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Montreal, May 29th, 2019

Mrs. Nancy Duquet-Harvey
MEADOWBANK DIVISION
AGNICO EAGLE MINES LIMITED
Baker Lake, NU X0C 0A0

Subject: Meadowbank Interim Closure and Reclamation Plan (ICRP) - Update 2019
Final Report
Our file: 662987-5000-4EER-0001 Rev 00

Dear Mrs. Duquet-Harvey,

We are pleased to submit the Meadowbank Interim Closure and Reclamation Plan (ICRP) update report revision 00 of the report mentioned in the above subject.

Do not hesitate to communicate with the undersigned should you have further questions regarding the content of this report.

Truly yours,

SNC LAVALIN INC.

Dominic Tremblay, Eng., M.Sc.A
Director, Mining Environment
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DT/gb

List of Revisions

Revision				Revised pages	Remarks
#	Prep.	App.	Date		
PB	NQ/PL	ALN/DT	04/15/2019		Issued for AEM comments
00	NQ/PL	ALN/DT	29/05/2019	all	Issued for Information

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1.0 Plain Language Summary

1.1 Statutory Context

This document presents the Interim Closure and Reclamation Plan (ICRP) for the Project. A first closure and reclamation plan (Agnico Eagle Mines Limited, 2008) was developed before the start of mining operation. An ICRP, produced by Golder Associates in January 2014 (Golder, 2014), was an update of the 2008 closure and reclamation plan.

Agnico Eagle Mines Limited (Agnico Eagle) was granted a Type A Water Licence 2AMMEA1525 in July 2015 (NWB, 2015). This Licence authorizes Agnico Eagle to use water and dispose of waste associated with the mining and milling undertakings at the Project mine site. The development of a closure and reclamation plan is also a requirement of the Nunavut Impact Review Board (NIRB) Project Certificate 004 (NIRB, 2016). The closure goal, as described in the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories issued by the Mackenzie Valley Land and Water Board (MVLWB) and Aboriginal Affairs and Northern Development Canada (AANDC) (AANDC/MVLWB, 2013), is to return the mine site and affected areas to viable and, wherever practicable, self- sustaining ecosystems that are compatible with a healthy environment and with human activities. Planning for mine closure and reclamation is an iterative process where ICRPs are prepared and updated on a regular basis, when there is a significant change to the mine plan, or according to key milestones in the mine life (AANDC/MVLWB, 2013).

1.2 Description of the Project

The Meadowbank Mine site (Meadowbank or the Project) is located in the Kivalliq region, Nunavut, approximately 70 km north of the Hamlet of Baker Lake, as shown on Figure 1-1. Mineral tenure covers 28,888 hectares and includes ten grandfathered Federal mining leases and three exploration concessions acquired from Nunavut Tunngavik Incorporated. The mine site is accessed by plane via the private Meadowbank Aerodrome (TC LID: CMB2), which is located 1 nautical mile (1.9 km; 1.2 mi) northeast of Meadowbank Gold Mine, Nunavut, Canada (latitude 65° 1′ 7″ N, longitude 96° 4′ 26″ W).

The Project components consist of the mine site, the Baker Lake Site Facilities and the All Weather Access Road (AWAR) linking Baker Lake to the mine site. Meadowbank Mine relies on marine transportation (to Baker Lake) for most of its supplies including fuel, construction and operation equipment, materials and consumables, including dangerous goods, food, household goods and other non-perishable supplies. Construction of the AWAR was initiated in 2007 and completed in 2008. The development of the Project has required periodic construction activities since the exploration phase (i.e., South and North Camps and airstrip). Construction activities at the mine site and the Baker Lake Site Facilities, for the purpose of mining operations, began in 2008. Mining was initiated in 2009; operation at the mine process plant started in early 2010, and thus, is entering its ninth year of operations.

Agnico Eagle is now proposing to develop the Whale Tail Pit, a satellite deposit located on the Amaruq property, to continue operations and milling at Meadowbank Mine, pending the receipt of required permits. The proposed open pit mine, mined by truck-and-shovel operation, will produce 8.3 million tonnes of ore that will be hauled and processed at the Meadowbank Mill. The tailings will be deposited in the approved TSF facilities, under Agnico Eagle existing Type A water Licence 2AM-MEA1525. The operations (mining and ore processing) will continue approximately 3 years with the Whale Tail Pit, from 2019 to 2022. As the Whale Tail project is going through the permitting process to obtain its specific Type A Water Licence, it is understood that all operations components of Whale Tail Pit and Amaruq Exploration/Hauling Road are included specifically in the Whale Tail Interim Closure and Reclamation Plan (Golder, 2016a). Only the activities covered under the Meadowbank Type A Water Licence 2AMMEA1525 will be included in this updated Meadowbank ICRP.

AEM is also looking to proceed to a tailings in-pit deposition in order to reduce quantities of tailings deposited in the current tailings storage facilities (TSF). Consequently, the infrastructures related to the tailings deposition will be changed, as well as the site water management and the quantities required for the TSF cover. These changes will also be covered in this updated Meadowbank ICRP.

1.2.1 Geology and ore process

Gold deposits are found along two main structural features that cross the property – the Meadowbank Trend and the Pipedream Lake (Northeast) Trend. The Meadowbank Trend hosts the Goose, Portage and Vault deposits, which are the sites of mining. These shallow deposits lie within 7 km of each other. In all deposits, gold mineralization is commonly associated with intense quartz flooding, and the presence of sulphide minerals (pyrite and/or pyrrhotite). The Goose and Portage deposits are hosted by magnetite-rich iron formation, while intermediate volcanic rocks host most of the mineralization at the Vault deposit farther north. Both the rock units and the gold deposits are tightly folded and structurally complex. Until now, Meadowbank has conducted surface mining from a series of three pits all within 7 km of the processing plant. Water retention dikes have been built to allow for mining beneath shallow lakes, using a unique in-water dike construction method. The mine works year-round, using conventional drilling, blasting, truck and shovel methods. Waste rock is used for construction, or dumped in waste storage facilities or previously mined-out areas. To minimize acid generation, the sulphide-bearing waste rock is encapsulated in permafrost and capped with an insulating layer of neutralizing rock.

The 11,000-tonne/day gold processing plant uses conventional technology adjusted to the Arctic climate. Any “free gold” is removed by a gravity circuit. The remainder is leached using cyanide, with the gold captured using carbon-in-pulp technology and electrowinning cells. Gold-plated cathodes and gravity concentrate are smelted in an induction furnace and poured as doré bars. The plant includes both a cyanide recycling thickener and an air-sulphur dioxide cyanide destruction circuit to ensure that no cyanide escapes to the environment. All water from the tailings pond is pumped back to the plant for reuse, making this a zero-discharge system. The plant will require minor modifications to treat the Whale Tail Pit ore, specifically the addition of a continuous gravity and regrind circuit, and is expected to operate at 9,000 tonnes/day.

Figure 1-1 : Meadowbank Mine Site Location

1.3 Closure and Reclamation Activities

1.3.1 Baker Lake Site Facilities

Baker Lake Facilities are located approximately 2 km east of the Hamlet of Baker Lake. This is the transfer point and temporary storage for all dry shipment and fuel materials arriving by barge prior to overland shipment to the mine site via the AWAR. Baker Lake Facilities are listed below:

- Barge Landing;
- Bulk Fuel Storage Facilities (6 diesel fuel storage tanks);
- Dry Freight Storage Facility;
- Access Road.

At closure, it is planned to offer the infrastructures of the Baker Lake Site Facilities to local interests. If there is no local interest, the facilities and equipment will be decommissioned, dismantled and removed as appropriate.

As mentioned in the previous Interim Closure and Reclamation Plan (Golder, 2014), Agnico Eagle will return, if possible, the Baker Lake site to pre-development conditions. The site may also be left in a semi-industrial condition if consistent with a different end land use agreed upon with regulators, the Hamlet of Baker Lake, and other local interest.

All remaining bulk fuel on site will first be cleaned and then removed and offered to local interests. Buildings or infrastructure, including office trailers and barge landing, will be emptied and also offered for local use and/or relocation. In the case that there is no local interest for the tanks or remaining infrastructures, the infrastructures will be dismantled, decontaminate and demolition waste will be either transported to the mine site landfill disposal, barged out of Baker Lake to a southern waste disposal or recycling facility or sale for scrap metal.

At closure, scarification of all disturbed areas, including gravel pads and roadways, is planned to loosen the compacted material. To promote surface drainage, areas will be profiled, and culverts will be removed from the roadways to re-establish natural drainage patterns.

It is important to note that any contaminated soils from the facilities will be removed and placed in sealed drums. These will then be transported to the mine site landfarm for biological treatment, or barged out of Baker Lake to a southern destination for treatment and disposal.

The main uncertainty is related to the local interest for the Baker Lake facilities or equipment.

1.3.2 All-Weather Access Road (AWAR)

The AWAR was constructed to connect the Hamlet of Baker Lake to the mine site. This 108 km long road was constructed above grade, using quarried material from non-acid generating rock.

Agnico Eagle is committed to manage the road as a private road with limited public access during the mine life and to fully decommission the road after closure. Agnico Eagle will consider the option of leaving the AWAR intact if it is deemed in the public interest based on guidance and approval from local communities and regulatory agencies. If agreed upon, road operation and maintenance responsibility would then be transferred to another party (Golder, 2014).

In the case that Agnico Eagle stays the owner of the AWAR, natural drainage courses will be restored by removing culverts and bridges, road fill material and removing in-stream works down to the original channel bed. Where affected watercourses are fish-bearing, channel beds will be re-constructed similar to baseline conditions. Work at these sites will consider appropriate timing for in-stream works and will be completed in accordance with Department of Fisheries and Oceans (DFO) operational statements (Golder, 2014).

The AWAR will be decommissioned by ripping the road bed to make it as impassable as possible to motorized vehicles, provide favorable conditions for natural drainage, vegetation re-colonization and stabilize the locally steep slopes. The road embankments will also be profiled to better blend with the existing topography to allow safe wildlife passage. All the communication towers will also be decommissioned.

At post-closure, the road will be reclaimed and the natural drainage and terrain will be restored as much as possible. Upon local interest and regulatory approval, the AWAR could be transferred to the local community.

1.3.3 Dikes and Saddle Dams

The dikes and dams are required to isolate mining activities from surrounding lakes (i.e., East, South Camp and Bay-Goose Dikes) or to contain tailings (i.e., Stormwater and Central Dikes, and Saddle Dams 1 to 5).

All dikes and dams were designed for long term stability. Once the Portage and Goose pits, as well as Vault and Phaser pits, will be completely flooded at closure and monitoring has determined that pit lake water meets water quality criteria established by the Meadowbank Water Licence, South Camp Dike, Bay-Goose Dike and Vault Dike will be opened to reconnect the pit lakes to the adjacent lakes. The controlling condition will occur during late winter, when thick ice conditions are expected to coincide with annual minimum lake levels.

As the runoff water from the TSF cover system will convey towards the Reclaim Pond located in the South Cell upstream of Saddle Dam 3, it is planned to open Saddle Dam 3 once the runoff water will demonstrate suitable water quality as per the Meadowbank Water Licence. Central Dike, Saddle Dams 1, 2, 4 and 5 will remain intact, to contain the stored tailings in the TSF.

It should be noted that site water will be kept into a close circuit, meaning that the dikes and dams will not be opened, until the water quality meets criteria of the Meadowbank Water Licence (CCME limits or site specific closure criteria to be defined).

1.3.4 Open Pits

The ore was extracted from the following deposits during the operational lifespan of the mine of the Project:

- Portage deposits (Pit A, B, C, D and E);
- Goose deposit; and
- Vault deposit, including Phaser/BB Phaser.

Open pit development is staged over the course of mining operations. Pit walls have been designed for long-term slope stability during operations and closure; therefore Agnico Eagle does not intend to establish long-term stable slopes by allowing gradual failure of rock masses.

The open pits will be flooded once mining and in-pit tailings deposition activities in each open pit are complete. Flooding will occur by allowing the natural accumulation of seepage and groundwater into the pits and surface water drainage reporting to the pit to remain in place. In addition, transfer of water at controlled rates from the surrounding lakes using high-capacity mechanical pump systems or siphons will contribute to the majority of the flooding. Goose Pit began natural flooding in 2015, with natural inflows such as groundwater, seepage and runoff water. Following in-pit tailings deposition in Goose Pit, the reclaim water will be transferred to Portage Pit and flooding will resumed with natural runoff and pumping of approximately 3,500,000 m^3 of water from the Third Portage Lake in summer 2021. For Portage Pit, once in-pit deposition activities are completed, the reclaim water will be treated and discharged to Third Portage Lake and pit flooding will commence with natural runoff from the North and South Cell TSF and surrounding pit area and with the pumping of approximately 21,700,000 m^3 of water from Third Portage Lake, from 2022 to 2027. Both Goose and Portage pits are predicted to reach the same water level as Third Portage Lake (133.6 masl) by 2031 (Agnico Eagle, 2017d).

Likewise, Vault Pit will be flooded by pumping water from Wally Lake once mining is completed. The pumping of 28,051,096 m^3 from Wally Lake is expected to commence in 2019 and to be completed in 2025. The natural inflow will then allow Vault pit to reach 139.9 masl (natural Wally Lake water level) (Agnico Eagle Water Balance, 2018a). Unlike Vault Pit, Phaser Pit and lake are planned to be flooded exclusively from their watershed run off inflows until the target elevation of Wally is reached, expected in summer 2027. From there, those same inflows will be used conjointly with the Vault Attenuation Pond inflows to flood to the same target elevation at 139.9 masl (Wally Lake level).

To minimize impacts to aquatic habitat in the surrounding lakes, it is anticipated that transfers from Third Portage and Wally lakes will be done during periods of higher water in the spring and summer months. Maximum yearly pumping rates will respect the limits specified in the Meadowbank Water Licence to avoid draw down levels in each source lake. Throughout the pit flooding phase, the dikes will remain in place, acting as barriers for water migration between the pit lake and the surrounding lakes and environment.

Water quality monitoring will continue during operations to expand the available water quality database. Water quality forecast for pit lake water will be performed annually to predict the water quality at closure. Treatment options will be examined and will be assessed in greater detail if required during the preparation of the Final Closure and Reclamation Plan.

The water balance and water management will also be reviewed on an annual basis and in closure to estimate the lake water transfer volume required for flooding, as well as the natural inflows, to ensure adequate water level are maintain into the pits until dikes opening.

1.3.5 Rock Storage Facilities

At Meadowbank some of the waste rock generated from the open pit mining is considered potentially acid-generating (PAG) and some non-potentially acid-generating (NPAG). Due to the distance between the Portage mining area and the Vault mining area, two main separate rock storage facilities are required. Waste rock from the Portage and Goose Pits is stored in a storage facility located near to these pits (Portage RSF or mined out areas of Portage and Goose Pits), while waste rock from the Vault, Phaser and BBPhaser Pits is stored in a separate rock storage facility adjacent to the Vault Pit (Vault RSF).

Some NPAG material is also stored at the Bay Goose RSF. Suitable waste rock material NPAG is used for construction purposes associated with dikes and roads and will also be used for closure activities.

Much of the closure and reclamation of the Portage RSF has been completed progressively during operations with the placement of the 4.0 m NPAG cover over the RSF PAG slopes. Approximately 84% of the NPAG cover has been placed over the PAG Portage RSF area from 2011 to 2017. The remaining closure and remediation requirements of the RSF will be completed after operations cease.

Most of the waste rock from the Vault deposit is NPAG; geochemical and water quality monitoring concluded that the Vault RSF is not expected to require NPAG capping in closure. As a precautionary measure, any PAG material encountered at Vault is and will be placed in the middle of the pile to be capped with NPAG waste rock as placement proceeds.

As mention in the previous Interim Closure and Reclamation Plan (Golder, 2014), the main uncertainty related to the Portage RSF closure is the cover thickness required to ensure adequate aggradation of permafrost, insulation from thaw, and effective long term encapsulation of waste rock.

Thermistors have been installed to monitor temperature and permafrost aggradation within the Portage RSF to monitor the temperature as freezing progresses. Latest results of temperature monitoring indicate that freezeback is occurring in the Portage RSF structures (Updated Waste Rock and Tailings Management Plan, 2018b).

1.3.6 Tailings Storage Facilities

At Meadowbank, all tailings are deposited within the Tailings Storage Facilities (TSF) until the end of mine operations. The TSF is divided into the North and South Cells, both of which employ subaerial or subaqueous tailings disposal within a dewatered lake basin. The North Cell is contained by Stormwater Dike, Saddle Dam 1, Saddle Dam 2, and rockfill road perimeter structures RF-1 and RF-2. All these structures are constructed to elevation 150 masl. Tailings were stored in the North Cell from 2010 to 2015. The South Cell is delineated by Stormwater Dike, Saddle Dam 3, Saddle Dam 4, Saddle Dam 5, and Central Dike. All these structures will be constructed to elevation 150 masl. The South Cell has been in use since November 2014 and will be used until tailings reach elevation 149.5 masl. The general operational management strategy for the TSF involved discharging tailings into the North Cell of the TSF to a maximum elevation of 149.5m. The operational freeboard required is 2.0m. The North Cell is filled up to its final capacity as the final tailings deposition was completed in October 2015. The reclaim system was put in place in the South Cell in October 2014. While the South Cell is in operation, progressive reclamation and NPAG capping was initiated in the North Cell in winter 2015.

Whale Tail Pit will produce an addition of approximately 8.3 million tons (Mt) of tailings to the Meadowbank TSF for a total of 37.8 Mt, including Meadowbank and Whale Tail. Total Meadowbank tailings production is approximately 29.5 Mt (18.2 Mt in North Cell at elevation 149.5 m and 11.3 Mt in South Cell at elevation 142.5 m). To store the additional volume of tailings from Whale Tail Pit, deposition of approximately 8.3 Mt of tailings will be stored in Goose Pit and Portage Pits. The disposal of tailings from Whale Tail using the existing Meadowbank Mine facilities and open pits will reduce potential impacts to the environment by reducing the project footprint and needs for reclamation of additional facilities

Preliminary design work was completed for the TSF cover in 2015 and 2016. The tailings cover will consist of non-acid generating granular material (NPAG) and ensures that the active layer remains within the NPAG layer. The objective for the cover system is to keep the tailings under 0°C in most conditions and to maintain saturation above 85%. Progressive reclamation of the North Cell has started in 2015 and continued to 2017 with the NPAG cover placement. The progressive cover is expected to continue in 2018 and 2019. The TSF North Cell is instrumented for thermal monitoring with thermistors installed in the tailings or the NPAG cover.

As mention in the previous Interim Closure and Reclamation Plan (Golder, 2014), the main uncertainty related to the TSF closure is permafrost encapsulation and the cover thickness required to ensure adequate aggradation of permafrost, insulation from thaw, and effective encapsulation of tailings.

Thermistors have been installed to monitor temperature and permafrost aggradation within the TSF and into the 2.0 m of closure capping. Latest results of temperature monitoring in each geotechnical structure along the perimeter of the North Cell TSF present frozen conditions of their foundation.

There is also an incertitude that surface runoff from the TSF covered areas may not be of sufficient quality for release to the environment. This could delay decommissioning of the Reclaim Pond, and/or require additional mitigation such as treatment (Golder, 2014).

