


	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	<b>Page</b> 1 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	


# Baffinland Iron Mines Corporation

## Snow Management Plan

**BAF-PH1-300-P16-0002**


**Rev 2**

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**Department:** Environment  
**Title:** Environmental Superintendent  
**Date:** May 7th 2018  
**Signature:** 

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**Date:** May 7th 2018  
**Signature:** 

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	Snow Management Plan	Issue Date: May 7, 2018 Revision: 2 Review Date: May 7, 2018	Page 2 of 33
	Operations/ Site Wide	Document #: BAF-PH1-300-P16-0002	

## DOCUMENT REVISION RECORD

Issue Date MM/DD/YY	Revision	Prepared By	Approved By	Issue Purpose
11/17/16	0	JM	SP	Use
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10/23/17	2	WB/CD	SP	Updating Snow Stockpile Locations
07/05/2018	2	WB/CD	FG	QIA comments

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	Snow Management Plan	Issue Date: May 7, 2018 Revision: 2 Review Date: May 7, 2018	Page 3 of 33
	Operations/ Site Wide	Document #: BAF-PH1-300-P16-0002	

## TABLE OF CONTENTS

<b>1</b>	<b>PURPOSE AND SCOPE .....</b>	<b>4</b>
<b>2</b>	<b>RESPONSIBILITIES .....</b>	<b>4</b>
2.1	Department Superintendent/ Manager .....	4
2.2	Supervisor .....	4
2.3	Operators Performing Snow Removal Activities .....	5
2.4	Environment Superintendent/ Coordinator .....	5
<b>3</b>	<b>DEFINITIONS .....</b>	<b>5</b>
<b>4</b>	<b>PROTOCOL .....</b>	<b>6</b>
4.1	Protecting Waterways and Water Bodies .....	6
4.2	Snow Containing Contaminants.....	6
4.3	Area Specific Snow Management Guidelines .....	7
<b>5</b>	<b>REFERENCES AND RECORDS.....</b>	<b>7</b>


### ATTACHMENTS

- Attachment A** Camp (Milne Port and Mine Site) Snow Management Guidelines
- Attachment B** Milne Port Ore Stockpile Snow Management Guidelines
- Attachment C** Milne Port Quarry Snow Management Guidelines
- Attachment D** Tote Road Snow Management Guidelines
- Attachment E** Mine Site Crusher Pad Snow Management Guidelines
- Attachment F** Mine Haul Road Snow Management Guidelines

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 4 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## 1 PURPOSE AND SCOPE

Baffinland Iron Mines (Baffinland) recognizes that there are safety and environmental risks associated with snow accumulation and management around the Mary River Mine Site (Mary River), Milne Port (Milne), and the Tote Road. These three areas will herein be collectively referred to as the Project Area. The Snow Management Plan (the Plan) provides specific procedures to effectively manage snow accumulation around the Project Area in a manner that ensures the safety of Project Personnel while maintaining compliance with Baffinland's permits, licenses, Environmental Protection Plan (BAF-PH1-830-P16-008), and the federal *Fisheries Act*.

The Plan presented, herein, is a new document that replaces the Snow Management Procedure (BAF-PH1-300-P16-0002) dated November 2016, and amended March 2017. Updates of this plan will be completed on an as-needed basis, based on the need to modify or adjust snow stockpile locations, addition of significant site infrastructure, or incorporation of operational improvements and optimizations.

## 2 RESPONSIBILITIES

### 2.1 DEPARTMENT SUPERINTENDENT/ MANAGER

The Department Superintendent and/or Manager is responsible for implementing the Plan within their department and area of operation. He/she must ensure that their personnel understand the contents of the Plan and adhere to its requirements. He/she is responsible for implementing an inspection program to ensure that the Plan is being fully implemented and to apply corrective actions in the event of identified non-conformances or issues of concern.


The Snow Management Inspection Program will involve monthly inspections of the Mine Site, Milne Port Site, and Tote Road. Details and observations from this inspection program will be recorded on an inspection form and distributed to the applicable department outlining the corrective actions to be taken. All communications and inspection forms will be recorded and saved by the Environment Department as per the approved Snow Management Plan.

### 2.2 SUPERVISOR

The Supervisor is required to ensure that their personnel have read and understand the contents of this Plan and will monitor and ensure snow management activities are completed in compliance with the Plan utilizing an inspection program developed by the Department Superintendent/Manager. If a non-conformance is identified in the implementation of the Plan, he/she must immediately cease the activity until it is confirmed that the non-conformance has been corrected. In the event that documentation (Incident Reporting) is required as a result of the non-conformance, the Supervisor is the responsible party for reporting the incident using the Baffinland Incident Investigation Form.

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 5 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

### 2.3 OPERATORS PERFORMING SNOW REMOVAL ACTIVITIES

Operators performing snow removal activities are required to have read and understand the contents of this Plan and follow its procedures. They are to sign off acknowledging that this is so. Records of operator sign off will be filed and maintained with the Training Department, as well as with the Environment Department's internal Snow Management files. Implementation of these records will be a process.

### 2.4 ENVIRONMENT SUPERINTENDENT/ COORDINATOR

The Environmental Superintendent/Supervisor is responsible for approving the Plan, coordinating the implementation of this Plan, in addition to facilitating periodic updates to the Plan in consultation with responsible departments. Periodic updates will be completed on an as-required basis.

The Environmental Superintendent or his/her designate is responsible for approving stockpile locations (greater than 31 m from the ordinary high water mark [HWM] of any watercourse or waterbody) in conjunction with the Supervisors. The Environmental Superintendent will work with Operations to ensure responsible Supervisor's aware of approved snow stockpile locations in his/her area and provide approval of any additional stockpile locations.


The Environmental Superintendent will implement periodic inspections to compare practices, stockpile conditions and locations, etc. with the Plan. If it is determined that snow management activities, snow stockpile conditions or locations do not conform to procedures outlined in this document, the Environmental Superintendent will inform and work with the responsible department to ensure that immediate actions are taken to correct the non-conformance. During such events, snow removal activities may be required to cease until the non-conformance has been corrected.

