March 21th 2017

Karen Kharatyan
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU
X0B 1J0

Re: Water License 2AM-MEL1631 Part D, Items 1&2 - Submission of Final Design and Construction Drawings for Rankin Inlet Bypass Road

Mr. Kharatyan,

Agnico Eagle Mines Limited (Agnico Eagle) is developing the Meliadine Project (the Project), a goldmine located approximately 25 km north from Rankin Inlet, and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. Situated on the western shore of Hudson Bay, the Project site is located on a peninsula between the east, south, and west basins of Meliadine Lake (63°1'23.8'' N, 92°13'6.42"W) on Inuit Owned Land. Agnico Eagle is developing the mine for production in late 2019.

The remote location of the Project requires that access, service and haul roads be built to support the development. A controlled 31 km long All-Weather Access Road (AWAR) links the proposed Meliadine mine site and Rankin Inlet. As proposed in the Roads Management Plan (Agnico Eagle, 2015), Agnico Eagle has to build a bypass road to divert traffic around the community of Rankin Inlet to minimize impacts on the Community. Its design is based on the specifications of the AWAR. The Rankin Inlet Bypass Road (RIBR) will be 6.3 km long with a gravel surface and will allow traffic from the Rankin Inlet Laydown Area to bypass the community of Rankin Inlet, delivering people, materials, and fuel to the proposed Meliadine mine site. The Rankin Inlet Bypass Road will be a private road for the duration of the operation of the mine.

In accordance with Water License 2AM-MEL1631, Part D, Items 1 and 2, please find enclosed with this letter, a copy of the final design and construction drawings for Rankin Inlet Bypass Road.

Should you have any questions regarding this submission, please contact me.

Regards,

Agnico Eagle Mines Limited – Meliadine Division

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cc: *Ian Parsons, Indigenous and Northern Affairs Canada*
Luis Manzo, Kivalliq Inuit Association

AGNICO EAGLE

DESIGN REPORT AND DRAWINGS FOR RANKIN INLET BYPASS ROAD, CULVERTS AND BRIDGE MELIADINE PROJECT, NUNAVUT

PRESENTED TO

Agnico Eagle Mines Ltd.

TETRA TECH

MARCH 2017
ISSUED FOR USE
TETRA TECH PROJECT NUMBER: 28920
AGNICO EAGLE DOCUMENT NUMBER: 6515-E-132-005-132-REP-006

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APPENDICES

ACRONYMS & ABBREVIATIONS

ACRONYMS	
AWAR	All-weather Access road
FEIS	Final Environmental Impact Statement
FOL	Forward Operating Location
IDF	Intensity duration frequency
NAG	Non-acid generating
T_C	Time of concentration
RIBR	Rankin Inlet Bypass Road
TAC	Transport Association of Canada

1.0 INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) retained the services of Tetra Tech to carry out the planning and design works associated with the Water and Environment and the Civil Works components of the Meliadine Gold Project (the Project). The mine is located approximately 25 km north from Rankin Inlet, and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. A new Type “A” Water Licence (No. 2AM-MEL1631) was recently awarded to Agnico Eagle for the development of the project. Agnico Eagle is developing the mine for production in late 2019.

The remote location of the Project requires that access, service and haul roads be built to support the development. A controlled 31 km long All-Weather Access Road (AWAR) links the proposed Meliadine mine site and Rankin Inlet. Figure 1, shown in Appendix A, provides an overview of the Project’s location.

As proposed in the Roads Management Plan (Agnico Eagle, 2015), Agnico Eagle has to build a bypass road to divert traffic around the community of Rankin Inlet to minimize impacts on the Community (dust, noise, traffic, etc…). Its design is based on the specifications of the AWAR. The Rankin Inlet Bypass Road (RIBR) will be 6.3 km long with a gravel surface and will allow traffic from the Rankin Inlet Laydown Area, near Melvin Bay (part of Hudson Bay) to bypass the community of Rankin Inlet, delivering people, materials, and fuel to the proposed Meliadine mine site. By building the bypass road, the use of municipal roads by AEM will be kept to a minimum. The RIBR will be a private road for the duration of the operation of the mine.

