Grab	TW	Thin Walled Open (Shelby)		
		WS	Wash Sample		

ABBREVIATIONS

P.P.	Pocket Penetrometer	P.L.	Point Load Strength Index (I_{50})	C	Consolidation
U.W.	Wet Unit Weight	RQD	Rock Quality Designation	DS	Direct Shear
PT	Standard Proctor Test	SCR	Solid Core Recovery	GS	Grain Size Analysis
		k	Permeability		

DYNAMIC CONE PENETRATION RESISTANCE PLOT —×— 20 40 60 80 100

MTO VANE ☐ INTACT ■ REMOULDED; NILCON VANE △ INTACT ▲ REMOULDED

UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100

PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L — WATER CONTENT (%) 10 20 30

ELEV DEPTH (m)	SOIL PROFILE DESCRIPTION	SAMPLES NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	ELEVATION (m)	PERMEABILITY (cm/s)	REMARKS
0.0 0.1	Brown **ORGANICS,** containing rootlets.								
	Dark brown **SAND AND GRAVEL,** contains cobbles and boulders Note: Fines washed from core	1	NQ	10					
		2	NQ	70					
		3	NQ	30					
9.2	Sandstone, **BEDROCK,** See Rock Log for detailed logging.	4	NQ	88					
	Becoming Red below about a depth of 14.0m depth	5	NQ	93					
15.0	**End of Borehole.**								

DEPTH (m): 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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RECORD OF BOREHOLE No. BH10-23

PAGE 1 OF 1

PROJECT Mary River Project Trucking Feasibility Study

ENGINEER

PROJECT NO. TC101510 DRILLER BORING METHOD LOGGED BY

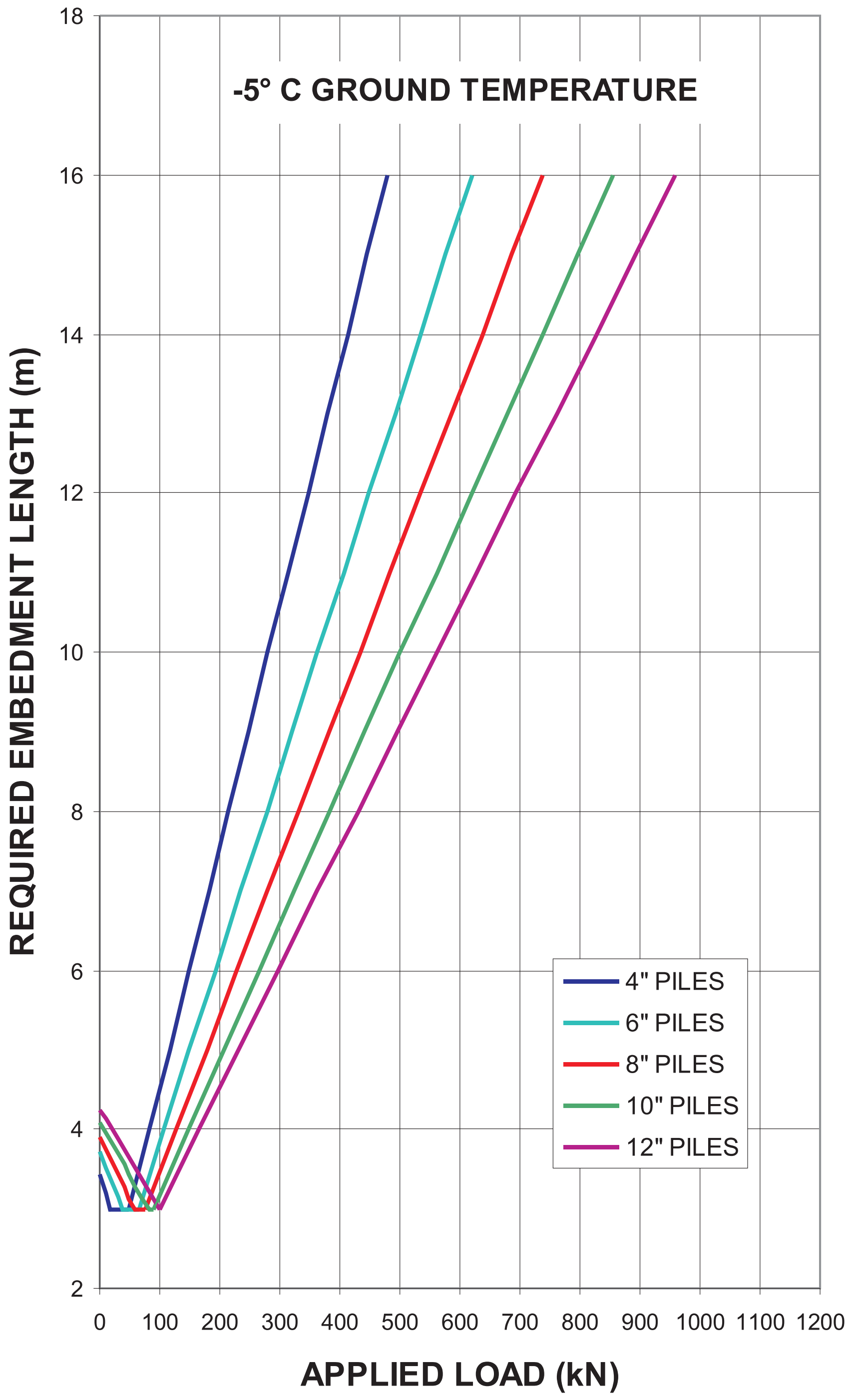
CLIENT Baffinland Iron Mines Corp. LOCATION 7914798m N 555877m E COMPILED BY NM