The Environment Superintendent/Coordinator will implement periodic sampling of surface water during the freshet/spring melt.

## 3 DEFINITIONS

**Snow Stockpile:** Approved non-contaminated snow deposition location for departmental snow storage over winter.

**Snow Dump:** Approved engineered lined containment facility for hydrocarbon contaminated snow deposition over winter.

	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 6 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## 4 PROTOCOL

### 4.1 PROTECTING WATERWAYS AND WATER BODIES

During spring freshet, melting snow stockpiles release sediments and debris that have accumulated within the stockpiles over the winter months. To prevent the debris and sediment from having a negative impact on the water quality of nearby lakes and streams, snow stockpiles must be located at distances greater than 31 m from the ordinary HWM of surrounding water bodies or watercourses (culverts) at all project areas, including along the Tote Road, as required by Baffinland's Water Licence.

During spring freshet, Baffinland executes an surface water monitoring program at the Mine Site, Milne Port, and along the Tote Road. During this water quality monitoring, visual observations (i.e. presence of debris, erosion, sediment loading) of the water body or watercourse and surrounding areas are completed and recorded. Should potential negative effects on water quality be noted and attributed to the presence of nearby snow piles, mitigation measures (i.e. silt fences, check dams, etc.) will be undertaken, where feasible. All approved snow pile locations have been strategically selected based on distance from watercourses/water bodies, topography, and substrate in an effort to minimize the effects of melting snow piles on the receiving environment. As part of the Snow Management Plan, the Environment Department and operations will observe snow stockpiles throughout the winter and during freshet to evaluate the approved snow pile locations, and will make adjustments to the placement of these snow piles that may be necessary in subsequent revisions of the Snow Management Plan, as required.

It is recognized that best efforts will be made to follow the Plan at all times, however, during extreme snow and windstorm events that result in large, deep drifts, safety of site personnel is paramount. Therefore, during these extreme weather events, operators may be required to temporarily deposit snow at locations less than 31 m from water bodies or watercourses in order to maintain site access for essential and emergency response vehicles. When clean snow is deposited/stockpiled in these locations, it will be excavated and removed to the authorized locations within a period of less than 10 days (depending on the severity of the storm).

### 4.2 SNOW CONTAINING CONTAMINANTS


Snow containing contamination (hydrocarbon, antifreeze, sewage, etc.) is prohibited from entering any watercourse or waterbody. Therefore, snow removed and stockpiled within the Project Area must be free of contamination. Snow containing or suspected to contain contaminants must be disposed of in either the contaminated snow facility or in the Polishing Waste Stabilization Ponds (PWSP). Contact Site Services – Surface Works for removal.

To prevent the collection of contaminated snow, a visual inspection must be completed prior to snow removal. This task will require operators to continuously monitor the snow for contaminants as it is being removed. If contamination is observed, snow removal must cease until the contaminated snow is delineated, isolated, and collected for proper disposal. Contamination volumes that are estimated to be

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 7 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

greater than 1 L must be reported using the Baffinland Incident Investigation Form.

### 4.3 AREA-SPECIFIC SNOW MANAGEMENT GUIDELINES

Area-specific snow management guidelines have been developed for the different areas within the Project Area (that are managed by different departments) to ensure safety and environmental hazards associated with snow management in each area are addressed and effectively mitigated. The following area-specific snow management guidelines (with accountable department) are provided as attachments to this document:

**Attachment A** Camp (Milne Port and Mine Site) Snow Management Guidelines (Site Services – Surface Works Department)

**Attachment B** Milne Port Ore Stockpile Snow Management Guidelines (Ore Handling Department)

**Attachment C** Milne Port Quarry Snow Management Guidelines (Road Maintenance Department)

**Attachment D** Tote Road Snow Management Guidelines (Tote Road Maintenance Department)


**Attachment E** Mine Site Crusher Pad Snow Management Guidelines (Crushing Department)

**Attachment F** Mine Haul Road Snow Management Guidelines (Mine Operations Department)

Requests for additional snow storage locations, or revisions to the snow management guidelines prescribed to each management area are subject to review and approval by the Environmental Superintendent prior to implementation.

## 5 REFERENCES AND RECORDS

1. Nunavut Water Board – License No. 2AM-MRY1325 - Amendment No. 1, July 21, 2015
2. Surface and Aquatic Ecosystems Systems Management Plan (Doc. No. BAF-PH1-830-P16-0026)
3. Environmental Protection Plan (Doc. No. BAF-PH1-830-P16-008)

	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	<b>Page</b> 8 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	

# Attachment A

## Camp Sites (Milne Port and Mine Site) Snow Management Guidelines


### (Site Services – Surface Works Department)

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 9 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## SNOW MANAGEMENT GUIDELINES FOR PROJECT CAMP SITES (MILNE PORT/MINE SITE)


To minimize the environmental impact associated with snow removal activities around Project camp sites, the following guidelines have been provided to ensure conformance with Baffinland's Snow Management Plan:

- To minimize the amount of debris collected and mixed with stockpiled snow to the greatest extent possible, site personnel must remove as much debris from the area prior to snow removal. This may include measures such as avoiding heavily littered areas until the debris can be sufficiently removed.
- During freshet (spring snow melt), the Environment Department will conduct weekly inspections, in conjunction with the freshet monitoring, of melting stockpiles for debris. Debris will be removed and appropriately disposed as soon as practicable. All snow stockpile inspections during freshet will be recorded and saved in the Environment Department's internal Snow Management filing system.
- Only stockpile snow at the approved locations identified in following figures (Figure A-1, A-2, A-3, A-4, & A5) provided for Mine Site (Mine Site Complex and Mine Site Weatherhaven) and Milne Port.
- Where practical, remove snow in the same direction as the prevailing winds of the area, and/or to the downhill side, this will minimize the amount of drifting occurring across the road and reduce the amount of melt water that will need to flow through the culverts in the spring.
- When removing snow in the same direction as the wind, ensure that the snow is carried from one side of the road to the other. Do not split the middle and push to both sides, doing this will cause faster drifting and more frequent road closure (multiple passes may be required to accomplish this technique).
- When removing snow with graders near culverts, rotate the moldboard to carry the snow past and away from the culvert area before moving snow to the edge of the road.
- To avoid debris from becoming windblown upon freshet, Surface Works personnel are required to monitor stockpile snowmelt and collect debris as it becomes released. Depending upon the rate of snowmelt and the amount of debris within the stockpiles, collection of debris may be necessary on a daily basis throughout freshet until the stockpiles have entirely melted.

