

December 15, 2022

Chris Spencer,  
Manager, Regulatory Affairs  
Qikiqtani Inuit Association  
P.O. Box 1340  
Iqaluit, NU X0A 0H0

**RE: Mine Site Hazardous Waste Berm Land Classification Amendment (Options Exercise Notice)  
Commercial Lease No. Q13C301**

In accordance with Section 3.2 of Commercial Lease No. Q13C301 (Commercial Lease) between the Qikiqtani Inuit Association (QIA) and Baffinland Iron Mines Corporation (Baffinland), the purpose of this letter is to request an amendment to reclassify Lands (Options Exercise Notice; OEN) within the limits of the Impact Areas for the Mary River Project (the Project), outlined in the Commercial Lease. Amendments to the Impact Area classifications are being requested to allow for the construction of a hazardous waste berm (HWB) at the Mary River Mine Site.

A completed Options Exercise Notice (OEN) Application Form for this request, consistent with the requirements of Section 3.4 of the Commercial Lease and Lease Operations Guide "Option Exercise Notice Submission", is provided in Attachment 1. A figure showing the proposed amendments to the Waste Storage Area limits are provided in Attachment 2. A design brief for the HWB is provided in Attachment 3. Details of the requested expansion to the waste storage area are provided in Table 1.

The new HWB will have a total area of 4,520 m<sup>2</sup>. The footprint of this new HWB overlaps with an existing HWB (MS-HWB-06) which will be decommissioned before construction of the new HWB. The existing HWB has an area of 388 m<sup>2</sup> which is already classified as a waste storage area, so the additional area requiring reclassification as a Waste Storage Area is 4,132 m<sup>2</sup>.

**Table 1 – Area Requiring an  
Amendment to Waste Storage Area Limits**

Approximate Location	Figure Reference	Additional Waste Storage Area Required (m <sup>2</sup> )
Mine Site	Figure 1	4,132
<b>Total (m<sup>2</sup>)</b>		<b>4,132</b>
<b>Total (hectares)</b>		<b>0.4</b>



We trust that this application is comprehensive for the purpose of reclassifying Lands at the Project under Section 3 of the Commercial Lease. Please do not hesitate to contact the undersigned, should you have any questions or comments.

Regards,

A handwritten signature in black ink, appearing to read "Steve Borcsok", written over a light grey rectangular background.

Steve Borcsok  
Approvals Manager

**Attachments:**

- Attachment 1: OEN Application Form
- Attachment 2: Figure
- Attachment 3: Design Brief

## **Attachment 1**

**OEN Application Form**

#	OEN APPLICATION FORM	
1	OEN Title	<b>Mine Site Hazardous Waste Berm Land Classification Amendment</b>
2	General geographic UTM coordinates of the areas subject to amendment	UTM (NAD83, Zone 17N) N7914539 E558228
3	A description of the characteristics of the land including acknowledgement and explanation of any environmental sensitivities <sup>1</sup>	<p>The land where the HWB will be constructed is previously disturbed land, partially taken up by an existing HWB which will be decommissioned before construction.</p> <p>Vegetation in this region is discontinuous. Dry sites are very sparsely vegetated, whereas wet areas tend to have a more continuous cover of sedge, cottongrass, saxifrage, and moss. Bedrock consists of undifferentiated gneisses and mixed rocks of Precambrian age. Bedrock outcroppings are common, and Turbic Cryosols developed on hummocky, thin, discontinuous sandy moraine is the dominant soil. Organic and Static Cryosolic soils also occur. Most of the ecoregion is underlain by continuous permafrost with low ice content. No other unique environmental sensitivities are expected and environmental management will be done in accordance to site environmental management and regulatory requirements.</p> <p>Figure 1 outlines the geographical features (e.g. water bodies, topography) in proximity to the proposed HWB.</p>
4	The specific nature of activities that have historically occurred on the proposed Lands <sup>2</sup>	The proposed location for the new HWB is located immediately adjacent to the Tote Road on previously disturbed land. A portion of the footprint of the HWB is taken up by a previously constructed HWB which will be decommissioned before construction.
5	The specific nature of activities to be conducted on the proposed Lands <sup>3</sup>	Baffinland is proposing to construct a new HWB in this location. A design brief is provided in Attachment 3. The HWB will be used for the temporary storage of hazardous waste materials generated during mining and iron ore production at the Mine Site.

<sup>1</sup> This description shall at a minimum include a complete description of the following components:

- i. Wildlife
- ii. Vegetation
- iii. Permafrost
- iv. Water quality (includes Acid Rock Drainage and Metal Leaching)
- v. Air quality
- vi. Associated map(s), sketches and other information in sufficient detail and in a scale as to QIA to consider the amendment request, including clear presentation of existing geographical features and relevant project facilities. The map(s) will include nearby facilities and geographical features (e.g. water bodies, topography).
- vii. Photographic record of pre-operations in the OEN area.

<sup>2</sup> Indicate whether lands are disturbed or undisturbed - if disturbed, nature and duration of past disturbance (e.g. hectares of land disturbed, tonnes of material quarried, other types of activities etc.)

<sup>3</sup> Associated drawings and designs are to be included as annexes.

#	OEN APPLICATION FORM	
6	Proposed duration of the activities	The use of the Mine Site HWB is anticipated to be continuous during operations, until such time as it may be decommissioned when no longer required, or during the closure phase of the project.
7	Associated changes to all Environmental Management and Monitoring Plans <sup>4</sup>	There are no planned changes to management practices or procedures associated with Environmental Management and Monitoring Plans. The HWB will be operated in accordance with Baffinland's Waste Management Plan (BAF-PH1-830-P16-0028) and Hazardous Materials and Hazardous Waste Management Plan (BAF-PH1-830-P16-0011).
8	All related Annual Work Plan amendments, if any. <sup>5</sup>	This activity was previously included in the Annual Work Plan as item 2019-11.
9	Relevant information concerning financial security, including the Security Deposit.	The proposed HWB was previously included in the Annual Work Plan as item 2019-11. During the 2022 Annual Security Review, the dimensions of the HWB and associated financial security were updated to reflect the design of the HWB (2,700 m <sup>2</sup> lined, 1,820 m <sup>2</sup> unlined). Adequate financial security is in place for the proposed HWB.
10	Indicate whether changes are required to existing approvals, licences, plans, permits or authorizations.	No changes to existing approvals, licences, plans, permits or authorizations are required.
11	The anticipated increase or decrease in Rent payment where the increase or decrease is shown compared against the initial Rent payment amount pre-OEN approval.	There is no anticipated increase or decrease in rent payment as a result of this OEN.

<sup>4</sup> Relevant environmental management plans associated with the OEN. If there are no revisions required to management plans, a list of the most current environmental management plans will be provided.

<sup>5</sup> Indicate whether activity is outside of scope of relevant Annual Work Plan.

## **Attachment 2**

### **Figures**





SAVED: C:\Users\katie.mcquillan\Documents\4 - Maps\Permits\BIM\_MineSite\_ProposedHWB.mxd; 04-May-22



## **Attachment 3**

### **Design Brief**



**August 6, 2021**

Mr. Shawn Parry  
Manager - Road Maintenance Mary River Mine Site  
Baffinland Iron Mines Corporation  
#300-2275 Upper Middle Road East  
Oakville, Ontario  
Canada, L6H 0C3

**Knight Piésold Ltd.**  
1650 Main Street West  
North Bay, Ontario  
Canada, P1B 8G5  
T +1 705 476 2165  
E northbay@knightpiesold.com  
www.knightpiesold.com

Dear Shawn,

## **RE: Design Brief and Construction Package for Hazardous Waste Berm**

### **1.0 INTRODUCTION**

Knight Piésold Ltd. (KP) is pleased to provide Baffinland Iron Mines Corporation (Baffinland) with this design brief and accompanying Issued for Construction (IFC) drawing package for the construction of Hazardous Waste Berms (HWB) at the Mary River Project Mine Site. The HWB are an approved component of the Project identified in Part A, Item 1 of Type A Water Licence 2AM-MRY-1325 (Nunavut Water Board [NWB], 2015).

Design details for the HWB are summarized below.