Following in-pit deposition, the tailings will also be covered with NPAG rock cover using the proposed approach developed at a high level by Arcadis Canada for CIRNAC (Arcadis, 2019). The rock cover will be placed on the tailings once the pit is drained and the surface of the tailings are exposed and allowed to freeze. For Goose Pit, reclaim water will be transferred to Portage Pit. For Portage Pit, once tailings deposition is completed, the reclaim water will be treated and discharged to Third Portage Lake. Note that the proposed concept to place a granular rock cover over the tailings in the pits pose certain technical challenges. Agnico Eagle will be reviewing the proposed concept as part of the Final Closure Plan and will evaluate its requirements based on the geochemical stability of the tailings and whether it can support fish habit in the long term. Agnico Eagle will also review the technical feasibility of this concept based on expected field conditions at closure and geotechnical stability of the tailings.

1.3.7 Water Management Facilities

The water management facilities were designed to support the construction and operations activities of the mine development. Permanent closure activities for these facilities will involve removal of structural components (i.e., pumps, pipelines and active treatment systems) and establishment of natural drainage conditions. The water management facilities are listed below:

- Dewatering systems;
- Portage and Vault Attenuation Pond;

- Reclaim Pond;
- Reclaim water pumping systems;
- Tailings Pipelines;
- Pit sump and pumping systems;
- Seepage and runoff collection systems;
- Culverts;
- Water Diversion Ditch;
- Freshwater intake, potable water treatment system and wastewater treatment system;
- Stormwater Management Pond (Tear Drop Lake); and
- Flooding systems.

Water management infrastructures will be decommissioned at various times in the overall closure and post-closure phases depending on their function and location, and natural drainage will be restored as much as possible.

Water quality and the type of water treatment requirements of the Reclaim Pond water at the end of in-pit deposition activities represent an area of uncertainty. Treatment of the Reclaim Pond water will be required to allow for the placement of a granular rock cover on the tailings in Portage Pit. Updates to the water balance model, and water quality predictions, will be completed prior to mine closure to determine the need and the type of water treatment and presented in the Final Closure and Reclamation Plan.

1.3.8 Infrastructures at Mill and Camp Areas

During the life of mine, surface infrastructures were required at different period in time for the mining, accommodation, water treatment, etc. Most of the infrastructures are located near the Portage and Goose pits and the Tailings Storage Facilities. Additional infrastructures were built near the Vault Pit.

The permanent closure activities for Infrastructures at the Mill and Main Camp removal are listed below (Golder, 2014):

- Equipment used for closure activities and long-term maintenance (e.g., trucks, backhoes, etc.) will be removed from the site once they are no longer required. Most of the mobile equipment will be removed once the closure stage is complete. A small subset of equipment will be retained on-site for a portion of the post-closure stage;
- Remaining bulk fuel and empty portable fuel storage tanks will be transported back to the Baker Lake Site Facilities and offered to community interests. The tanks will be emptied, cleaned, and dismantled for disposal in the site landfill or shipped south. Any contaminated soil will be excavated and taken to the landfarm for treatment;
- All buildings and structures will be decontaminated, decommissioned and dismantled at closure. If required, the process plant may be temporarily converted to treat water in the Reclaim Pond.

Demolition waste that cannot be reused, recycled or provided to local interests will be disposed of in the on-site landfill. Salvageable material will be removed off site;

- Hazardous wastes will be removed for disposal by a Licenced handler;
- Any above grade concrete structures will be demolished and the rubble will be disposed of in the landfill. Any slabs on grade will be punctured and then left in place and covered with soil or non-potentially acid generating/non-metal leaching waste rock. Any subgrade foundations will be left in place;
- All disturbed site areas will be re-graded to suit the surrounding topography. In areas where the original ground surface was lowered for site grading or structural requirements, the slopes will be stabilized and contoured. Cover materials may be required for erosion and dust control.

If not properly reclaimed, wildlife maybe injured by entering reclaimed areas with depressions and if subsidence occurs. Environmental design features and mitigation, as well as current wildlife management practices used in other mining projects will be implemented at the Project to limit wildlife injury such as re-contouring reclaimed areas to reduce hazards to wildlife. Buildings and equipment not required for post-closure activities will be removed from the site. Proper reclamation is also required to leave the site in appropriate conditions that do not present safety risks for humans. This is considered the most appropriate closure plan based on the Meadowbank Mine experience.

No major uncertainties are related to the closure of the Meadowbank infrastructures. The pre-disturbance terrain was covered by discontinuous vegetation interspersed with few bedrock outcroppings. The reclamation plan will be designed to encourage a natural succession of indigenous plant species within disturbed site areas. Grading and contouring would be done, where appropriate, to control soil erosion and to promote natural drainage.

1.3.9 Landfills, Incinerator and Landfarm

The waste management facilities include the landfill, landfarm, incinerator and hazardous waste management area.

The waste management facilities will be reclaimed following best practices put in place during operation and in order to minimize long term disturbance.

During the closure phase of the Project, demolition and non-hazardous waste from the Meadowbank site will be deposited in the demolition Landfill (Landfill #2), located on top of the Portage RSF. The demolition landfill will be located in an estimated 4.0 m deep depression on the top of the Portage RSF. The demolition landfill will ultimately be encapsulated within the waste rock. It will be covered with a 4.0 m layer of coarse NPAG rock as part of the closure plan for the RSF.

The incinerator receives food, domestic and organic waste from Meadowbank and eventually from Whale Tail Pit Project. At the end of the active closure phase, the incinerator will be decommissioned, barged out of the Baker Lake Site Facilities to a southern destination for re-use or sale, or dismantled and disposed at the on-site landfill.

Hazardous materials will be managed in operations such that minimal quantities remain on site at closure. Any remaining hazardous materials that cannot be used during closure activities will be transported to

Licenced disposal facilities in the south, as is currently being done, in accordance with the Hazardous Material Management Plan (Agnico Eagle, 2013e).

A landfarm will be required during the closure period for petroleum-contaminated soil. The Landfarm 2, constructed in 2016 and located on the North East side of the TSF South Cell, is now in use until the end of operations and also for the closure period. The Landfarm 2 receives contaminated soil from Meadowbank and will eventually receive contaminated soil from Whale Tail. The landfarm is located within the South Cell TSF and following removal of all remediated soil, will be capped with 4.0m of NPAG waste rock material to ensure freeze-back encapsulation.

1.4 Cost Estimate

A permanent closure and reclamation financial security cost estimate has been prepared with the present Project layout and infrastructure. The cost estimate covers the closure and reclamation of all Project facilities as described in this report and was prepared using RECLAIM Version 7.0, March 2014, for permanent closure of the Project.

Agnico Eagle is required to submit a detailed financial security cost estimate for the Meadowbank ICRP - Update 2018 to Indigenous and Northern Affairs Canada (INAC) and to the Kivallik Inuit Association (KIA) to support land use and water licensing requirements. RECLAIM Version 7.0 workbook has been used for this estimate, as per the Guidelines for Closure and Reclamation Cost Estimates for Mines, issued by Indigenous and Northern Affairs Canada, Mackenzie Valley Land and Water Board and the Government of the Northwest Territories (INAC, MVLWB, GNWT, 2017).

For the purpose of this financial security cost estimate, only progressive rehabilitation measures which have already been completed to date are considered in the calculations.

The updated 2019 estimated closure and reclamation costs for the Meadowbank Project represent a total of $ 89,427,746. This total includes $ 62,269,580 of direct costs and $ 27,158,166 of indirect costs.

2.0 Introduction

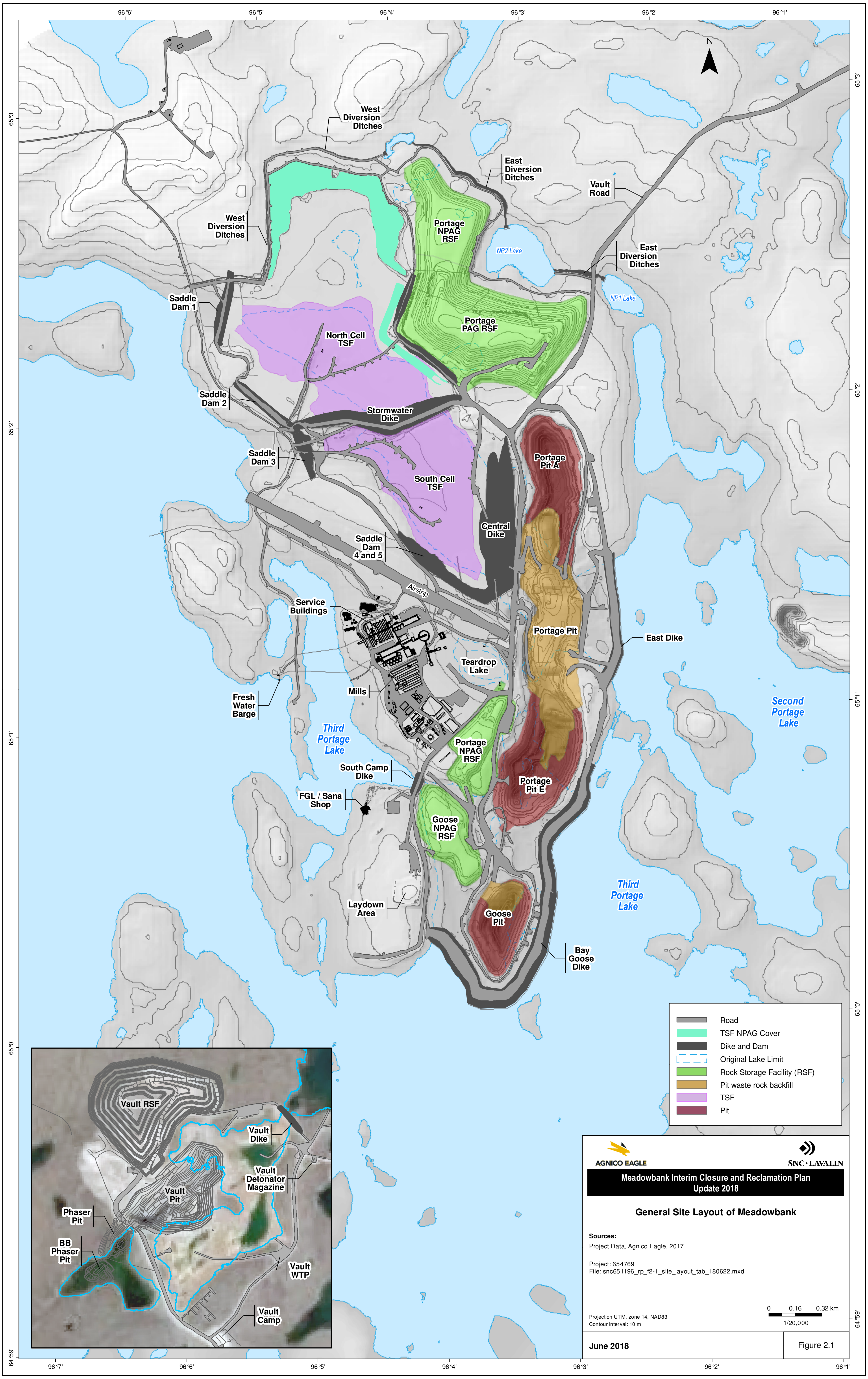
2.1 Purpose and Scope of the Interim Closure and Reclamation Plan

2.1.1 General description of the Project

The Meadowbank gold open pit mine (Meadowbank or the Project) achieved commercial production in March 2010 and produced its two millionth ounce of gold in 2015. It has 345,000 ounces of gold in proven and probable reserves (5 million tonnes at 2.28 g/t) as of December 31, 2017. Meadowbank mine is expected to produce 220,000 ounces of gold in 2018, which is anticipated to be the last year of the mine production for Meadowbank.

The mine plan expected start of operations at Amaruq in Q3 2019, with the start of mining of Whale Tail Pit (Whale Tail). Agnico Eagle has approved the Amaruq satellite deposit at Meadowbank for development pending the receipt of the required permits, which are currently expected to be received in Q2 2018. Whale Tail ore will be hauled by truck to the plant at the Meadowbank site for processing and tailings deposition in the approved facilities. Mining at Whale Tail is expected to end in Q4 2021. Ore from stockpiles will be processed in January 2022. Figure 2-1 presents the general site layout of Meadowbank with the different infrastructures.

The present updated Meadowbank Interim Closure and Reclamation Plan (ICRP) is based on the current Life of Mine (LOM) of Meadowbank, (refer to Section 4.4.1 for quantities and detailed LOM) including the mining activities planned at the Meadowbank site, as well as the activities related to Whale Tail ore processing and tailings deposition. As the Whale Tail project is going through the permitting process, it is understood that all operations components of Whale Tail Pit and Amaruq Exploration/Hauling Road are included specifically in the Whale Tail Interim Closure and Reclamation Plan (Golder, 2016a). Only the activities covered under the Meadowbank Type A Water Licence 2AM-MEA1525 are included in this updated Meadowbank ICRP.


West Diversion Ditches
East Diversion Ditches
Vault Road
Portage NPAG RSF
NP2 Lake
NP1 Lake
West Diversion Ditches
East Diversion Ditches
Saddle Dam 1
North Cell TSF
Portage PAG RSF
Saddle Dam 2
Stormwater Dike
Saddle Dam 3
Portage Pit A
South Cell TSF
Central Dike
Saddle Dam 4 and 5
Airstrip
Service Buildings
Portage Pit
East Dike
Teardrop Lake
Fresh Water Barge
Mills
Second Portage Lake
Third Portage Lake
Portage NPAG RSF
South Camp Dike
Portage Pit E
FGL / Sana Shop
Goose NPAG RSF
Third Portage Lake
Laydown Area
Goose Pit
Bay Goose Dike
Vault RSF
Vault Dike
Vault Detonator Magazine
Vault Pit
Phaser Pit
BB Phaser Pit
Vault WTP
Vault Camp
Road
TSF NPAG Cover
Dike and Dam
Original Lake Limit
Rock Storage Facility (RSF)
Pit waste rock backfill
TSF
Pit
AGNICO EAGLE
SNC·LAVALIN
Meadowbank Interim Closure and Reclamation Plan Update 2018
General Site Layout of Meadowbank
Sources:
Project Data, Agnico Eagle, 2017
Project: 654769
File: snc651196_rp_f2-1_site_layout_tab_180622.mxd
Projection UTM, zone 14, NAD83
Contour interval: 10 m
0 0.16 0.32 km
1/20,000
June 2018
Figure 2.1

2.1.2 Purpose of the ICRP

The general purpose of this ICRP is to update the preceding according to the current mine operating plan, ongoing engagement, reclamation research results and progressive reclamation. This ICRP provides increasing levels of detail on the closure and reclamation of individual project components and details for components that have been progressively reclaimed during mine operation, and operational details for components which are to be progressively reclaimed earlier in the mine life. This document presents an update to the ICRP for the development phase of the Meadowbank Gold Project prepared by Golder Associates in 2014 (Golder, 2014). The ICRP produced in January 2014 was an update of the closure and reclamation plan produced for the development phase of the Project (Agnico Eagle, 2008).

Further steps will be undertaken in order to complete the detailed engineering for the mine closure. The ICRP document is the main reference to be used throughout the closure engineering process for the development of the Final Closure and Reclamation Plan. This document does not include detailed engineering closure designs, or specific post-closure monitoring programs as these will be developed in the future. However, a view of the current closure concepts for each area of the mine site and the plans to advance these designs are provided.

The focus of this ICRP for the Project is to:

- Provide closure objectives for the Project components;
- Describe closure options for temporary and permanent closure;
- Identify uncertainties related to the proposed closure objectives, options, or criteria;
- Identify post-closure monitoring requirements and responsibilities for the selected closure activities;
- Predict the likelihood of potential post-reclamation risks to the environment and human and wildlife health; and
- Estimate the closure and reclamation costs.

This ICRP does not include details on fisheries offsetting compensation activities. Independent closure plans and cost estimates for these activities are provided in the following documents:

- Agnico Eagle Mines Meadowbank Division No-Net-Loss Plan, October 2012 (Agnico Eagle, 2012a);
- Agnico Eagle Meadowbank Mine No-Net-Loss Plan, Implementation Cost Estimate and Construction Schedule, November 2013 (Agnico Eagle, 2013f).

2.1.3 Description of the proponent

The proponent of the Project is :	Agnico Eagle Mines Limited (Agnico Eagle)
The address for the proponent is:	10200, Route de Preissac Rouyn-Noranda, Quebec J0Y 1C0 (Canada)
The Project site is located at: :	latitude 65° 1′ 7″ N, longitude 96° 4′ 26″ W Territory of Nunavut, Canada
Acting on behalf of the proponent :	SNC-Lavalin Inc. (SLI) Mines et métallurgie 5500 des Galeries Blvd., Suite 200 Quebec (Qc) Canada G2K 2E2
The contact person for the Project is:	Nancy Duquet-Harvey Baker Lake, Nunavut, Canada, X0C 0A0 Ph.: 819.759.3555 x6980 Email: nancy.harvey@agnicoeagle.com

2.2 Goal of the Closure and Reclamation Plan

Permanent closure is defined as the final closure of the mine site after mining has ceased. Permanent closure is typically a planned event, the timing of which is dependent on the life of mine of the project. The closure approach for the project, as well as specific closure activities at each project facility, is guided by the intended end land use of the area. Based on stakeholder and local community consultation to date, the intended end land use for project-affected areas is a return to the “natural” state. As such, closure activities are focused on decommissioning mine components so that they blend into the existing landscape to the extent possible.

Agnico Eagle is committed to responsible mining practices for the protection of human, wildlife and aquatic life health, and for minimizing impacts on the environment. Agnico Eagle intends to leave behind a positive community and environmental legacy. The closure goal as described in the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest (AANDC/MVLWB, 2013), is to return the mine site and affected areas to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities. The four closure principles of physical stability, chemical stability, no long-term active care requirements, and future use (including aesthetics and values) support the closure goal:

- Physical stability: The components of the reclaimed site should be built or modified at closure so that they do not erode, subside or move under extreme design events, and therefore do not pose a threat to humans, wildlife, or environmental health and safety;

- Chemical stability: The components of the reclaimed site should be chemically stable so as to prevent adverse soil, water and air quality effects that might pose a risk to humans, wildlife or environmental health and safety; and
- Future use and aesthetics: The reclaimed site should be compatible with the surrounding lands at the completion of the reclamation activities.

These broad objectives were used to support the identification of closure objectives that are specific to the Project. These specific objectives are:

- Physically and chemically stable lands and waters at the reclaimed Meadowbank site that are safe for human, wildlife and aquatic life;
- Lands and waters at the reclaimed Meadowbank site that allow for traditional uses;
- Final landscape guided by pre-development conditions and traditional knowledge;
- Post closure conditions that, where appropriate, do not require a continuous presence of project staff until a walk-away condition is achieved.

2.3 Closure and Reclamation Planning Team

The strategy used by Agnico Eagle is an integrated approach consisting of a consortium between all the Meadowbank departments and Engineering consultant firms. This multidisciplinary team will form the Reclamation Planning Team, which will be responsible for coordinating activities and projects related to closure. The Reclamation Planning Team will be in charge of reviewing the ICRP, developing the Final Closure and Reclamation Plan and communicate its content to all departments of the Project. The communication effort is intended to provide a sufficient level of awareness among operations staff as to the importance of closure and reclamation activities on Project development. The proposed team members are comprised of Engineering and Environment Department staff members for now. External support for the development of the plan is currently provided by SNC Lavalin Inc. (SLI) for the development of the Meadowbank ICRP - Update 2018, although other consultants and contractors may be involved in the preparation of the subsequent ICRP and/or the final plan.

