TITLE: **TECHNICAL SPECIFICATIONS | CONSTRUCTION OF MAMMOTH DIKE**

CLIENT: AGNICO-EAGLE MEADOWBANK DIVISION

PROJECT: DETAILED ENGINEERING OF WATER MANAGEMENT AND GEOTECHNICAL INFRASTRUCTURE AT WHALE TAIL PIT

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Index of revisions

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☐ Entire Specification revised. Reissue all pages

☐ Reissue revised pages only

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☐ Released for internal revision

☐ Issued for comments and approval

☐ Released for bid

☒ Released for construction (installation specifications only)

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 WORK DESCRIPTION

1.1 Description of the Project

Agnico Eagle Mines Limited, Meadowbank Division ("Agnico Eagle", or the Owner) is developing the Whale Tail Pit, a satellite gold deposit on the Whale Tail property, as a continuation of current mine operations and milling at the Meadowbank Mine. The Whale Tail property is a 408 km² site located on Inuit Owned Land, approximately 150 km north of the Hamlet of Baker Lake and approximately 50 km northwest of the Meadowbank Mine in the Kivalliq region of Nunavut. The property was acquired by Agnico Eagle in April 2013 and is subject to a mineral exploration agreement with Nunavut Tunngavik Incorporated.

The Meadowbank Mine is an approved mining operation and Agnico Eagle extends the life of the mine by constructing and operating the Whale Tail Pit. To operate the Whale Tail Pit, Agnico Eagle has to build Mammoth Dike, a dewatering dike located across the north east finger of the lake is shown on Figure 1-1. Mammoth Dike is an infrastructure that will be built to prevent flooding of the mine pit by Mammoth lake.

The upstream slope of the dike, whose main body will be composed of rock fill, will be lined with bituminous geomembrane (BGM) anchored at its toe in a layer of fine filter amended with bentonite (FFAB); the latter placed in a key trench.

Mammoth Dike will be dismantled after the end of mining in the Whale Tail Pit.

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N

Nemo Lake

206.2 ha

148.3 ha

108.9 ha

Whale Tail waste rock storage facility

Whale Tail Lake (North basin)

North East dike

Waste rock exploration pad

Ore stockpile

Industrial area

Open pit

162.7 ha

WRSF dike

Water treatment plant

Whale Tail attenuation pond

95.9 ha

Whale Tail camp

Mammoth dike

Ore stockpile

Overburden storage

Whale Tail dike

2,301.8 ha

Mammoth Lake

Whale Tail Lake (South basin)

South Whale Tail channel

A39 A11 A40 C46 C43 C38 C44 A113 C42 C41 A-P38 A48 C39 A-P37 C40 A-P49 A47 C-P1 A49 A46 A50 A51 A-P57 A-P59 A-P47 A-P21 A54 A-P5 A53 A53 A57 A56 A58 A61 A59 A60 A16 A-P39 A17 C20 C21

PROJECT COMPONENTS (PHASE I)

- Dike or cofferdam
- Modified waterbody
- Collection ditch
- Diversion ditch
- Open pit
- Storage facility
- Industrial area
- Road

HYDROGRAPHY

- Watercourse
- Lake
- Modified watershed

AGNICO EAGLE

SNC·LAVALIN

AMARUQ GOLD MINING PROJECT
Detailed Engineering of Water Management and Geotechnical Infrastructure

Mine Layout Watersheds – Phase 1

Sources:
Topography, PhotoSat, 2015
Project components : March 2018

Project: 651298
File: snc651298_004_fX_Mammoth_181016.mxd

0 200 400 m
1:20 000
UTM projection, Zone 14, NAD83 (CSRS)

October 16, 2018

Figure 1-1

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1.2 Work Included

The work shall include mobilization of all necessary equipment and materials as well as providing supervision, technical personnel (including surveyors) and skilled labour for the construction of Mammoth Dike.

The Contractor shall prepare a detailed work plan outlining its proposed method of execution with particular focus on the key trench excavation and the placement of the FFAB into which the BGM liner will be keyed. This work plan shall be approved by the Owner and the Design Engineer.

The Contractor's attention is drawn to the fact that the lake level is generally at or above the dike foundation (mostly lakebed) and locally, the overburden is composed of gravel, cobbles and boulders which has to be removed until the bottom of the trench reaches the glacial till or bedrock. Although, it is possible to excavate gravel, cobbles and boulders under water, it will not be easy neither to control the side slopes of the trench nor to avoid disturbing the underlying glacial till (locally), but most importantly it will be practically impossible to construct the FFAB. It is therefore, recommended to do these tasks in winter after ground freeze-up.

The Contractor may however perform as much excavation as he wishes under water to minimize the quantity of drilling and blasting required during winter construction, however Agnico Eagle will not pay for over excavation beyond the sections shown on the drawings unless approved by the Owner.

The Work includes but is not limited to the following items:

1. Site preparation including snow, ice and boulder removal and proper disposal;
2. Key trench excavation or blasting expected to include overburden only,
3. Bedrock surface treatment to seal cracks and joints at the bottom of the key trench (where encountered);
4. Fill placement including before and after BGM installation on the upstream slope of the dike and the FFAB on the bottom of the key trench;
5. Installation of BGM keyed into the FFAB;
6. Sampling and testing.

If judged necessary by the QA Inspector, the QC Representatives or the Owner, additional tests will be performed by an external laboratory.

1.3 Instrumentation

This dike will be instrumented with a set of three thermistor strings to be supplied and installed by Agnico Eagle in holes that will be drilled by a third party. The locations where the thermistors will be installed will be selected during construction but shall be made easily accessible and once installed shall be protected against damage by construction equipment traffic.