### **2.0 DESIGN AND OPERATING SUMMARY**

The HWB will be used to temporarily store hazardous waste for up to a year in a single cell. The cell has been sized to contain hazardous waste materials generated during mining and iron ore production at the Mine Site. The cell has also been designed to temporarily store snowmelt and rainfall occurring directly within its footprint.

The main design and operating criteria used as a basis for the HWB are summarized in Table 1 and were developed in consultation with Baffinland. The HWB design is focused on foundation preparation, berm construction, and basin lining to establish the required hazardous waste storage capacity. Additional infrastructure required for the HWB development that are not addressed in this report include:

- Access roads to and into the HWB containment area
- Drainage details around the perimeter of the HWB
- Water removal details from the HWB containment area to an approved storage/discharge area

IFC Drawings and technical specifications for construction are also included with this letter. General specifications for the construction of the HWB are shown on Drawing C501. The location and layout of the HWB are provided on Drawing C510 and the sections are illustrated on Drawing C511. The design is consistent with the existing Mine Site Landfarm (KP, 2020) and guidance established by the Government of the Northwest Territories, prepared by Fergusson Simek Clark [FSC], 2003).

### 3.0 HAZARDOUS WASTE BERM DESIGN AND CONSTRUCTION

#### 3.1 GENERAL

Due to the granular nature of the existing foundation soils and the presence of permafrost, it was determined that the slope stability of the perimeter berms and bearing capacity of the foundation soils would be adequate for the HWB (KP, 2008). It is expected that the differential settlement of the foundation soils will be negligible (KP, 2008). The HWB will be assessed as part of Baffinland's biannual geotechnical inspections, and any identified stability issues will need to be addressed based on recommendations contained in the corresponding geotechnical inspection reports submitted to the NWB annually, and in accordance with Part D, Item 18 and Part I, Item 12 of the Type A Water Licence (NWB, 2015).

Design and construction details for site grading/foundation preparation, containment berm, and geosynthetic lining system; along with the estimated HWB cell capacity, are provided in the following sections.

#### 3.2 STORAGE CAPACITY

The HWB cell was sized to contain the following:

- A 1,100 m<sup>2</sup> footprint dedicated to the storage of hazardous waste
- Average annual base snow depth (105 mm water equivalent; KP, 2020)
- Average annual snow drift accumulation (assumed to have a slope of 6H:1V extending from each berm and assumed to have a density of 325 kg/m<sup>3</sup>)
- Runoff generated from the Annual 1 in 100-year precipitation value (260 mm; KP, 2020)
- 300 mm freeboard depth

The storage capacity for the HWB cell is summarized in Table 2 and based on the Drawings and above criteria. It is estimated that 1,890 m<sup>3</sup> of hazardous waste can be stored within the HWB cell.

**Table 2 Hazardous Waste Berm Capacity Summary**

Cell	Effective Footprint Area (m <sup>2</sup> ) <sup>1</sup>	Average Annual Base Snow SWE <sup>2</sup> (m <sup>3</sup> )	Average Annual Snow Drift SWE (m <sup>3</sup> )	Annual 1 in 100-year Precipitation (m <sup>3</sup> )	Hazardous Waste Storage Capacity <sup>3</sup> (m <sup>3</sup> )	Total <sup>4</sup> (m <sup>3</sup> )
Hazardous Waste Berm	4,520	369	554	710	1,890	3,520

**NOTES:**

1. FOOTPRINT AREA INCLUDES FOR HAZARDOUS WASTE, SNOW, AND WATER STORAGE, AS WELL AS THE BERM FOOTPRINTS.
2. SWE = SNOW WATER EQUIVALENT.
3. HAZARDOUS WASTE STORAGE CAPACITY VOLUME IS BASED ON APPROX. 50% OF THE INTERIOR CELL AREA BEING COVERED BY HAZARDOUS WASTE MULTIPLIED BY THE AVERAGE HEIGHT OF THE BERMS BEFORE FREEBOARD REQUIREMENTS.
4. TOTAL STORAGE CAPACITY INCLUSIVE OF HAZARDOUS WASTE MATERIAL, AS WELL AS SNOW AND PRECIPITATION ALLOWANCES.

### 3.3 FILL MATERIALS

Baffinland has indicated that the following fill materials will be used to construct the HWB:

- 4 inch (100 mm) minus material (till), locally borrowed, to be used as a subgrade layer
- Well graded, clean, durable and angular sand and gravel, to be used as a bedding layer (both below and above the geosynthetic lining system)

In general, all fill materials used for construction shall meet the following requirements:

- Be free of any potentially acid generating (PAG) or metal leaching (ML) concerns
- Consist of hard, durable material, free of clay, loam, and other deleterious materials or organic matter, and shall contain no ice

### 3.4 LAYOUT AND SUBGRADE PREPARATION

The HWB layout will be established by constructing the subgrade, followed by bedding layer and berm construction. The subgrade layer will be placed directly on the existing ground to establish required grades, ranging from 1 to 2%. Cuts should not be used to establish these grades. The bedding layer will be placed on the subgrade to provide a suitable foundation for the geosynthetic lining system. Perimeter berms will then be constructed to form the limits of the cell. All berms will have 2H:1V slopes and have a crest width of 2 m, prior to placement of the bedding layer over the geosynthetic lining system.

### 3.5 GEOSYNTHETICS, BEDDING AND SEACAN FLOOR INSTALLATION

The HWB cell will be lined with 60 mil textured HDPE geomembrane and installed between two layers of 12oz/yd<sup>2</sup> non-woven geotextile. The geosynthetic lining system will extend up the interior slope of each berm and will be anchored at the crest of each berm, as indicated on Drawing C511. Sea container floors will be placed above the leveled bedding material and along the cell floor to provide additional protection for the geosynthetic lining system from heavy machinery. Each anchor trench and berm crest will also be covered with bedding material to protect the geosynthetic lining system.

Bedding material is to be dumped at the edge of each cell, spread, and levelled with small, low ground pressure equipment. Specifications for maximum equipment pressure vs. bedding thickness are shown on Drawing C501. The sea containers shall be installed following placement and levelling of the bedding material. Construction equipment shall not travel directly over the geosynthetic lining system until the sea containers are installed.

### 3.6 QUALITY ASSURANCE/QUALITY CONTROL

The construction Quality Assurance/Quality Control program shall include the following key components to meet the intent of the design and the technical specifications, as shown on the Drawings:

- Survey control and periodic topographic surveys to establish lines and grades and to provide support for the preparation of Record drawings
- Foundation approvals prior to the placement of subgrade material
- Monitoring of construction activities, including the timely completion of field tests on fill materials
- Timely collection and laboratory testing of fill materials
- Approval of subgrades prior to the installation of geosynthetics
- Appropriate delivery, handling, and storage of geosynthetics
- Timely field seam inspection and testing of geosynthetics
- Provision of as built documentation for geosynthetics



The Owner's Representative appointed to oversee the HWB construction shall contact KP immediately if there are any uncertainties related to the drawings or technical specifications.

### 3.7 MATERIAL AND QUANTITY ESTIMATES

The material and quantity estimates for the HWB are provided in Table 3. The quantities were measured based on the IFC designs and dimensions shown on the Drawings and are "neat line" estimates.

## 4.0 CLOSURE AND RECLAMATION

Final closure of the HWB will meet the objectives and criteria outlined in the Interim Closure and Reclamation Plan (Baffinland, 2018). For closure planning, the total lined area is approximately 2,700 m<sup>2</sup> and the unlined area (the outside portions of the berms) total 1,820 m<sup>2</sup>.