With respect to water management, 11 group of culverts and 1 bridge, named C01 to C12, will be installed along the road to allow surface water to drain properly.

As part of the scope of work, Agnico Eagle asked Tetra Tech to:

- Conduct the design of the Rankin Inlet Bypass Road and the associated culverts and bridge;
- Produce construction drawings and specifications for the RIBR and the associated culverts and bridge;
- Prepare design and construction summary reports of these water management infrastructures in accordance with the requirements in the Type “A” Water Licence (No. 2AM-MEL1631).

As required by the Water Licence A, this report summarizes the site conditions, design basis, considerations, criteria and the detailed design of the RIBR and the associated culverts and bridge.

2.0 GENERAL SITE CONDITIONS

2.1 Climate and Meteorology

The Project is located in the Kivalliq Region of Nunavut, near the northern border of the southern Arctic terrestrial ecozone, and within the Arctic tundra climate region. Within this region daylight reaches a minimum of 4 hours per day during the winter to a maximum of 20 hours per day during the summer. The climate is extreme with long cold winters and short cool summers. Temperatures are cool, with a mean temperature of 12°C in July and -31°C in January. The mean annual air temperature at the Project site is approximately -10.4 °C (Golder, 2012a).

The recorded prevailing winds are from north and north-northwest. The wind blows from the north and north-northwest direction more than 30% of the time, and the least frequent wind direction is west-southwest, with a frequency of 2.1%. The calm frequency is 2.8% of the time. The mean values for wind speed show that the north-northwest together with north and northwest winds have the highest speeds and tend to be the strongest.

Table 2.1 presents the annual precipitation, evaporation, and temperature characteristics. Detailed climate characteristics at the site are described in the FEIS of Support Document (SD) 7-1 Aquatic Baseline Synthesis Report.

Table 2.1 Estimated Monthly Climate Characteristics in Rankin Inlet

Month [a]	Monthly Air Temperature (˚C)			Monthly Precipitation (mm)		
	Minimum	Average	Maximum	Rainfall [b]	Snowfall [b]	Total [b]
January	-37.2	-30.9	-19.8	0.0	8.6	8.4
February	-35.3	-30.1	-24	0.0	8.7	8.4
March	-30.8	-25.1	-18.8	0.0	12.4	12.2
April	-20.2	-15.7	-10.4	1.2	19.2	20.0
May	-10.8	-5.9	-1.2	6.8	12.8	19.1
June	0.1	4.1	6.7	23.4	4.7	28.0
July	6.9	10.5	14.9	38.7	0.1	38.8
August	7.7	9.7	11.2	56.4	0.2	56.5
September	1.3	3.8	6.8	40.0	3.8	43.8
October	-9.9	-4.6	1.7	13.7	24.6	37.9
November	-23.6	-17.2	-10.2	0.3	22.2	21.6
December	-33.3	-25.9	-19.4	0.0	12.6	12.0
Annual	-37.2	-10.4	14.9	180.6	128.8	305.5

[a] Data obtained from SD 7-1 Aquatics Synthesis Baseline of the FEIS .
[b] Mean Monthly and Mean Annual Precipitation at Rankin Inlet A, from 1981 to September 2009

2.2 Permafrost

The project site is located within the Southern Arctic terrestrial eco-zone, one of the coldest and driest regions of Canada, in a zone of continuous permafrost. Continuous permafrost to depths of between 360 m to 495 m is expected based on historical and recent ground temperature data from thermistors installed near Tiriganiaq, F-Zone, and Discovery deposits (Golder, 2012b). The measured ground temperature data indicates that the active layer is 1.0 m to 3.0 m in areas of shallow soils and areas away from the influence of lakes. It is anticipated that the active layer adjacent to lakes or below a body of moving water such as a stream could be deeper. The typical permafrost ground temperatures at the depths of zero annual amplitude (typically at a depth of below 15 m) are in the range of -5.0°C to -7.5°C in the areas away from lakes and streams. The geothermal gradient ranges from 0.012°C/m to 0.02°C/m (Golder, 2012b). Terrain and permafrost conditions along the proposed bypass route comprise mostly overburden soil materials that would appear to contain excess visible ice in many locations as identified from the available satellite imagery. Ice wedge terrain is visible in these images indicating that the soils would be prone to thaw settlement (thaw susceptible) if thermally disturbed.