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	Snow Management Plan	Issue Date: May 7, 2018 Revision: 2 Review Date: May 7, 2018	Page 10 of 33
	Operations/ Site Wide	Document #: BAF-PH1-300-P16-0002	

## APPROVED SNOW STOCKPILE LOCATIONS

### MINE SITE




Figure A-1 – Mine Site Complex – Approved Snow Stockpile Location

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	<b>Page</b> 11 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	



**Figure A-2 – Mine Site Complex – Additional Snow Stockpile Location**

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	<b>Page</b> 12 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	




Figure A-3 – Mine Site Weatherhaven – Approved Snow Stockpile Locations

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 13 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	

## MILNE PORT



Figure A-4 – Milne Port – Approved Snow Stockpile Locations

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	Snow Management Plan	Issue Date: May 7, 2018 Revision: 2 Review Date: May 7, 2018	Page 14 of 33
	Operations/ Site Wide	Document #: BAF-PH1-300-P16-0002	



Figure A-5 – Milne Port – Approved Snow Stockpile Locations

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	Snow Management Plan	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 15 of 33
	Operations/ Site Wide	<b>Document #:</b> BAF-PH1-300-P16-0002	

## Attachment B


# Milne Port Ore Pad Snow Management Guidelines (Ore Handling Department)

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 16 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## SNOW MANAGEMENT GUIDELINES FOR THE MILNE PORT ORE STOCKPILE PAD

To minimize the environmental impact associated with snow removal activities completed at the Milne Port Ore Stockpile Pad, the following guidelines have been provided to ensure conformance with Baffinland's Snow Management Plan:

- Remove and transport ore impacted snow on the pad to the approved snow stockpile locations identified in Figure B-1 Milne Port Ore Stockpile Pad – Approved Ore Laden Snow Stockpile Locations. Any ore impacted snow leaving the ore pad must be stockpiled in containment areas constructed with clean aggregate berms and pumped to the nearest perimeter ditch during the spring melt.
- Limit stockpiled snow within 3 m of the Ore Stockpile Pad perimeter ditch; do not bury containment ditches
- Remove and transport all clean snow (non-ore impacted) on the pad to the approved snow stockpile location identified in Figure B-2 Milne Port Ore Stockpile Pad – Approved Clean Snow Stockpile Locations
- To minimize the amount of debris collected and mixed with stockpiled snow to the greatest extent possible, site personnel must remove as much debris from the area prior to snow removal. This may include measures such as avoiding heavily littered areas until the debris can be sufficiently removed.
- Snow stockpiles may be temporarily stored on the Ore Pad until they can be transported to the approved stockpile location.
- Routine monitoring of stockpiled snow will be conducted to ensure that minimal amounts of ore and debris are mixed in during snow removal.
- To minimize the amount of ore (lump/fines) collected and transported during snow removal:
  - Maintain a loader bucket lift of two (2) inches when clearing snow;
  - Exercise caution when clearing snow around the bases of stockpiles, making sure not to cause gouging of pile toes; and
  - Exercise caution when removing snow/drifts near stockpile face(s), making sure not to cut into/scrape stockpile face(s).
  - When possible, select a loader that is most suited for the area where snow removal is required. For example, the use of a 950 loader is more suitable for stockpile faces whereas a 988 loader is better suited for removing snow from the pad floor and perimeter road.

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 17 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	



Figure B-1 - Milne Port Ore Stockpile Pad – Approved Ore Laden Snow Stockpile Locations

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 18 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	



Figure B-2 - Milne Port Ore Stockpile Pad – Approved Clean Snow Stockpile Locations

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	Snow Management Plan	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 19 of 33
	Operations/ Site Wide	<b>Document #:</b> BAF-PH1-300-P16-0002	

# Attachment C


## Milne Port Quarry Snow Management Guidelines

### (Road Maintenance Department)

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 20 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## SNOW MANAGEMENT GUIDELINES FOR THE MILNE PORT QUARRY

To minimize the environmental impact associated with snow removal activities completed at the Milne Port Quarry, the following guidelines have been provided to ensure conformance with Baffinland's Snow Management Plan:

- Do not stockpile snow within 31 m of the culverts, ditches or streams;
- Remove and transport snow on the pad to the approved snow stockpile location identified in Figure C-1.
- To minimize the amount of debris collected and mixed with stockpiled snow to the greatest extent possible, site personnel must remove as much debris from the area prior to snow removal. This may include measures such as avoiding heavily littered areas until the debris can be sufficiently removed.
- Snow stockpiles may be temporarily stored on the Quarry until they can be transported to the approved stockpile location.
- Routine monitoring of stockpiled snow will be conducted to ensure that minimal amounts of aggregate and debris are being mixed in during snow removal.
- To minimize the amount of aggregate collected and transported during snow removal:
  - Maintain a loader bucket lift of two (2) inches when clearing snow;
  - Exercise caution when clearing snow around the bases of aggregate piles, making sure not to cause gouging of pile toes; and
  - Exercise caution when removing snow/drifts near quarry material stockpile face(s), making sure not to cut into/scrape stockpile face(s).
  - When possible, select a loader that is most suited for the area where snow removal is required.

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	Snow Management Plan	Issue Date: May 7, 2018 Revision: 2 Review Date: May 7, 2018	Page 21 of 33
	Operations/ Site Wide	Document #: BAF-PH1-300-P16-0002	



Figure C-1 – Milne Port – Approved Quarry Snow Stockpile Location

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	Snow Management Plan	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 22 of 33
	Operations/ Site Wide	<b>Document #:</b> BAF-PH1-300-P16-0002	


## Attachment D

# Tote Road Snow Management Guidelines (Road Maintenance Department)

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> May 7, 2018 <b>Revision:</b> 2 <b>Review Date:</b> May 7, 2018	Page 23 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## SNOW MANAGEMENT GUIDELINES FOR THE TOTE ROAD

To minimize the environmental impact associated with snow removal activities along the Tote Road, the following guidelines have been provided to ensure conformance with Baffinland's Snow Management Plan.