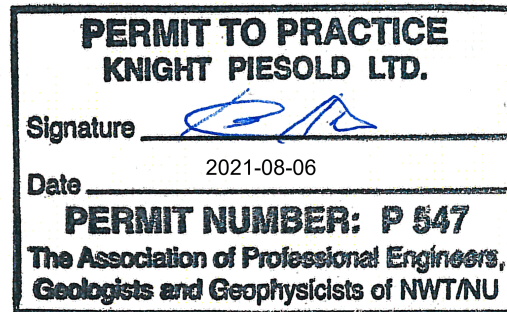
## 5.0 REFERENCES

- Baffinland Iron Mines Corporation (Baffinland), 2018. *Interim Closure and Reclamation Plan*. October 30. Doc. No. BAF-PH1-830-P16-0012, Rev. 5.
- Ferguson Simek Clark (FSC), 2003. *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories. Prepared for Municipal and Community Affairs, Government of the Northwest Territories. Yellowknife, Northwest Territories.* FSC Project No: 2001-1330.
- Hatch Ltd. (HA), 2018. *Civil Design Philosophy*. March 12, 2018. H353004-00000-200-210-0001, Rev. 2
- Knight Piésold Ltd. (KP), 2008. *Mary River Project Bulk Sampling Program Landfill Design and Operations*. March 31. North Bay, Ontario. Ref. No. NB102-00181/10-6, Rev 1.
- Knight Piésold Ltd. (KP), 2012. *Baseline Hydrology Report*. January 4. North Bay, Ontario. Ref. No. NB102-181/30-7, Rev 1.
- Knight Piésold Ltd. (KP), 2020. Letter to: Mr. Shawn Parry, Baffinland Iron Mines Corporation. Re: *Mary River Project - Mine Site Landfarm - Design Brief and IFC Drawings*. June 16. North Bay, Ontario. Ref. No. NB20-00494 (NB102-181/56).
- Nunavut Water Board (NWB), 2015. July 30. Water Licence No: 2AM-MRY1325 - Amendment No.1.

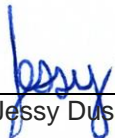
## 6.0 CLOSING

We trust that the information contained in this design brief is satisfactory at this time. Please do not hesitate to contact us if there are any questions or uncertainties related to the IFC design and construction package for the HWB.


Yours truly,  
Knight Piésold Ltd.



Prepared:

  
Jessy Dussault, P.Eng.  
Project Engineer

Reviewed:

  
Wilson Muir, P.Eng.  
Senior Engineer

Approval that this document adheres to the Knight Piésold Quality System:



### Attachments:

Table 1 Rev 0	Design Criteria
Table 3 Rev 0	Schedule of Estimated Materials and Quantities
Drawing C500 Rev 0	Drawing List
Drawing C501 Rev 0	Specifications
Drawing C510 Rev 0	Plan and Setting Out Details
Drawing C511 Rev 0	Typical Sections and Details

Copy To: Allan Knowlton, Baffinland Iron Mines Corporation  
Emmanuel Ocran, Baffinland Iron Mines Corporation

/jjd

TABLE 1

BAFFINLAND IRON MINES CORPORATION  
MARY RIVER PROJECT

DESIGN BRIEF AND CONSTRUCTION PACKAGE FOR HAZARDOUS WASTE BERM  
DESIGN CRITERIA

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Item No.	Item	Design Criteria	Reference
1.0 GENERAL			
1.1	Language and Units	• Documents to be written in English	Baffinland
		• Metric units, unless otherwise noted	Baffinland
		• Coordinate System: UTM (NAD83), Zone 17	Baffinland
1.2	Codes, Standards and Guidelines	• Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories	Ferguson Simek Clark, 2003
		• Civil Design Philosophy	Hatch, 2018
1.3	Site Elevation	• El. 170.0 to 175.0 m in the vicinity of the Hazardous Waste Berms	KP
1.4	Meteorological Parameters	• Average Maximum Daily Summer Temperature: 6.0 °C (July)	KP, 2012 (NB102-181/30-7)
		• Average Minimum Daily Winter Temperature: -34.1 °C (February)	KP, 2012 (NB102-181/30-7)
		• Average Annual Base Snow Accumulation: 105 mm (snow water equivalent)	KP, 2020
		• Average Snow Drift Accumulation: Assume 6H:1V slopes upstream of the Perimeter Landfarm Berms and a snow density of 325 kg/m <sup>3</sup>	KP, 2020
		• Annual 1 in 100 year Precipitation Value: 260 mm	KP, 2020
2.0 STORMWATER MANAGEMENT			
2.1	Runoff Management System	• Divert runoff from upstream of the Hazardous Waste Berms to the environment via berms/culverts, to be completed by Baffinland	KP
2.2	Storm Water Containment System	• Safely and temporarily contain water volume in the Hazardous Waste Berm cell from the following sources, combined:  o Average Annual Base Snow Depth  o Average Annual Snow Drift Accumulation  o Annual 1 in 100 year Precipitation Value	KP
		• Freeboard: 0.3 m	KP
3.0 HAZARDOUS WASTE BERMS			
3.1	Function	• Secure and temporary storage of hazardous material from the Mine Site area for up to one year	KP, Baffinland
3.2	Foundation	• Founded on competent soil (permafrost) or exposed bedrock	KP
3.3	Hazardous Waste Berm Characteristics & Geometry	• One cell to manage the temporary storage of hazardous waste material	KP, Baffinland
		• Hazardous waste storage to reach a maximum capacity of 60% of cell floor area (1100 m <sup>2</sup> )	KP, Baffinland
		• Remainder of cell area to be used to store precipitation/stormwater (730 m <sup>2</sup> )	KP, Baffinland
		• Hazardous waste cell is to be graded to allow water to drain to low point or sump. Water to be pumped to water treatment plant.	KP, Baffinland
		• Berm Crest Elevation: 176.8 m	KP
		• Berm Toe Elevation: 173.2 m	KP
		• Maximum Perimeter Berm Height: 2.7 m inside, 3.6 m outside	KP
		• Berm Crest Width: 2 m at elevation of HDPE geomembrane	KP
		• Perimeter Berm Slopes: 2H:1V	KP
		• Length of Hazardous Waste Berm (from centerline of perimeter berm to centerline of perimeter berm): 70.2 m	KP
		• Width of Hazardous Waste Berm (from centerline of perimeter berm to centerline of perimeter berm): 40.2 m	KP
3.4	Geosynthetic Lining System	• Geosynthetic Lining System includes:  o Bedding layer below the Geosynthetic Lining System to provide a suitable foundation for the geomembrane  o 60 mil HDPE textured (both sides) geomembrane to prevent seepage of any hazardous waste into the underlying soils.  o A second bedding layer to protect the geomembrane  o Installation of sea container floors to protect the geomembrane and provide running surface for equipment	KP, Baffinland
4.0 INSTRUMENTATION AND MONITORING			
4.1	General	• Operation, Maintenance and Surveillance (OMS) on Hazardous Waste Berm to follow existing Baffinland waste management guidelines	Baffinland, 2018

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**TABLE 3**
**BAFFINLAND IRON MINES CORPORATION  
 MARY RIVER PROJECT**
**DESIGN BRIEF AND CONSTRUCTION PACKAGE FOR HAZARDOUS WASTE BERM  
 SCHEDULE OF ESTIMATED MATERIALS AND QUANTITIES**

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Item No.	Description	Unit	Estimated Quantity
<b>1.0 MOBILIZATION AND DEMOBILIZATION</b>			
1.1	Mobilization	Lump Sum	1
1.2	Demobilization	Lump Sum	1
1.3	Sediment Control and Stormwater Best Management Practices (BMP's)	Lump Sum	1
<b>2.0 EARTHWORKS</b>			
2.1	Process and Stockpile - Liner Bedding	m <sup>3</sup>	1,100
2.2	Clearing, Stripping and Grubbing - Cell Foundation	m <sup>2</sup>	4,600
2.3	Haul, Place and Compact - Subgrade Material	m <sup>3</sup>	7,400
2.4	Load, Haul, Place and Compact - Liner Bedding (including top of berm and anchor trench)	m <sup>3</sup>	1,100
2.5	Excavate, Backfill and Compact - Anchor Trenches for Geosynthetic Lining System	m <sup>3</sup>	20
<b>3.0 GEOSYNTHETICS</b>			
3.1	Supply and Install - 60 mil Textured (both sides) HDPE Geomembrane	m <sup>2</sup>	3,200
3.2	Supply and Install - 12 oz/yd <sup>2</sup> Non-Woven Geotextile	m <sup>2</sup>	6,400
<b>4.0 SEA CONTAINER FLOOR</b>			
4.1	Supply and Install - 8 in thick, 8 ft wide, 20 ft long Sea Container Floor over Cell area.	ea.	93
<b>5.0 GEOTECHNICAL INSTRUMENTATION</b>			
5.1	Supply and Install - Groundwater Monitoring Well	ea.	2
5.2	Supply and Install - Vibrating Wire Piezometers and Readout Box	Lump Sum	1

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**NOTES:**

1. QUANTITIES BASED ON NEAT LINE ESTIMATES.
2. QUANTITIES FOR EXTERNAL DRAINAGE, ACCESS ROAD CONSTRUCTION AND ACCESS INTO HAZARDOUS WASTE BERM CELLS TO BE ESTIMATED BY BAFFINLAND.
3. WATER REMOVAL EQUIPMENT TO BE ESTIMATED AND PROVIDED BY BAFFINLAND.