3.0 DESIGN OF THE ROAD

The following drawings present the details of the Rankin Inlet Bypass Road:

- Drawing 65-117-230-201 presents the general overview
- Drawing 65-117-230-202 presents the plan and profile view – 0+000 to 1+000
- Drawing 65-117-230-203 presents the plan and profile view – 1+000 to 2+000
- Drawing 65-117-230-204 presents the plan and profile view – 2+000 to 3+000
- Drawing 65-117-230-205 presents the plan and profile view – 3+000 to 4+000
- Drawing 65-117-230-206 presents the plan and profile view – 4+000 to 5+000
- Drawing 65-117-230-207 presents the plan and profile view – 5+000 to 5+900
- Drawing 65-117-230-208 presents the details and sections
- Drawing 65-117-230-209 presents the details and sections

These drawings are presented in Appendix B.

3.1 Road geometric design

The geometric design of the road is based on the criteria included in the Transport Association of Canada Geometric Design Guide for Canadian Roads (TAC 2007), as well as the criteria used for the AWAR.

3.2 Road summary

The table below presents a summary of the RIBR.

Table 3.1: Summary of the Rankin Inlet Bypass Road

Parameters	Value
Length	6 321 m
Width	6.5 m for the majority of the road 8.0 m from chainage 0+262 to 1+492 8.0 m from chainage 5+840 to 5+871
Minimum fill on running surface	1.3 m
Number of pullouts	11
Number of groups of culverts	11
Number of bridge	1
Embankment typical slope	2.5H: 1V

3.3 Proposed Routing

The routing of the RIBR was selected to minimize possible effects on the environment, minimize water crossings, minimize snow drift, help drainage and avoid disturbance to others.

The selection of the route was based on a number of considerations, boundaries and restrictions, including the following:

- Geomorphology and terrain conditions;
- Watercourse crossings;
- 30 m offset from archeological site;
- 30 m offset from points of interest such as the “cross” site and the “airplane crash” site.
- 31 m offset from the higher high water large tide limit (Licence “A” limit of work). At some locations, because of terrain conditions and boundaries, the road needs to be constructed within 31 m from the higher high water large tide limit. Mitigation measures will be put in place at the appropriate locations to minimize impacts to the environment, such as protection of the embankments with riprap.
- National Defense boundaries and restrictions:
  - Vehicle minimum speed is 20 km/h within a 500m radius from the FOL National Defense building. Thus no pullouts shall be constructed within this radius. The road width is increased to 8 m to allow for continuous 2 way traffic.
  - 1 m offset from the National Defense boundaries;
- Rankin Inlet Airport boundaries and restrictions:
  - Part of the road is constructed within the Rankin Inlet Airport boundaries;
  - No road shall be constructed within the clearway area (an area of 300 m in length and 150 m in width from the runway threshold);
  - No conflict within the take-off/approach surface (a divergence area of 15 degrees from the inner edge of the runway for a distance of 3000 m rising at a 2.5% slope from the inner edge of the runway).

An overview of the proposed road routing is shown in drawing 65-117-230-201 in Appendix B. The drawing also presents the limits, obstacles and boundaries that have been considered.

The proposed road will begin at the Rankin Inlet Laydown Area and will travel along the southern Fuel Farm berm. Then, the road will go south of the National Defense buildings, the Rankin Inlet Airport and Cygnet Lake, crossing an existing secondary road, before connecting to the existing AWAR road.

3.4 Road Typical cross section

The road will be a nominal single lane road with a running surface of 6.5 m in width for the majority of its course.

For safety purposes and to allow for two way traffic, 11 pullouts are proposed. The pullouts are 20 m in length and spaced at intervals of approximately 400 m. The nominal running surface at each pullouts will be 9.5 m in width.