ELEVATION m COORD. BORING DATE Start: Aug 26, 10 End: Aug 26, 10 CHECKED BY BL

SAMPLE TYPES
AU Auger
BU Bulk
GS Grab
RC Rock Core
SS Split Spoon
TW Thin Walled Open (Shelby)
WS Wash Sample
GS Grab

ABBREVIATIONS
P.P. Pocket Penetrometer
U.W. Wet Unit Weight
PT Standard Proctor Test
P.L. Point Load Strength Index (I_{50})
RQD Rock Quality Designation
SCR Solid Core Recovery
k Permeability
C Consolidation
DS Direct Shear
GS Grain Size Analysis

SOIL PROFILE		SAMPLES											
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	RECOVERY (%)	SPT "N" VALUES or RQD	WELL / PIEZOMETER INSTALLATION	DEPTH (m)	ELEVATION (m)	DYNAMIC CONE PENETRATION RESISTANCE PLOT —×— 20 40 60 80 100 MTO VANE ☐ INTACT ■ REMOULDED NILCON VANE △ INTACT ▲ REMOULDED UNDRAINED SHEAR STRENGTH (kPa) 20 40 60 80 100	PLASTIC LIMIT W_P NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L WATER CONTENT (%) 10 20 30	PERMEABILITY (cm/s)	REMARKS
0.0	Greyish Brown **SAND AND GRAVEL,** likely frozen below a depth of about 2m. Note: Fines washed from core		1	NQ	21								
3.6	Brown **SAND,** containing cobbles and boulders, likely frozen. Note: Fines washed from core		2	NQ	28								
6.0	Sandstone **BEDROCK,** See Rock Log for detailed logging.		3	NQ	100								
	Becoming highly weathered coarse brown Bedrock below 10m.		4	NQ	135								
12.0	**End of Borehole.**												



