



# **AGNICO EAGLE**

**Meadowbank Division**

## **Whale Tail Landfill – 60 Day Construction Notice**

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1	2019/03			First Version

## 1. Introduction

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is developing the Whale Tail Pit (the “Project”), a satellite deposit located on the Amaruq property, to continue mine operations and milling at Meadowbank Mine. The Amaruq property is a 408 square km<sup>2</sup> site located on Inuit Owned Land approximately 150 km north of the hamlet of Baker Lake and approximately 50 km northwest of Meadowbank Mine in the Kivalliq Region of Nunavut. The deposit will be mined as an open pit (i.e. Whale Tail Pit), and ore will be hauled to the approved infrastructure at Meadowbank Mine for milling.

A landfill will be required for the disposal of non-salvageable, non-hazardous, non-putrescible solid wastes from the construction, operations, and closure of the Project. Reduce, reuse, and recycle initiatives will be developed at the Project to minimize the quantity of waste generated. Waste segregation will be used to capture wastes suitable for reuse or recycling, while managing hazardous waste appropriately. The proposed landfill will be located within the Whale Tail Waste Rock Storage Facility (WRSF) located to the northwest of the mine infrastructure. The landfill will be filled progressively and in an orderly manner. Wastes will be disposed directly on the landfill floor and compacted with heavy equipment against the berm or an existing row of debris that was compacted earlier. Controlling the materials that can be placed in the landfill is a strategy aimed to reduce the concentration of constituents in potential leachate and to minimize the attraction of wildlife to the landfill. Landfill operation will also conform to best management practices to reduce the potential for windblown debris. Leachate from the landfill is anticipated to be weak due to the controls placed on materials acceptable for landfilling. Moreover, drainage from the landfill is largely expected to freeze within the Whale Tail WRSF with little to no seepage water reporting to the WRSF pond or collection infrastructure. However, in the event there is leachate from the landfill due to periods of heavy rainfall or spring freshet, the runoff will be collected in the WRSF Pond and pumped to the Whale Tail Attenuation Pond for further management.

### 1.1 Climate

Climate characteristics presented herein were extracted from the permitting level engineering report (SNC, 2015).

The Project is located in an arid arctic environment that experiences extreme winter conditions, with an annual mean temperature of -11.3 degrees Celsius (°C). The monthly mean temperature ranges from -31.3°C in January to 11.6°C in June, with above-freezing mean temperatures from June to September. The annual mean total precipitation at the Project is 249 millimeters (mm), with 59 percent (%) of precipitation falling as rain, and 41% falling as snow. Mean annual losses were estimated to be 248 mm for lake evaporation, 80 mm for evapotranspiration, and 72 mm for sublimation. Mean annual temperature, precipitation, and losses characteristics are presented in Table 1.1.

Short-duration rainfall events representative of the Project are presented in Table 1-2, based on intensity-duration-frequency curves available from the Baker Lake A meteorological station (Station ID 2300500) operated by the Government of Canada (2015).

**Table 1-1: Estimated Mine Site Monthly Mean Climate Characteristics**

Month <sup>a</sup>	Mean Air Temperature (°C) <sup>a</sup>	Monthly Precipitation (mm) <sup>a</sup>			Losses <sup>a</sup>		
		Rainfall (mm)	Snowfall Water Equivalent (mm)	Total Precipitation (mm)	Lake Evaporation (mm)	Evapo-transpiration (mm)	Snow Sublimation (mm)
January	-31.3	0	7	7	0	0	9
February	-31.1	0	6	6	0	0	9
March	-26.3	0	9	9	0	0	9
April	-17.0	0	13	13	0	0	9
May	-6.4	5	8	13	0	0	9
June	4.9	18	3	21	9	3	0
July	11.6	39	0	39	99	32	0
August	9.8	42	1	43	100	32	0
September	3.1	35	7	42	40	13	0
October	-6.5	6	22	28	0	0	9
November	-19.3	0	17	17	0	0	9
December	-26.8	0	10	10	0	0	9
<b>Annual</b>	<b>-11.3</b>	<b>146</b>	<b>103</b>	<b>249</b>	<b>248</b>	<b>80</b>	<b>72</b>

<sup>a</sup> SNC (2015). mm = millimetre; °C = degrees Celsius.

**Table 1-2: Estimated Mine Site Extreme 24-Hour Rainfall Events**

Return Period (Years) <sup>a</sup>	24-hour Precipitation (mm) <sup>a</sup>
2	27
5	40
10	48
25	57
50	67
100	75
1000	101

<sup>a</sup> SNC (2015). mm = millimetre.

## 2. Landfill Design Criteria

### 2.1 Site location

The proposed landfill will be sited within the Whale Tail Waste Rock Storage Facility (WRSF), which is located north of the Mammoth Lake (Figure 1). The following criteria were considered in determining its location:

- Drainage – sites that will drain into areas where water will be collected and monitored as part of the overall site plan were preferred.
- Disturbed areas – sites within or near areas that will be disturbed as part of the future overall mine plan were preferred to minimize the environmental footprint of the Project.

- Access – sites located close to existing service or haul roads were preferred.
- The landfill site had to be large enough to accommodate non-salvageable, non-hazardous, non-putrescible solid industrial wastes for the life of the Project, including the closure period.