The Reclamation Planning Team will ensure to:

- Take leadership of the Closure Project and develop a work environment characterized by open communication, commitment, dedication to safety and continuous improvement;
- Liaise with Engineering Consultant and manage inter-company relationships;
- Take responsibility for the staffing and organization of the studies required for the interim and final closure and reclamation plans;
- Respect the schedule and permitting requirements;
- Identify closure risks and opportunities;
- Manage documentation; and
- Provide services in an ethical manner that is consistent with the Agnico Eagle corporate policies and its professional reputation.

Furthermore, Agnico Eagle has developed a Responsible Mining Management System (RMMS) Standard. The RMMS supports the application of Agnico Eagle's Sustainable Development policy. All Agnico Eagle Divisions must implement the RMMS outlined in the current standard at all of their sites. Sites include operations, exploration, projects, offices, and closed sites. The application of RMMS does not take precedence over site-specific statutory and permitting requirements. The primary focus of this system is to provide an integrated framework for the management of health, safety, environmental and social acceptability performance. This standard applies to all phases of mining projects including closure and post-closure phases.

2.4 Engagement

Since the last ICRP in 2014 (Golder, 2014), Agnico Eagle continued its efforts in community development agreements in Nunavut. In February 2017, the Meadowbank IIBA was renewed and, Agnico Eagle continued its support of the Kivalliq Mine Training Society and for the unique upward mobility training program for Inuit employees developed at Meadowbank. This program provides training and career path opportunities for Inuit with limited education and work experience in the area of heavy equipment operations, mill operations and site services. Skills acquired through the program are easily transferable to other sectors of the Nunavut economy (Agnico Eagle, 2017a). Since operation of the mine began, Agnico Eagle has continued public consultation on a regular basis by meeting with communities, local stakeholders, regulatory agencies, and local employees. Effective consultation has provided Agnico Eagle with a better general understanding of the rights, interests, values, aspirations, and concerns of the potentially affected stakeholders and in particular the local population. Through this continued consultation Agnico Eagle has developed an operational culture that recognizes and respects these relevant interests in the planning and executing processes at the Meadowbank Mine (Golder, 2016a).

Agnico Eagle is committed to the sustainable development of the Kivalliq region and will strive to maximize the benefits of the Project for all parties involved while minimizing or eliminating any negative impacts or long-term influences on the environment and local community. Agnico Eagle has made it a priority to keep the community informed of the Project advancements or setbacks, and to create constructive dialogue between all parties. Consequently, numerous mine elements have been planned based on community input. This practice of information sharing will continue through all phases of mine development, including the development of the closure and reclamation plan, and will provide a framework for addressing future opportunities and concerns (Golder, 2014). Agnico Eagle recognizes the iimportance of initiating permitting process and discussion with the Regulators and Community during the preparation of the Final Closure and Reclamation Plan.

Agnico Eagle is committed to the following:

- Supporting the local community for procuring resources and personnel wherever possible;
- Maintaining open lines of communication between all parties involved. Extensive traditional knowledge has been gained and community input has been solicited through meetings, personal interviews, site visits, discussions with local heritage associations, and traditional knowledge-based land use maps;
- Understanding and integrating the Project within a context of ecosystem integrity, social health, and economic stability. Agnico Eagle's objective is to minimize disturbance to the local environment

during operations, and leave the site in as natural a state as possible after closure. Post-closure monitoring will be a key component in ensuring this objective is realized.

2.5 Regulatory Instruments for Closure and Reclamation

2.5.1 Applicable regulatory guidelines

The ICRP follows applicable regulatory guidelines, the principles of which are described in:

- Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (AANDC/ MVLWB, 2013);
- Mine Site Reclamation Guidelines for the Northwest Territories (AANDC, 2007);
- Abandonment and Reclamation Policy for Inuit Owned Lands;
- Mine Site Reclamation Policy for Nunavut (AANDC, 2002);
- Environment Canada, Environmental Code of Practice for Metal Mines (Environment Canada, 2009).

The Project is located within the Nunavut Territory and is thus subject to the regulatory processes established under the applicable laws and regulations of Canada and of Nunavut. The Project is subject to the Federal and Territorial Acts and Regulations listed below:

- Arctic Waters Pollution Prevention Act and Regulations;
- Canadian Environmental Act and Regulations;
- Fisheries Act and Regulations;
- Navigable Waters Protection Act and Regulations;
- Nunavut Land Claims Agreement and Regulations;
- Nunavut Waters and Nunavut Surface Rights Tribunal Act and Regulations;
- Territorial Lands Act and Regulations;
- Nunavut Environmental Protection Act and Regulations;
- Nunavut Transportation of Dangerous Goods Act and Regulations; and
- Nunavut Mine Health and Safety Act and Regulations.

The Nunavut Water Board (NWB) Water Licence and the Nunavut Impact Review Board (NIRB) Project Certificate for Meadowbank details are found in Table 2-1. A list of the known Federal and Territorial Acts and Regulations applicable to the ICRP and a list of all Authorizations for the Project are found in Tables H-1 and H-2 of Appendix H, respectively.

Table 2-1 : NWB Water Licence and NIRB Project Certificate for Meadowbank

Authorization	Issuing Authority	Note
Type A Water Licence (2AM-MEA1525), expires July 22, 2025	Nunavut Water Board (NWB)	
Project Certificate NIRB-004 Amendment 2, August 2016	Nunavut Impact Review Board (NIRB)	Amendment of Project Certificate to reflect development of Vault Pit Expansion Project

2.5.2 Concordance between the Water Licence Requirements and the ICRP

Agnico Eagle was granted a Type A Water Licence 2AM-MEA1525 in July 2015 (NWB, 2015). This Licence authorizes Agnico Eagle to use water and dispose of waste associated with the mining and milling undertakings at the Project mine site. The Licence sets out several conditions with respect to Agnico Eagle's right to alter divert or otherwise use water for the purpose of mining. Specifically, in Part J, the Licence stipulates the conditions applying to abandonment, reclamation and closure. A summary of the specific requirements listed within the water Licence for the ICRP are provided in Table 2-2. The development of a closure and reclamation plan is also a requirement of the NIRB Project Certificate 004.

Table 2-2 : Concordance between the Water Licence Requirements and the ICRP Sections

Part/Condition	Water Licence Requirements	Corresponding Sections in the ICRP
Part C-2	An amount that the Kivalliq Inuit Association confirms is sufficient to secure the mine closure and reclamation costs (including cumulative and legacy liabilities) estimated to be required for the portion of the Project located on Inuit-owned lands	Section 10 (Financial Security)
Part J-1	The Licencee shall notify the Board in writing, at least sixty (60) days prior to any intent to achieve Recognized Closed Mine status.	Section 4.4.1 (Project Mine Plan) Section 8 (Integrated Schedule of Activities)
Part J-2	The Licencee shall complete all progressive reclamation work in accordance with the Interim Closure and Reclamation Plan (2014) referred to in this Part as approved by the Board.	Section 6 (Progressive Reclamation) Section 8 (Integrated Schedule of Activities)
Part J-3	The Licencee shall submit to the Board for approval at least twelve (12) months prior to the expected end of planned mining, a Final Closure and Reclamation Plan. The Final Plan shall incorporate revisions, which reflect the pending closed status of the mine, and include: a. Soil Quality Remediation Objectives along with Canadian Council of Ministers of the Environment (CCME) Guidelines and the Government of Nunavut Environmental Guideline for Site Remediation; b. Environmental Site Assessment plans in accordance Canadian Standards Association (CSA) criteria; and c. An evaluation of the Human Health and Ecological Risk associated with closure options.	Section 5 (Permanent Closure and Reclamation Plan) Section 3 (Project Environment)
Part J-4	The Licencee shall notify the Board in writing, at least sixty (60) days prior to, or as soon as practically possible, any intent to enter into a Care and Maintenance Phase.	Section 7 (Temporary Closure) Section 8 (Integrated Schedule of Activities)
Part J-5	The Licencee shall provide the Board, within thirty (30) days of the Licencee providing notice of intent to enter into Care and Maintenance under Part J, Item 4, a Care and Maintenance Plan that details the Licencee's plans for maintaining compliance with the Terms and Conditions of the Licence.	Section 5 (Permanent Closure and Reclamation Plan) Section 8 (Integrated Schedule of Activities)
Part J-6	The Licencee shall implement progressive reclamation, including progressive covering of the tailings and if practicable re-vegetation.	Section 6 (Progressive Reclamation) Section 8 (Integrated Schedule of Activities)

Part/Condition	Water Licence Requirements	Corresponding Sections in the ICRP
Schedule B-17	A summary of any progressive closure and reclamation work undertaken including photographic records of site conditions before and after completion of operations, and an outline of any work anticipated for the next year, including any changes to implementation and scheduling.	Section 6 (Progressive Reclamation) Section 8 (Integrated Schedule of Activities)
Schedule B-18	A summary of on-going field trials to determine effective capping thickness for the Tailings Storage Facility and Rock Storage Facilities for the purpose of long term environmental protection.	Section 5 (Permanent Closure and Reclamation Plan)
Schedule B-19	An updated estimate of the current restoration liability based on Project development monitoring, results of restoration research and any changes or modifications to the Appurtenant Undertaking.	Appendix E (Reclamation Research Plan) Section 10 (Financial Security)
Schedule I	Monitoring programs according to Table 2	Section 9 (Post Closure Site Assessment)

3.0 Project Environment

The Project Environment details presented herein were extracted from the main documents listed below:

- Final Environmental Impact Statement (Cumberland 2005a), including;
- Baseline Physical Ecosystem (Cumberland 2005b);
- Air Quality Impact Assessment (Cumberland 2005c);
- Baseline Kinetic Test Report (Cumberland 2005d);
- Baseline Terrestrial Ecosystem (Cumberland 2005e);
- Baseline Aquatic Ecosystem (Cumberland 2005f);
- Baseline Traditional Knowledge (Cumberland, 2005g);
- Baseline Archaeology Report (Cumberland, 2005h);
- Meadowbank Gold Project Interim Closure and Reclamation Plan (Golder, 2014);
- Meadowbank Water Management Report and Plan (Agnico Eagle, 2018a);
- Meadowbank Updated Mine Waste Rock and Tailings Management Plan (Agnico Eagle, 2018b).

Regional information has also been updated with information contained in the Whale Tail FEIS (Agnico Eagle, 2016a). This section provides a detailed description of the pre-disturbance conditions and the current development status of the Project.

3.1 Atmospheric Environment

3.1.1 Climatic Conditions

The Meadowbank site is located at the southern limit of the Northern Arctic terrestrial ecozone, with a Low Arctic ecoclimate. This ecoregion is classified as a polar desert and is characterized by long cold winters and short cool summers. Winds are predominately from the northwest and exceed 20 kilometers per hour (km/hr) more than 25% of the time

Climate data has been collected at the Environment Canada meteorological station at Baker Lake, near the Baker Lake Marshaling Facilities, and located approximately 107 km southeast of the Project was selected to represent conditions at the Project site. Long-term (1981 to 2010) meteorological records from the Baker Lake A meteorology station record average daily air temperature in June to September of approximately 7 degree Celsius (°C) with October to May average daily air temperatures of -20.6 °C. The mean annual air temperature at the Project site is approximately -11.3 degrees Celsius (°C). The monthly average temperature ranges from -31.3°C in January to +11.6°C in July, with above-freezing averages for only four months of the year i.e., June to September.

Total annual precipitation at Baker Lake station is low, averaging just 249 millimeters (mm) per year, with 59% of precipitation falling as rain, and 41% falling as snow. Table 3-1 summarizes estimated monthly climate characteristics at the Project site. Average annual evaporation for small waterbodies in the Project area is estimated to be 248 mm between June and September. The average annual loss of snowpack to sublimation and snow redistribution is estimated 29% of the total precipitation for the winter period and occurs between October and May.

Table 3-1 : Estimated Mine Site Monthly Climate Characteristics (Agnico Eagle, 2018b)

Month	Max. Air Temp. (°C)	Min. Air Temp. (°C)	Rainfall (mm)	Snowfall (mm)	Total Precip. (mm)	Lake Evap. (mm)	Min. Relative Humidity (%)	Max. Relative Humidity (%)	Wind Speed (km/h)	Soil Temp. (°C)
January	-29.1	-35.5	0	11.2	11.2	0	67.1	75.9	16.3	-25.5
February	-27.8	-35.2	0	10.5	10.5	0	66.6	76.5	16.0	-28.1
March	-22.3	-30.5	0.1	14.6	14.6	0	68.4	81.4	16.9	-24.9
April	-13.3	-22.5	2.3	16.7	19.0	0	71.3	90.1	17.3	-18.1
May	-3.1	-9.9	9.8	11.3	21.1	0	75.7	97.2	18.9	-8.0
June	7.6	0.0	14.5	3.9	18.4	8.8	62.6	97.2	16.4	2.0
July	16.8	7.2	36.7	0.0	36.7	99.2	47.5	94.3	15.1	10.5
August	13.3	6.4	45.5	0.9	46.4	100.4	59.2	97.7	18.4	9.3
September	5.7	0.9	30.1	8.8	38.9	39.5	70.8	98.6	19.3	3.6
October	-5.0	-10.6	3.5	30.3	33.8	0.1	83.1	97.4	21.4	-2.8
November	-14.8	-22.0	0	23.6	23.6	0	80.6	91.1	17.9	-11.7
December	-23.3	-29.9	0	15.0	15.0	0	73.3	82.7	17.7	-19.9

Note: Some numbers may not add due to rounding.

Data from Baker Lake A station is available from 1946 to 2011. During this period, the data quality is good, with the exception of years 1946 to 1949, and 1993 which were removed from the compilation.

Source: Meadowbank Updated Mine Waste Rock and Tailings Management Plan (Agnico Eagle, 2018b).

Short-duration rainfall, representative of the Project are presented in Table 3-2, based on Intensity duration-frequency (IDF) curves available from the Baker Lake A meteorological station (1987-2006) operated by Environment Canada.

Table 3-2 : Estimated Mine Site Extreme 24-hour Rainfall Events (Agnico Eagle, 2018a)

Return Period (years)	Precipitation (mm)
2	246
5	295
10	322
20	345
100	391

*Source: Meadowbank Water Management Report and Plan (Agnico Eagle, 2018a), from SNC-Lavalin 2012 Water Management Plan (SNC, 2013)

3.1.2 Climate Change

Closure and reclamation planning must consider the potential impact of climate change on site conditions (Golder, 2014). BGC (2003) suggests that global average temperature may increase by about 2°C by 2100 due to climate change. However, this increase may be for sites located at 50°N. The climate in the Arctic is changing faster than at mid-latitudes (IPCC, 2014). The most recent set of climate model projections (CMIP5) predict an Arctic-wide year 2100 multi-model mean temperature increase of +13°C in late fall and +5°C in late spring under the IPCC’s “business as usual scenario”. IPCC climate change mitigation scenario results in a year 2100 multi-model Arctic wide prediction of +7°C in late fall and +3°C in late spring (Overland et al., 2013). The effects of changes of this magnitude to terrestrial, aquatic and marine ecosystems, social and economic systems of the Arctic are an active area of research (Agnico Eagle, 2016a).

Permafrost is sensitive to climate change and an increase in air temperature will likely cause natural permafrost degradation. By the middle of the 21st century, the effect of temperature change is predicted to reduce near-surface permafrost by 12% to 15% once equilibrium conditions become established under the new temperatures. The predicted increase of 15% to 30% in active layer thickness will reach equilibrium relatively much faster. Studies have indicated that the boundaries of discontinuous and continuous permafrost are expected to move northward due to climate change (Woo et al. 1992). The sensitivity of permafrost to climate change in Canada has been assessed by Smith and Burgess (1998, 2004) by categorizing the response of ground thermal conditions to climate and the effects of permafrost thaw on terrain stability. The impacts of the warming and thaw of permafrost will be most important in areas of ice-rich permafrost. The Project is within the continuous permafrost zone, and the ground ice content is reported to be between 0 and 10% (Heginbottom et al. 1995). Within the Project area, permafrost is regionally predicted to be moderately thermally sensitive to climate change, with a low to moderate physical response resulting from thaw (Smith and Burgess 2004). Appendix I shows the permafrost map of Canada. Predictions based on a warming of 4°C to 5°C over the next 50 years (NRC, 2010), which approximately double the rate described above from BGC (2003) and IPCC (2014), suggest that the Project areas would remain within the zone of continuous permafrost under this scenario. The active layer thickness would be expected to increase, while the total thickness of permafrost may slowly reduce in time. However, these changes are not anticipated to compromise the planned permafrost encapsulation strategies for the rock storage and tailings storage facilities.

3.1.3 Air Quality

3.1.3.1 Air Quality and Dustfall Monitoring Plan

The primary sources for air quality emissions for the Project are (Golder, 2014):

- Diesel fuel combustion emissions from the power plant and vehicles; and
- Fugitive dust emissions from tailings and waste rock disposal, process operations (including ore hauling), and road travel.

Other potential sources of emissions are the milling and materials handling operations, although no Particulate Matter (PM) is anticipated from these wet streams. Potential dry PM emission sources include the truck dump bin vent, primary crushing, ore stockpile, pebble crushing plant, and furnace. Plant design includes the installation of dust control equipment that will control emissions of PM to the ambient air for all these sources.

Fugitive dust emissions from the tailings storage facilities and rock storage facilities is caused by three distinct activities: equipment traffic in the storage areas, waste aggregate unloading (handling), and wind erosion of pile surfaces and ground areas around open rubble piles. Fugitive dust from the coarse ore stockpile will comprise emissions from the conveyor ore drop at the top of the pile and wind erosion. However, road travel is anticipated to be the largest contributor of dust emissions at the mine site, caused by entrainment in vehicle wheels and the wake created by moving vehicles.

Yearly, the monitoring program at Meadowbank is conducted according to the Air Quality and Dustfall Monitoring Plan - Version 2 (Agnico Eagle, November, 2013d). The objective of the program is to measure dustfall, NO2, and/or suspended particulates (TSP, PM10, PM2.5) at the four monitoring locations around the Meadowbank site. Locations were established in 2011 in consultation with Environment Canada. No other gaseous pollutants were monitored because of low concentrations predicted in pre-construction dispersion modelling (Cumberland 2005c).

In 2016 and 2017, results obtained for the measured parameters were compared to Government of Nunavut (GN) Environmental Guidelines for Ambient Air Quality (October, 2011) for TSP, PM2.5 and NO2; BC Air Quality Objectives (August, 2013) for PM10; and Alberta Ambient Air Quality Guidelines (August, 2013) for dustfall. The Canadian Ambient Air Quality Standards for PM2.5 (2015) are also referenced.

No TSP samples exceeded the relevant 24-h GN standard of 120 µg/m^3, nor did annual average TSP values exceed the GN guideline of 60 µg/m^3. For PM10, no samples exceeded the BC Air Quality Objective of 50 µg/m^3 for the 24-h average. For PM2.5, no samples exceeded the GN guideline of 30 µg/m^3 or the Canadian Ambient Air Quality Standard of 28 µg/m^3 for the 24-h average (2016 and 2017 Annual Reports, Agnico Eagle 2017a and 2018b).