- Follow the Tote Road snow management directions outlined in the following figures (Figure D-1 to D-5)
- Never stockpile snow within 31 meters of a water body (stream, lake, river, etc.)
- Minimize the amount of road material (i.e. sand, gravel) mixed in with the snow cleared off the road.
- Never push snow onto a culvert or waterbody.
- Where practical, remove snow in the same direction as the prevailing winds of the area, and/or to the downhill side, this will reduce amount of drifting that occurs across the road and will reduce the amount of melt water that will need to flow through the culverts in the spring.
- In some areas, due to natural contours, it may be necessary to direct snow to the opposite side of what is recommended.
- When removing snow in the same direction as the wind, ensure that the snow is carried from one side of the road to the other. Do not split the middle and push to both sides, doing this will cause faster drifting and more frequent road closure (multiple passes will be required to carry out this technique).
- When pushing snow away from the road with dozers, maintain a low flat angle and take special care not to disturb the tundra under the snow.
- When using dozers to push snow, push the snow in a 45° angle away from waterbodies and culvert crossings.
- When removing snow with graders near culverts, rotate the moldboard to carry the snow past and away from the culvert area before moving snow to the edge of the road.
- When grading snow from the roadway, leave it in a berm fashion away from the edge of the road so that it can be easily driven over by the snow blower and discarded away from the road and not built up on the road shoulders and/or embankments.
- In areas where snow is moved away from the road, snow piles will be kept within the Milne Inlet Tote Road Land Use Area (100 m right-of-way). Distances off the roadway that snow is pushed will vary depending on local topography and roadside features (i.e. water bodies or watercourses). In locations where pushing off the road is not feasible, snow will be loaded and trucked to approved snow dump locations.
- This Snow Management Plan has been developed to support and work in conjunction with the Roads Management Plan.

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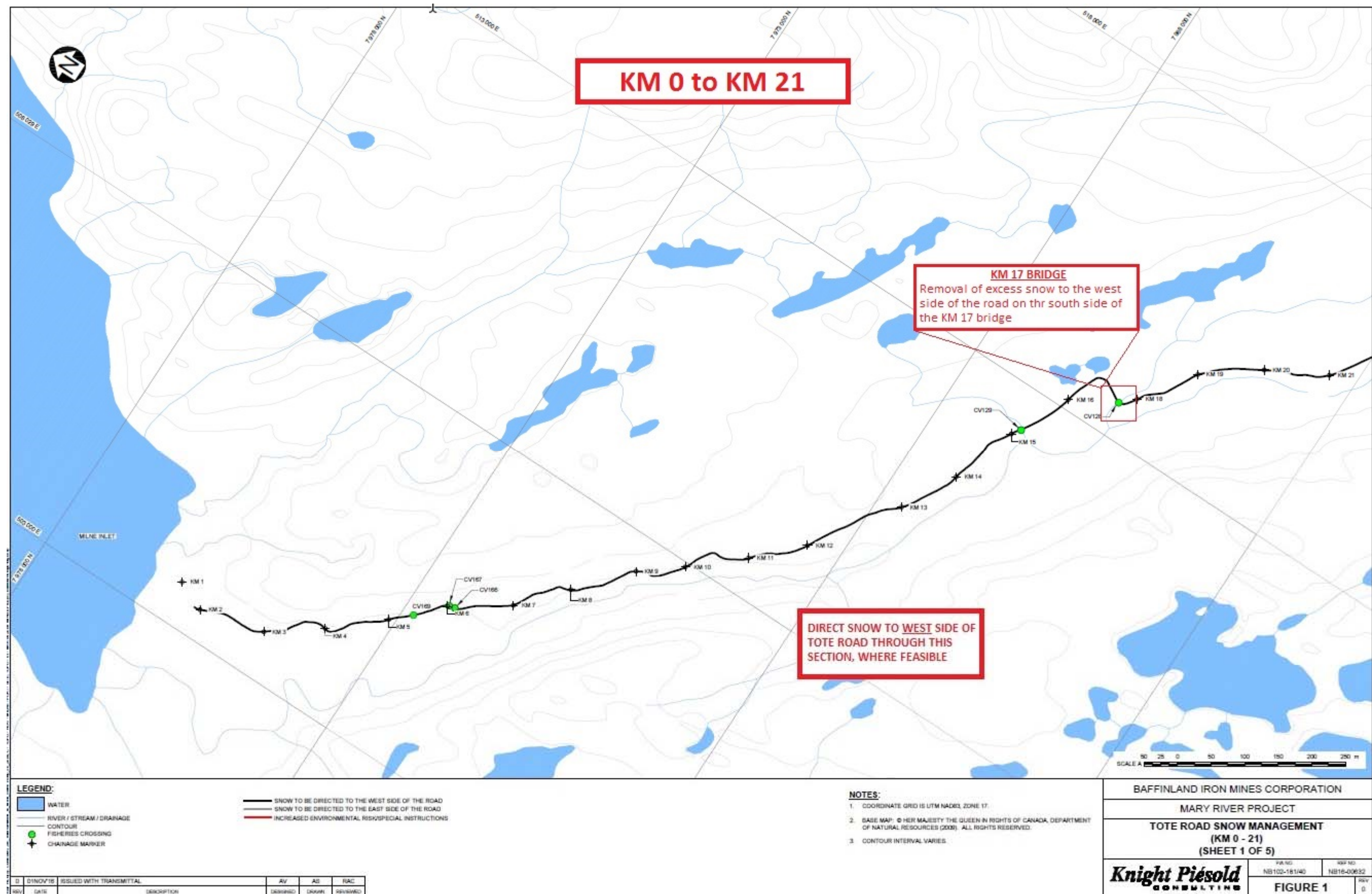


Figure D-1. Tote Road – Approved snow management protocol for the Tote Road from KM 0 to 21