1.4 List of drawings

The list of drawings is provided in the following Table 1-1 and the drawings are included in Appendix 1.

Table 1-1: List of Drawings

DRAWING NO	TITLE
651298-5000-4GDD-0000	LOCATION MAP AND DRAWING INDEX
651298-5000-4GDD-0001	GENERAL ARRANGEMENT PLAN
651298-5000-4GDD-0002	GENERAL PLAN OF FIELD INVESTIGATION LOCATIONS
651298-5000-4GDD-0003	MAMMOTH DIKE FIELD INVESTIGATION LOCATIONS PLAN AND SOIL STRATIGRAPHIC SECTION
651298-5000-4GDD-0004	MAMMOTH DIKE DESIGN PLAN AND LONGITUDINAL SECTION
651298-5000-4GDD-0005	MAMMOTH DIKE SELECTED DESIGN SECTIONS

2.0 GENERAL

2.1 Unit system

Unless indicated otherwise, all Whale Tail's coordinate and elevations are tied to the UTM Zone 14, NAD83 (CSRS), and the metric unit system (SI) is used.

2.2 Codes and Standards

1. The standards applicable to Mammoth Dike for soil tests are provided in the following Table 2.1.
2. The standards applicable for the BGM are provided in Appendix 2.
3. The main standard applicable for sodium bentonite is given in Section 3.3.5.

Table 2-1: Standars

Test	Latest Standard
Slush grout	CAN/CSA1-23.1-14 – Concrete Materials and Methods of Concrete Constructability/Test Methods and Standard Practice for Concrete.
Water (Moisture) Content	ASTM[2] D2216 - Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.
Wet Preparation of Soil Samples	ASTM D2217 Standard Practice for Wet Preparation of Soil Samples for Particle Size Analysis and Determination of Soil Constants.
Particle Size Analysis	ASTM D422 - 63(2007), Standard Test Method for Particle-Size Analysis of Soils.
Compacted Dry Density of Soil-Standard Proctor	ASTM D698-Standard Practice for Laboratory Compaction Characteristics of Soil Using Standard Effort (600 kN-m/m^3)
Compacted Dry Density of Soil-Modified Proctor	ASTM D1557-Standard Practice for Laboratory Compaction Characteristics of Soil Using Modified Effort (2700 kN-m/m^3)
In-Situ Dry Density of Soil	ASTM D1556-Standard Test Method for Density and Unit Weight of Soil in-Place by the Sand-Cone Method.
Swell Index of Bentonite	ASTM D5890-Standatd Test Method for Swell Index of Clay Mineral Components of Geosynthetic Clay Liner

2.3 Stakeholders

1. Agnico Eagle is the Owner and is responsible for overseeing the execution and coordination of the entire work. Agnico Eagle will also be responsible for the supply of rock fill, fine and coarse filters as well as all instrumentation (where required).

1 CSA = Canadian Standards Association

2 ASTM = American Society for Testing and Materials

2. SNC-Lavalin Inc. (SLI) will act as the Quality Assurance (QA) Inspector.
3. SNC-Lavalin Inc. (SLI) will also act as the Designer for Mammoth Dike.
4. KCG is the Contractor for the entire work. KCG is also responsible for all subcontractors (if any).
5. GHD is mandated by Agnico Eagle to be responsible for Quality Control (QC) for the entire work, except the QC for the installation of the BGM which will be provided by the Contractor).
6. Agnico Eagle and its Contractor(s) will be responsible for Quality Control (QC) during BGM installation.

2.4 Line of communication

The line of communication basically follows the organizational chart shown on Figure 2-1 below.