0	6AUG'21	ISSUED WITH LETTER NB21-00669	JJD	CWM
REV	DATE	DESCRIPTION	PREP'D	RVW'D

# BAFFINLAND IRON MINES CORPORATION

## MARY RIVER PROJECT

### HAZARDOUS WASTE BERM

DRAWING NO.	REVISION	TITLE
C500	0	HAZARDOUS WASTE BERM - DRAWING LIST
C501	0	HAZARDOUS WASTE BERM - SPECIFCATIONS
C510	0	HAZARDOUS WASTE BERM - PLAN AND SETTING OUT DETAILS
C511	0	HAZARDOUS WASTE BERM - TYPICAL SECTIONS AND DETAILS


ISSUED FOR CONSTRUCTION


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DRG. NO.	DESCRIPTION	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
REFERENCE DRAWINGS				REVISIONS					REVISIONS						

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**BAFFINLAND IRON MINES CORPORATION**

**MARY RIVER PROJECT**

**HAZARDOUS WASTE BERM  
DRAWING LIST**

1/A NO. **NB102-181/64**

DRAWING NO. **C500**

REVISION **0**

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CO-ORDINATION BETWEEN OWNER, ENGINEER AND CONTRACTOR

1. AFTER THE CONTRACTOR HAS COMPLETED PREPARING THE SUBGRADE SURFACE WHICH WILL LIE DIRECTLY BELOW THE GEOSYNTHETICS, THE CONTRACTOR, ENGINEER AND OWNER WILL VERIFY ACCEPTANCE BY SIGNING A FORM WHICH DESCRIBES THE EXTENT OF THE AREA. AT THAT TIME, THE CONTRACTOR ASSUMES RESPONSIBILITY OF PROTECTING THE APPROVED SURFACE, UNTIL IT IS COVERED WITH GEOSYNTHETICS.
2. ANY DAMAGE BY MECHANICAL MEANS CAUSED BY THE CONTRACTOR TO APPROVED SUBGRADE AREAS SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER AT THE EXPENSE OF THE CONTRACTOR. ANY DAMAGE CAUSED BY WEATHER TO APPROVED SUBGRADE AREAS SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER AT THE EXPENSE OF THE OWNER. ANY DAMAGE CAUSED BY WEATHER TO APPROVED SUBGRADE AREAS RESULTING FROM WIND EROSION OR POOR SURFACE RUNOFF CONTROL (E.G. ALLOWING SURFACE RUNOFF ONTO APPROVED AREAS) AS A RESULT OF OPERATIONS OF THE CONTRACTOR SHALL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER AT THE EXPENSE OF THE CONTRACTOR.
3. AFTER INSTALLATION OF THE GEOSYNTHETICS AND FINAL QUALITY CONTROL MEASURES ARE COMPLETED BY THE CONTRACTOR, AREAS RECEIVING COVER MATERIAL SHALL BE CLEARLY IDENTIFIED AND THE ENGINEER SHALL BE NOTIFIED FOR GEOSYNTHETICS INSPECTION. UPON SIGNED ACCEPTANCE BY THE ENGINEER THAT THE GEOSYNTHETICS HAVE BEEN INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS, IT WILL BE AVAILABLE TO THE CONTRACTOR FOR PLACING THE COVER MATERIAL, WHERE APPLICABLE. AT THAT TIME THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR MAINTAINING THE CONDITION OF THE PORTION OF THE GEOSYNTHETICS UNTIL IT IS ADEQUATELY COVERED.
4. ANY DAMAGE TO PREVIOUSLY ACCEPTED GEOSYNTHETICS AS A RESULT OF THE CONTRACTOR'S OPERATION WILL BE REPAIRED TO THE SATISFACTION OF THE ENGINEER AT THE CONTRACTOR'S EXPENSE.
5. IN THE EVENT OF CONTRADICTION OR CONFLICT BETWEEN PARTIES MENTIONED ABOVE, QUESTIONS WILL BE TAKEN TO THE ENGINEER AND OWNER FOR FINAL DECISION.

SUBGRADE PREPARATION

1. SUBGRADE PREPARATION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND INSTALLATION GUIDELINES.
2. SUBGRADE PREPARATION OVER ROCK SURFACES SHALL REQUIRE THE REMOVAL OF ANY PROTRUDING OBJECT SUCH THAT A SMOOTH GEOMEMBRANE SURFACE IS PROVIDED. NO OVERHANGS, PROTRUSIONS, OR LEDGES OF MORE THAN 0.1 m IN HEIGHT SHALL BE ACCEPTED.
3. PLACEMENT AND COMPACTION OF BEDDING OVER EXPOSED BEDROCK SURFACES SHALL BE CONDUCTED USING PLACEMENT AND COMPACTION METHODS TO SUIT THE SPECIFIC FIELD CONDITIONS. WHERE COMPACTION WITH A STANDARD VIBRATORY ROLLER IS NOT POSSIBLE, ALTERNATIVE COMPACTION EQUIPMENT MAY BE ACCEPTED. THE PLACEMENT AND COMPACTION METHODS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THEIR IMPLEMENTATION.

DELIVERY, HANDLING AND STORAGE

1. DELIVERY, HANDLING AND STORAGE OF GEOSYNTHETICS MATERIAL SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S PRINTED INSTRUCTIONS.

GEOSYNTHETICS INSTALLATION

1. THE GEOMEMBRANE SHALL BE 60 mil HDPE TEXTURED ON BOTH SIDES, OR APPROVED EQUIVALENT. THE GEOTEXTILE SHALL BE 12 oz/yd², OR APPROVED EQUIVALENT AND SHALL BE INSTALLED IN INTIMATE CONTACT WITH THE GEOMEMBRANE.
2. THE GEOTEXTILE AND GEOMEMBRANE SHALL BE HANDLED IN SUCH A MANNER AS TO ENSURE THAT IT IS NOT DAMAGED IN ANY WAY. THE MATERIALS SHALL BE STORED INDOORS AT TEMPERATURES ABOVE 0 DEGREES CELSIUS PRIOR TO PLACEMENT. SHOULD THE CONTRACTOR DAMAGE THE GEOTEXTILE TO THE EXTENT THAT IT IS NO LONGER USABLE AS DETERMINED BY THESE SPECIFICATIONS OR BY THE ENGINEER, THE CONTRACTOR SHALL REPLACE THE GEOTEXTILE AT THEIR EXPENSE.
3. THE SUBGRADE UNDERLYING THE GEOTEXTILE SHALL BE APPROVED BY THE ENGINEER AND SHALL BE SMOOTH AND FREE OF RUTS OR PROTRUSIONS WHICH COULD DAMAGE THE GEOTEXTILE. THE GEOTEXTILE AND GEOMEMBRANE SHALL BE LAID FLAT AND SMOOTH SO THAT IT IS IN DIRECT CONTACT WITH THE SUBGRADE. THE GEOTEXTILE SHALL BE FREE OF TENSILE STRESSES, FOLDS AND WRINKLES SO THAT THE OVERLYING MATERIALS WILL NOT EXCESSIVELY STRETCH OR TEAR THE FABRIC. ON SLOPES STEEPER THAN 10H:1V, THE GEOTEXTILE SHALL BE LAID WITH THE MACHINE DIRECTION OF THE FABRIC PARALLEL TO THE SLOPE DIRECTION. ANCHORING OF THE TERMINAL ENDS OF THE GEOTEXTILE SHALL BE ACCOMPLISHED THROUGH THE USE OF ANCHOR TRENCHES, ANCHOR BERMS OR APRONS AT THE CREST AND TOE OF THE SLOPE. THE GEOTEXTILE SHALL BE PLACED DIRECTLY ON THE PREPARED SUBGRADE WITH SEAMS UPWARD AND SHALL EXTEND FOR A MINIMUM OF 0.9 m PAST THE DESIGNED SLOPE TOE.
4. UNLESS OTHERWISE NOTED INSTALLATION OF GEOSYNTHETICS SHALL BE IN ACCORDANCE WITH THE FOLLOWING:

• INTERNATIONAL ASSOCIATION OF GEOSYNTHETICS INSTALLERS - "GUIDELINES FOR INSTALLATION OF FACTORY FABRICATED HEAVY WEIGHT >0.64 mm (25 mil) THICKNESS FABRIC - SUPPORTED GEOMEMBRANES" (MARCH 2014)

• APPLICABLE GEOSYNTHETICS RESEARCH INSTITUTE STANDARDS, AND THE MANUFACTURER'S "QUALITY CONTROL MANUAL" (JANUARY 2017)

• GUIDELINES FOR INSTALLATION OF "FACTORY FABRIC SUPPORTED GEOMEMBRANES" (MARCH 2014)

NOTES:

1. THE DRAWING SHALL BE READ IN CONJUNCTION WITH THE ACCOMPANYING CONTRACT DOCUMENTS AND APPLICABLE TECHNICAL SPECIFICATIONS.
2. BEDDING TO BE USED FOR ANCHOR TRENCH BACKFILL AND BEDDING MATERIAL BELOW AND ABOVE GEOSYNTHETIC LINING SYSTEM.
3. SUBGRADE MATERIAL TO BE USED FOR THE CELL BERMS AND BASE.
4. FILL MATERIALS USED FOR CONSTRUCTION SHALL NOT BE POTENTIALLY ACID GENERATING (PAG) OR METAL LEACHING (ML). THROUGHOUT CONSTRUCTION, ADEQUATE INSPECTION AND PERIODIC TESTING SHOULD BE CARRIED OUT TO DEMONSTRATE THE SUITABILITY OF THE FILL MATERIALS.
5. UNLESS OTHERWISE NOTED ALL MATERIALS SHALL CONSIST OF HARD, DURABLE FILL MATERIAL, FREE OF CLAY, LOAM, TREE STUMPS, ROOTS AND OTHER DELETERIOUS MATERIALS OR ORGANIC MATTER, AND CONTAIN NO MASSIVE ICE.

5. THE CONTRACTOR SHALL PROVIDE A WRITTEN GUARANTEE COVERING MATERIALS AND ALL WORKMANSHIP AS WELL AS DEGRADATION DUE TO ULTRAVIOLET LIGHT FOR EXPOSED AREAS. THE MATERIAL SHALL BE WARRANTED AGAINST MANUFACTURER'S DEFECTS FOR A PERIOD OF 5 YEARS FROM THE DATE OF INSTALLATION. THE INSTALLATION SHALL BE WARRANTED AGAINST DEFECTS IN WORKMANSHIP FOR A PERIOD OF 2 YEARS FROM THE DATE OF INSTALLATION.
6. THE GEOSYNTHETICS SHALL BE INSTALLED ON THE AREA SHOWN ON THE DRAWINGS OR AS DIRECTED BY THE ENGINEER.
7. PRIOR TO DEPLOYMENT OF THE GEOSYNTHETICS, THE CONTRACTOR, WITH THE OWNER AND ENGINEER SHALL INSPECT, CERTIFY, AND ACCEPT ALL SURFACES ON WHICH THE GEOTEXTILE AND GEOMEMBRANE IS TO BE PLACED TO ENSURE CONFORMANCE WITH THE DESIGN AND SPECIFICATIONS. SURFACES NOT IN COMPLIANCE WITH THE SPECIFICATIONS SHALL BE RECTIFIED BY THE CONTRACTOR. ACCEPTANCE OF THE ANCHOR TRENCHES FOR PLACEMENT OF THE GEOMEMBRANE SHALL BE INCLUDED IN THE SURFACE PREPARATION ACCEPTANCE.
8. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A FINAL PANEL LAYOUT DRAWING, AND HARDCOPY FORMATS, AT LEAST ONE WEEK PRIOR TO PLACING THE GEOMEMBRANE. NO HORIZONTAL SEAMS ON A SLOPE WILL BE ACCEPTED. NO GEOSYNTHETICS SHALL BE INSTALLED WITHOUT PRIOR APPROVAL BY THE ENGINEER OF THE PROPOSED LAYOUT.
9. THE GEOSYNTHETICS WILL BE PLACED USING METHODS AND PROCEDURES THAT ENSURE A MINIMUM OF HANDLING. THE INSTALLER SHALL PROVIDE ADEQUATE TEMPORARY ANCHORING DEVICES TO PREVENT DAMAGE DUE TO WINDS.
10. THE GEOSYNTHETICS SHALL BE INSTALLED IN A RELAXED CONDITION AND SHALL BE FREE OF TENSION OR STRESS UPON COMPLETION OF THE INSTALLATION. ALL NECESSARY PRECAUTIONS, INCLUDING PROVISIONS FOR INSTALLING EXTRA MATERIAL, SHALL BE TAKEN TO AVOID TRAMPOLINING OF ANY GEOMEMBRANE WHICH MAY REMAIN EXPOSED.
11. SEAMS SHALL BE MADE BY LAPPING THE UPSLOPE MATERIAL OVER THE DOWNSLOPE MATERIAL WITH SUFFICIENT OVERLAP. A MINIMUM OF 1 m IS REQUIRED FROM THE TOE OF THE SLOPE TO ANY HORIZONTAL SEAM ON FLAT AREAS.
12. EXTREME CARE SHALL BE TAKEN BY THE CONTRACTOR IN THE PREPARATION OF THE AREAS TO BE WELDED. THE AREAS TO BE WELDED SHALL BE CLEANED AND PREPARED ACCORDING TO THE APPROVED PROCEDURES, AND ALL SHEETING SHALL BE WELDED TOGETHER BY THERMAL METHODS.
13. THE WELDING EQUIPMENT USED SHALL BE CAPABLE OF CONTINUOUSLY MONITORING AND CONTROLLING THE TEMPERATURES IN THE ZONE OF CONTACT WHERE THE MACHINE IS ACTUALLY FUSING THE GEOMEMBRANE MATERIAL, TO ENSURE CHANGES IN WEATHER CONDITIONS WILL NOT AFFECT THE INTEGRITY OF THE WELD.
14. NO "FISH MOUTHS" SHALL BE ALLOWED WITHIN THE SEAM AREA. WHERE "FISH MOUTHS" OCCUR, THE MATERIAL SHALL BE CUT, OVERLAPPED, AND EXTRUSION WELDED. ALL WELDS ON COMPLETION OF THE WORK SHALL BE TIGHTLY BONDED. ANY GEOMEMBRANE AREA SHOWING DISTRESS DUE TO EXCESSIVE SCUFFING OR PUNCTURE DURING INSTALLATION BE REPLACED OR REPAIRED AT THE CONTRACTOR'S EXPENSE.
15. THE CONTRACTOR SHALL TAKE INTO ACCOUNT THAT RAPID WEATHER CHANGES ARE VERY POSSIBLE, RESULTING IN DELAYS IN CONSTRUCTION OF FIELD SEAMS. JOINTING OF PANELS AND REPAIRS WILL ONLY BE PERMITTED UNDER WEATHER CONDITIONS ALLOWING SUCH WORK WITHIN THE WARRANTY LIMITS IMPOSED BY THE GEOMEMBRANE MANUFACTURER.