The Alberta recreational area guideline for dustfall was exceeded in one out of 47 samples. While the applicability of these guidelines is not well defined, there are no recreational or residential users within the vicinity of the mine site and exceedance of one sample is not expected to result in significant aesthetic or nuisance concerns. The industrial area guideline was not exceeded in any sample.

The GN annual average standard for NO_2 of 32 ppb was not exceeded, with a maximum monthly average of 2.4 ppb.

Estimated greenhouse gas emissions for the Meadowbank site as reported to Environment Canada's Greenhouse Gas Emissions Reporting Program in 2017 were 197,678 tonnes CO_2 equivalent, which is similar to the value obtained in 2015 and 2016 (187,280 and 184, 223 tonnes CO_2 equivalent).

Incinerator stack testing has also been completed in 2015, 2016 and 2017. A summary of incinerator stack testing results is provided on an annual basis in the Meadowbank Annual Report.

Overall, there are no apparent trends towards increasing air quality concerns at the Meadowbank site.

In response to community concerns of dust generation, Agnico Eagle has conducted studies of dustfall along the Meadowbank All Weather Access Roads (AWAR) since 2012. These studies characterize dust deposition rates and compare to those predicted in the Final Environmental Impact Statement (FEIS).

Based on results, it is unlikely that impacts to VECs (Valued Ecosystem Components, vegetation community productivity and wildlife) due to dust are occurring beyond FEIS assumptions.

Results of the visual assessment and dust sampling program indicated that Tetra Flake is the optimal product for use in this program, to reduce dust along the AWAR. In 2017, Agnico Eagle applied Tetra Flake to the three areas of concern along the AWAR identified by the HTO, as well as to the locations treated annually in the hamlet of Baker Lake and near the Meadowbank site. Wildlife monitoring to date has indicated no significant road-related effects, dust monitoring has indicated no trend towards increasing rates of dustfall, and risk assessment has indicated no incremental risk for wildlife from chemical contaminants near the AWAR. Therefore, impacts of Meadowbank AWAR road dust do not appear to be exceeding predictions made in the FEIS.

3.2 Physical (Terrestrial) Environment

3.2.1 Topography and drainage basin

The landscape in the region and immediate vicinity of the Project consists of rolling hills and relief with low growing vegetative cover and poor soil development. Numerous lakes are interspersed among boulder fields, eskers and bedrock outcrops, forming complex drainages. The Project mine site is located close to the surface water divide between the Back River basin, which flows north to northeast towards the Arctic Ocean, and the Quoich River basin, which flows east to southeast into Chesterfield Inlet. The terrain along the All Weather Access Road (AWAR) has low relief, and is generally gently-to moderately-sloping with short, steep slopes occurring locally on some bedrock surfaces. Elevation ranges from approximately 130 m above mean sea level at lakeshores up to 200 m on ridge crests (Golder, 2014).

3.2.2 Surficial Geology

Laterally extensive deposits of glacial till cover the Project mine site. Block fields of weathered parent material interspersed with thin veneers of till or organics are common. However, the predominant surficial material is locally derived glacial till. Till thickness at site was determined from core and reverse circulation overburden drill holes and ranges up to 12.5 m with an average of less than 3 m. Appendix J shows the regional geology of the Meadowbank area and contours that indicate the approximate thickness of overburden (till) (Golder, 2014).

In general, the till can be described as unsorted, medium brown, silty sand/gravel till, with between 20% and 40% fines (silt and clay) of locally derived volcanic, sedimentary, and lesser granitic clasts. Clast sizes range from granule to boulder with a high proportion in the granule to pebble range. In most of the channels between the lakes and ponds, coarse-grained soils are common. In some, the finer organic material and sediments have been removed by flow between lakes, leaving a stony pavement. In others, solifluction has brought coarse grained material into the low-lying areas from adjacent slopes (Golder, 2014).

Small deposits of deltaic sand and fine gravel flank some streams along Third Portage Lake. Glaciofluvial deposits are volumetrically insignificant. The site was above the last glacial marine transgression; consequently, no glaciomarine deposits are known in the area. Material recovered from beneath the Project lakes during geotechnical drilling along the proposed dike alignments can be generally described as cobbles and gravel with traces of sand, silt, and clay. Samples of sand and clay were obtained locally. Further details on the rock types comprising the Portage, Goose, and Vault deposits and their relative proportions within the footprint of the deposits can be found in the Baseline Physical Ecosystem Report (Cumberland, 2005b).

Two main faults have been encountered in the geotechnical drilling completed to date: the Second Portage Lake fault, and the Bay Zone fault. The Second Portage Lake fault trends in a northwest-southeast direction along Second Portage Lake, while the Bay Zone Fault trends in a north-south direction. Stratigraphic contacts are also pervasive structures. No sites of palaeontological or palaeobotonical significance have been found (Golder, 2014).

The terrain along the AWAR is dominated by undulating and irregular bedrock surfaces, veneers and blankets of till and/or weathered (frost-shattered) bedrock (felsenmeer), and discontinuous organic veneers. Occasional marine (beach) deposits and very small glaciofluvial deposits are present locally. Shallow, hand-dug soil pits excavated in late July 2005 indicate thaw to depths of 1 m or less on imperfectly- to poorly-drained upland till surfaces at this time of year (Cumberland 2005b).

3.2.3 Bedrock Geology

The Project mine site is underlain by a sequence of Archaean greenstone (ultramafic and mafic flow sequences) and metasedimentary rocks that have undergone polyphase deformation resulting in the superposition of at least two major structural events. Enclosed within the greenstone are volcaniclastic sediments, felsic-to-intermediate flows and tuffs, sediments (greywackes), and oxide iron formations. The sequence also contains sericite schists, which are believed to be altered felsic flows or dikes. The ultramafic rocks are variably altered, containing serpentinite, chlorite, actinolite, and talc. The ore in the Vault deposit is hosted in intermediate volcanic rocks. The ore in the Portage deposit is hosted in iron formation rocks (Golder, 2014).

3.2.4 Geological Hazards and Seismicity

The mine site is located in an area of relatively low seismic risk. The peak ground acceleration (PGA) for the area was estimated using seismic hazard calculator from the 2010 National Building Code of Canada-Natural Resources Canada (NRC) website (NRC 2010). The estimated PGA is 0.019 g for a 5% in 50-year probability of exceedance (0.001 per annum or 1 in 1,000 year return) and 0.036 g for a 2% in 50-year probability of exceedance (0.000404 per annum or 1 in 2,475 year return) for the area (see Appendix J for the seismic zoning map).

3.2.5 Permafrost

The Project site is located within a region of continuous permafrost (see Appendix I). Permafrost is defined as ground that remains at or below 0°C for at least two years. Permafrost does not necessarily contain ice; rather, its definition is based solely on the temperature of the mineral or organic parent material. Permafrost in the Project area is considered stable and has temperatures colder than -5°C (Cumberland 2005a). In this region, the layer of permanently frozen subsoil and rock is generally deep and overlain by an active layer that thaws during summer. The depth of the active layer is estimated to range between 1 and 3 m. Permafrost thickness (defined by the depth of zero degree isotherm in the baseline study area is expected to be approximately 425 m below ground surface). Permafrost depths are estimated to be between 450 and 550 m, depending on proximity to lakes, slope, aspect, and other site-specific conditions. The measured active layer depth in the project area currently ranges from about 1.3 m in areas of shallow overburden and away from the influence of lakes, up to 4.0 m adjacent to lakes, and up to 6.5 m beneath the streams connecting Third Portage and Second Portage lakes. Below Whale Tail Lake, a talik is expected to form a continuous channel that is closed in the northern portion of Whale Tail Lake below the open pit and becomes open towards the south and central portion of the lake. Circular lakes with a radius greater than 300 m, or elongated lakes with a half-width of at least 150 m, are assumed to be connected to the deep groundwater flow regime through open taliks.

Late-winter ice thickness on freshwater lakes is approximately 2.0 m. Ice covers usually appear by the end of October and are completely formed in early November. The spring ice melt typically begins in mid-June and is complete by early July, depending on site specific conditions of water depth and exposure. Where water depth is greater than about 2.0 to 2.5 m, taliks are expected. Round lakes that do not freeze to the bottom in winter and have a diameter in the order of 570 m or greater, or elongated lakes that do not freeze to the bottom and have a width in the order of 320 m or greater, are expected to have a talik that extends through permafrost. The taliks beneath Second and Third Portage lakes likely extend through permafrost. The talik beneath Vault Lake likely does not penetrate through permafrost.

The ground ice content of permafrost soil and rock in the Meadowbank area is expected to be between 0% and 10% (dry permafrost) based on regional scale compilation data. Locally on land, ice lenses and ice wedges are present, as indicated by ground conductivity, and by permafrost features such as frost mounds. These areas of local ground ice are generally associated with low-lying areas of poor drainage.

Rock and soil-related terrain instability is a minor concern in the Meadowbank project area. Although permafrost will degrade in certain areas, for the most part the permafrost is “dry,” and has low ground ice content. The exception is the wetlands occupying lowlands adjacent to lakes and ponds where excess ground ice is present and thaw instability is foreseeable. These impacts can be mitigated using currently accepted permafrost engineering practices as part of dike construction, drawdown and re-watering of lakes, pit development, and waste rock facilities and Tailings Storage Facilities construction and closure.

3.2.6 Hydrogeology

In areas of continuous permafrost, there are two groundwater flow regimes: a deep regime beneath the permafrost and a shallow regime in the active layer near the ground surface (see Appendix J). The deep groundwater regime is connected to taliks located beneath large lakes. The water level elevations in lakes that have these deep taliks provide the driving force, or hydraulic head, for the deep groundwater flow. The presence of the thick and significantly low permeability permafrost beneath land located between large lakes results in negligible recharge to the deep groundwater flow. Smaller lakes, which have taliks that probably do not extend down to the deep groundwater regime, do not influence the groundwater flow in the deep regime. Locally, groundwater in the active layer would flow to local depressions and ponds that drain to Second Portage and Third Portage lakes or would flow directly to these two water bodies (Golder, 2014)

There does not appear to be a detectable difference in the hydraulic conductivity of the various rock types. Ultramafic rocks, at a given depth, have similar hydraulic conductivity to those of the Intermediate Volcanics at the same depth. The hydraulic conductivity of the shallow exfoliated and weathered bedrock and faults, regardless of rock type, is generally higher than the deeper, less fractured rock (Golder, 2014).

Groundwater sources from either the active layer or from the deep groundwater regime below the permafrost are not presently utilized for drinking water at the Project site, due to the presence of deep permafrost, the seasonal nature of the active layer, and the availability of good quality surface drinking water sources in the vicinity of the Project site (Golder, 2014).

3.2.7 Surface Water Hydrology

Hydrology in the Project area is highly influenced by geographic location, the headwater nature of the Project watersheds, and by the seasons. The Project area streams are relatively short, small- to medium-width ephemeral channels with boulders. They connect all Project area lakes in a cascading network (Golder, 2014).

Snowmelt runoff in the region begins in the period from late May to mid-June, and the snowmelt peak is often the peak flow for the year. Secondary peaks due to rainfall events can occur during the summer and can sometimes exceed snowmelt peaks. Flows typically decline through the late summer and fall, with freeze-up occurring in late September for the smallest streams and in late November for the medium channels. All channels are anticipated to freeze to the bottom with zero flows over the winter period (Golder, 2014).

Third Portage Lake currently drains into Second Portage Lake via two small, ephemeral channels that are impassable by fish. The width of these channels is between 50 to 150 m. The construction of the West Channel Dike in 2009 blocked a third outlet channel with similar characteristics. The elevation difference is 1 m between these two lakes (Golder, 2014).

Discharge from Second Portage Lake flows south into Tehek Lake via a wide connecting channel and small chute about 50m long. Vault, Wally, and Drill Trail lakes are connected in succession. Water from these lakes is directed to Second Portage Lake, just north of its outlet to Tehek Lake. Average runoff depths for the four monitored basins (2PL, 3PL, Drill Trail Lake, Turn Lake) over 2002 to 2004 ranged from 112 mm for Third Portage Lake to 176 mm for Drill Trail Lake. The variation in runoff correlates roughly with the relative percentage of lake surface area in each basin. Site runoff data were combined with analysis of available regional stream flow data to estimate long-term average and extreme discharge characteristics for the Project area. Table 3-3 summarizes the mean monthly runoff from May through October, as a proportion of total annual runoff.

Table 3-3 : Estimated Mean Monthly Runoff Depth as Proportion of Annual Depth – Project Basin

Month	Percent of Mean Annual Runoff
May	**0%**
June	**30%**
July	**40%**
August	**20%**
September	**9%**
October	**1%**
Year	**100%**
***Source:** Cumberland 2005b	

Table 3-4 summarizes the results of frequency analyses of annual runoff for Project area basins. Analysis of the available data from the four regional stream flow stations was carried out to develop estimates of flood flows and low flows for the outlets of Turn, Drill Trail, Third Portage, and Second Portage lakes (Golder, 2014).

Table 3-4 : Estimated Annual Runoff Depths – Project Basin

Return Period (Years)	Condition	Estimated Basin Runoff Depth (mm)		
		Drill Trail & Turn	Third Portage	Second Portage
100	**WET**	378	238	284
50	**WET**	345	217	259
20	**WET**	300	189	225
10	**WET**	266	168	200
5	**WET**	230	145	173
2	**MEDIAN**	175	110	131
5	**DRY**	135	85.1	101
10	**DRY**	118	74.3	88.5
20	**DRY**	105	66.2	78.8
50	**DRY**	92.6	58.4	69.5
100	**DRY**	84.8	53.4	63.6
* **Source**: Cumberland 2005b				

3.2.8 Lake and Littoral Zone Characteristics

Several bathymetric surveys were conducted for the lakes in the Project mine site area (Golder 2002, 2003, 2006, 2008a and b, Dougan 2011). The surface area, volume and average depth of these lakes are summarized in Table 3-5.

Table 3-5 : Characteristics of Lakes at Mine Site Area

Lake	Surface Area (10^3 m^2)	Water Volume (10^6 m^3)	Average Depth (m)
Second Portage	3,851	29.72	7.72
Third Portage	33,065	446.23	13.50
Vault	980	2.2	10 (maximum)
Wally	7,671	27.90	3.64
Turn	3,235	26.47	8.18
Drill Tail	2,149	11.67	5.43
Source: Golder 2006			

These water bodies are headwater lakes, and the surface area for each constitutes an appreciable portion of their respective basin drainage area. Small channels connect the lakes in the Project mine site area, although there is little flow between lakes during most of the year. The ice-free season is very short, with ice breakup occurring in late-June to mid-July and ice freeze-up beginning in late September or early October, with complete ice cover by late October. No flow is anticipated between lakes during the ice cover period. Maximum ice thickness is at least 2 m by March/April (Golder, 2014).

Lake shorelines are covered predominantly with a complex mixture of boulders and large cobble with some gravel to a depth of between 4 to 6 m below the surface. These substrates are very stable and not subject to erosion except by ice scouring and ice rafting. Below a depth of about 6 m, there is a transition to fines, with the bottom consisting predominantly of silt/clay. The organic carbon content of the fine sediment provides a food source for burrowing invertebrate worms and chironomid larvae. The majority of the lakes are relatively shallow, with average depths between 3.6 and 13.5 m maximum depth. In larger lakes, such as Second and Third Portage lakes, maximum depth in certain areas can exceed 40 m (Golder, 2014).

Appendix J shows the bathymetry data for Second and Third Portage, Vault, Wally, Turn and Drill Tail lakes.

3.3 Chemical Environment

3.3.1 Soil Chemistry

All samples of overburden (till) other than Third Portage trench spoil piles have no potential to generate Acid Rock Drainage (ARD). The ARD potential of trench spoil piles is due to the higher sulphide content of soil directly above the ore deposit. Rock samples collected along the AWAR are indicated to be non-acid generating (Cumberland 2005b).

3.3.2 Sediment Quality

Sediment can be an important source or sink for contaminants such as metals. Contaminants entering aquatic systems (via tributary streams or directly from local sources) are usually associated with suspended particulate material in the water column that eventually settle in depositional areas as sediment, especially in deeper areas of lakes. Sediment provides a long-term, temporal record of deposition, integrating concentrations over time (Golder, 2014).

Lakebed substrate in the project area is a key habitat attribute that dictates the species composition and abundance of benthic invertebrates and its importance as feeding habitat by fish. Water depth is the strongest determinant of physical features of the lake substrate, especially grain size. Between the surface and about 4 m depth, substrate consists of a heterogeneous mixture of boulder, rock, and cobble. At depths of less than 2 m, the lakebed substrate is ice scoured and subject to erosion by wave-driven currents. Below 4 m depth, sediment grain size diminishes with sand, silt, and clay becoming more abundant. At depths of 6 to 8 m and greater, bottom sediment consists of a uniform silt/clay mixture that dominates aerial substrate distribution in Second Portage Lake (70%) and Third Portage Lake (81%) (Golder, 2014).

Sediment samples at depths of 8 m or greater collected from numerous locations throughout the Project mine site area and reference lakes revealed a great similarity in grain size, organic carbon (2.5% to 5%) and metals concentration. Total metals concentration in sediment was similar among project and reference lakes and over years, suggesting that the erosional and geochemical processes within lakes in the Meadowbank region are similar (Golder, 2014).

At Meadowbank, all sediment metals concentrations observed can be regarded as background because of the near absence of anthropogenic activities. Metals concentrations are generally similar across the area, including reference lakes, and reflect the natural, mineralized nature of the sediments and low rate of deposition. Adverse impacts to the benthic community were not observed and fish tissue metals concentrations are low and similar to concentrations in fish found in other pristine lakes (Golder, 2014).

3.3.3 Surface Water Quality

3.3.3.1 Baseline Surface Water Quality

The lakes in the Project mine site are ultra-oligotrophic, soft water, nutrient poor and isothermal, with neutral pH and high oxygen concentrations year round. Limnological conditions tend to be very stable. The vertical distribution of temperature, oxygen and nutrients is typically uniform during summer and winter, with minor temporary stratification. Water clarity is high, with Secchi depths of 10 m or more. The dissolved and suspended solids concentrations are very low. The headwater nature of the Project lakes means that there are no large streams entering or leaving the watershed. As a result, external sources of nutrients or sediment to potentially contribute to nutrient enrichment or productivity of the system are limited (Cumberland, 2005a).

Due to the site's northern latitude and climate, lakes naturally experience long periods of cold temperatures and low light levels during the winter months. Ice covers the lakes for extended periods of time each year and low water temperature exists year round. As a result of the ice cover, gas exchange with the atmosphere is limited most of the year. However, oxygen concentrations remain high under the ice because of the low rates of biological activity and decomposition of organic material (Golder, 2014).

Turbidity and suspended and total dissolved solids in surface waters are low, typically below laboratory detection (<1.1 NTU, <1 mg/L and <10 mg/L, respectively). Hardness (4.4 to 9.5 mg/L), and dissolved anions (chloride, fluoride, sulphate) were also very low and near detection limits (<0.05 to 0.06 mg/L). Surface water has circumneutral pH (6.6 to 7.7) and low conductivity (5 to 77 µS/cm). Nutrient concentrations (nitrogen, carbon, phosphorus) in the project lakes do not differ significantly within or between lakes and seasons and are typical of ultra-oligotrophic lakes. Nitrogen nutrients (nitrate, nitrite, ammonia, dissolved phosphate) seldom exceed 0.001 mg/L, while dissolved phosphate ranges from <0.001 to 0.003 mg/L. Dissolved organic carbon (DOC) concentrations range from 1.4 to 2.3 mg/L (Golder, 2014).