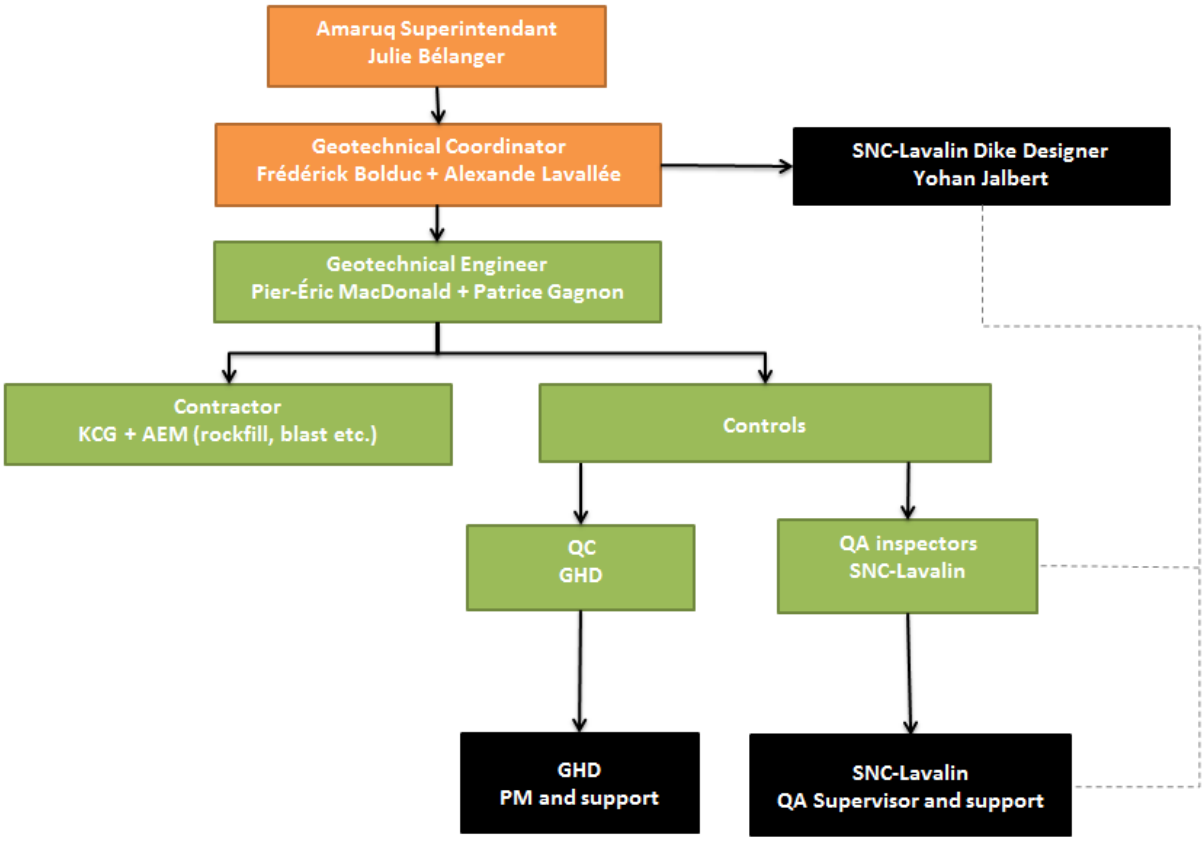


Figure 2-1: Organizational Chart

2.5 Scope of Responsibilities

The responsibilities of each stakeholder are defined as follows:

2.5.1 Geotechnical Engineer (Agnico Eagle)

1. Primary point of contact for the QA Inspector, QC representatives and the Contractor (also named Owner's Representative).
2. Review work and monitoring of construction.
3. Share data with QA Inspectors and QC representatives including but not limited to layout, scope limit control and data collection for as-built drawings and report.
4. Review quantities.
5. Coordination, daily interaction with QA and QC personnel.
6. Follow-up and update the construction schedule.
7. Confirm the waste disposal area.
8. Plan or approve platforms to stockpile materials.
9. Responsible of the health and safety and Environmental issues and procedures on site.

2.5.2 Quality Control Representative (GHD, a contractor to Agnico Eagle)

1. Inspection and documentation of work procedures to ensure the works meet the drawings (lines, grades) and the specifications.
2. QC testing as required by the specifications (Appendices 2 and 3).
3. Prepare daily report.
4. Prepare approval forms.
5. Work under the supervision of the Owner's Representative (Agnico Eagle Geotechnical Engineer) as applicable.
6. Request additional testing when required.
7. Review survey data.

2.5.3 Quality Assurance Inspectors (SLI)

1. Inspection, documentation and review of QA work to ensure that the control meets the specifications and the Design.
2. QA personnel may perform occasional independent checks. The Contractor shall co-operate during sampling and testing. Loading and disposal of sampled materials, when no longer required by the SLI, shall be carried out by the Contractor.

3. Request additional testing when required and review of QC testing and procedures.
4. Collect signed forms (approval and non-conformity forms) and give copy to the Owner's representative.
5. Prepare QA report to be included in as-built report.
6. Prepare as-built report, including testing results, drawings and reports.

2.5.4 Contractor (KCG):

1. Construction of Mammoth Dike in compliance with the requirements of the drawings and the specifications.
2. Carry out all survey and stake out and provide all material volumes and survey points to the Owner's representative, QA Inspectors and QC representatives.
3. Supervise all its sub-contractors.
4. Share all collected data with Owner's representatives, QA Inspectors and/or QC representatives.
5. Identify changes to be made in the design or drawings, collect information and share it with the Agnico Eagle Geotechnical coordinator.

2.5.5 Agnico Eagle Geotechnical Coordinator

1. Primary point of contact for the Designer.
2. Identify changes to be made in the design or drawings, collect information and share it with the Designer.
3. Communicate with the Designer for any technical questions or issues.
4. Request a design change to the Designer and approve the estimation of hours.

2.5.6 Designer (SLI)

1. Review documentation requested from the Contractor (refers to section 2.13) prior to the beginning of the Work.
2. Be informed of the construction schedule and the advancement of the Work.
3. The Designer will not be present on site. The Designer will make design change(s) when required based on the available information.
4. Provide estimated hours required for the design change to the Agnico Eagle Geotechnical Coordinator prior to initiate the design change.
5. Send a sealed technical memorandum to the Owner's representative within appropriate timeframe to confirm the design change(s).

2.6 Work method and equipment

The Contractor shall submit to the Owner its working methods with the specific equipment and procedures he plans to use at least one month prior to the start of the work. The list of documentation to be submitted prior to the start of the work is provided in Section 2.13.

2.7 Subsurface conditions

The subsurface condition at the Mammoth Dike foundation described next is based on only three geotechnical boreholes close to the axis of either the dike or the key trench on the upstream side as shown on Drawing 651298-5000-4GEF-0003 (Series AMQMD-01). However, the bedrock profile shown on the longitudinal section of the dike is based on a large number of mine boreholes drilled within the footprint of the dike. The drawing also shows 5 destructives boreholes (from Tamrock drill rig) put down in 2017 on the upstream side of the dike (Series L1611). The overburden consists of a surficial layer of gravel, cobles and boulders underlain by glacial till followed by bedrock. The thicknesses in rounded figures of the upper gravel- cobbles-boulder layer, the glacial till and the overall overburden vary from to: 0.8/2.7 m, 1.1/1.7 m and 2.0/2.9 m respectively. Most of the dike foundation will be submerged in spring with the lake level being at or slightly above the lakebed.