FIELD SEAM INSPECTION AND TESTING

1. A MAXIMUM EFFORT SHALL BE MADE TO INSTALL A PERFECT LINER SYSTEM. THIS MEANS THAT ALL SEAMS COMPLETED IN THE FIELD, PATCHES AND EXTRUSIONS SHALL BE INSPECTED, TESTED AND RECORDED.
2. A QUALITY CONTROL TECHNICIAN SHALL INSPECT EACH SEAM, MARKING HIS/HER INITIALS AND THE DATE INSPECTED AT THE END OF EACH PANEL. ANY AREA SHOWING A DEFECT SHALL BE MARKED AND REPAIRED IN ACCORDANCE WITH APPLICABLE GEOMEMBRANE REPAIR PROCEDURES.
3. ALL FIELD SAMPLING AND TESTING SHALL BE DONE BY THE CONTRACTOR AS APPROVED BY THE ENGINEER.
4. THE FIELD INSTALLATION TESTING PROGRAM SHALL CONSIST OF PERIODIC VISUAL OBSERVATIONS, CONTINUITY, AND STRENGTH TESTS. THESE INSPECTIONS AND TESTS ARE TO BE MADE ROUTINELY AND ARE REQUIRED REGARDLESS OF OTHER TYPES OF TESTING THAT MAY BE COMPLETED. THE INSTALLER SHALL PERFORM QUALITY CONTROL TESTING ACCORDING TO THE TYPES AND FREQUENCY INDICATED BELOW.

• VISUAL OBSERVATIONS ARE TO BE MADE ROUTINELY AND SHALL INCLUDE THE FOLLOWING:

• VISUALLY CHECK FIELD SEAMS FOR SQUEEZE OUT, FOOT PRINT, MELT AND OVERLAP

• CHECK MACHINES FOR CLEANNESS, TEMPERATURE AND RELATED ITEMS.

• ANY AREA OF THE SEAM OR PANEL SHOWING A DEFECT SHALL BE MARKED AND REPAIRED IN ACCORDANCE WITH THE APPLICABLE REPAIR PROCEDURES.

• CONTINUITY TESTING IS REQUIRED FOR ALL FIELD SEAMS AND REPAIRED AREAS. INTER-SEAM PRESSURE OR "AIR TESTING" AND TESTING USING VACUUM BOX ARE CONSIDERED ACCEPTABLE METHODS FOR CONTINUITY TESTING. THE TEST PROCEDURE FOR INTER-SEAM PRESSURE OR AIR TESTING IS AS FOLLOWS:

• SEAL BOTH ENDS OF THE SEAM TO BE TESTED BY APPLYING HEAT TO THE END OF THE SEAM UNTIL FLOW TEMPERATURE IS ACHIEVED. CLAMP OFF THE ENDS AND LET COOL.

• INSERT A PRESSURE GAUGE/NEEDLE ASSEMBLY INTO THE END OF THE SEAM AND
- SEAL.

• THE SEAM SHALL BE PRESSURIZED TO AN INITIAL START PRESSURE, MINIMUM 28 psi AND MAXIMUM 30 psi.

• THE INITIAL START PRESSURE IS READ AFTER A 2-MINUTE RELAXING PERIOD, WHICH ALLOWS THE AIR TO REACH AMBIENT GEOMEMBRANE TEMPERATURE; THE ENDING PRESSURE IS READ AFTER 5 MINUTES.

• THE ALLOWABLE PRESSURE DROP IS 3 psi LESS THAN THE INITIAL START PRESSURE.

• THE RESULTS OF THE AIR TEST SHALL BE MARKED AT THE TEST LOCATION AND SHALL BE RECORDED BY THE CONTRACTOR. IF THE TEST FAILS, THE LOCATION OF THE LEAK SHALL BE FOUND AND REPAIRED AND RETESTED OR THE ENTIRE SEAM SHALL BE REPAIRED AND RETESTED.

• THE TEST PROCEDURE FOR VACUUM BOX TESTING IS AS FOLLOWS:

• MIX A SOLUTION OF LIQUID DETERGENT AND WATER AND APPLY AN AMPLE AMOUNT TO THE AREA TO BE TESTED. IF A SEAM CONTAINS EXCESS OVERLAP OR LOOSE EDGES IT IS TO BE TRIMMED BEFORE TESTING.

• PLACE A TRANSLUCENT VACUUM BOX OVER THE AREA AND APPLY A SLIGHT AMOUNT OF DOWNWARD PRESSURE TO THE BOX TO THE SEAL TO THE GEOMEMBRANE.

• APPLY A VACUUM (3 psi TO 5 psi) TO THE AREA. ANY LEAKS WILL BECOME VISIBLE BY LARGE BUBBLES AND SHALL BE REPAIRED.

5. STRENGTH TESTS ON SEAMS SHALL BE CARRIED OUT ON SAMPLE COUPONS CUT FROM THE INSTALLED GEOMEMBRANE IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS AND THE INTERNATIONAL ASSOCIATION OF GEOSYNTHETICS INSTALLERS "GUIDELINES FOR INSTALLATION OF FACTORY FABRICATED HEAVYWEIGHT > 0.64 mm (25 mil) THICKNESS FABRIC - SUPPORTED GEOMEMBRANES" (MARCH, 2014), APPLICABLE GEOSYNTHETICS RESEARCH INSTITUTE STANDARDS AND THE MANUFACTURER'S QUALITY CONTROL MANUAL.

AS-BUILT DOCUMENTATION

1. THE CONTRACTOR SHALL PROVIDE THE OWNER AND ENGINEER WITH COPIES OF ALL THE FABRICATION AND INSTALLATION TEST LOGS AND CONFORMANCE DATA INCLUDING:

• GEOSYNTHETIC CERTIFICATION

• DAILY PANEL PLACEMENT LOGS

• AS-BUILT PANEL LAYOUT DRAWINGS

• SEAM CONTROL LOGS

• CONSTRUCTION REPAIR REPORT

2. IN ADDITION, THE CONTRACTOR SHALL SUBMIT AS-BUILT DRAWINGS SHOWING THE INSTALLED GEOMEMBRANE PANEL LAYOUT WITH EACH PANEL OR PORTION OF PANEL IDENTIFIED BY THE MANUFACTURER'S IDENTIFICATION NUMBER. THE EXTENT OF THE INSTALLED GEOSYNTHETICS AND LOCATIONS OF ALL TESTS SHALL BE IDENTIFIED ALONG WITH LOCATIONS OF ANY REPAIRS. THE AS-BUILT DRAWINGS SHALL BE MADE AVAILABLE ELECTRONICALLY TO THE OWNER AND ENGINEER IN A TIMELY FASHION AFTER THE WORK IS COMPLETE.

FILL MATERIALS:

MATERIAL PLACEMENT AND COMPACTION REQUIREMENTS	
ZONE AND MATERIAL TYPE	PLACING AND COMPACTION REQUIREMENTS
BEDDING MATERIAL	MATERIAL SHALL CONSIST OF 19 mm WELL GRADED, CLEAN, DURABLE AND ANGULAR SAND AND GRAVEL FREE OF CLAY, LOAM, ORGANIC, AND OTHER DELETERIOUS MATERIAL.
	LOWER LAYER - FLOOR: MATERIAL SHALL BE PLACED, SPREAD AND MOISTURE CONDITIONED IN MAXIMUM 300 mm LAYER TO 98% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D698 (STANDARD PROCTOR) FROM A VIBRATORY COMPACTOR OR PLATE COMPACTORS.
	LOWER LAYER - SIDE SLOPES AND UPPER LAYER: MATERIAL SHALL BE PLACED, SPREAD AND MOISTURE CONDITIONED IN MAXIMUM 300 mm LAYER AFTER COMPACTION. NOMINAL COMPACTION.
SUBGRADE MATERIAL	MATERIAL SHALL CONSIST OF CLEAN, WELL GRADED, 100 mm MINUS PROCESSED ROCKFILL OR BORROWED GRANULAR MATERIAL AND SHALL BE FREE OF CLAY, LOAM, ORGANICS, AND OTHER DELETERIOUS MATERIALS. <div>PLACED AND SPREAD IN MAXIMUM 300 mm LAYERS AFTER A MINIMUM OF 8 PASSES FROM A VIBRATORY COMPACTOR.</div>

FILL PLACEMENT

1. STANDARDS:

a. ASTM D698 [07E1], STANDARD TEST METHODS FOR LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING STANDARD EFFORT (12,400 ft lb/ft) (600 kN m/m³).

b. ASTM D422 TEST METHOD FOR PARTICLE-SIZE ANALYSIS OF SOILS.

c. ASTM D2216 TEST METHOD FOR LABORATORY DETERMINATION OF WATER (MOISTURE) CONTENT OF SOIL AND ROCK.

d. ASTM D1556 TEST METHOD FOR DENSITY OF SOIL IN PLACE BY THE SAND-CONE METHOD.

e. ASTM D2922 TEST METHODS FOR DENSITY OF SOIL AND SOIL-AGGREGATE IN PLACE BY NUCLEAR METHODS (SHALLOW DEPTHS).