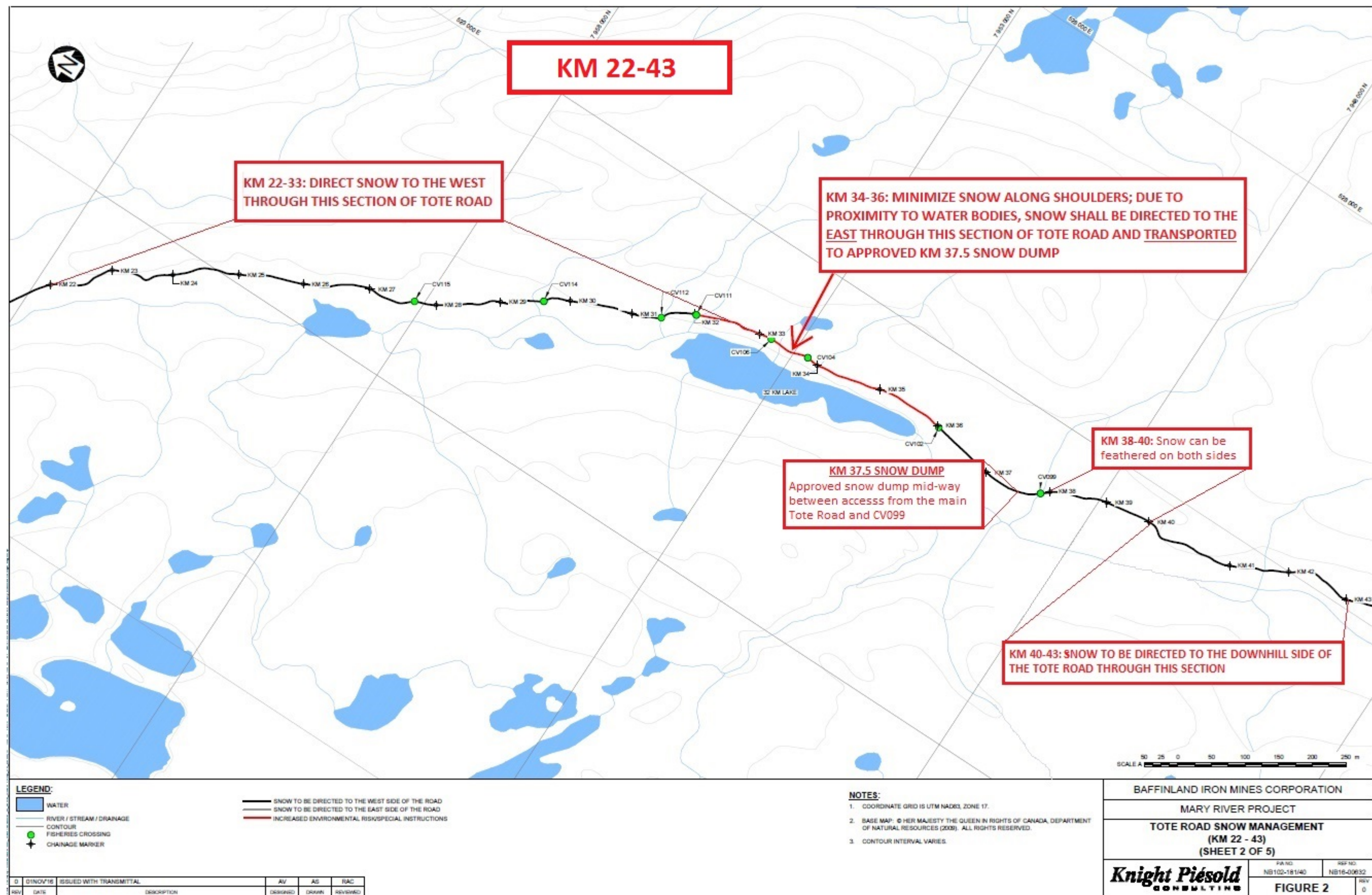


Figure D-2. Tote Road – Approved snow management protocol for the Tote Road from KM 22-43