2.8 Lines, grades and tolerances

1. Lines and grades shall be obtained from the drawings presented in Appendix 1.
2. Bench marks for the layout of the dike will be provided by the Contractor's surveyor.
3. The Contractor's surveyor shall be responsible for all staking and/other survey requirements such as lines and grades specified or shown on the drawings.
4. Lines and grades are subject to modifications by the Designer and/or the Owner (when justified) and additional lines and grades may be required as the work progresses. Tolerance on grades and lines is 0.1 m.
5. The Contractor shall use the applicable control points to complete the layout of all the works. If the Contractor judges that additional control points are necessary to execute the work adequately, he shall request Agnico Eagle for them.
6. If the Contractor or any of its subcontractors or any of their Representatives or employees move or destroy or render inaccurate any survey control point, such control point shall be replaced at the Contractor's expense.

2.9 Additional drawings

The Designer may provide additional drawing(s) if considered necessary. These drawings shall form part of the contractual document.

2.10 Land, lake, environment and infrastructure protection

1. The Contractor shall limit traffic to the boundary established by the Owner.
2. Fires are not allowed on site.
3. The Contractor shall make sure that all personnel under his responsibility will do everything possible to protect the environment.
4. Unless approved by the Owner, once construction is completed it is not allowed to leave any fill material on the ice.
5. All frozen excavated materials must be disposed of as directed by the Agnico Eagle Geotechnical Engineer.
6. All excavated snow shall be disposed of in the Attenuation Pond or as directed by the Agnico Eagle Geotechnical Engineer.

2.11 Site Cleanup

The Contractor is responsible for the cleanup and removal of garbage and other foreign materials from the construction site to the satisfaction of the Agnico Eagle Geotechnical Engineer.

2.12 Health and Safety

1. All construction work shall be conducted in accordance with Agnico Eagle's sustainable development and Health and Safety standards and regulations.
2. All personal protection equipment appropriate for the work shall be used by all workers.
3. Detailed work procedures for every construction task shall be provided by the Contractor and approved by the Agnico Eagle Geotechnical Engineer.
4. A Detailed Job Safety Analysis (JSA) shall be completed for each construction task and submitted by the Contractor to the Owner for approval.
5. A daily coordination meeting shall be held between the Contractor, QA and QC personnel and the Agnico Eagle Geotechnical Engineer to discuss planning and safety.

2.13 Documentation to be provided by the Contractor

At least sixty (60) days prior to the beginning of the Work, the Contractor shall submit the following documents:

1. The location of the stockpile area(s) he plans to use as well as the locations of borrow sources and access roads.
2. The proposed construction schedule (under thawed and frozen ground conditions), method and a list of specific tools and equipment which will be used during the excavation of the key trench.

3. The proposed methods of key trench excavation under water (when applicable) and in frozen state, including slope and key trench bottom alignment and grade controls.
4. The list of specific tools and equipment which will be used during excavation of the key trench.
5. The proposed method of cleaning bedrock cracks and joints in the key trench bottom or at the abutment and their treatment (sealing) to cut-off all potential seepage beneath the FFAB. The Contractor shall demonstrate that the product he proposes to use to seal the crack and joints has been used in similar cold weather application;
6. The proposed water management during construction including the proposed method to maintain the trench bottom dry to allow the construction of the FFAB.
7. The proposed method of construction of the FFAB and the list of specific equipment it plans to use.
8. The proposed method of fill placement for the various zones;
9. A detailed written procedure for water management during construction.

3.0 CONSTRUCTION MATERIALS

3.1 General

1. Only sound and suitable materials meeting the requirements of this document and approved by the QC and/or QA personnel shall be used.
2. Fill materials shall be free from all organic matter or other deleterious, unapproved, unstable or unsuitable materials such as ice and/or snow, till, or peat.
3. The placement of materials shall be done on a dry or snow and ice free surface.
4. Unless approved by the Agnico Eagle Geotechnical Engineer as well as supported by random inspections by the QC and/or QA personnel, all fill materials shall only be obtained from stockpiles or sources identified at the beginning of the construction works.
5. All materials shall be manufactured from NPAG[3] rock.
6. Stockpiling, loading, and placement of fill materials shall be carried out in a way that minimizes segregation.

3.2 Definitions

7. "Sound" or "Suitable" fill materials are defined as being free from deleterious matter, having a gradation which permits compaction or placement to a stable state, and having the characteristics specified for the particular materials after handling, re-handling, processing, and reprocessing have taken place.
8. "Unstable" or "Unsuitable" fill materials are defined as being too wet, containing oversized or segregated particles, organic or other deleterious matter, such as ice or snow, or having poor characteristics which may result in undesirable settlement or other movement of the fill or within the fill, or otherwise not meeting the requirements of the specifications. However, this definition permits drying, dewatering, watering, screening, raking and any other processing or reprocessing to make the material stable and suitable prior to incorporating it into the fill.
9. BGM shall mean bituminous geomembrane which is also referred to as liner.
10. FFAB shall mean fine filter amended with bentonite.

[3] NPAG : Non potential acid generating.

3.3 Material

3.3.1 Rockfill

The material to be used for the main body (shell) of the Mammoth Dike and its safety berms, shall be a well graded crushed rock < 1000 mm (Material Type 3) from a quarry, pre-production or production zone (runoff mine). Oversize rockfill up to 1500 mm is allowed in the downstream side of the dike. As much as possible, the finer rockfill shall be placed in the fill zone closer to the key trench. After placement, it shall meet the gradation limits specified below in Table 3-1.