2. ALL WORK SHALL CONFORM TO THE LINES AND GRADES SHOWN ON THE DRAWINGS.

3. THE CONTRACTOR SHALL PREPARE THE FOUNDATIONS AND EXCAVATED SLOPES AND CONSTRUCT THE VARIOUS EMBANKMENT FILL ZONES TO THE LINES AND GRADES AS SHOWN ON THE IFC DRAWINGS, WITHIN THE TOLERANCES SPECIFIED IN THE TABLE BELOW:

DESCRIPTION	MAXIMUM PERMISSIBLE DEVIATION	
	LINE	GRADE
FILL SLOPES	± 300 mm	+ 100 mm - 0 mm
BERM CREST	± 300 mm	+ 100 mm - 0 mm
BEDDING MATERIAL	± 300 mm	+ 100 mm - 0 mm

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DRAINAGE, EROSION PROTECTION AND PREVENTION OF WATER POLLUTION DURING THE WORK. THIS INCLUDES THE CONSTRUCTION OF ALL CONSTRUCTION DEWATERING STRUCTURES REQUIRED BY THE OWNER'S REPRESENTATIVE.

5. NO FILL MATERIALS SHALL BE PLACED UNTIL ALL FOUNDATION PREPARATION AND TREATMENT IN THE FILL AREA HAS BEEN COMPLETED AND APPROVED IN WRITING BY THE OWNER'S REPRESENTATIVE.

6. ALL SNOW, DEBRIS, VEGETATION, OR ANY OTHER MATERIAL NOT CONFORMING TO THE FILL SPECIFICATIONS SHALL BE REMOVED PRIOR TO THE PLACEMENT OF FILL OR ADDITIONAL FILL.

7. THE TESTING REQUIREMENTS ARE SPECIFIED IN THE TABLE BELOW:
- | TEST                        | STANDARD         | MINIMUM TESTING FREQUENCY |
|-----------------------------|------------------|---------------------------|
| COMPACTION                  | ASTM D698        | 1 PER 200 m²              |
| IN SITU DENSITY             | ASTM D1556/D2922 | 1 PER 100 m²              |
| MOISTURE CONTENT/GRAIN SIZE | ASTM D2216/D422  | 1 PER 200 m²              |
8. DAMAGE TO THE GEOSYNTHETIC LINING SYSTEM SHALL BE AVOIDED DURING PLACEMENT OF THE BEDDING MATERIAL ABOVE THE GEOSYNTHETIC LINING SYSTEM. HAULING EQUIPMENT SHALL NOT TRAVEL ON SURFACES WHERE THE GEOSYNTHETIC LINING SYSTEM IS PRESENT. THE MAXIMUM EQUIPMENT SIZES WHILE WORKING ABOVE THE GEOSYNTHETIC LINING SYSTEM ARE SPECIFIED IN THE TABLE BELOW:
- | BACKFILL THICKNESS OVER LINER | ALLOWABLE GROUND PRESSURE                                               |
|-------------------------------|-------------------------------------------------------------------------|
| NO BACKFILL                   | FOOT TRAFFIC OR ATV ONLY                                                |
| 150 mm OR LESS                | HAND PLACEMENT                                                          |
| 200 mm TO 300 mm              | 28.7 kPa TO 29.0 kPa (D3 TO D4 CAT TRACK LOADERS B LOW GROUND PRESSURE) |
| 300 mm TO 600 mm              | 29.0 kPa TO 59.9 kPa (D4 TO D6 STYLE CAT OR EQUIVALENT)                 |
| 600 mm TO 900 mm              | 72.8 kPa TO 109 kPa (D7 TO D9 CAT OR EQUIVALENT)                        |
- DISCLAIMER —

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REGISTERED PROFESSIONAL ENGINEER

KE. HAWTON

LICENSEE

2021-08-06

AWTAW

ISSUED FOR CONSTRUCTION

BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT

HAZARDOUS WASTE BERM SPECIFICATIONS

DRG. NO.	DESCRIPTION	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED	0	06AUG'21	ISSUED FOR CONSTRUCTION	JD	CJV		
									REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED
REFERENCE DRAWINGS					REVISIONS					REVISIONS					

IA NO.

NB102-181/64

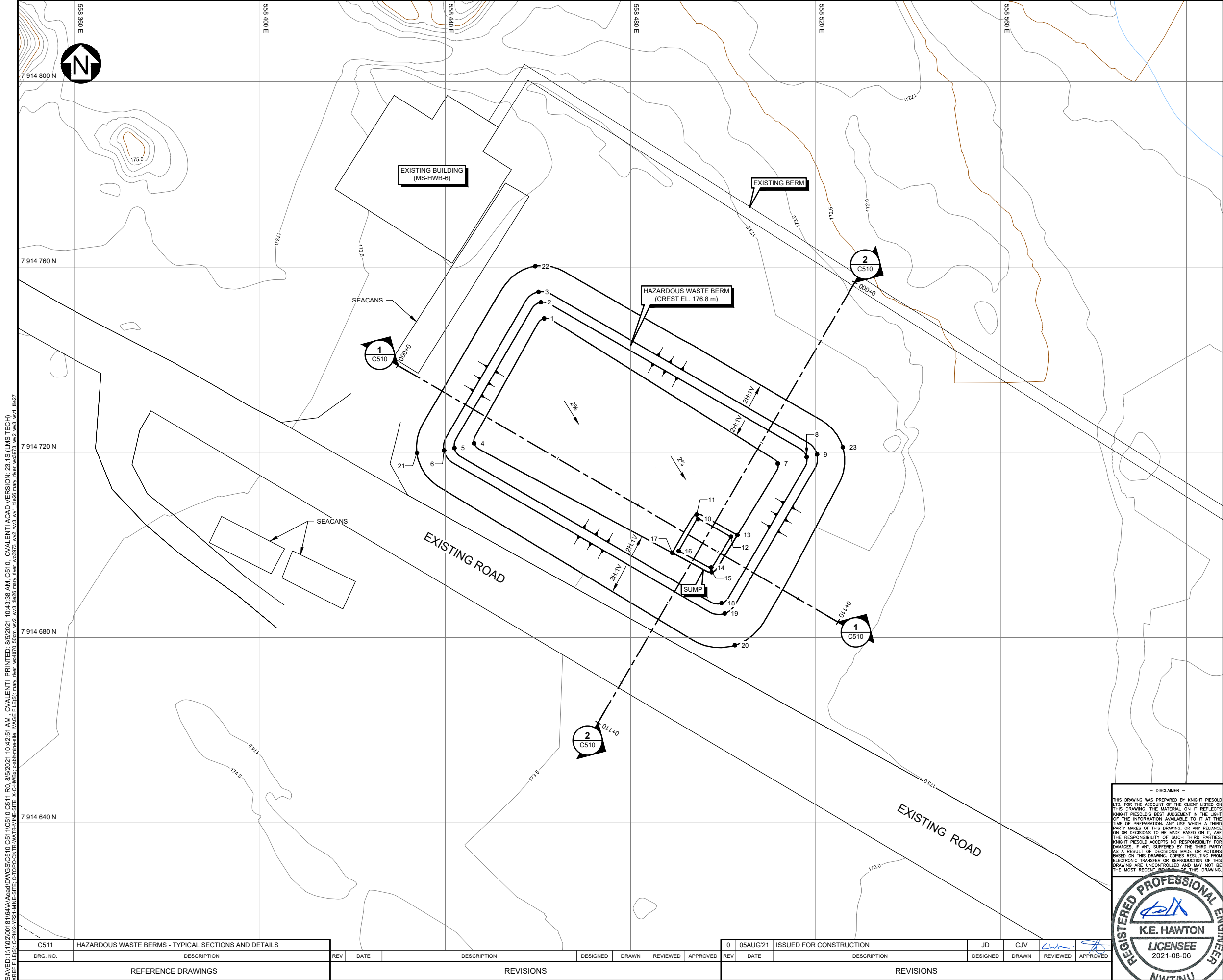
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REVISION