Because of the restrictions imposed by the National Defense, whereas vehicles must maintain a steady speed above 20 km/h within a radius of 500 m from the FOL buildings, no pullouts can be built within this radius. Thus, from chainage 0+262 to 1+492, the running surface will be 8 m wide to allow for continuous two way traffic without the need for a pullout.

Due to local topography, some areas of the RIBR require embankments greater than 3 m. Thus for safety issues, 777 m of safety barriers (guardrails) will be installed between chainage 0+000 and 1+000. An additional 2 m wide shoulder will also be added to the width of road for the installation of these guardrails.

From chainage 5+840 to 5+871 the running surface of the road will be increased to 8 m wide to aid with the transition to the existing secondary road.

The majority of the road will be built on soil which is considered to be Thaw Susceptible (poorly drained, ice-rich, organic or bog over bedrock). Thus minimum fill thickness of 1.3 m shall be used for the road foundation. The fill thickness will be increased in culvert areas to allow for sufficient fill cover over the culverts. A geotextile shall be installed for fill material compaction purposes and to prevent loss of fill material if the construction schedule extends to the summer and the site conditions require it.

Typical cross-sections of the road can be seen in drawing 65-117-230-208 in Appendix B.

4.0 DESIGN OF THE CULVERTS AND BRIDGE

4.1 Culverts and bridge location

Along the course of the Rankin Inlet Bypass Road, there will be a total of 11 groups of culverts and 1 bridge installed. The locations of these infrastructures are shown on drawing 65-117-230-201 while drawing 65-117-230-209, in Appendix B, presents typical cross-sections of the culverts.

At the time of this report, the detailed design of the bridge has not yet been completed. However, the approximate location of the bridge and its abutments is shown in drawing 65-117-230-201 in Appendix B. Preliminary design parameters for the bridge are presented in section 4.4.

4.2 Hydraulic analyses and peak flow calculations

The catchment areas for each crossing were delineated using the 2014 ML survey data and range from 3 ha to 1000 ha (see Figure 2). Hydrologic and hydraulic analyses were carried out for all of the crossings to provide recommendations on culvert sizes to accommodate 25-year peak design flows at each location. Two methods of calculating peak flow were considered, the Rational Method and Regional Analysis.

Rational Method

The Rational Method was applied to calculate the peak flows for the water crossings with catchment areas smaller than 20 ha. Due to the site's proximity to Rankin Inlet, the intensity duration frequency (IDF) curve developed by Environment Canada for Rankin Inlet was used (Environment Canada 2014). A 1 in 25 year rainfall intensity for a duration equivalent to the time of concentration of the catchment was used to determine the design peak flows for the culvert crossings.

The time of concentration (T_C), which represents the time it takes for the most remote portion of the catchment to contribute to the flow at the outlet of the catchment, was calculated using the Kirpich equation (Akan, A. O., & Houghtalen, R. J.,2003). For catchments where T_C < 10 min, a T_C of 10 minutes was used for design purposes.

Regional Analysis
A regional analysis approach was used to estimate 25-year peak flows for crossings with catchment areas larger than 50 ha.

Two Water Survey of Canada streamflow gauge stations were considered:

- Akkutuak Creek near Baker Lake with a drainage basin area of 18 km^2
- Qinguk Creek near Baker Lake with a drainage basin area of 392 km^2

Also considered as part of the regional analysis were peak flows for the All Weather Access Road for the Meliadine Gold Project developed by Golder for 11 drainage crossings with basin areas ranging from 16 to 1431 ha (Golder, 2010).

Historical flow data was obtained from the Water Survey of Canada (Water Survey of Canada, 2014) and the annual maximum flows were identified for each station for each year of record. A statistical analysis using HYFRAN-PLUS software was performed on the collected data and the peak flow for a 25 year return period was obtained for each station. The results were plotted in order to identify a correlation between the peak discharge and catchment area in order to provide a conservative estimate for the remaining larger catchment areas on the site.

Estimated 25-year peak flows for the three catchments greater than 50 ha were subjectively determined considering the Golder and WSC-derived results and the amount of lake storage in each basin which would attenuate the peak flow.