Total and dissolved metals concentrations are remarkably similar within and between lakes between 1997 and 2002. Total antimony, arsenic, chromium, copper, mercury, and nickel concentrations from lakes in the Project mine site are all below laboratory detection limits and well below water quality guidelines for the protection of aquatic life (CCME, 2007). In addition to common salts (sodium, magnesium), the only metals to exceed detection limits are aluminum (0.006 to 0.014 mg/L), lead (up to 0.0012 mg/L), and zinc (0.001 to 0.019 mg/L). Only lead marginally exceeded surface water quality guidelines at a few sampling stations. Dissolved metals concentrations comprise the vast majority of total metals concentrations where results exceeded detection limits, indicating that nearly all metals are dissolved and not associated with particulates, which is consistent with the low suspended solids concentrations observed (Cumberland, 2005a). Results from the average baseline water quality in Third Portage, Second Portage and Wally are provided in Appendix M.

Spring freshet water is moderately acidic and has very low sulphate, dissolved metals, and total dissolved solids. The quality of water infers limited interaction of surface drainage water with the underlying bedrock (Cumberland, 2005a).

3.3.3.2 Surface Water Quality Monitoring Program

There are many monitoring programs conducted to evaluate water quality at Meadowbank. These are mainly a requirement of the Meadowbank Type A Water Licence. They are designed to provide immediate feedback such that mitigation or adaptive management can be implemented. The site map with the different surface water sampling locations is presented in Appendix G.

As outlined in the FEIS, the Core Receiving Environment Monitoring Program (CREMP) is intended to monitor large-scale (e.g. basin-wide) changes in physical and biological variables to evaluate potential impacts from all mine related sources in the receiving environment. It therefore serves as the most important monitoring program for evaluating short term and long term potential impacts to the aquatic environment. In 2016, Agnico Eagle implemented an updated CREMP plan in accordance with the terms of their renewed NWB water Licence (2AM-MEA1525) for the Meadowbank site. Each year, information from the CREMP and other targeted programs is evaluated in an integrated manner and reported as the Aquatic Effects Management Program (AEMP) to determine any required changes to mitigation practices. The AEMP for the Meadowbank site was developed in 2005 as part of the project's Final Environmental Impact Statement (FEIS), and has been formally implemented since 2006. The AEMP summarizes the results of each of the underlying monitoring programs, including the CREMP, reviews the inter-linkages among the monitoring programs; integrates the results, and recommends management actions.

Aspects of the mine that were identified in the FEIS as potentially leading to significant impacts during operations are summarized Table 3-6, along with results of the monitoring programs aimed at assessing these impacts. Note that this assessment focuses on comparing current measured effects with predictions made in the Physical Environment Impact Assessment Report (Cumberland, 2005b); it does not attempt to compare effects of all aquatic environment monitoring programs with respective threshold or trigger values developed for AEMP programs or to regulatory criteria imposed. In 2017, monitoring was conducted for the constructed spawning pad, located at stream crossing R02 along the all-weather access road (AWAR) to Baker Lake, as well as for several onsite habitat compensation features (East Dike, Bay-Goose Dike, Dogleg Ponds).

Onsite, interstitial water quality within the dike faces met Canadian Council of Ministers of the Environment (CCME) Guidelines for aquatic life with the exception of TSS in one sample, and healthy periphyton community growth with increasing biomass was observed.

Table 3-6 : Predicted and Measured impacts to Water Quality (Agnico Eagle, 2018a)

Potential Impact	Potential Cause(s)	Proposed Monitoring	Monitoring Conducted (2017)	Predicted Impact	Measured Impact (2017)
Impaired Wally Lake water quality	Vault attenuation pond effluent discharge, dike leaching	Effluent and receiving environment monitoring	Receiving environment: CREMP Effluent: MMER, Water Licence	Receiving environment: CREMP results ≤CWQG except arsenic and cadmium Effluent: ≤MMER	Receiving environment: CREMP results all ≤CWQG Effluent: ≤MMER and Water Licence Criteria
Impaired Second Portage Lake water quality	Portage attenuation pond effluent discharge, dike leaching; (East Dike seepage)	Effluent and receiving environment monitoring	Receiving environment: CREMP Effluent: MMER, Water Licence	Receiving environment: CREMP results ≤CWQG except cadmium Effluent: ≤MMER, Water Licence	Receiving environment: CREMP results all ≤CWQG Effluent: ≤MMER and Water Licence Criteria except 2 TSS samples
Impaired Third Portage Lake water quality	Portage attenuation pond effluent, dike leaching	Effluent and receiving environment monitoring	Receiving environment: CREMP (MMER effluent monitoring not required)	CREMP results ≤CWQG except cadmium	Receiving environment: CREMP results all ≤CWQG

Overall, the FEIS predicted a low impact on the receiving environment water quality, designated by <1x change in CCME Water Quality Guidelines, and no exceedances of MMER/NWB Water Licence criteria. As described in Table 3-6, with the exception of 2 TSS samples for effluent discharged to Second Portage Lake, these predictions were not exceeded in 2017. On average, the TSS exceedances did not exceed 10% of the Licence limit of 30 mg/L, and discharge to the receiving environment ceased immediately upon receipt of results (2 days after sample collection). These exceedances are therefore not expected to have a significant impact on receiving environment water quality. Furthermore, no exceedances of TSS triggers were observed in Second Portage Lake through CREMP sampling (2017 Annual Report, Agnico Eagle 2018c).

3.3.4 Groundwater Quality

3.3.4.1 Baseline Groundwater Quality

Groundwater baseline data were collected from four monitoring wells located within the three main rock types in the area of the Goose and Portage deposits and from the talik underlying the proposed tailings facility area at Second Portage arm. Wells were not installed in the Vault deposit as it lies within continuous permafrost.

No samples reported Canadian Metal Mining Effluent Regulations (MMER, EC, 2009) exceedances, although some samples reported exceedances of Canadian Environmental Quality Guidelines (CCME 2007). Concentrations of total metals generally exceeded those of dissolved metals for all wells. The chemical signature of groundwater (from major ion chemistry) is distinct between each lithology and differs from that of lake water. Groundwater quality is generally consistent with rock leachate characteristics, with the majority of constituents present in rock leachate also present in the groundwater of the corresponding lithology (Golder, 2014).

The groundwater is brackish to saline with high total dissolved solids and chloride concentrations. Based on data from other sites in the Canadian Shield, it is expected that the salinity of the groundwater will increase with depth. Water samples collected from monitoring wells installed in the talik beneath Second and Third Portage lakes to depths of 175 m have chloride concentrations of up to 626 mg/L and total dissolved solids values up to 800 mg/L. This represents a salinity of 1.1, where salinity is equal to approximately 1.8 times the chloride concentration (in parts per thousand). Water samples collected from a number of large lakes in the area have chloride concentrations of less than 1 mg/L. By comparison, sea water has chloride concentrations of approximately 19,000 mg/L (Golder, 2014).

3.3.4.2 Groundwater Monitoring Program

As required by NIRB Project Certificate No.004 (Condition 8), groundwater sampling has been undertaken through the groundwater monitoring program at Meadowbank. It was conducted in accordance with the Groundwater Monitoring Plan (Agnico Eagle, 2018c). The objective of this program is to document any effects of mining on groundwater quality, particularly with respect to tailings deposition. This is done by monitoring parameters which can be associated with the reclaim water chemical signature such as chloride, sulfate, total cyanide, total iron and total arsenic. The recorded data is also used to update water quality predictions at the site. In 2017 and 2018, efforts were made to collect data to enable comparison of groundwater samples collected to other site water to ensure full comprehension of results and patterns. Therefore, an extensive groundwater sampling program took place. The program aimed at better characterizing natural groundwater chemistry, potential sources of contaminants at the mine site, and potential link between surface and groundwater

Historically, groundwater quality data start from 2003. From 2003 to 2016, a total of 14 groundwater monitoring wells were installed to characterize the groundwater (SNC-Lavalin, 2018b). Throughout the years, a total of 34 groundwater samples and 21 duplicates were collected from these sampling wells. However, most of the monitoring wells became inactive due to the challenging artic condition and permafrost environment at Meadowbank. In 2017, groundwater samples were taken from 4 wells and pit wall seepages. In 2018, four monitoring wells were added to the sampling network and open pit wall seepage points were also sampled.

For the 2017 and 2018 groundwater sampling campaigns, emphasis was put on understanding groundwater water quality and to establish comparatives within onsite water management. With the understanding that each groundwater sample has a distinctive signature defined by its dissolved concentrations of chemical constituents, the interpretation of groundwater chemistry data contributes to a better understanding of groundwater flow. Thus, contaminants migration and transformation processes along pathways as water composition varies. This strategy can also help identifying zones where surface water and groundwater interact and defining if the interaction is continuous or only during permafrost thawing

The 2017 and 2018 groundwater program were the focus of a detailed and consistent approach that will need consistency (same station needs to be sample through time) moving forward. Future groundwater monitoring program will be adapted at Meadowbank. The groundwater monitoring program will be updated as the project progresses. New information from the hydrogeological numerical model and from hydrogeological field data will be integrated throughout. Moreover, methods to obtain representative groundwater samples and improve well designs under artic climate continue to be investigated.

3.3.5 Acid Rock Drainage and Metal Leaching Potential

3.3.5.1 Baseline Geochemical Data

A material geochemical program was developed to characterize the Project geologic materials and define the nature and magnitude of impacts that may result from the interaction between these materials and the environment during all phases of project development, including post-closure. This program involved characterizing (Golder, 2014):

- Geochemistry of bedrock in the area of the proposed open pits and planned mine infrastructure away from the ore deposits through static testing;
- Tailings material and overburden through static testing; and
- Long-term weathering behaviour of selected pit rock and tailings samples with respect to acid rock drainage (ARD) potential and constituent leaching rates through kinetic testing.

Metal concentrations in leachate generated by static and kinetic tests were compared to the Canadian Council of Ministers of the Environment's (CCME) Quality Guidelines (CCME, 2007) for the protection of freshwater aquatic life, and to the Canadian Metal Mining Effluent Regulations (EC, 2009). Pit rock samples were obtained from exploration drill core specifically for ARD and metal leaching testing to determine the spatial and compositional variability of each rock unit to be disturbed, including targeted testing of starter pit rock that was used for construction of mine site roads and dikes. Analysis of weathered drill cores that had been exposed to climatic conditions on site for 11 to 12 years was conducted to document the effects of weathering on the chemical characteristics of pit rock. Tailing solids and decant water samples were obtained from the metallurgical program, which focused on the processing characteristics of representative ore samples from each deposit (Golder, 2014).

The rock types and their relative proportions within the footprint of Portage, Goose, and Vault deposits are discussed in Cumberland (2005d). The results of kinetic testing relating the measured potential of rock to generate ARD and to leach metals are summarized in Table 3-7. The sulphide content of pit rock from each lithology is generally low, with median total sulphur contents of less than 1%. The bulk of the Iron Formation (IF) and quartzite rock is potentially acid generating (PAG). The ARD potential was realized under accelerated laboratory weathering tests but not under field conditions, after over two years of exposure. Ultramafic (UM) rock is non-potentially acid generating (NPAG) and has the highest median buffering capacity of all rock types. The bulk of the Intermediate Volcanics (IV) rock type is NPAG (Golder, 2014).

Table 3-7 : Summary of Kinetic Testwork for Pit Rock (Cumberland, 2005d)

Area Lithology	Portage			Vault IV
	UM	IF	IV	
Proportion of Pit Rock Waste	36%	37%[a]	28%	13.50
ARD Potential[b]	2% PAG 2% Uncertain 96% NPAG	67% PAG 13% Uncertain 20% NPAG	20% PAG 14% Uncertain 66% NPAG	14% PAG 11% Uncertain 75% NPAG
Laboratory Test Leachate MMER Exceedances	As	pH, Zn	n.e.[c]	n.e.[c]
Field Barrel Test Leachate MMER Exceedances	n.e.	n.e.	n.e.	n.e.

a) IF rock proportions include 2% of quartzite rock
b) Based on static testing database
c) Result from the 100-kg composite sample
n.e.: no exceedances

The relative potentials of the rock types to generate ARD or leach metals under neutral drainage conditions and the implications for potential use as construction rock are presented in Table 3-8. This is based on a classification system used to identify the appropriate use and storage for all mine rock. This system identifies PAG or NPAG rock types and those with the potential for metal leaching (ML) (Golder, 2014).

Table 3-8 : Rock Types and Potential for ARD (Cumberland, 2005a)

Open Pit	Material Type	Potential for ARD	Potential for ML	Restrictions for Storage or use in Construction
All Pits	Overburden	None	Low	None
	Tailings	High	High	Requires measures to control ARD
	Lake Sediment	Variable (none to high)	High	May require collection and treatment of drainage
Portage and Goose	Ultramafic and Mafic Volcanic	None	Low	May require collection and treatment of drainage
	Intermediate Volcanics	Variable (none to moderate)	Moderate	Requires measures to control ARD
	Iron formation	High	High under ARD conditions / Low under neutral conditions	Requires measures to control ARD
	Quartzite	High	Low	Co-disposal with ultramafic/mafic volcanic or cap/water cover
Vault	Intermediate Volcanics	Low	Variable (low to moderate)	May require collection and treatment of drainage

Waste rock represents all rock materials, except ore and tailings, that are produced as a result of mining operations and have no current economic value.

PAG mine waste rock from Portage and Goose Pits are stored in the Rock Storage Facilities (mostly the Portage facility and backfill in the Portage Pit), which are designed for long-term stability with minimal environmental and aesthetic impact. The surface storage area will be constructed to minimize the disturbed area. The Portage Rock Storage Facility will be capped with a layer of NPAG waste rock to constrain the active layer within non-acid generating rock. The waste rock below the capping layer will freeze, minimizing ARD generation in the long term.

All of the waste rock from the Vault and Phaser/BB Phaser Pits can be stored in the Vault Rock Storage Facility northwest of the pit. Geochemical predictions indicate it will not be necessary to place capping over the Vault Rock Storage Facility

The tailings chemistry will be dependent on the origin of the processed ore. It is estimated in the Meadowbank FEIS that 53% of the ore processed will originate from the Portage deposit, 8% from Goose deposit, and 39% from the Vault deposit. A summary of the tailings chemistry is provided in Table 3-9. The North and South Cells Tailings Storage Facilities will be capped with a layer of NPAG waste to constrain the active layer within non-acid generating rock. The tailings below the capping will freeze, minimizing ARD.

Table 3-9 : Summary of Tailings Chemistry at Meadowbank (Cumberland, 2005c)

Deposit	Portage	Goose	Vault
Proportion of Total Tailings	53%	8%	39%
ARD Potential of Tailings	PAG	PAG	PAG
Flotation Circuit Tailings MMER Exceedances	pH, Cu, Ni, Zn	pH, Cu, Ni, Zn	n.e.
Whole Ore Circuit Tailing Composite Sample[a] MMER Exceedances	n.e.	n.e.	n.e.

a) Sample consisting of 54% Portage, 8% Goose, and 39% Vault whole ore tailings.
n.e.: no exceedances

Whale Tail tailings are also considered PAG. 100% of the Whale Tail tailings will be deposited in Goose and Portage pits sub-aqueously. At closure, a water cover will be maintained above the tailings to limit contact of the tailings with oxygen, thus limiting the potential of ARD formation.

3.3.5.2 Geochemical Monitoring

During the operations, Agnico Eagle sampled approximately 25% of blast holes and analyzed the percentages of sulphur and carbon. The results from these analyses are used to differentiate NPAG from PAG materials. Refer to Table 3-10 for a summary of Acid Rock Drainage (ARD) Guidelines used to classify Meadowbank waste rock. The operational acid/base accounting used for waste rock designation (PAG and NPAG rock) is described as well as the frequency of sampling in the Operational ARD/ML Testing and Sampling Plan (Agnico Eagle, 2013c). Once characterized by the geology team, the waste rock material is segregated and placed in appropriate location.

Table 3-10 : Summary of Tailings Chemistry

Initial Screening Criteria	ARD Potential
NPR < 1	Likely Acid Generating (PAG)
1 < NPR < 2	Uncertain
2 < NPR	Acid Consuming Non Potentially Acid Generating (NPAG)

The mine geology staff uses the derived NPR to characterize the rock in the blast pattern. Mine surveyors use this information to delineate the dig limits within the blasted rock to guide the shovel and loader operators in directing where the rock is to be taken.

Segregation of ore, waste rock as PAG or NPAG material based on operational testing during mining activity to differentiate waste rock type is part of the Meadowbank Waste Rock Management Plan. Sampling and testing of waste materials for acid rock drainage (ARD) is conducted during mine operation in order to segregate PAG waste from NPAG waste rock material, so that waste material can be assigned to specific locations or use. This practice has been ongoing since the beginning of the mining operations at Meadowbank, and will continue during the remaining operation period. The geochemical properties of all Meadowbank mining wastes have been confirmed with duplicates samples sent to certified laboratory, through both static and kinetic testing on numerous representative samples, by various test methods and through multiple project development stages.

In the FEIS, it was determined that for Vault, 14% of the rock will be PAG, 11% uncertain and 75% NPAG. Analysis from Agnico's internal determination shows that in 2017, for Vault material, 8.8 % are PAG, 15.3 % are uncertain and 75.9 % are NPAG. Ultimately, there is a slightly higher ratio of NPAG versus what was initially predicted. Similar results were obtained in 2014, 2015 and 2016. As a mitigative measure any PAG or uncertain waste rock material is placed in the middle of the Vault Rock Storage Facility while NPAG material is placed on the perimeter to encapsulate the PAG material (Agnico Eagle, 2018c).

Agnico Eagle takes throughout the year quarterly samples of tailings that are sent to an accredited laboratory to analyze for ARD potential and metal leaching. Table 3-11 below presents the results of 2017. The results indicate that the tailings are PAG but have low metal leaching potential. These sample results are also integrated in the Water Quality Forecast updated yearly. Tailings samples analyses were also integrated in the design of the TSF cover for closure.

Table 3-11 : 2017 Tailings Monitoring (2017 Annual Report, Agnico Eagle, 2018c)

Analysis	Units	14 jan-2017	3 Apr-2017	4 Jul-2017	6 Nov-2017
NP	t $CaCO_3$/1000t	33	64	94	69
AP	t $CaCO_3$/1000t	76,6	58,4	72,5	50,6
Net NP	t $CaCO_3$/1000t	-43,4	6,06	21	18,1
NP/AP	ratio	0,43	1,1	1,29	1,36
Sulphur	%	2,67	1,94	2,46	1,92
Acid Leachable SO4-S	%	0,22	0,07	0,17	0,3
Sulphide	%	2,45	1,87	2,29	1,62
C	%	0,436	0,87	0,884	0,862
CO_3	%	1,02	2,04	2,16	2,74
Final pH	units	1,78	1,73	1,83	1,55
As	mg/L	0,0220	0,094	0,053	0,035
Cu	mg/L	0,053	0,054	0,047	0,064
Ni	mg/L	0,073	0,066	0,037	0,092
Zn	mg/L	0,088	0,013	0,092	0,079

3.4 Biological Environment

Baseline studies on vegetation, and terrestrial wildlife in and around the Project area were conducted for 3 study areas (Cumberland, 2005e):

- A regional study area (RSA) centered on the Project area, and encompassing the mine site, the AWAR and the Baker Lake Marshaling Area;
- A local study areas (LSA) centered on two sites, the Portage and Goose deposit area and Vault deposit; and
- The AWAR LSA composed of a 3 km wide corridor centered on the AWAR.