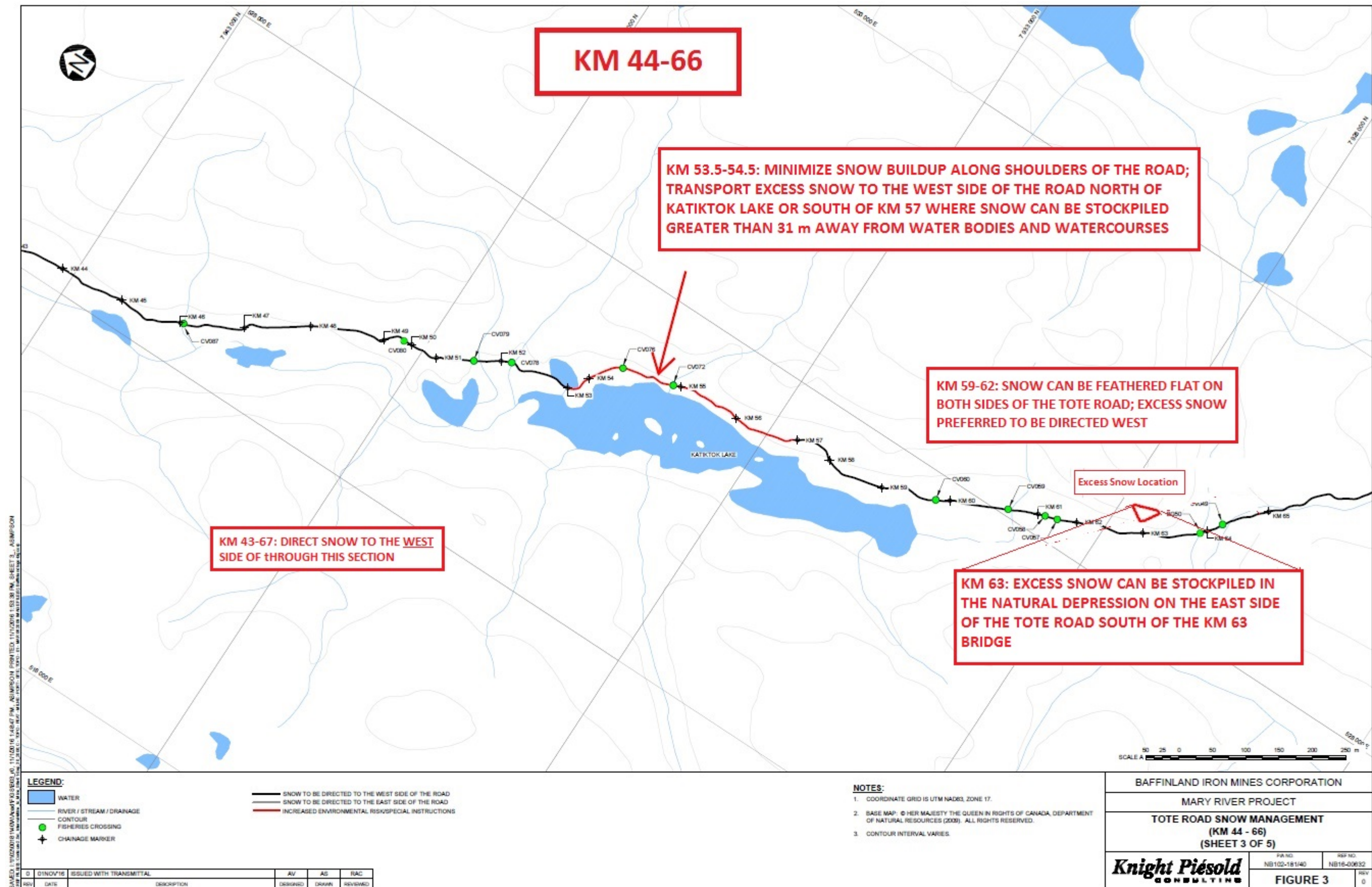


Figure D-3. Tote Road – Approved snow management protocol for the Tote Road from KM 44-66



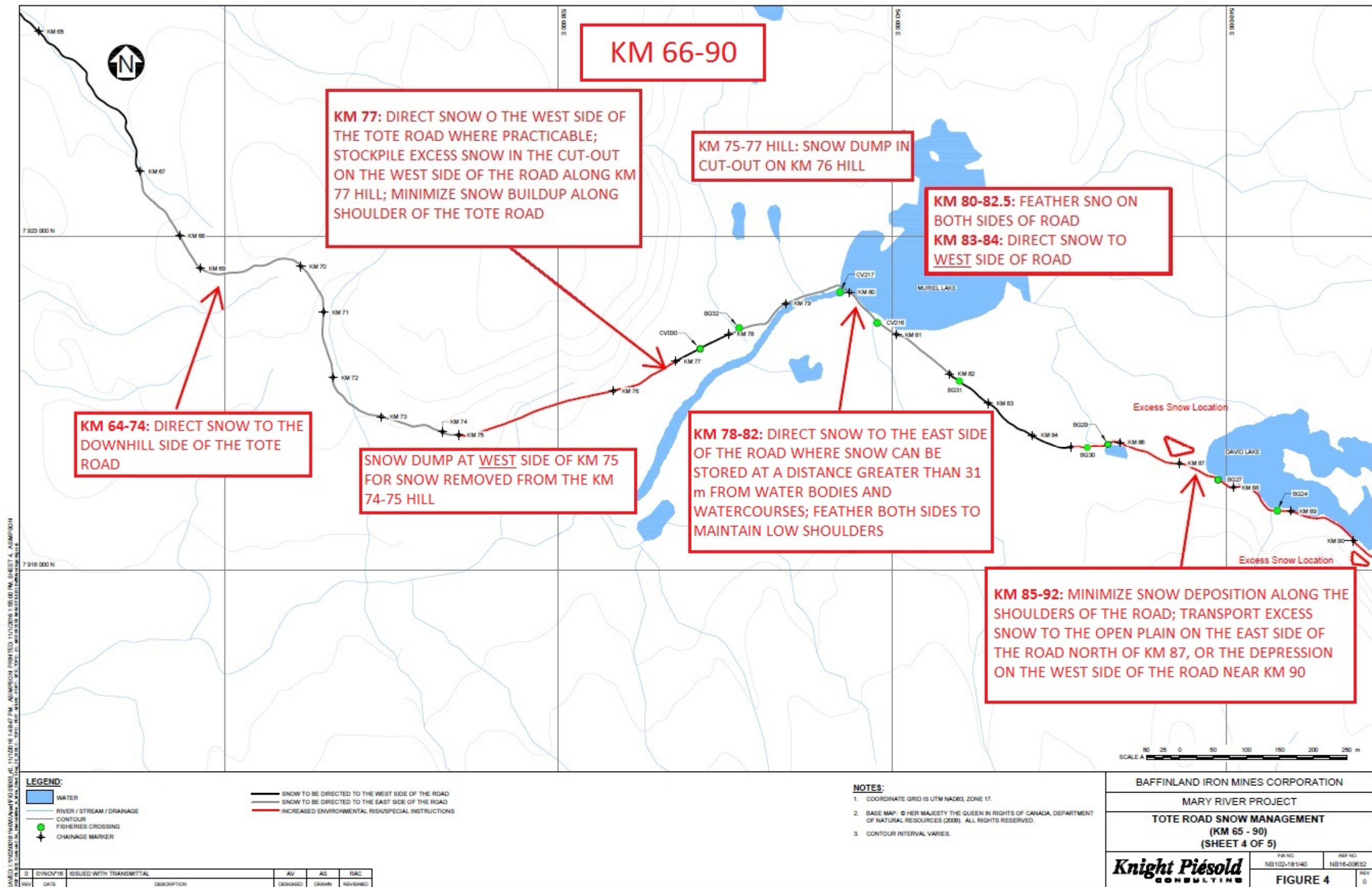


Figure D-4. Tote Road – Approved snow management protocol for the Tote Road from KM 65-90