Table 3-1: Rockfill gradation

Particle Size (mm)	Finer Than (%)
1000	100
500	40-100
200	10-50
100	0-28
30	0-4

3.3.2 Coarse filter

The material to be used as a transition zone between the rockfill and the fine filter on the upstream slope of Mammoth Dike, also referred to as the coarse filter shall be a well graded and clean granular fill (Material Type 2) produced by crushing rock (Material Type 3) and shall meet the gradation limits specified below in Table 3-2.

Table 3-2: Coarse filter gradation

Particle Size (mm)	Finer Than (%)
200	100
100	60-100
30	20-57
10	5-32
4.75	0-24
2	0-17
0.850	0-12
0.425	0-10
0.150	0-8
0.075	0-7

3.3.3 Fine Filter

The material to be used for the fine filter (Material 1) of the Mammoth Dike, shall be produced by crushing rock (Material Type 3) and shall meet the gradation limits specified below in Table 3-3.

Table 3-3: Fine filtergradation

Particle Size (mm)	Finer Than (%)
30	100
10	51-88
4.75	30-64
2	17-41
0.850	11-27
0.425	9-18

0.150	7-13
0.075	6-10

3.3.4 Sealing of cracks and joints

The product required to fill cracks and joints after exposure of the bedrock surface on the bottom of the key trench and at the abutment shall be adapted to the conditions that is encountered during the construction and shall be pre-approved by Agnico Eagle Geotechnical Engineer.

3.3.5 Fine filter amended with bentonite (FFAB)

1. This material is produced by mixing fine filter material mixed homogeneously with 6% (weight basis) of granular sodium bentonite, added mechanically or by other method(s) approved by the QC and/or QA personnel;
2. The bentonite shall be free flowing, high swelling, granular sodium bentonite, American Colloid Company, Volclay SG-40; Wyo-Ben, Evirogel-10; or equivalent. The bentonite shall have a free swell of at least 18 cc/2 gm measured by ASTM Standard Test Method D-5890 and shall meet the following gradation shown on Table 3-4.

Table 3-4: Sodium bentonite gradation

Particle Size (mm)	Finer Than (%)
2.0	100
0.85	60-100
0.075	0-20

3. This material shall be mixed in an area protected from wind and rain;
4. Only small stockpiles of this material are permitted to be produced in order to minimize the loss of fines by the wind and/or excessive particle segregation.

3.3.6 Bituminous geomembrane (BGM) Liner

1. "Bituminous geomembrane (BGM)" liner shall be Colentanche Product ES2 with a nominal thickness of 4.0 mm;
2. Rolls shall be stored in accordance with the supplier's specifications;
3. For each roll, the Contractor shall provide the Owner's Representative the following information:
    i. Identification label and shipping weights; it is important that the labels be durable to withstand shipping, unloading and temporary storage;
    ii. Thickness, length and width;
    iii. Manufacturer's approved QC stamp,
    iv. ASQUAL[4] label;
4. The technical specifications from the manufacturer shall meet the minimum requirements presented in Appendix 2;
5. The Contractor shall demonstrate his ability to adequately weld seams and make patches on site under arctic winter conditions.

[4] ASQUAL : Assurance quality Label

3.4 Site Quality Control/Quality Assurance QC/QA During BGM Installation

The Contractor shall follow the QC/QA Plan during BGM installation provided in Appendix 4. The QC/QA personnel or the Agnico Eagle Geotechnical Engineer may request additional tests to make sure that the installed BGM satisfies the specifications.

3.5 Non-Conforming Materials

Where and when directed by the QC Representative or the QA Inspector, the Contractor shall excavate and/or remove all unsuitable materials to the designated spoil or dump.

4.0 EXECUTION OF WORKS

The Contractor's attention is drawn to the fact that the work will be executed (in part) during arctic winter and in a protected area (in an environmental context). Special care shall be taken to ensure the safety of all employees, to avoid damage to the land and breaking ice outside the designated working area.

The construction of Mammoth Dike, may start at the end of the thawing season of 2018 or during the winter as long as the dike is constructed prior to the 2019 freshet. It is recognized however, that high water level and the presence of a surficial deposit of highly permeable gravel, cobbles and boulders, means that the bulk of the key trench excavation shall be carried out in winter when the ground is frozen as explained in Section 1.2.

4.1 Work method and sequence

1. The method of construction and the sequence of execution shall be adapted to conditions that may change often, in order to minimize fill cross contaminations and foundation disturbance and to maximize removal of all gravel, cobles and boulders below the FFAB;
2. Heavy equipment traffic shall be adapted to the site conditions that may change often so as to minimize surface disturbance and the formation of ruts in the work area. The Contractor shall restore disturbed areas as close as possible to the original condition to the satisfaction of the Owner.

4.2 FFAB Construction

The FFAB layer in the key trench shall be placed in two (2) compacted lifts: 30 cm followed by 50 cm. The Contractor’s attention is drawn to the fact that prior to the placement of the second lift, he shall install the BGM to the extent necessary that the latter is encapsulated a minimum of 1.5 m as shown on Drawing 651298-6000-4GDD-0005.