A map illustrating the three baseline study areas is provided in Appendix L. Baseline surveys were conducted for the terrestrial components described below.

3.4.1 Overall Ecosystem

The Project Area is characterized by a continuous vegetation cover interspersed with bedrock outcroppings and continuously aggrading surfaces. Vegetative cover is composed of lichens, mosses, ericaceous shrubs and heaths, herbs, grasses, and sedges (Golder, 2014).

3.4.2 Vegetation Habitat

Baseline vegetation studies were conducted in 1999 and 2002 for the mine LSA and in 2005 for the AWAR road (Cumberland, 2005e). An inventory of the flora plant communities was performed and showed that vegetation at the mine site is typical of upland tundra. No sensitive, rare, regionally unique or endangered species or communities were identified within the Project area or AWAR LSA (Cumberland, 2005a). The baseline studies provided field data and set the framework for the Ecological Land Classification (ELC) units. In addition, a land classification initiative undertaken by the Nunavut Department of Sustainable Development provided additional ground data and the mapping methodology used to generate to the ELC mapping (Cumberland, 2005e).

The thirty-one ELC units identified to describe the vegetation characteristics of the mine site RSA are shown in Appendix L. Further details are found in the baseline terrestrial report (Cumberland 2005e). The ELC units for the Project area are defined in Appendix L.

Water is the most common ELC unit within the mine site LSA, covering about 31% of the land surface. The most common vegetated unit within the mine site LSA is Sedge, covering approximately 20%. Other common ELC units are Rock & Boulder and Lichen-Rock. Heath Tundra is the most common ELC unit within the access road LSA, covering approximately 29%. Other common ELC units are Lichen and Birch & Riparian Shrub. Similarly, Heath Tundra is the most common ELC unit within the RSA, covering about 23%, followed by Water (19%), Lichen (14%), and Birch & Riparian Shrub (13%) (Golder, 2014).

Vegetation surveys at Meadowbank identified 121 vascular plant species (including hybrids and intergrades) from 26 families in the project area during the 1999, 2002 and 2005 baseline surveys. An additional 56 vascular plant species are likely to occur near the proposed mine development, but were not observed during field surveys. In addition, 53 non-vascular plants, primarily lichens, were identified during the same surveys;

however, many of the non-vascular plants collected during those surveys remain unidentified (Cumberland 2005e).

No rare vascular plants or plant communities were found in the Project area. Although it is possible that some rare non-vascular species (e.g., lichens) may be present, very little is known of non-vascular plant distribution in the Arctic and most species are difficult to identify (Golder, 2014).

Seven vascular plant species of restricted range are known or expected to occur in the area, but none are considered to be rare or of special concern. These species include greyleaf willow, Bell's crazyweed, mountain heather, diapensia, alpine pussytoes, marsh marigold, and Rocky Mountain cinquefoil. Of these, the first five species were all recorded in the Project area (Golder, 2014).

3.4.3 Aquatic Biota and Habitat

Studies targeting the ecological characteristics of the aquatic environment in the Project mine site area have been conducted since 1991 and were compiled in the baseline aquatic ecosystem report (Cumberland, 2005f). Results indicate that the Project lakes are ultra-oligotrophic/oligotrophic (i.e., nutrient poor and unproductive) lakes. Although biological productivity of the lakes is limited by nutrient availability, cold water and a short growing season, they support healthy communities of plankton, benthos and fish that are typical of oligotrophic Arctic lakes (Cumberland, 2005f).

The headwater nature of the lakes in the Project area, their great distance from marine waters of Hudson Bay, the paucity of stream habitat, and impassable falls (i.e., Quoich River Falls) also determine why certain fish species are found in great abundance and why others are absent. For example, the high latitude, cold climate, and near absence of stream habitat explains the lack of Arctic grayling (Thymallus arcticus). Grayling require stream habitat for spawning during spring as well as for feeding. Their absence from the project area is due in great part to the lack of suitable habitat, but also because the project lakes are situated near the maximum northern range of their distribution (McPhail and Lindsay 1970). The lack of snow cover and brief freshet in spring does not provide sufficient water flow and adequate water temperature for successful incubation of eggs by grayling (Golder, 2014).

Lake cisco are also absent from the mine site lakes and are not known to occur in this watershed (Lawrence and Davies 1977, MacDonald and Stewart 1980). Arctic cisco are relatively abundant in lakes near Hudson Bay, where they have easier access to the ocean. Cisco, like Arctic char, often travel back and forth between the lake and marine environment, where they spend the short summer months foraging near shore in the brackish water, returning to lakes to overwinter (Golder, 2014).

Lake trout and round whitefish dominate in the mine site lakes and are typically the two most common species in Arctic headwater lakes in Nunavut and the Northwest Territories (Scott and Crossman 1979). Lake whitefish are also known to be present in other watersheds in this region, but are absent from the Quoich River system (Lawrence et al. 1977, MacDonald and Stewart 1980). This species is near the edge of its northerly distribution, which may also explain its absence in the mine site area lakes (Golder, 2014).

Landlocked (i.e., non-anadromous) Arctic char are present in all of the mine site lakes, although relative abundance differs among lakes. Char generally tend to be relatively more abundant in downstream lakes than upstream lakes. South of Tehek Lake, anadromous char are known to migrate up the Prince River to Whitehills Lake, which is used by Arctic char to overwinter (MacDonald and Stewart 1980).

Other fish species that comprise a very minor abundance (<1% combined) include burbot (Lota lota), ninespine stickleback (Pungitius pungitius) and slimy sculpin (Cottus cognatus). Burbot typically occur in deep water portions of lakes, and, given the lack of stream habitat are limited to lake basins. Unlike other species, they spawn during mid-winter under the ice over sand, gravel, and rubble substrates in shallow depths (Scott and Crossman 1979, Richardson et al. 2001). Juveniles and adults inhabit rocky shorelines at margins of deeper areas of lakes, as well as in deeper areas away from shorelines and shoals. Sculpin are spring spawners and spawn over sand, gravel and rock substrates in shallow water. Seasonal movements within lakes are restricted and this species is often favored as a sentinel species. Ninespine sticklebacks are widespread in lakes and streams and inhabit shallow bays, ponds, and stream channels. Although stickleback prefer areas with macrophytes and vegetation, given the absence of aquatic plants in the mine site lakes, stickleback were associated with coarse substrates with good shelter nearshore associated with rocky, cobble shorelines (Golder, 2014).

3.4.4 Wildlife

3.4.4.1 Baseline Wildlife Data

Due to the extreme northern climate and low structural heterogeneity, relatively few terrestrial vertebrates are found in the Project area. During the baseline wildlife surveys, 61 terrestrial wildlife species were recorded: 12 mammals; 49 birds; and no amphibians or reptiles (Cumberland, 2005e).

Barren-ground caribou is a key mammal as the Baker Lake Inuit population heavily depends on it for food. Caribou are listed as secure in Nunavut (GN, 2001), and as a species of Special Concern federally (COSEWIC, 2010). They are currently not under any of the schedules of the Species At Risk Act (SARPR, 2010). Seasonal and yearly differences of the various population parameters are difficult to determine as little scientific information is available on local caribou population parameters, distribution, abundance, and migration corridors.

However, Inuit traditional knowledge of caribou is extensive as they are of very high value to the people in Baker Lake and other communities. Based on traditional and scientific knowledge of the area, caribou are present in the RSA in considerable numbers during the fall, winter, and spring, but are very sparsely distributed in summer. Caribou wintering in the RSA appear to originate from a number of different herds in the region, including the Beverly, Qamanirjuaq, Lorillard, Wager Bay, Boothia Peninsula, and Ahiak herds. In February 2004, an estimated 21,000 caribou were recorded in the area (Cumberland, 2005e). Agnico Eagle has participated with the Government of Nunavut Department of Environment Caribou satellite collaring program since 2008. The joint satellite-collaring program was developed to provide information on the distribution of caribou occurring within the Meadowbank RSA and contribute data to other ongoing satellite collaring programs for the Beverly and Qamanirjuaq herds. Based on the results of this monitoring program, collared caribou were primarily present in the Meadowbank RSA and LSA during the early winter period, although some presence during spring migration also occurred. Calving or post calving has not been documented within the Meadowbank study area to date (NEC, 2013).

Barren-ground caribou was the most common mammal species recorded during baseline surveys. Other common mammal species recorded in the Meadowbank area included muskox (Ovibos moschatus), Arctic wolf (Canis lupus arctos), Arctic hare (Lepus arcticus), Arctic ground squirrel (Spermophilus parryi) and Arctic fox (Alopex lagopus). Grizzly bears (Ursus arctos horribilis) and wolverines (Gulo gulo) are occasionally seen in the Meadowbank area. Relevant existing traditional and scientific knowledge on key wildlife species was documented and supplemented with wildlife surveys during the terrestrial baseline study (MMC, 2007).

The bird species observed in greater numbers than any other species during the surveys were snow goose (Chen caerulescens), Canada goose (Branta canadensis), Lapland longspur (Calcarius lapponicus), and horned lark (Eremophila alpestris). Other commonly observed breeding bird species were savannah sparrow (Passerculus sandwichensis), semipalmated sandpiper (Calidris pusilla), sandhill crane (Grus canadensis), and rock ptarmigan (Lagopus mutus). Sandhill crane, Canada goose, and snow goose were most common during the migratory period. Raptors, as well as all three species of jaegers, were recorded occasionally during baseline surveys (Golder, 2014).

3.4.4.2 Wildlife monitoring

As a requirement of the NIRB Project Certificate, the 2017 Wildlife Monitoring Summary Report represents the 12th of a series of annual Wildlife Monitoring Summary Reports for the Meadowbank Mine. Baseline and monitoring programs were first initiated in 1999 and will continue throughout the life of the mine. The complete report presenting the whole program and complete analysis of the result is presented in Appendix G13 of the 2017 Annual Report (Agnico Eagle, 2018c).

The GN Caribou (Rangifer tarandus) collaring program, ongoing for the past 10 years in the Baker Lake area, continued in 2017 with monitoring of existing collared animals.

Wildlife protection at Meadowbank is ensured by various protocols implemented during operations and presented in the Terrestrial Ecosystem Monitoring Plan (TEMP, a component of the FEIS). Road closures were implemented at specific times of the year under certain conditions to ensure safe passage of migrating Caribou herds. Waste management has also been implemented to limit wildlife attractant. In general, improved food-handling practices and employee awareness programs at the mine site have helped prevent mine-related fatalities.

The raptor nest survey monitoring program has been designed to confirm that mine-related activities do not result in inadvertent negative effects on nesting raptors. To construct the AWAR in 2007/2008, excavated and blasted rock materials were used from numerous quarries along the alignment, resulting in the creation of some moderate and high suitability raptor nesting habitat areas characterized by steep rock walls. Established nests within some of these quarries are monitored on an annual basis to evaluate occupancy.

3.5 Social Environment

The Project area is located in the Kivalliq Region, one of three administrative regions in Nunavut. The 2001 population estimates indicate that over 7,500 people spread among seven communities live in the Kivalliq region (Cumberland, 2005g). Baker Lake, with an estimated population of over 1,500 in 2001, is the only inland community in the region. The regional economy is mixed, combining the formal wage economy with traditional ways of life. Participation in traditional ways of life is high, at about 50% both in Nunavut as a whole and in Baker Lake (Golder, 2014).

3.5.1 Recent and Traditional Land Use

Based on information from the Elders of Baker Lake, the area between Baker Lake and the Meadowbank site was most commonly used as part of a transportation corridor between Baker Lake and the Back River, their traditional winter hunting and fishing area. The traditional winter transportation route passed directly through Third Portage Lake. While hunting and fishing activities were, and still are, conducted near the mine property, these activities seem to be of an opportunistic nature while enroute to Back River and beyond. The Inuit also stop to camp at various lake sites—including the Portage Lakes—but these sites are not annually used. More permanent camp sites utilized by both current residents and their ancestors are further north (Golder, 2014).

Traditionally, Tehek and the Portage Lakes were used extensively for fishing, fox trapping, caribou hunting, and food caching (Cumberland 2005g). This area is also reported by the Elders to be very spiritual, and grave sites exist along the shore of Second Portage Lake. There are also other grave sites located randomly throughout the area between Baker Lake and the Project site. No permanent outpost camps or commercial tourist facilities exist in the vicinity of the Project site, and no known traditional use areas were identified within the footprint of the Project area (Golder, 2014).

In 2016/2017, the third report on the Meadowbank Gold Mine Socio-Economic Monitoring Program (SEMP) was developed in consultation with the Kivalliq Socio-Economic Monitoring Committee (SEMC).

The socio-economic monitoring report is updated yearly and submitted with the annual report.

Monitoring results were provided on the following valued socio-economic components (VSECs) (Agnico Eagle, 2018c):

- Employment;
- Income;
- Contracting and Business Opportunities;
- Education and Training;
- Culture and Traditional Lifestyle;
- Migration;
- Individual and Community Wellness;
- Worker Health and Safety;
- Community Infrastructure and Services;
- Nunavut Economy.

In the Meadowbank IIBA, Agnico has also committed to prepare an annual Baker Lake Wellness Report & Implementation Plan. The KIA has agreed that the report and plan will be community-based and driven.

3.5.2 Archaeological and Cultural Site

Archaeological surveys were conducted in 1999, 2003 and 2005. The surveys covered the following main areas (Golder, 2014):

- Mine site and vicinity;
- The winter road alignment during the exploration phase, which is near the AWAR alignment;
- Selected sites outside the development area; and
- The Baker Lake Site Facilities.

Approximately 70 sites of interest have been identified and detailed information on these sites are found in the Baseline Archaeology Report (Cumberland, 2005h). Additionally, archaeological surveys were conducted by FMA Heritage Resources Consultants Inc. in 2007 and 2010 to supplement previous studies (Golder, 2014).

The area between Baker Lake and the Project site is considered primarily a transit route to the traditional winter hunting and fishing area of Back River, as evidenced by the many campsites and other heritage features along the corridor. Most of the sites encountered in the study area were temporary campsites and were occupied recently, probably within the last 50 years. No Pre-Dorset or Dorset sites were encountered in the study area, and only one Thule or early historic site was visited (Cumberland 2005h). Additionally, Baker Lake residents continue to hunt here and construct stone features in the traditional manner, particularly caches and tent rings (Golder, 2014).

Consequently, there is a continuous temporal range which presents considerable difficulty in differentiating recent use from past use that would be considered archaeological (defined as more than 50 years old). The AWAR was designed to avoid any potential archaeological sites. The sites surveyed were typically small scale with one or two features of interest. The types of features encountered at the various sites included tent rings, semi-subterranean houses, autumn houses, hearths, shelters, inuksuit, markers, blinds, caches, storage features, kayak stands, fox traps, graves, campsites, killsites, and unidentified features (Golder, 2014). Further details can be found in the Baseline Archaeology Report (Cumberland 2005h) and the supplemental study reports (FMA 2007, 2010).

4.0 Project Description

4.1 Location and Access

The mine site of the Project is located in the Kivalliq region, Nunavut, approximately 70 km north of the Hamlet of Baker Lake, as shown in Figure 1-1. Mineral tenure covers 28,888 hectares and includes ten grandfathered Federal mining leases and three exploration concessions acquired from Nunavut Tunngavik Incorporated. The mine site is accessed by plane via the private Meadowbank Aerodrome (TC LID: CMB2), which is located 1 nautical mile (1.9 km; 1.2 mi) northeast of Meadowbank Gold Mine, Nunavut, Canada (latitude 65° 1′ 7″ N, longitude 96° 4′ 26″ W). Meadowbank Mine relies on marine transportation (to Baker Lake) for most of its supplies including fuel, construction and operation equipment, materials and consumables, including dangerous goods, food, household goods and other non-perishable supplies.

4.2 Site History

The exploration phase of the Project began in 1995, after Cumberland Resources Ltd. (Cumberland) purchased a 60% interest in the Project from Asamera Minerals and formed a joint venture with Comaplex Minerals. Cumberland acquired the 40% interest held by Comaplex Minerals in 1997 and hence became the sole owner of the Project. Cumberland later formed a subsidiary: Meadowbank Mining Corporation (MMC). Agnico Eagle acquired its ownership in Meadowbank in 2007 when it acquired Cumberland Resources. First gold pour was completed in February 2010. Pre-feasibility engineering and environmental baseline studies, as well as community consultations, have paralleled the exploration programs. The Project was advanced to the feasibility phase in 2003, and the final environmental impact assessment was submitted to NIRB in 2005. A certificate for the development of the Project was granted by NIRB in 2006. As part of the implementation of the Project, permits and Licences were also obtained from the Nunavut Water Board (NWB), the Kivalliq Inuit Association (KIA), the Government of Nunavut (GN), Aboriginal Affairs and Northern Development Canada (AANDC; formerly INAC) and Fisheries and Oceans Canada (DFO). An Inuit Impact and Benefit Agreement for the Meadowbank mine (the ‘‘Meadowbank IIBA’’) was signed with the Kivalliq Inuit Association to ensure that local employment, training and business opportunities arising from all phases of the project are accessible to Inuit Beneficiaries living in the Kivalliq region and was renewed in 2017.

The Project components consist of the mine site (Figure 2-1) presented in Section 2.1, the Baker Lake Site Facilities (Figure 4-1) and the All Weather Access Road (AWAR, Figure 4-2) linking Baker Lake to the mine site. Construction of the AWAR was initiated in 2007 and completed in 2008. The development of the Project has required periodic construction activities since the exploration phase (i.e., South and North Camps and airstrip). The original water retention dikes, which allow for mining beneath shallow lakes, were the East Dike in Second Portage Lake and the small West Channel Dike. They closed off the North Portage pit area, so that approximately 16 million liters of water could be pumped out before mining could begin at Meadowbank.

Construction activities at the mine site and the Baker Lake Site Facilities, for the purpose of mining operations, began in 2008. Mining was initiated in 2009; operations at the mine process plant started in early 2010, and thus the Project is entering its ninth year of operations. In addition to routine activities throughout the 2018 season, a number of secondary construction/modification projects will be undertaken. Construction of the Central Dike Phase 7, planned North Cell Internal Structure (depending on regulatory approval) and Saddle Dam 3 Phase 4 will be completed in 2018. In addition, evaluation of future tailings deposition options will be considered in 2018. The mining operations at the Meadowbank site are scheduled to be completed in September 2018 (refer to Section 4.4.1, Tables 4-1 to 4-4 for detailed LOM and schedule).

Environmental monitoring (wildlife, aquatic effects, groundwater, noise and air) will continue yearly in support of all operational undertakings at the Meadowbank site as required by the NWB Type A Water Licence 2AM-MEA1525, NIRB Project Certificate No.004, DFO authorizations, and MMER regulations.