The estimated peak flow for each water crossing is summarized in Table 4.1 below:

Table 4.1: Estimated Peak Flows at Crossings

Crossing Name	Drainage Area (ha)	Estimated Peak Flow (m^3/s)
C01	9.7	0.72
C02	3.9	0.29
C03	3.3	0.24
C04	8.0	0.59
C05	13.2	0.97
C06	17.3	1.28
C07	9.7	0.72
C08	4.3	0.32
C09	8.8	0.65
C10	1004.3	5.40
C11	132.9	3.50
C12	328.5	4.40

4.3 Culvert design

Culverts are proposed for 11 crossings, C01 to C09 and C11 to C12. A combination of 0.7 m, 1.0 m and 1.2 m diameter culverts are recommended in order to convey the designed peak flow. An “offset stacked” configuration will be used to enable flow conveyance before complete ice break-up within the watercourses (Golder, 2010). The lowest culvert(s) will also be embedded into the watercourse to provide low water fish passage, where applicable.

The embedded culverts are sized to accommodate the estimated peak flows at each crossing assuming inlet control, a HW/D ratio of 0.833 and ignoring the reduced capacity due to the embeddedness. The remaining group of culverts in the "offset stacked" configuration were sized to have a total pipe capacity also sufficient to pass the peak flow for a scenario in which the embedded culverts are blocked with ice or debris.

The proposed culverts will be installed during the construction of the RIBR and will be in service for up to 15 years. The standard galvanized, corrugated steel pipe culvert is proposed. Culverts will be a group of several pipes that will have varied diameters of 0.7 to 1.2 m with a minimum corrugation profile of 68X13 mm and a specified thickness varying between 1.6 and 2.0 mm, depending on the diameter of the culvert, as per the recommendations of the supplier.

A minimum of 1 m fill cover shall be placed over the culverts. The backfill around the culverts will be Granular Fill 0-50 mm and shall be placed in lifts no greater than 0.3 m thick and compacted to a minimum of 90% of Maximum Dry Density (Modified Proctor test).

The table below presents the design parameters for each groups of culverts.

Table 4.2: Design parameters for the culverts

No.	Drainage Area (ha)	Peak Flow (m3/s)	Typical Cross-Section Type	Type F1 culverts (embedded)	Type F2 culverts	Type F3 culverts	Culvert Capacity (m3/s)		Length of Culverts (m)
				Number x Diameter			Embedded	Non - embedded	
C01	9.7	0.72	A	1 x 1.0 m		1 x 1.0 m	0.95	0.95	2x31.5
C02	3.9	0.29	A	1 x 0.7 m		1 x 0.7 m	0.40	0.40	2x31.4
C03	3.3	0.24	A	1 x 0.7 m		1 x 0.7 m	0.40	0.40	2x31.3
C04	8.0	0.59	A	1 x 1.0 m		1 x 1.0 m	0.95	0.95	2x32.2
C05	13.2	0.97	B	1 x 1.0 m	1 x 1.0 m	1 x 0.7 m	0.95	1.35	3x20.0
C06	17.3	1.28	B	1 x 1.2 m	1 x 1.0 m	1 x 0.7 m	1.50	1.35	3x31.8
C07	9.7	0.72	A	1 x 1.0 m		1 x 1.0 m	0.95	0.95	2x19.9
C08	4.3	0.32	A	1 x 0.7 m		1 x 0.7 m	0.40	0.40	2x37.3
C09	8.8	0.65	A	1 x 1.0 m		1 x 1.0 m	0.95	0.95	2x19.1
C11	132.9	3.50	C	3 x 1.2 m	2 x 1.2 m	1 x 1.0 m	4.50	3.95	6x18.4
C12	328.5	4.40	D	3 x 1.2 m	3 x 1.2 m	1 x 1.0 m	4.50	5.45	7x28.1

4.4 Bridge design

Because the flow generated by watershed and the potential of fish, location C10 will have a bridge installed instead of culverts.

At the time of this report, the detailed design of the bridge has not yet been completed. However, it will be a modular steel bridge with granular backfill bin-wall type abutments and the approximate length and width of the bridge has been determined.