CLIENT

MARY RIVER - MINE SITE FOUNDATIONS

REQUIRED EMBEDMENT LENGTH vs. APPLIED AXIAL LOAD FOR ADFREEZE PILES

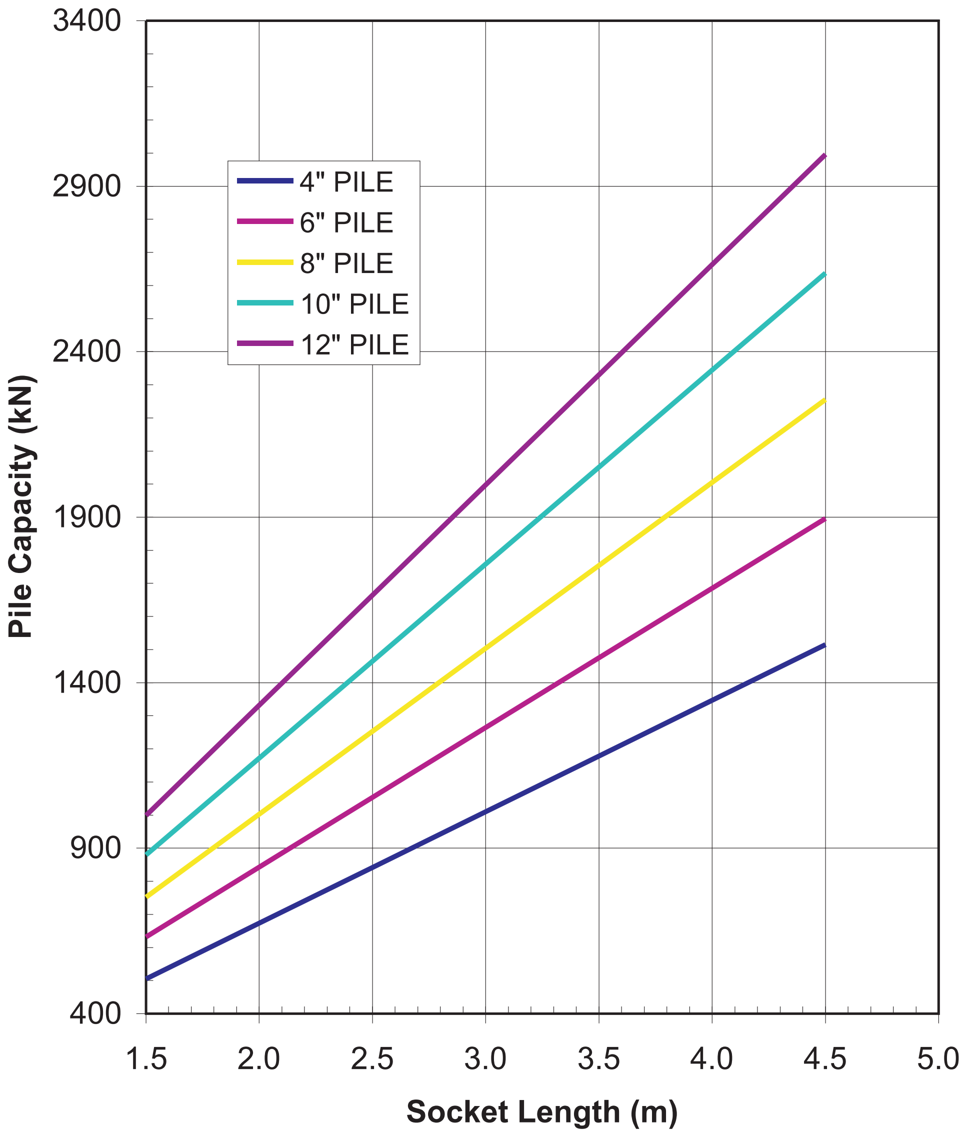
EBA Engineering
Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
E14101009.003	TK	KWJ	1

OFFICE
EBA-EDM

DATE
September 2010

Figure 1



CLIENT

MARY RIVER - MINE SITE FOUNDATIONS

ALLOWABLE GROUTED ROCK SOCKETED PILE CAPACITIES

EBA Engineering
Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
E14101009.003	TK	KWJ	1
OFFICE	DATE		
EBA-EDM	September 2010		

Figure 5