A first closure and reclamation plan (Agnico Eagle, 2008) was developed before the start of mining operations and represented an updated compilation of the following components:

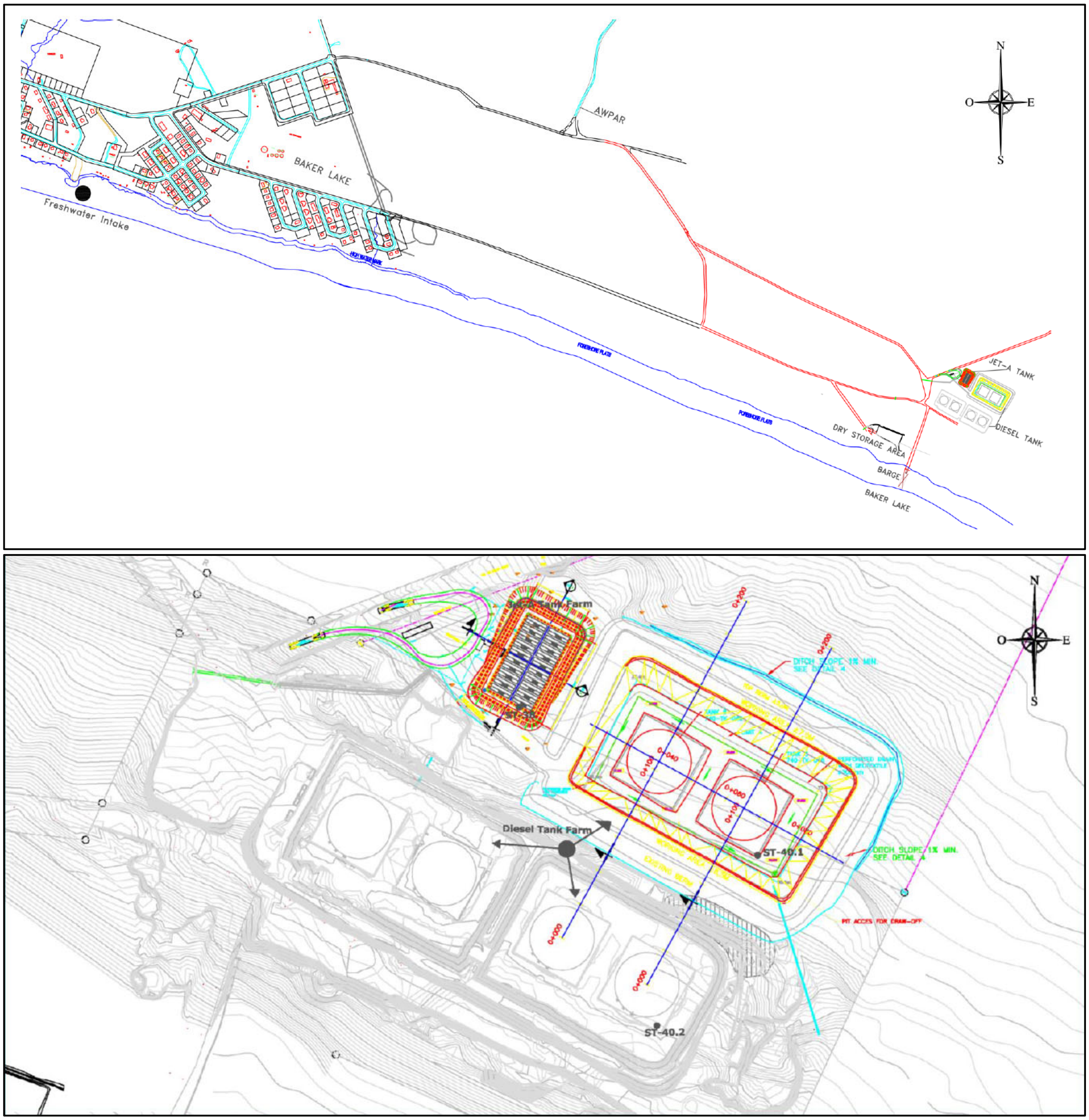
- Meadowbank Gold Project, Reclamation Cost Estimate (Brodie 2008);
- Abandonment and Restoration Plan, Agnico-Eagle Meadowbank Project, Baker Lake Facilities, Licence 8BC-MEA0709, October 24, 2007 (Agnico Eagle, 2007a);
- INAC Lease 66A/8-71-2 & 66A/8-72-2, Updated Closure and Reclamation Plan for the Tehek Lake All Weather Private Access Road, Baker Lake – Meadowbank, December 17, 2007 (Agnico Eagle, 2007b); and
- Meadowbank Gold Project, Preliminary Closure and Reclamation Plan, August, 2007 (MMC, 2007).

An ICRP, produced by Golder Associates in January 2014, was an update of the 2008 closure and reclamation plan.

Following an internal technical study, in February 2017, the Whale Tail satellite deposit at Amaruq was approved for development, pending the receipt of required permits. Agnico Eagle is proposing to develop the Whale Tail Pit, a satellite deposit located on the Amaruq property, to continue operations and milling at Meadowbank Mine. The proposed open pit mine, mined by truck-and-shovel operation, will produce 8.3 million tonnes of ore that will be hauled and processed at the Meadowbank Mill. The tailings will be deposited in the approved TSF facilities, under Agnico Eagle existing Type A water Licence 2AM-MEA1525. The operations (mining and ore processing) will continue approximately 3 years with the Whale Tail Pit, from Q3 2019 to early 2022.

As the Whale Tail project is going through the permitting process to obtain its specific Type A Water Licence, it is understood that all operations components of Whale Tail Pit and Amaruq Exploration/Hauling Road are included specifically in the Whale Tail Interim Closure and Reclamation Plan (Golder, 2016a). Only the activities covered under the Meadowbank Type A Water Licence 2AM-MEA1525 will be included in this updated Meadowbank ICRP.

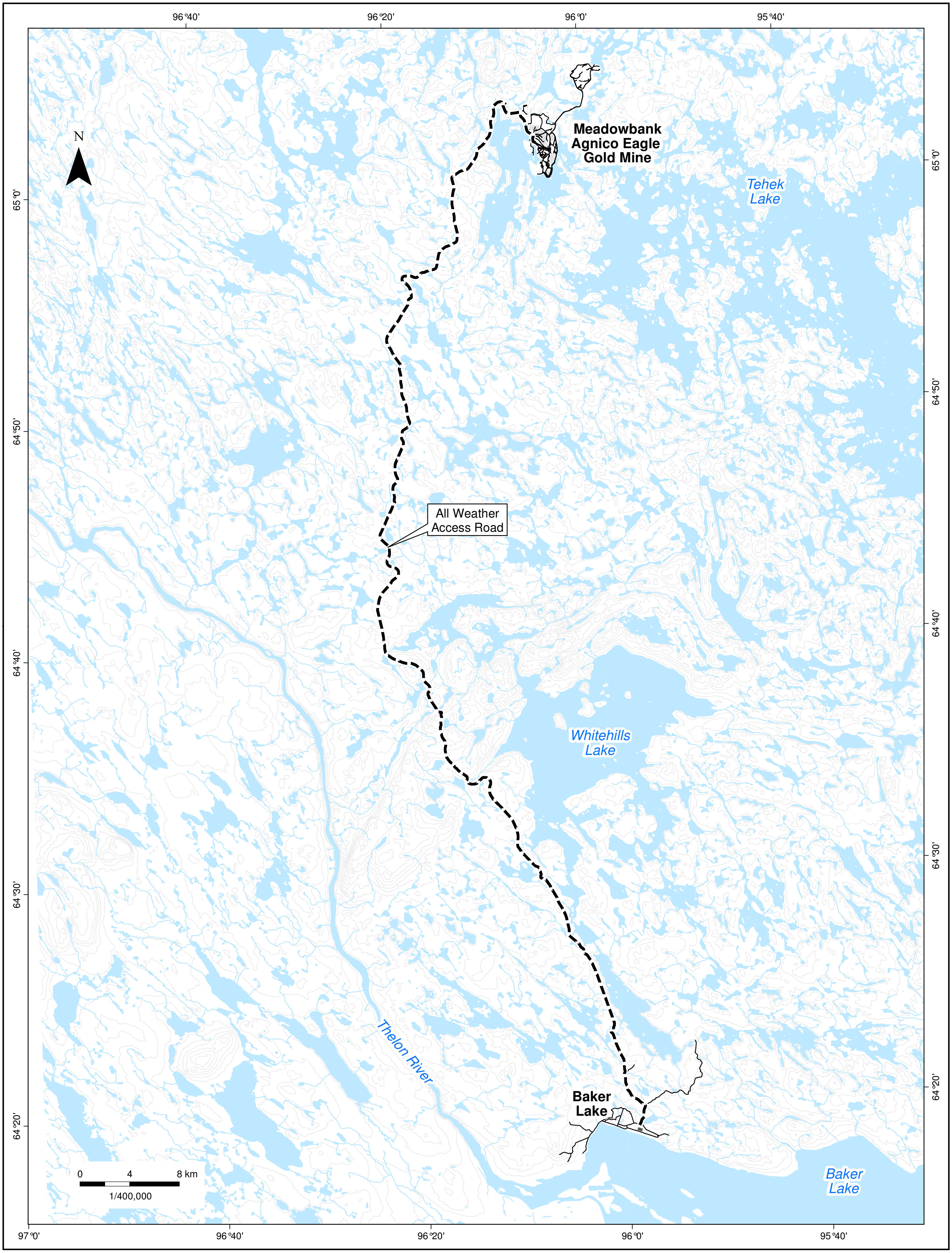
Figure 4-1 : Baker Lake Site Facilities



(Source : Agnico Eagle, Oil Pollution Emergency Plan, Version 7, May 2016; Meadowbank Annual Report 2016 (2017a))

All Weather Access Road (AWAR)

Figure 4.2



4.3 Site Geology and Ore Processing

Gold deposits are found along two main structural features that cross the property – the Meadowbank Trend and the Pipedream Lake (Northeast) Trend (refer to Appendix J). The Meadowbank Trend hosts the Goose, Portage and Vault deposits, which are the sites of mining. These shallow deposits lie within 7 km of each other. In all deposits, gold mineralization is commonly associated with intense quartz flooding, and the presence of sulphide minerals (pyrite and/or pyrrhotite). The Goose and Portage deposits are hosted by magnetite-rich iron formation, while intermediate volcanic rocks host most of the mineralization at the Vault deposit farther north. Both the rock units and the gold deposits are tightly folded and structurally complex, sandwiched between granite plutons (Agnico Eagle website, consulted May 2018).

Since this updated Meadowbank ICRP includes the activities related to ore processing and tailings deposition from the additional ore from Whale Tail Pit, the Amaruq property geology is presented herein. The Amaruq property is underlain by Archean supra crustal rocks of the metamorphosed Woodburn Lake Group; the same sequence as at the Meadowbank Mine. These rocks are believed to have been deposited in a continental rift setting. They are comprised of mafic to ultramafic volcanic and volcaniclastic rocks interlayered with clastic sedimentary units that include greywacke, siltstone, mudstone, chert and banded iron formation. This rock sequence has been intruded by granitoid rocks and lamprophyres, and underwent multiple deformation events and metamorphism to the upper greenschists facies. There are four Paleo-Proterozoic aged events of deformation recognized, two of which have significant effects on the geometry of the deposit. There are four Paleo-Proterozoic aged events of deformation, two of which have significant effects on the geometry of the deposit. The main lithological units associated with the Whale Tail deposit include: ultramafic komatiites, clastic sedimentary rocks, mafic volcanic rocks and felsic to intermediate intrusive rocks (Golder, 2016a).

Until now, Meadowbank has conducted surface mining from a series of three pits all within 7 km of the processing plant. Water retention dikes have been built to allow for mining beneath shallow lakes, using a unique in-water dike construction method. The mine works year-round, using conventional drilling, blasting, truck and shovel methods. Waste rock is used for construction, or dumped in waste storage facilities or previously mined-out areas. To minimize acid generation, the sulphide-bearing waste rock is encapsulated in permafrost and capped with an insulating layer of neutralizing rock.

The 11,000-tonne/day gold processing plant uses conventional technology adjusted to the Arctic climate. Any “free gold” is removed by a gravity circuit. The remainder is leached using cyanide, with the gold captured using carbon-in-pulp technology and electrowinning cells. Gold-plated cathodes and gravity concentrate are smelted in an induction furnace and poured as doré bars. The plant includes both a cyanide recycling thickener and an air-sulphur dioxide cyanide destruction circuit to ensure that no cyanide escapes to the environment. All water from the tailings pond is pumped back to the plant for reuse, making this a zero-discharge system. The plant will require minor modifications to treat the Whale Tail Pit ore, specifically the addition of a continuous gravity and regrind circuit, and is expected to operate at 9,000 tonnes/day.

4.4 Project Summary

The Meadowbank Gold Mine consists of several gold-bearing deposits within reasonably close proximity to one another. The three main deposits are: Vault (including Phaser and BB Phaser), Portage (South, Center and North Portage deposits), and Goose, as presented on Figure 2-1.

The South Portage deposit is located on a peninsula, and extends northward under Second Portage Lake (2PL) and southward under Third Portage Lake (3PL). The North Portage deposit is located on the northern shore of 2PL. The South, Center and North Portage deposits are mined as a single pit, termed the Portage Pit, which extends approximately 2 km in a north-south direction. The Goose deposit lies approximately 1 km to the south of the Portage deposit, and beneath a portion of 3PL. The Vault deposit is located adjacent to the former Vault Lake, approximately 6 km north of the Portage deposits. Phaser and BB Phaser Pits are located west of the Vault Pit, in the former Phase Lake. A series of dewatering dikes (East, West Channel, Bay-Goose, South Camp and Vault dikes) were required for dewatering to isolate the mining activities from the lakes. Additional dikes (the Central Dike, Stormwater Dike and Saddle Dams) are required to manage tailings within the dewatered 2PL Arm.

4.4.1 Project Mine Plan

In 2018, Agnico Eagle mining plan (Agnico Eagle, 2018b) is to operate Portage and Vault pits at the Meadowbank mine site. The waste rock management plan for 2018 is to maximize waste storage facility utilization and minimize haulage cycle times which will, in turn, minimize the greenhouse gas emissions and impact on the environment. Environmental monitoring (wildlife, aquatic effects, groundwater, noise and air) will continue through 2018 in support of all operational undertakings at the Meadowbank site as required by the NWB Type A Water Licence 2AM-MEA1525, NIRB Project Certificate No.004, DFO authorizations, and MMER regulations. Tables 4-1 to 4-4 present the detailed Life of Mine (LOM).

Table 4-1 presents the projected mill throughput with the expected quantities of ore to be processed from 2018 to 2022, as well as the ore origin. The end of ore processing from Meadowbank is expected in September 2018, following by a transition period of 9 months. The processing will then restart with ore from Whale tail Pit, from July 2019 to 2022.

The mined tonnages at Meadowbank for ore and waste rock realized for 2017 is presented in Table 4-2. The projected mined tonnages for 2018 are presented in Table 4-3. The NPAG waste rock projected closure requirements for 2018 and 2019 at Meadowbank are presented in Table 4-4, including the various closure construction works.

The waste rock tonnage for Whale Tail Pit is not presented herein as the waste rock management for Whale Tail is included in the Whale Tail Interim Closure Plan (Golder, 2016a).

Table 4-1 : Projected Ore Processed at Meadowbank

Year/Month	Projected Ore Processed (Mill Throughput) (tonnes)	Origin
January-18	279 000	Meadowbank (Portage, Vault and Phaser/BB Phaser)
February-18	252 000	
March-18	279 000	
April-18	270 000	
May-18	279 000	
June-18	270 000	
July-18	249 065	
August-18	249 065	
September-18	241 031	
October-18	0	
November-18	0	
December-18	0	
TOTAL 2018	**2 368 161**	
January-19	0	Whale Tail
February-19	0	
March-19	0	
April-19	0	
May-19	0	
June-19	0	
July-19	276 726	
August-19	276 726	
September-19	267 799	
October-19	276 726	
November-19	267 799	
December-19	276 726	
TOTAL 2019	**1 642 500**	
January-20	279 766	
February-20	261 717	
March-20	279 766	
April-20	270 742	
May-20	279 766	
June-20	270 742	
July-20	276 726	

Year/Month	Projected Ore Processed (Mill Throughput) (tonnes)	Origin
August-20	276 726	Whale Tail
September-20	267 799	
October-20	276 726	
November-20	267 799	
December-20	276 726	
TOTAL 2020	**3 285 000**	
January-21	279 000	
February-21	252 000	
March-21	279 000	
April-21	270 000	
May-21	279 000	
June-21	270 000	
July-21	279 000	
August-21	279 000	
September-21	270 000	
October-21	279 000	
November-21	270 000	
December-21	279 000	
TOTAL 2021	**3 285 000**	
January-22	66 644	
TOTAL 2022	**66 644**	

Source: Water Balance, Agnico Eagle, 2018d

Table 4-2 : Meadowbank Mined Tonnages for 2017

Month	Ore	Portage Pit & Vault Pit – Waste Rock (PAG/NPAG) (tonnes) – Destination: Dikes	Roads	Crushers	Waste Rock Facilities[1]	Stockpiles	Other	Total	Ore Processed in Mill (tonnes)
January	386,298	45,991	0	12,301	1,498,959	14,815	6	1,572,073	331,889
February	374,894	6,084	22,937	23,998	1,251,365	404,648	2,977	1,712,008	314,269
March	376,855	167	8,508	12,614	919,668	483,332	583	1,424,872	279,684
April	355,410	0	10,674	17,671	1,002,425	655,770	10	1,686,550	328,391
May	437,319	0	135,889	84,180	933,559	434,648	27,889	1,616,165	344,961
June	401,035	12,537	14,316	88,241	977,125	522,816	2,588	1,617,623	322,939
July	334,363	183,868	66,559	6,647	1,016,081	523,311	0	1,796,466	336,222
August	391,414	485,008	12,182	2,361	1,271,636	97,549	19,925	1,888,662	326,409
September	343,504	13,148	107,454	14,945	1,246,694	509,366	189	1,891,796	275,754
October	364,663	259,074	57,565	528	1,169,063	255,796	1,991	1,744,017	328,028
November	321,403	21,676	653	5,395	1,406,720	69,651	1,362	1,505,456	330,465
December	352,291	0	401	571	1,781,334		7	1,782,313	334,023
TOTAL	**4,439,449**	**1,027,553**	**437,137**	**269,453**	**14,474,629**	**3,971,701**	**57,528**	**20,238,001**	**3,853,034**

1. Waste Rock disposed at the waste rock facilities includes overburden stripped for exploitation of Portage Pit & Vault Pit

Source: Modified from Updated Mine Waste Rock and Tailings Management Report and Plan, 2017 (Agnico Eagle, 2018b)

Table 4-3 : Projected Meadowbank Mined Tonnages (2018)

		2018
Portage Pit	**Total Waste Rock (tonnes)**	**169,392**
	NAG (~ %)	27%
	PAG (~ %)	73%
	Till (tonnes)	0
	Ore (tonnes)	98,622
Vault Pit	**Total Waste Rock (tonnes)**	**1,464,113**
	NAG (~ %)	100%
	PAG (~ %)	<1%
	Till (tonnes)	0
	Ore (tonnes)	983,366
Phaser Pit	**Total Waste Rock (tonnes)**	**941,121**
	NAG (~ %)	100%
	PAG (~ %)	<1%
	Till (tonnes)	0
	Ore (tonnes)	167,817

1. Difference between pit mill feed and total mill feed is due to stockpiled material to be processed
Source: Updated Mine Waste Rock and Tailings Management Report and Plan, 2017 (Agnico Eagle, 2018b)

Table 4-4 : NAG Stockpile for mine closure requirement, Destinations & Tonnages (2018 – 2019)

Year/Mine Closure Items	2018	2019	TOTAL
Capping Portage Rock Storage Facility (PAG Dump) with NAG	1,157,318	0	**1,157,318**
	12%	0%	**8%**
Capping TSF (North Cell)	3,893,819	2,973,625	**6,867,444**
	39%	56%	**45%**
Capping TSF (South Cell)	0	0	**5245187**
	0%	0%	**0%**
Central Dike	0	0	**0**
	0%	0%	**0%**
Saddle Dams	0	0	**0**
	0%	0%	**0%**
Primary Crusher NAG capping	465,234	0	**465,234**
	5%	0%	**3%**
Goose Rock Garden/Finger Dikes (fish habitat compensation)	256,945	0	**256,945**
	3%	0%	**2%**
Stormwater Dike Capping	350,064	0	**350,064**
	3%	0%	**2%**
Capping Marginal Dump	642,600	0	**642,600**
	6%	0%	**4%**
NAG Stockpiles	3,256,830	2,364,450	**5,621,280**
	32%	44%	**37%**
All Portage NAG to be Stockpiled	10,022,810	5,338,075	**15,360,885**
	100%	100%	**100%**

Source: Updated Mine Waste Rock and Tailings Management Report and Plan, 2017 (Agnico Eagle, 2018b)

4.4.2 Project Facilities

4.4.2.1 Baker Lake Site Facilities

The Baker Lake Site Facilities are located about 2 km east of the Hamlet of Baker Lake, as shown in Figures 4-1 and 4-2. The Baker Lake facilities act as a transfer point and temporary storage for all dry freight and fuel materials arriving by barge prior to overland shipment to the mine site via the AWAR.