4.3 Site preparation

4.3.1 General

1. The Contractor shall remove snow, ice and boulders within Mammoth Dike footprint prior to any fill placement and shall keep the work area dry. Removal of boulders is required only along the key trench.
2. The QC Representative may occasionally request that additional soil stripping and removal of snow and ice be carried out from areas outside the dike footprint shown on the drawing.
3. The material removed shall be stockpiled separately in areas approved by the Agnico Eagle Geotechnical Engineer.
4. The prepared foundation shall be approved by the QC/QA personnel prior to fill placement.
5. All survey shall be done by the Contractor;

6. The approval and visual inspection forms shall be prepared by QC/QA personnel;

4.3.2 Access Roads

1. The Contractor shall use in a proper manner the access road that leads to the construction site.
2. If required, the Contractor shall submit to the Agnico Eagle Geotechnical Engineer full details of all temporary construction roads, ramps and access planned for the construction of the dike. Details related to these temporary works shall include location, alignment, required safety berm or traffic signs, period of use, materials used and plan for their removal.
3. The Contractor shall maintain in good condition all existing or new access roads used for the execution of the work such as the access roads connecting the work area to stockpiles and waste dump areas to the satisfaction of the Agnico Eagle Geotechnical Engineer.
4. All temporary access roads shall be constructed on top of the existing ground. No stripping or excavation shall be undertaken unless approved by the Agnico Eagle Geotechnical Engineer.
5. The Contractor shall supply and install all required traffic signs and safety equipment to ensure worker safety on the construction site for the complete duration of the work.
6. Access road maintenance shall be planned and executed in such a way that worker safety is not compromised. Access roads shall be kept clean of snow and if required, sprinkled with abrasive materials such as gravel to the satisfaction of the Agnico Eagle Geotechnical Engineer.
7. Once the construction work is complete, all temporary access roads shall be removed and the material disposed of as directed by the Agnico Eagle Geotechnical Engineer.

4.3.3 Temperature of the foundation

1. The thermal condition of the foundation shall be taken into account prior to develop the work methods.
2. The profile of the thermal regime of the foundation is presented in the Appendix 6. The readings of the thermal profile shown account for the presence of shallow water at the thermistor station.

4.4 Water management during construction

The Contractor shall be responsible for the construction of temporary swales, ditches, and sumps and be equipped with all the necessary pumps, hoses, and other equipment needed to maintain excavations dry for the complete duration of the work and to the satisfaction of the QC and the

QA personnel. The pumped water shall be discharged into the attenuation pond[5] for subsequent treatment. However, a detailed written procedure of water management during construction shall be submitted to Agnico Eagle's Geotechnical Coordinator for approval prior to the beginning of the Work (Section 2.13).

4.5 Snow Management

During the construction, the Contractor shall remove all snow accumulated above the thermal cover of the FFAB to promote its freezing or to reinforce its frozen state.

4.6 Foundation preparation

4.6.1 General

Foundation preparation involves making sure that the footprint of Mammoth Dike is free of snow, ice, water, boulders and any other deleterious materials or soft pocket at all times during the first layer fill placement regardless of the type or fill zone.

4.6.2 Key trench excavation and bedrock treatment

1. Based on the available geotechnical information described in Section 2.7, the key trench excavation is expected to be entirely in overburden; however depending on the thickness of the later, the trench bottom could be partly on the bedrock surface and partly on or in the glacial till overburden;
2. The minimum depth of key trench excavation is 2 m. However, to avoid bedrock excavation or key trench bottom ending in the surficial gravel, cobbles and boulders layer, the bottom of the key trench must be established on or below the glacial till surface or on bedrock surface. Where the surficial gravel, cobbles and boulders layer is thicker than 2 m, the excavation must continue until this material has been completely removed. In which case, the Contractor shall adjust the elevation and/or position of the FFAB liner from the axis of the dike to fit the field conditions with the approval of Agnico Eagle Geotechnical Engineer prior any fill placement.
3. The key trench excavation shall be carried out in winter when the ground is frozen, thus requiring drilling and blasting. However, the Contractor is encouraged to remove as much overburden as possible during the thawing season to minimize the volume of drilling and blasting. Given the fact that key trench excavation in the gravel, cobbles and boulder will involve working under water, the Contractor is advised to use a method that will avoid over-excavation, yet achieves the geometry of the trench as designed.
4. The final key trench depth as well as longitudinal and lateral dimensions shall meet those shown on the drawings and shall be approved by the Agnico Eagle Geotechnical Engineer and the QC/QA personnel before the construction of the FFAB.

5 See Drawing 651298-5000-4GDD-0001

5. Excavated materials shall be set aside separately or stockpiled in areas approved by the Agnico Eagle Geotechnical Engineer.
6. The QC/QA personnel may, from time to time, request additional excavation or cleaning of the bedrock surface.
7. The key trench shall be dewatered (when applicable) and all thawed soil removed prior to any backfilling. Snow and/or ice have to be completely removed from the bottom of the key trench before any fill placement to the satisfaction of the QC/QA personnel.
8. Snow and/or ice, soil and rock shall be placed into the WRSF area where the water will be collected and treated.
9. The bedrock surface at the bottom of the key trench, shall be carefully cleaned. All pockets, cracks and depressions filled with soil and rock fragments shall be cleaned using compressed air or water to the satisfaction of the QC/QA personnel.
10. Cracks and joints exposed at the bottom of the key trench on bedrock surface shall be sealed with a product and method pre-approved by Agnico-Eagle Engineer.

4.7 Stockpile and disposal areas

1. Unless authorized otherwise, all stripped materials including snow, ice and soil shall be disposed in the Waste Storage Facility (WRSF). During the construction, any other waste disposal area requires written authorization by the Agnico Eagle Geotechnical Engineer.
2. The Contractor shall develop its stockpiles to facilitate drainage and minimize fill segregation.

4.8 Fill placement and compaction

4.8.1 General

The Contractor shall prepare the surface to be filled, load, unload and handle the fill in such way that segregation and loss of fines are limited and shall meet the requirements of Section 3.0 after placement. The Contractor shall also develop a work method that will avoid fill placement without construction equipment traffic over the BGM.