The width of the bridge shall be approximately 7.4 m. The final width might vary depending on the supplier. The length of the bridge will be approximately 15 m long. This length was determined such that the abutments of the bridge shall be constructed outside of the watercourse, as to not interfere with the watercourse and the possible fish passage.

A portion of the bridge constructed will be encroaching in the 31 m Licence "A" limit of Cygnet Lake high water line. This location was chosen to minimize the footprint of the bridge, thus minimizing the impacts on the possible watercourse and the environment. Indeed, the watercourse at this location is well-defined while further south it seems to be more widespread with wet zones around it. This location is based on aerial photographs taken from the crossing between Cygnet Lake and Melvin Bay. The table below presents the general details of the bridge.

Table 4.3: General details for the bridge

No.	Drainage Area (ha)	Peak Flow (m3/s)	Length of Bridge (m)	Width of Bridge (m)
C10[a]	1004.3[a]	5.40	15	7.4

[a]The net drainage area of C10 is 542.9 ha. However, it also collects runoff from C11 and C12, for a total drainage area of 1004.3 ha.

5.0 CONSTRUCTION

5.1 Material Quantities

Table 5.1 below presents the granular material quantities for the construction of the RIBR, including the associated culverts and bridge. The quantities presented are in-place quantities and do not include any extras for excess or losses.

Table 5.1: Granular material In-Place Quantities for Construction

Material	Quantities
Borrow pit material Class A or Granular Fill 0-600 mm material (m^3)	116 350
Borrow pit material Class A or Granular Fill 0-600 mm material or overburden material approved by the field engineer (m^3)	5 580
Granular fill 0-50 mm for road and culverts (m^3)	10 400
Granular fill 0-30 mm for abutments (m^3)	400
Rip Rap 50-300 mm for culverts (m^3)	420
Rip Rap 600-1000 mm for protection of embankments (m^3)	760
Total Fill Material Volume (m^3)	**133 910**
Non-woven geotextile 200 g/m^2 (if required)	10 000

5.2 Earth Work Construction Material Specifications

The general requirements for the materials are specified below. The requirements for each of the materials can vary slightly for a specific earth structure to meet specific design intents.

5.2.1 Borrow pit Class A and Granular Fill (0-600 mm)

The borrow pit material Class A and Granular Fill (0-600mm) can have a wide variation of gradation, with maximum particle size 600 mm. Rockfill particles shall be angular and shall be derived from hard, durable rock. Any oversized boulders should be removed before the rockfill is placed into the earth structures.

5.2.2 Approved Overburden

The Approved Overburden can be used to construct the guardrail shoulders. The Approved Overburden shall consist of overburden material that is compactable and easily drainable and that is approved for the required use by the field geotechnical engineer.

5.2.3 Granular Fill (0-50 mm)

Granular Fill (0-50 mm) shall consist of, hard durable particles, be free of roots, topsoil and other organic material and have a particle size distribution as presented in the table below. Processing will be required to achieve the specified gradation.

Table 5.3: Granular Fill (0-50 mm) – Particle Size Distribution Limits

Particle Size	% Passing
50	100
38	87-100
19	60-95
12.5	46-80
5	35-60
2	25-45
0.315	10-25
0.08	4-10

5.2.4 Granular Fill (0-30 mm)

Granular Fill (0-30 mm) shall consist of, hard durable particles, be free of roots, topsoil and other organic material and have a particle size distribution as presented in the table below. Processing will be required to achieve the specified gradation.

Table 5.2: Granular Fill (0-30 mm) – Particle Size Distribution Limits

Particle Size	% Passing
30	100
14	65 – 100
5	45 – 70
0.63	15 – 35
0.08	4 – 10

5.2.5 Rip-rap

Rip-rap shall be used as erosion protection materials. The particle size specifications for the graded rip-rap materials are presented in the table below. The material shall be free of roots, topsoil, and other organic material. Processing may be required to achieve the specified gradation. The material can be processed from hard, durable, NAG rock. Rocks used for rip-rap should generally be blocky and angular or sub angular, with sharp clean edges and relatively flat faces. It is generally recommended that rocks should be close to equi-dimensional rather than elongate, although this is not always possible. Typically, the average ratio of the long axis to the thickness should be less than 2.