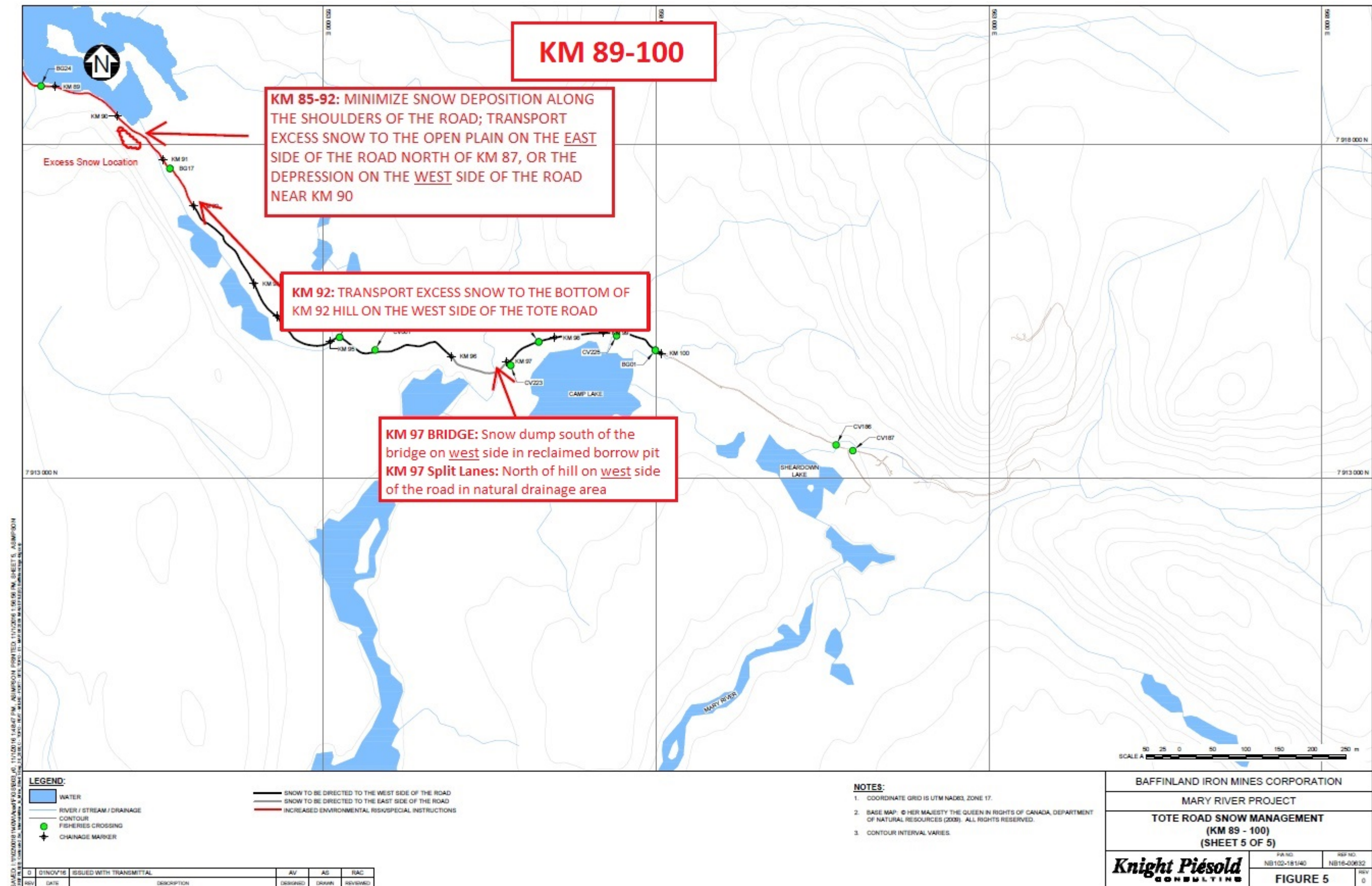



Figure D-5. Tote Road – Approved snow management protocol for the Tote Road from KM 89-100

	Snow Management Plan	<b>Issue Date:</b> Oct 23, 2017 <b>Revision:</b> 2 <b>Review Date:</b> Oct 23, 2018	Page 28 of 33
	Operations/ Site Wide	<b>Document #:</b> BAF-PH1-300-P16-0002	


## Attachment E

# Mine Site Crusher Pad Snow Management Guideline (Crushing Department)

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> Oct 23, 2017 <b>Revision:</b> 2 <b>Review Date:</b> Oct 23, 2018	Page 29 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## SNOW MANAGEMENT GUIDELINES FOR THE MINE SITE CRUSHER PAD

To minimize the environmental impact associated with snow removal activities at the Crusher Pad, the following guidelines have been provided to ensure conformance with Baffinland's Snow Management Plan.

- No ore impacted snow should leave water retention structures for ore storage locations.
- Transport all snow to the designated snow storage location on the southeast end of the crusher pad, within the ditched perimeter, as indicated in Figure E-1. Following winter storms, snow stockpiles may be temporarily stored at other locations on the pad until they can be transported to the approved stockpile location.
- Never push snow off the pad.
- Do not stockpile snow within 3 m of the crusher pad perimeter ditch and monitor to ensure ditching is not blocked to allow for positive drainage;
- Do not push snow against the snow fences. Remove any drifts that have developed in front of the snow fences from the side to ensure snow fences are not pushed off the pad.
- To minimize the amount of ore (lump/fines) collected and transported during snow removal:
  - Maintain a loader bucket lift of two inches (2") when clearing snow;
  - Exercise caution when clearing snow around the bases of stockpiles, making sure not to cause gouging of pile toes; and
  - Exercise caution when removing snow/drifts near stockpile face(s), making sure not to cut into/scrape stockpile face(s).