4.8.2 Rockfill (0-1000 mm)

1. The Contractor shall sort out boulders bigger that 1000 mm prior to fill placement; boulders up to 1500 mm may be pushed to the downstream shoulder of the dike;
2. The Contractor may use dozers or any other suitable equipment to place this material;
3. As much as possible, the finer rockfill shall be placed on the upstream slope side of the dike which will support the BGM;
4. The maximum allowable lift thickness is 2.0 m prior compaction;

5. Haul trucks shall dump their load on horizontal surface and not in the slope to limit fill segregation and the formation of voids;
6. Great care shall be taken to limit particle segregation during placement. Occasionally the QC and/or QA personnel may request the Contractor to modify his construction procedures to meet this requirement;
7. The Contractor shall compact each lift with at least 4 passes of a heavy dozer or equivalent as well as manage construction equipment traffic to promote additional compaction with tires and tracks on all surfaces.
8. Placement and compaction of fill must be performed to the satisfaction of the QC and QA personnel.

4.8.3 Coarse Filter

1. The Contractor shall avoid excessive handling of the coarse filter to prevent particle segregation;
2. The coarse filter may have to be placed in freezing temperatures. Any snow and ice accumulated on the previous lift shall be removed before placement of the new lift.
3. Each lift shall be placed with an excavator bucket and great care must be taken to limit particle segregation during placement. Occasionally the QC and QA personnel may ask the Contractor to modify his construction procedure to meet this requirement;
4. This material shall be compacted with an excavator bucket and approved by the QC and QA personnel;
5. The coarse filter shall not be sprayed with water during compaction.
6. Placement and compaction of the fill must be performed to the satisfaction of the QC and QA personnel.

4.8.4 Fine filter

1. The fine filter is used as bedding for and cover on the BGM except where the latter is keyed in the FFAB layer at the bottom of the trench.
2. The Contractor shall avoid excessive handling of this material to prevent particle segregation and loss of fines.
3. The layers below and above the liner in the slope shall have a maximum loose thickness of 0.50 m.
4. Each lift must be placed with an excavator bucket taking great care to limit particle segregation during placement. Occasionally, the QC and/or QA personnel may ask the Contractor to modify its construction procedure to meet this requirement.

5. This material shall be compacted with the excavator bucket and approved by the QC and QA personnel;
6. The material shall not be sprayed with water during compaction.
7. Placement and compaction of this material shall be carried out to the satisfaction of the QC and QA personnel.

4.8.5 Fine filter amended with bentonite (FFAB)

1. The Contractor shall mix the materials near the construction site and following a pre-approved procedure by the QC/QA personnel. The mixing procedure shall be adjusted depending on wind direction and/or intensity so as to minimize bentonite loss.
2. The Contractor is not allowed to pre-mix and stockpile the FFAB.
3. The Contractor shall proceed with the mixing process in such way that the material can be placed immediately without requiring double handling.
4. The Contractor is responsible for planning the mixing and placement sequence to respect the construction schedule.
5. The FFAB shall have a minimum compacted thickness of 0.8 m built in two layers: 0.3 m for the first (bottom) layer and 0.5 m for the second (top) one. The actual thickness is expected to vary locally depending on deeper pockets of gravel, cobbles and boulders that need to be removed as well as on the topography of the exposed bedrock surface and the need to provide an horizontal surface that will allow anchoring of the BGM with full contact to the FFAB. The Contractor's attention is drawn to the fact that where the FFAB is thicker than 0.5 m, it shall be placed and compacted in maximum lift thicknesses of 0.5 m.
6. Each lift must be placed with an excavator bucket and great care must be taken to limit loss of bentonite fines due to wind and/or particles segregation during placement. Occasionally the QA and/or QC personnel may ask the Contractor to modify his construction procedure to meet this requirement.
7. Each lift must be compacted with the minimum number of passes determined following a test pad work done elsewhere on the same material.
8. The FFAB shall not be sprayed with water nor placed in wet conditions.
9. Placement and compaction of the fill must be performed to the satisfaction of the QC and/or QA personnel.

4.8.6 Bituminous geomembrane (BGM)

1. The Contractor shall store, handle, roll-out, place, and weld the BGM in accordance with the manufacturer's specifications included in Appendix 2.
2. The Contractor shall roll-out the BGM panels vertically along the slope.

3. The BGM shall be free of folds before it is covered with fill. Cutting and patching may be performed to meet this requirement.
4. All welding and reparation work shall be carried out under the supervision of an experienced and certified technician and in the presence of the QC and/or QA personnel.
5. The Contractor shall take all necessary precautions to ensure that the BGM is not accessed by construction equipment tracks. A minimum soil cover of 0.5 m must be provided over the liner before it could be accessed by construction equipment tracks after QA/QC approval. On the slope, any traffic will not be authorized.
6. No fill material shall be placed over the BGM prior to approval by the QC and/or QA personnel.
7. Patch dimensions shall overlap all defects by at least 20 cm.

4.9 Thermistor strings (under Agnico Eagle's responsibility)

1. The Owner shall store, handle and install the thermistor strings with care to minimize damage.
2. The Owner shall install thermistor strings that have been both tested and verified. A data sheet must be available for each thermistor string installed.
3. For each thermistor string installed, the Owner shall note the identification number, location, and the spacing between each thermistor beads.
4. The thermistor string beneath the liner must be placed prior to liner installation.
5. The vertical thermistor string must be installed once the dike construction has been completed.
6. The Owner shall survey and record the top (upper) thermistor bead coordinates and elevation of each thermistor string.
7. Thermistor strings must be connected to a data logger or equipped with a connector for reading.
8. Thermistor connection to a data logger must be performed by an experienced and certified technician.