Table 5.4: Particle Size Specifications for Rip-rap Materials

Rip-rap Types	Minimum Particle Size (mm)	Median Particle Size (mm)	Maximum Particle Size (mm)
Rip-rap for Culvert	50	150	300
Rip-rap for toe of embankment	600	800	1000

5.2.6 Non-woven Geotextile

A non-woven geotextile shall be placed under the road fill, when required by the site conditions and construction schedule. All geotextile shall be comprised of needle punch polypropylene fabric made of 100% polypropylene staple fibers conforming to the properties in the table below.

Table 5.5: Specifications for Geotextile

Parameter	Value	ASTM Test Method (or Approved Equal)
Grab Tensile (N/lbs)	710	D4632
Elongation (%)	50	D4632
Tear (N/lbs)	270	D4533
Puncture (N/lbs)	-	D4833
CBR Puncture (N)	1820	D6241
Weight (g/m^2)	200	D5261
UV Resistance	70	D4355

5.3 Rough Construction Schedule and Quality Control/Assurance

The construction of Rankin Inlet Bypass Road is scheduled to begin in spring 2017 and will be completed by the end of 2017.

A quality control/assurance program will be conducted during construction of each of the infrastructures to ensure that construction-sensitive features of the design are achieved. The specific requirements and testing frequencies for the quality assurance process will be set out in the Construction Specifications prepared during final designs.

5.4 Instrumentation and Monitoring

Performance monitoring is an integral part of the operation of any water retention structure, particularly in an arctic environment. The performance of the culverts and bridge will be monitored throughout their construction and operating life. The monitoring activities may include, but not be limited to, visual inspection for any deformations, surface cracks, surface erosion, and seepage.

An annual site inspection may be required to document the performance of each of the earth structures. Regular maintenance activities will be required to ensure adequate operation of the road, culverts and bridge.

6.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Agnico Eagle Mines Ltd. and their agents. Tetra Tech does not accept any responsibility for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Agnico Eagle Mines Ltd., or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this report is subject to the terms and conditions stated in Tetra Tech's Services Agreement.

7.0 CLOSURE

We trust this report meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech

PERMIT TO PRACTICE
TETRA TECH INDUSTRIES, INC.
O/A TETRA TECH
Signature
Date 2017/03/17
PERMIT NUMBER: P 1029
NT/NU Association of Professional Engineers and Geoscientists