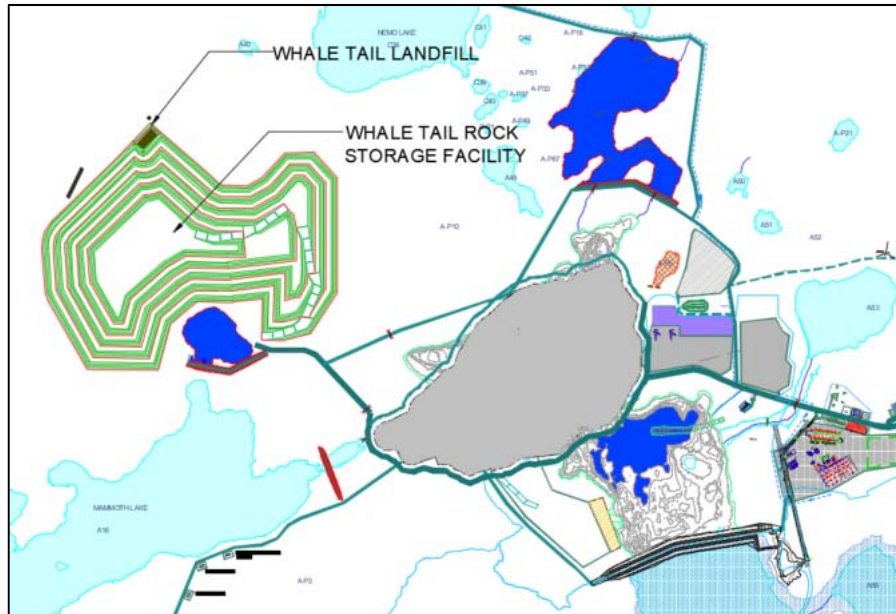


Figure 1: Whale Tail WRSF and Landfill location

The first three criteria are recommendations from the Mine Site Reclamation Guidelines for the Northwest Territories (INAC 2007).

The location of the landfill within the WRSF is depicted in Appendix A

### 3. Landfill Construction Plan

#### 3.1 Construction Method

The proposed landfill is planned to be located within the Whale Tail WRSF. Berms will be constructed along the perimeter of the landfill. Both the floor and the berm of the proposed landfill will be constructed with rockfill sourced from the open pit. A service road, accessible only to mine staff and Agnico Eagle contractors, will connect the landfill to other mine infrastructure. Berms surrounding the facility on two sides will be built of rockfill material. The design of the berms does not assume that they will be in a frozen state, or permanently impermeable to leakage. The berms will serve to confine the area for waste disposal and act as a wind shield to reduce windblown debris. A typical section of the design of the landfill is in Appendix A. The location of the landfill will change for every 20m increase in elevation to allow access at all time of the landfill. Each landfill will respect the same specifications as the one in Appendix A. The landfill incorporation schematic is in Appendix B.

#### 3.2 Material Placement Protocol

Waste will be disposed of directly on the pad and compacted with heavy equipment against the berm or existing row. When the sub landfill is full of compacted waste, the waste will be covered with waste rock. A new sub landfill will be built, including a rockfill berm to act as a wind shield. Materials destined for burial in the demolition landfill will be dismantled as safely and efficiently as possible, stacked in a stockpile and will be cut by flame, hydraulic shears or saw, into manageable sizes for safe transport and placement in the landfill. The demolition debris will be placed in compacted layers and then buried. Once compacted, waste rock will be placed on the debris to infill voids. Once a continuous layer of waste rock has been covered the compacted debris a final cover of non-potentially acid generating (NPAG) waste rock will be placed over the entire landfill area.

### 3.3 Leachate management

The quantity of leachate is expected to be minimal, and of low ionic strength. The proposed landfill will nonetheless receive precipitation during the summer period, which could infiltrate the landfill before it can evaporate. In the event that leachate reports from the landfill, it will be collected in the WRSF Pond and pumped to the Whale Tail Attenuation Pond for further management (see Whale Tail Pit Water management plan in Appendix C). Based on the design strategy for the proposed landfill, and the management and operating procedures listed above, a liner is not considered necessary for the landfill.

### 3.4 Final Cover design

The proposed landfill will be covered with NPAG waste rock (same thickness as surrounding cover for Whale Tail WRSF), and should thereafter be stable. Drainage water, if present will be naturally directed to the WRSF Pond, monitored and discharged.

### 3.5 Surface Water and Erosion Control

The slopes of the landfills will be covered with rockfill, thus protecting them from erosion. Any water that may runoff from the Whale Tail WRSF will flow to the WRSF Pond.

### 3.6 Schedule

The proposed landfill will be used for the operations and closure phases. It will not be required for post-closure. The area set aside for the proposed landfill will be large enough to accommodate all non-salvageable, non-hazardous, non-putrescible solid industrial wastes expected to be landfilled over the life of the Project.

The schedule for the proposed landfill is as follows:

- Year 1 to 4 (2019 to 2022): Construction of the landfill berms will occur in 2019, the first year of operations, using waste rock material from the pit operations to build the designed geometry. The landfill will be used continuously during operations.
- Years 5 to 15 (2023 to 2034): The landfill will be one of the last parts of mine infrastructure to be closed. It is expected to be used during closure for demolition waste and will remain operational until it is no longer needed.

#### **4. REFERENCES**

-Whale Tail Landfill and Waste Management Plan – January 2017, Version 1

#### **5. Appendices**

- A. LANDFILL LAYOUT AND CROSS SECTION
- B. LANDFILL INCORPORATION SCHEMATIC