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HAZARDOUS WASTE BERM TABLE OF SETTING OUT POINTS			
DESCRIPTION	NORTHING	EASTING	ELEVATION (m)
1	7,914,748.9	558,461.3	175.45
2	7,914,752.4	558,460.6	176.80
3	7,914,754.6	558,460.1	176.80
4	7,914,721.9	558,446.3	175.14
5	7,914,720.9	558,442.0	176.80
6	7,914,720.4	558,439.7	176.80
7	7,914,717.6	558,511.8	174.39
8	7,914,719.0	558,518.0	176.80
9	7,914,719.5	558,520.3	176.80
10	7,914,705.6	558,494.5	173.88
11	7,914,706.5	558,494.3	174.38
12	7,914,701.7	558,501.7	173.70
13	7,914,702.1	558,503.1	174.21
14	7,914,695.1	558,497.4	173.63
15	7,914,694.1	558,497.5	174.13
16	7,914,698.7	558,490.4	173.79
17	7,914,698.3	558,489.0	174.29
18	7,914,687.4	558,499.6	176.80
19	7,914,685.2	558,500.3	176.80
20	7,914,678.3	558,502.5	173.20
21	7,914,719.8	558,433.9	173.87
22	7,914,760.2	558,459.4	174.00
23	7,914,721.1	558,525.8	173.91

- LEGEND:
- ROAD
  - 2% DIRECTION OF SURFACE GRADING
  - SETTING OUT POINT

- NOTES:
- COORDINATE GRID IS UTM (NAD83) ZONE 17.
  - TOPOGRAPHY BASED ON INFORMATION PROVIDED BAFFINLAND (2019).
  - CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 0.5 m.
  - DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
  - LOCATIONS AND DETAILS OF CONSTRUCTION ITEMS MAY BE MODIFIED TO SUIT ACTUAL SITE CONDITIONS.
  - THE DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DOCUMENTS AND APPLICABLE TECHNICAL SPECIFICATIONS.
  - FOUNDATION PREPARATION: PROVIDED THE AMOUNT OF ORGANICS AND UNSUITABLE MATERIAL ON THE GROUND IS NEGLIGIBLE, DISTURBANCE TO THE EXISTING GROUND (EXCAVATING, SCARIFYING, ETC.) SHOULD BE MINIMIZED SO AS NOT TO IMPACT CURRENT PERMAFROST CONDITIONS. ALTERNATIVE METHODS OF FOUNDATION PREPARATION MAY BE NECESSARY FOR SOME AREAS, AT THE DISCRETION OF THE OWNER'S REPRESENTATIVE. ALL FOUNDATIONS MUST BE MAINTAINED CLEAR OF SNOW, PONDED WATER AND ICE.
  - SETTING OUT POINTS CORRESPOND TO THE TOP OF THE SUBGRADE MATERIAL.

ISSUED FOR CONSTRUCTION



DISCLAIMER

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REGISTERED PROFESSIONAL ENGINEER  
K.E. HAWTON  
LICENSEE  
2021-08-06



BAFFINLAND IRON MINES CORPORATION








MARY RIVER PROJECT

HAZARDOUS WASTE BERM  
PLAN AND SETTING OUT DETAILS

C511	HAZARDOUS WASTE BERMS - TYPICAL SECTIONS AND DETAILS				0	05AUG'21	ISSUED FOR CONSTRUCTION	JD	CJV		
DRG. NO.	DESCRIPTION	REV	DATE	DESCRIPTION	DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION
REFERENCE DRAWINGS				REVISIONS				REVISIONS			

IA NO.	DRAWING NO.	REVISION
NB102-181/64	C510	0

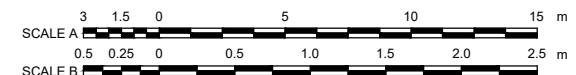


-  SUBGRADE MATERIAL  
 BEDDING MATERIAL  
 NON-WOVEN GEOTEXTILE  
 HDPE LINER  
 GEOMEMBRANE WITH NON-WOVEN  
GEOTEXTILE ABOVE AND BELOW  
 EXISTING GROUND  
 SEA CONTAINER FLOOR


1. DIMENSIONS AND ELEVATIONS ARE IN METRES, UNLESS NOTED OTHERWISE.
2. LOCATION AND DETAILS OF CONSTRUCTION ITEMS MAY BE MODIFIED TO SUIT SITE CONDITIONS.
3. FOR MATERIAL AND GEOSYNTHETIC SPECIFICATIONS **SEE DRG C501**.
4. GEOMEMBRANE TO BE 60 mil HDPE GEOMEMBRANE, TEXTURED BOTH SIDES, OR APPROVED EQUIVALENT AND TO BE INSTALLED AS PER THE MANUFACTURER'S SPECIFICATIONS.
5. ANCHOR TRENCH TO BE EXCAVATED TO THE APPROXIMATE LIMITS SHOWN (0.3 m x 0.3 m IN SECTION), FOLLOWING GEOTEXTILE AND GEOMEMBRANE INSTALLATION, TRENCH TO BE BACKFILLED WITH COMPACTED SUBGRADE MATERIAL.
6. DOWNSTREAM SLOPE OF BERMS TO BE TRIMMED AND NOMINALLY COMPACTED. UPSTREAM SLOPE OF BERM TO BE PREPARED FOR GEOSYNTHETICS INSTALLATION AS PER THE TECHNICAL SPECIFICATIONS.
7. EXCAVATION SLOPES ARE THE CONTRACTOR'S RESPONSIBILITY.
8. FOUNDATION PREPARATION: PROVIDED THE AMOUNT OF ORGANICS AND UNSUITABLE MATERIAL ON THE GROUND IS NEGLIGIBLE, DISTURBANCE TO THE EXISTING GROUND (EXCAVATION, SCARIFYING, ETC.) SHOULD BE MINIMIZED SO AS NOT TO IMPACT CURRENT PERMAFROST CONDITIONS. ALTERNATIVE METHODS OF FOUNDATION PREPARATION MAY BE NECESSARY FOR SOME AREAS, AT THE DISCRETION OF THE OWNER'S REPRESENTATIVE. ALL FOUNDATIONS MUST BE MAINTAINED CLEAR OF SNOW, PONDED WATER AND ICE.
9. THE DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DOCUMENTS AND APPLICABLE TECHNICAL SPECIFICATIONS.
10. NON-WOVEN GEOTEXTILE TO BE 12 oz/yd<sup>2</sup>. NON-WOVEN GEOTEXTILE TO BE INSTALLED AS PER MANUFACTURER'S SPECIFICATIONS.
11. FINAL SLOPES SHALL BE TRIMMED TO THE LINES AND TOLERANCES INDICATED ON THE DRAWINGS AND IN THE TECHNICAL SPECIFICATIONS.



**ISSUED FOR CONSTRUCTION**



C501	HAZARDOUS WASTE BERMS - SPECIFICATIONS																				
C510	HAZARDOUS WASTE BERMS - PLAN AND SETTING OUT DETAILS																				
DRG. NO.	DESCRIPTION																				
REV	DATE	DESCRIPTION					DESIGNED	DRAWN	REVIEWED	APPROVED	REV	DATE	DESCRIPTION					DESIGNED	DRAWN	REVIEWED	APPROVED
REFERENCE DRAWINGS		REVISIONS										REVISIONS									



K.E. HAWTON  
LICENSEE  
2021-08-06

P/A NO.		DRAWING NO.		REVISION	
NB102-181/64		C511		0	

SAVED: I:\0200181164\Acad\DWG\5C510\5C511 R0, 8/5/2021 10:42:51 AM, CVALENTI  
 PRINTED: 8/5/2021 10:43:55 AM, C511, CVALENTI  
 ACAD VERSION: 23.1 (LMS TECH)  
 REF FILES: C-PH02-YR21-1-MINE-SITE: C-TOPO-CNTR-WATR-MINE-SITE: X-C-HWBX: cabl-mine-site  
 IMAGE FILE(S): many river wo3973 wv2 wv3 file28 many river wo3973 wv2 wv3  
 many river wo4070 50cm wv2 wv3 file28 many river wo3973 wv2 wv3 wv1 file27