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REFERENCES

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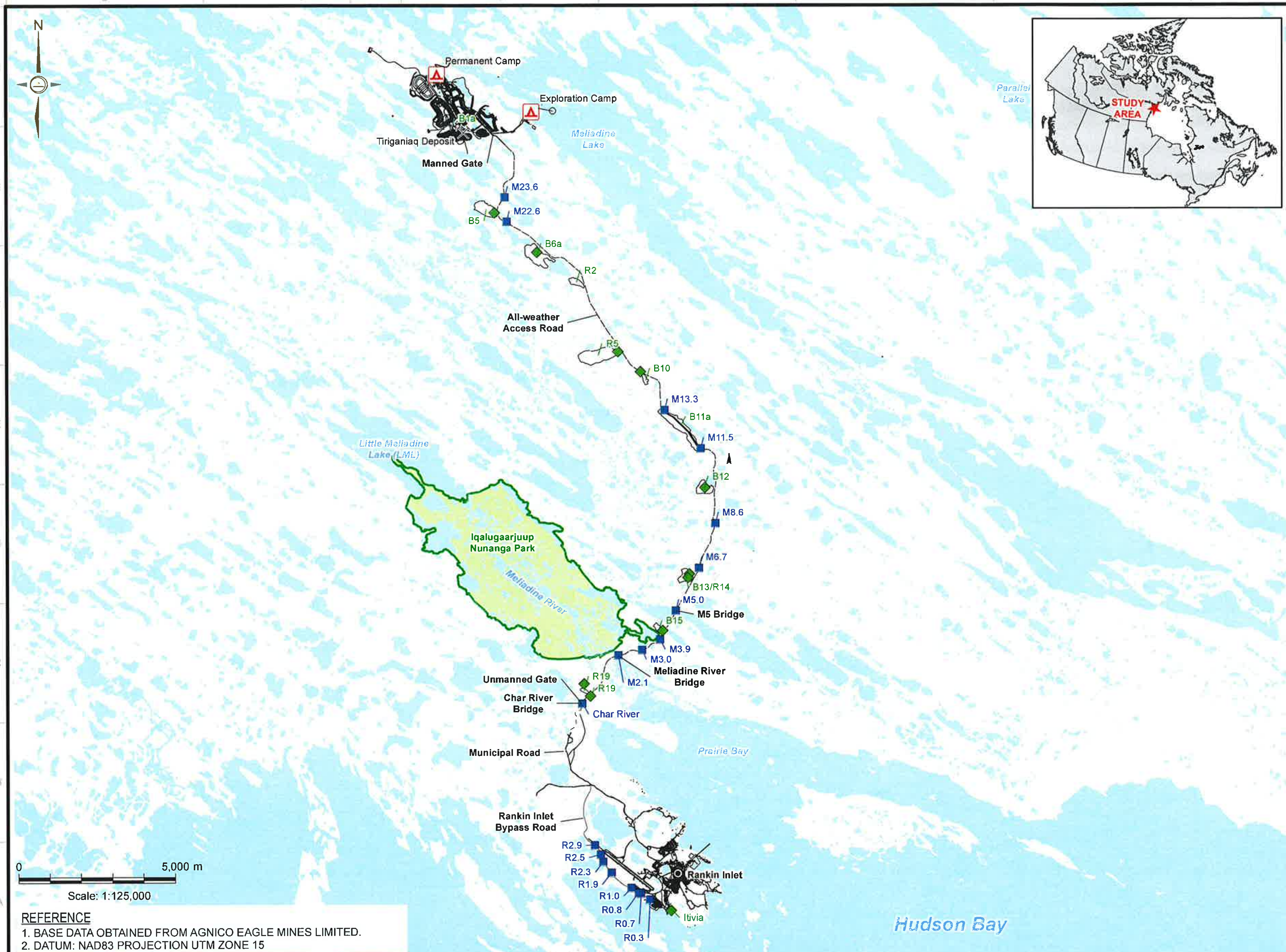
APPENDIX A
Figures

NO. DESSIN
DRAWING NO.

FORMAT ANSI B–11x17



REFERENCE
1. BASE DATA OBTAINED FROM AGNICO EAGLE MINES LIMITED.
2. DATUM: NAD83 PROJECTION UTM ZONE 15

LEGEND

- CAMP
- PROPOSED MINE SITE
- QUARRY/BORROW PIT LOCATION
- WATERCOURSE CROSSING
- ALL-WEATHER ACCESS ROAD (AWAR)
- ROAD - NEW
- ROAD - EXISTING
- WATERCOURSE
- WATERBODY
- TERRITORIAL PARK

AGNICO EAGLE

Golder Associates

TITRE / TITLE	# DWG
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DESSINS EN RÉFÉRENCE/REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	PAR BY
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REVISIONS

DESSINÉ PAR / DRAWN BY	CDB	DATE	25–11–2014
VÉRIFIÉ PAR / CHECKED BY	LY		24–03–2015
APPROUVÉ PAR / APPROVED BY	DRW		24–03–2015
No. PROJET / PROJECT NO.	1405283		
DATE	–		

TITRE / TITLE
AGNICO EAGLE – MELIADINE DIVISION
FIGURE 1–1 MELIADINE ACCESS ROAD NETWORK WITH QUARRIES AND DRAINAGE

ÉCHELLE/ SCALE	1:125,000	FICHIER FILE	.DWG
No. DESSIN/ DRAWING NO.	–	REVISION 0	FEUILLE/SHT 1 / 1

AE–CART–ANSI B

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