The Owner shall take all the necessary precautions to ensure that the thermistor strings are not damaged during installation.

5.0 QUALITY CONTROL AND QUALITY ASSURANCE PROGRAM

1. The QC / QA approval form is included in the appendix 5 and the tasks for QC / QA are presented in Appendix 4.
2. The Contractor shall be entitled to be represented during all field tests carried out by the QC Representative in order to determine whether fill materials meet the requirements of the Specifications.
3. The QC Representative will notify the Contractor of any such tests but the QC Representative shall not be required to wait for the arrival of the Contractor prior to the start of the test.
4. The Contractor shall provide assistance when required for collecting and handling the samples.
5. Sampling or testing required by the QC Representative shall be executed by the Contractor without delay. All samples and tests shall be taken or performed in accordance with the appropriate standard, approved by the QC Representative, and shall meet the requirements of the present document.
6. Visual inspections of excavation and sources of imported fills will be carried out by the QC Representative on a regular basis to ensure that the excavation work and fill materials meet the requirements of the document.
7. Full time visual inspection during BGM welding will be carried out by the QC Representative to ensure that the welding meets the design requirements.
8. Samples of the BGM shall be taken and kept for a minimum of 6 months;
9. Maximum tensile strength tested on the BGM (ASTM D 7275) shall meet the requirement of manufacturer's specification included in Appendix 2. Vacuum tests shall be done by maintaining a minimum pressure of -200 to -400 mbar for 15 seconds;
10. The QC report on the BGM installation shall include a plan view with defect and patch locations, panel number associated with each roll, seam locations, and other relevant information.

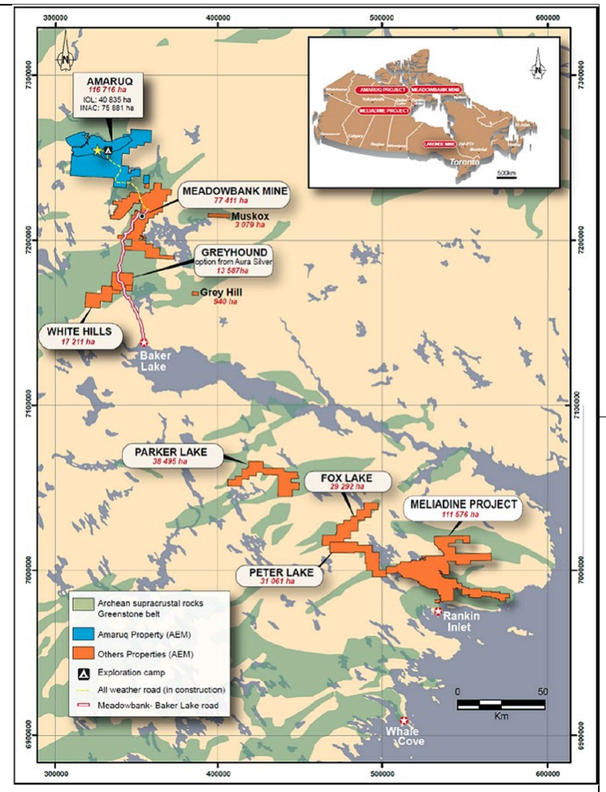
APPENDIX 1

Drawings of Mammoth Dike

AGNICO EAGLE – MEADOWBANK DIVISION

WHALE TAIL PROJECT

DRAWING No.	TITLE	REVISION	DATE
651298-5000-4GDD-0000	LOCATION MAP AND DRAWING INDEX	00	2018-09-06
651298-5000-4GDD-0001	GENERAL ARRANGEMENT PLAN	00	2018-09-06
651298-5000-4GDD-0002	GENERAL PLAN OF FIELD INVESTIGATION LOCATIONS	00	2018-09-06
651298-5000-4GDD-0003	MAMMOTH DIKE - FIELD INVESTIGATION - LOCATION PLAN AND SOIL STATIGRAPHIC SECTION	00	2018-09-06
651298-5000-4GDD-0004	MAMMOTH DIKE - DESIGN PLAN AND LONGITUDINAL SECTION	00	2018-09-06
651298-5000-4GDD-0005	MAMMOTH DIKE - SELECTED DESIGN SECTIONS	00	2018-09-06



KEY PLAN

ISSUE No	REV.	DATE (Y/M/D)	PURPOSE OF ISSUE
03	00	2018-09-06	ISSUED FOR CONSTRUCTION
02	PB	2018-08-22	ISSUED FOR CLIENT COMMENTS
01	PA	2018-08-08	ISSUED FOR INTERNAL COMMENTS

ISSUE REGISTER

ISSUE No	REV.	DATE (Y/M/D)	PURPOSE OF ISSUE

ISSUE REGISTER

No	REVISION DESCRIPTION	DATE (Y/M/D)	*	**

INITIALS: * DESIGNED ** APPROVED

REVISION REGISTER

No

REFERENCE DRAWINGS

PROFESSIONAL SEAL

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6/09/2018

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CLIENT: AGNICO EAGLE

PROJECT: AGNICO EAGLE – MEADOWBANK DIVISION WHALE TAIL PROJECT

TITLE: LOCATION MAP AND DRAWING INDEX

PROJECT No	SUBDIVISION	SUBJECT	SERIAL	REV.
651298	5000	4G DD	0000	00

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