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> Oct 23, 2017 <b>Revision:</b> 2 <b>Review Date:</b> Oct 23, 2018	Page 30 of 33
	<b>Operations/ Site Wide</b>	<b>Document #:</b> BAF-PH1-300-P16-0002	



Figure E-1 – Mine Site Crusher Pad – Approved Snow Stockpile Location

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	Snow Management Plan	<b>Issue Date:</b> Oct 23, 2017 <b>Revision:</b> 2 <b>Review Date:</b> Oct 23, 2018	Page 31 of 33
	Operations/ Site Wide	<b>Document #:</b> BAF-PH1-300-P16-0002	

## Attachment F


### Mine Haul Road Snow Management Guidelines (Mine Operations Department)

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	<b>Snow Management Plan</b>	<b>Issue Date:</b> Oct 23, 2017 <b>Revision:</b> 2 <b>Review Date:</b> Oct 23, 2018	Page 32 of 33
	<b>Operations/ Site Wide</b>	<b>Document #: BAF-PH1-300-P16-0002</b>	

## SNOW MANAGEMENT GUIDELINES FOR THE MINE HAUL ROAD

To minimize the environmental impact associated with snow removal activities along the Mine Haul Road, the following guidelines have been provided to ensure conformance with Baffinland's Snow Management Plan:

- Follow the Mine Haul Road snow management directions outlined in Figure F-1.
- Never stockpile snow within 31 meters of a waterbody (stream, culvert, etc.)
- Never push snow or material into the surface water drainage infrastructure (swales, ditches, culverts)
- When practical, remove snow in the same direction as the prevailing winds of the area, and/or to the downhill side – this will reduce amount of drifting that will occur across roadways and reduce the amount of melt water needing to flow through culverts in the spring;
- When pushing snow away from the road with dozers, maintain a low flat angle, taking special precaution not to disturb the tundra under the snow;
- When pushing snow with dozers, remove in a 45° angle away from water ways and culvert crossings;
- When removing snow with graders near culverts, rotate the moldboard to carry the snow past the culvert area and away before moving the snow back to the edge of the road;
- When grading material or gravel near culverts, do not spread material in a manner that pushes material off the road;
- When removing snow in the same direction as the wind, the snow must be carried from one side of the road to the other, do not split the middle and push to both sides, this will cause more drifting to occur and more frequent road closure (multiple passes along the road will be required for this technique);
- When grading snow from the roadway, leave snow in a berm fashion away from the edge of the road. This will prevent snow stockpiles from building up along the road shoulders and embankments.

	Snow Management Plan	Issue Date: Oct 23, 2017 Revision: 2 Review Date: Oct 23, 2018	Page 33 of 33
	Operations/ Site Wide	Document #: BAF-PH1-300-P16-0002	

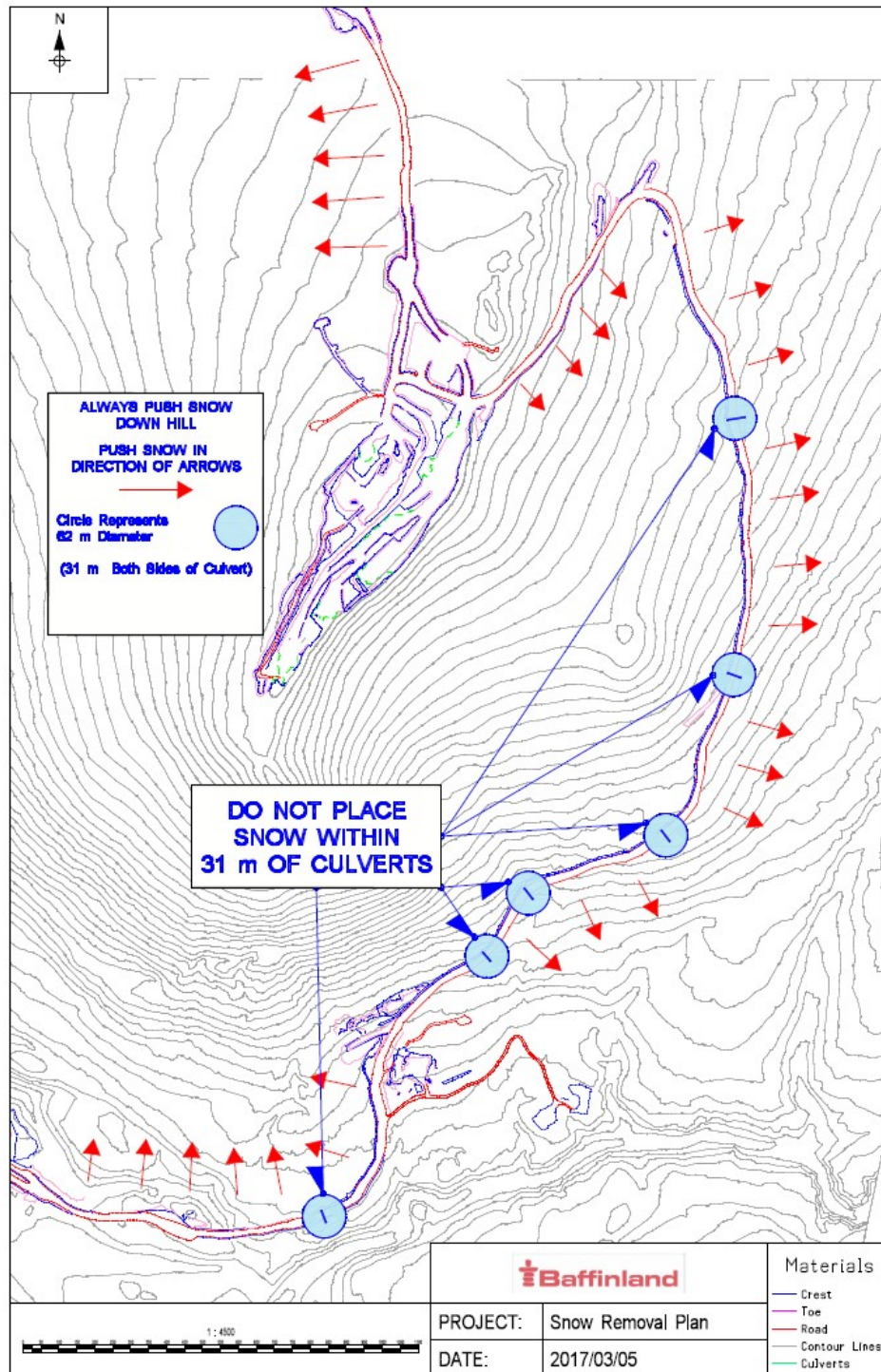


Figure F-1 – Mine haul Road Snow Management Areas

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