The infrastructures present on Baker Lake Site includes (modified from Golder, 2014):

- Barge Landing: All construction and operating supplies for the Project are transported on ocean freight systems to Baker Lake. A barge unloading facility and a container handler receive all shipments prior to redirecting them to the mine site;
- Bulk Fuel Storage Facility: The above ground Bulk Fuel Storage Facility includes six (6) 10 million liters (10,000 m^3) diesel fuel storage tanks to receive bulk shipment of diesel fuel and to provide sufficient above-ground fuel storage capacity to operate the Project for a year. The Bulk Fuel Storage Facility is located on the northeast corner of the Baker Lake Site Facility, approximately 300 m from the shore of Baker Lake. Fuel is shipped by barge to the facility, pumped from the barges to the storage tanks through a 200 mm hose, and distributed to highway vehicles or tanker trucks at a dispensing station located on the North side of the facility. The Bulk Fuel Storage Facility is used throughout the year. The tanks are located within a lined and bermed containment area capable of storing at least 110 % of the volume of one 10,000 m^3 storage tank. In addition, eighteen (18) - 100,000 L fuel tanks are located within a lined and bermed containment pad at the fuel storage area to provide jet fuel storage capacity. The dispensing station for the Jet A Facility is setup within an arctic container installed on a lined and compacted gravel pad. This lined area is capable of containing 110% of the volume of one 100,000L storage tank. A collection sump is also located within the lined pad to collect accidental spills or leakage. A secondary containment area lined with a low permeable geomembrane provides additional fuel confinement at the fuel tank farm;
- Dry Freight Storage Area: The general lay-down area of the dry freight storage area includes a terraced gravel based pad for stacking sea containers and other equipment. The area covers approximately 65,000 m^2. The roads and unloading platform of main traffic zones are covered with 1 m of compacted granular fill. The storage platforms are covered with 0.6 m of compacted granular fill to provide stable support;
- Access Roads: An all-season road links the Baker Lake Site Facilities to the AWAR leading to the mine site. Roads have a gradient of 8% or less and are typically covered with compacted granular fill;
- Water and Power Management: The general strategy for water management is to minimize sediment and pollutant mobilization by implementing best management practices during operation of the facilities. Water that has accumulated within the berms surrounding the Bulk Fuel Storage Facility is released to the environment once it is confirmed to meet all regulatory water quality criteria and approval has been granted from the government inspector;
- Power for the facilities: The facilities include the office trailer supplied by portable generators and yard lighting is provided by portable, diesel powered light towers.

4.4.2.2 All-Weather Access Road

The All-Weather Access Road (AWAR) is 108 km long and links the Hamlet of Baker Lake to the mine site, as shown in Figure 4-2. The AWAR was constructed above grade, using quarried material from non-acid generating rock. Its alignment is contained almost exclusively within the Prince River drainage to avoid stream crossings wherever possible. A total of 24 streams are crossed by the AWAR, using thirty eight (38) culverts and nine (9) bridges.

Additional culverts have been installed in low lying areas to accommodate surface drainage patterns. Only six crossings occur on streams used by Arctic grayling as a migration route and/or for spawning. These streams are crossed using bridges to mitigate potential impacts to the migratory fish populations. Most of the remaining streams have little or no fisheries habitat value as they are mostly small in size and do not connect fish-bearing lakes upstream or downstream of the proposed crossing (Golder, 2014).

Graded aggregate from quarries along the AWAR provided general road embankment fill. A total of 22 quarries were used, with rock that was determined to be not potentially acid generating (Cumberland, 2005i). Finer graded road surfacing fill was obtained from further processing of the coarse aggregate. Two structural fill types were used to construct the AWAR (Golder, 2014):

- Type 1 Fill: Minus 75 mm, well graded crushed “Granular Base”; and
- Type 2 Fill: Minus 300 mm well graded general “Rockfill”.

Additional Facilities along the AWAR consist of 3 communication towers. Typical communication towers include the following:

- Antenna;
- Receiver/transmitter unit;
- Foundation mounts; and
- Portable generator.

4.4.2.3 Dikes and Saddle Dams

Non-acid generating overburden and waste rock materials produced during initial mining on the Portage Peninsula and from the pits are used for dikes and dams adjacent to the receiving environment, with the exception of a portion of the Central Dike. Based on material balance estimations, sufficient quantities of suitable rockfill and till borrow materials are available for the remaining construction activities for the Central Dike and Saddle Dams 3 and 4.

The dikes are required to isolate mining activities from surrounding lakes (i.e., East, West Channel, South Camp and Bay-Goose Dikes) or to contain tailings (i.e., Stormwater and Central Dikes, and Saddle Dams 1 to 5). All dikes and saddle dams are shown in Figure 2-1 and listed below:

- East Dike: Construction was started in 2008 and completed in 2009. The East Dike isolates the Tailings Storage Facilities and Portage Pit from Second Portage Lake and allowed the dewatering of the Second Portage Lake North Arm;

- West Channel Dike: The West Channel Dike was also constructed in 2008. The dike functioned to block the western outlet channel from Third Portage to Second Portage Lakes, upstream of the East Dike. Following completion of the South Camp and Bay-Goose Dikes, and dewatering of the Third Portage Lake area enclosed by these two dikes, the West Channel Dike was no longer required, and removed as part of the development of Portage Pit;
- South Camp Dike: The South Camp Dike was built in 2009 to assist in isolating the Portage and Goose Pits from Third Portage Lake;
- Bay-Goose Dike: The Bay-Goose Dike was built over a 3-year period, from 2009 to 2011. The Bay-Goose Dike, together with the South Camp Dike, isolates the Portage and Goose Pits from Third Portage Lake and allowed dewatering;
- Vault Dike: The Vault Dike was constructed in 2013 and isolates Vault Lake from Wally Lake, to allow mining of the Vault Pit following dewatering of Vault Lake. Dewatering of Vault Lake commenced in 2013 and was completed in 2014;
- Central Dike: The Central Dike retains tailings and limit seepage from the South Cell TSF towards the Portage Pit. The dike crest is used to support tailings pipelines. The Central Dike is founded on competent soils, with an engineered key trench extending to either bedrock or a dense till. The dike is constructed primarily of rockfill, with an upstream low-density polyethylene geomembrane. The Central Dike was constructed in stages, starting in 2012 and is planned to be completed in 2018 at an elevation of 150 masl;
- Stormwater Dike: The Stormwater Dike provides the separation between the North and South Cells of the TSF. The dike crest is used to support tailings pipelines and spigots. The dike is constructed with potentially acid generating rockfill and has a low hydraulic conductivity bituminous geomembrane liner on the upstream face that is keyed into the foundation soils. The first stage of the Stormwater Dike was built in 2009 to elevation 140 masl, the second stage of the Stormwater Dike was constructed in 2010 to elevation 148 masl, and in 2013 the third stage of the Stormwater Dike was completed to elevation 150 masl;
- Saddle Dams 1 to 5: The purpose of the Saddle Dams is to retain the tailings within the TSF and limit seepage to the downstream environment. The dams also support the tailings pipelines. Saddle Dams 1 and 2 contain the tailings in the North Cell of the TSF, while Saddle Dams 3, 4 and 5 will contain the tailings in the South Cell. The first stage of Saddle Dam 1 was constructed in 2009 to an elevation of 141 masl and in 2010 was raised to its Stage 2 crest at elevation of 150 masl. Construction of the first stage of Saddle Dam 2 commenced in 2010; it was completed in 2011 (Stage 2) at elevation 150 masl, in addition to the connection between Saddle Dam 2 and Stormwater Dike, to an elevation of 150 masl. The construction of Saddle Dams 3, 4 and 5 started in 2015 and is planned to be completed in 2018 at elevation 150 masl.

As built information and drawings of the different dikes and dams are available in the following documents:

- Meadowbank East Dike Construction As-Built Report (Golder, 2009);
- Bay-Goose Dike Construction As-Built Report, Meadowbank Gold Mine (Golder, 2013);

- South Camp Dike Construction Summary Report, Meadowbank Gold Project (Agnico Eagle, 2012b);
- Construction Summary Report, Vault Dike (Agnico Eagle, 2013b);
- Construction Report, Tailings Storage Facilities, Meadowbank Gold Project. (Agnico Eagle, 2012b);
- 2016 Construction Season As- Built Report (Golder, 2016b).

4.4.2.4 Open Pits

The deposits are mined as truck-and-shovel open pit operations. The ore was extracted from the following deposits during the operational lifespan of the mine (refer to Figure 2-1):

- Portage deposits (Pit sector A, B, C, D and E);
- Goose deposit; and
- Vault deposit, including Phaser/BB Phaser.

The Portage and Goose deposits are located in a centralized mining and milling area. The Portage deposits are mined as a single pit (Portage pit) that is approximately 2 km long running north-south, across Second and Third Portage lakes. The Goose deposit is approximately 1 km south of the Portage deposit, under Third Portage Lake. The Vault deposit is approximately 8 km to the north of the Portage deposit, on the shores of Vault Lake. Phaser and BB Phaser Pits are adjacent to Vault Pit on the South East side. Mining activities in Goose Pit occurred from 2011 to 2015, started in Portage Pit 2010 and are planned until 2018. Vault Pit mining activities started in 2014 and are planned until 2018, and from 2017 to 2018 in Phaser/BBPhaser.

4.4.2.5 Rock Storage Facilities

Waste rock is stored at the Portage and Vault Rock Storage Facilities (RSF) (Figure 2-1). Deposition tonnages at the Portage RSF is separated into potentially (PAG) and non-potentially (NPAG) acid generating, to be used at closure. The Vault RSF includes mainly NPAG waste rock, with some PAG waste rock placed in the center of the pile. Some waste rock is also placed in the mined areas of the Portage and Goose pits as pit backfill. The material stored at beside Goose Pit only includes NPAG to be used for closure construction. Smaller storage areas also include NPAG material that will be reclaimed at closure. The rock storage facilities volumes are presented in Table 4-5. The total quantity of waste rock generated by Portage and Vault pits in 2017 and the projected quantity in 2018 are presented in section 4.4.1.

Table 4-6 below summarizes the overall (final) physical dimensions and aspects of the Portage and Vault RSFs.

Table 4-5 : Meadowbank Rock Storage Facility Volume

Rock Storage Facilitity	Volume (m^3)	Type of Waste Rock
Vault RSF	35,859,759	PAG/NPAG
Portage RSF - NPAG Area	6,500,000	NPAG
Portage RSF - PAG Area	30,355,469	PAG/NPAG
Portage NPAG - Primary crusher	1,472,517	NPAG
Goose NPAG	2,863,107	NPAG
Central - NPAG SP	425	NPAG

1. Estimated volume to date (February 2018) 2. Vault RSF includes mainly NPAG material and PAG material placed in the center of the facility 3. Portage RSF - PAG Area includes 2,700,000 m3 of NPAG cover 4. Waste rock material is also placed in the mined sectors of Goose Pit and Portage Pit as backfill Source: Data provided by Agnico Eagle, 2018

Table 4-6: Details of Rock Storage Facilities

Descriptors	Portage Rock Storage Facility	Vault Rock Storage Facility
Approximate storage volume	39.3 Mm^3	29.1 Mm^3
Approximate final crest elevation	254 m	246 m
Approximate final height	100 m	80 m
Maximum elevation of adjacent topography	192 m	190 m
Approximate footprint area	80.8 ha	61.0 ha

Source: Updated Mine Waste Rock and Tailings Management Report and Plan, 2017 (Agnico Eagle, 2018b)

4.4.2.6 Tailings Storage Facilities

All tailings will be deposited within the Tailings Storage Facilities (TSF) until the end of mine operations. The facility includes two cells, the North Cell, where tailings were deposited until 2015, and South Cell, where tailings are deposited since 2014 to the end of the mine life (Figure 2-1). In 2017, a total of 4,042,652 m^3 of tailings slurry was deposited in the tailings storage facilities. From 2010 to 2017, a total of 22,250,000m^3 of tailings slurry from the mill had been deposited in the TSF's (Agnico Eagle, 2018b). The remaining portion of the tailings generated by ore processing from Meadowbank is planned to be stored in the South Cell.

Tailings from Whale Tail Pit will be stored in Goose and Portage Pits. Approximately 1.4 MT of tailings will be stored in Goose Pit, with the balance in Portage Pit. The management operation and monitoring of the TSF is regulated under Agnico Eagle existing Type A Water Licence 2AM-MEA1525.

Table 4-1 in Section 4.4.1 presents the projected ore process (mill throughput) quantities for the Project, from 2018 until 2022. Figure 4-3 presents a schematic cross-section of Portage Pit and Goose Pit at the end of in-pit deposition.

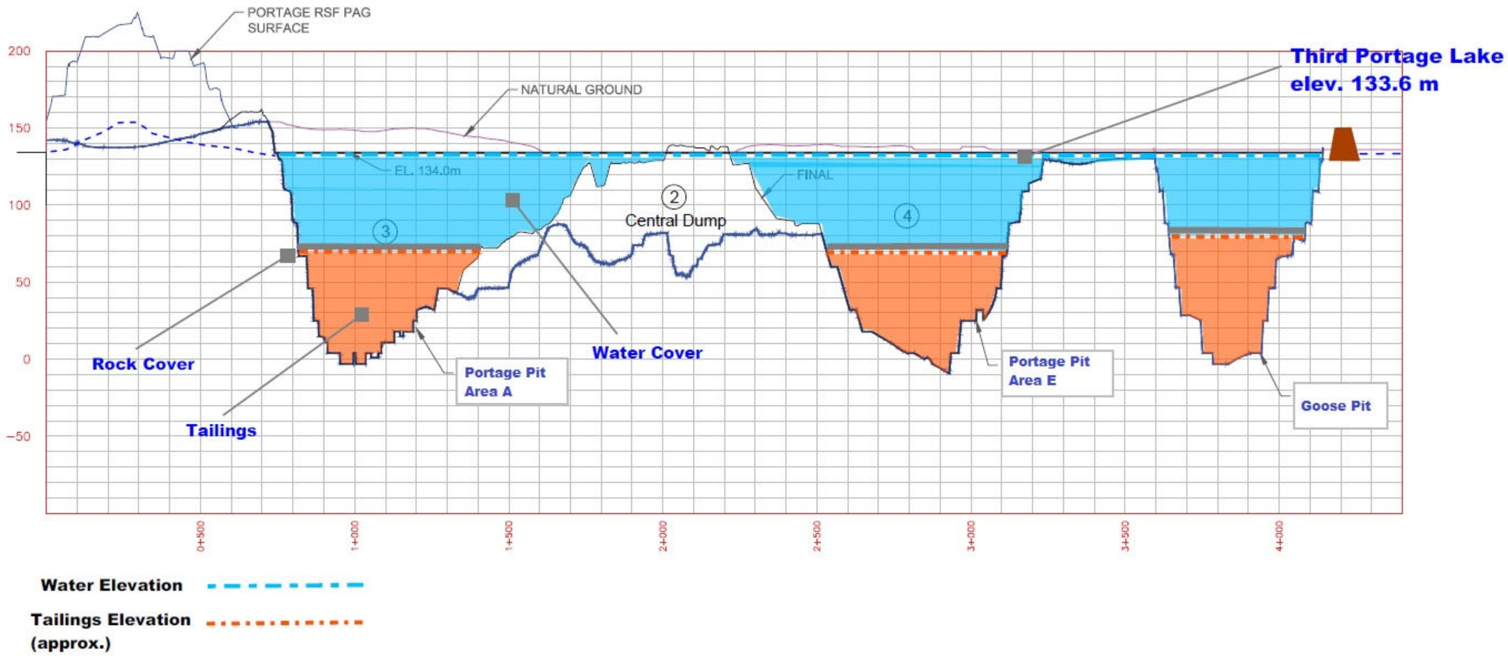


Figure 4-3: Schematic Cross Section of Portage Pit and Goose Pit

4.4.2.7 Water Management Facilities

At Meadowbank, five major sources of inflow water are considered in the site water management system: freshwater pumped from Third Portage Lake, natural run off, natural pit groundwater inflow, seepage inflow from the East Dike and freshet water. This water is either utilized or removed from the inflow by the following means: water treatment plant effluent (if treatment necessary to meet discharge criteria), water trapped in the capillary voids of the tailings fraction (including ice entrapment for winter months) at the TSF, East Dike seepage discharge into Second Portage Lake, water trapped within the in-pit rock storage facilities area voids and natural pit flooding.

A detailed water balance is reviewed yearly and is provided in the annual Water Management Report and Plan (provided with the Meadowbank Annual Report). The Appendix K of this ICRP presents the Water Balance considered (Agnico Eagle, 2018d).

The water management facilities include the components listed below:

- Dewatering systems: Consisting of pumps in parallel connected to a surface pipeline that conveyed water to a treatment facility for the removal of suspended solids prior to discharge;
- Flooding systems: Following completion of mining and in-pit deposition, the pit areas will be flooded. Flooding will be carried out through a combination of:
    - Precipitation;
    - Surface runoff;
    - Seepage from the East dike (Portage and Goose pits only); and
    - Pumping from Third Portage and Wally lakes;
- Rock storage runoff collection systems: The topography on the Southwest side of the Portage Rock Storage Facility naturally conveys surface water runoff to the Tailings Storage Facilities North Cell. To date, this runoff is minimal, generally at spring freshet only. No seeps have been identified on the Southwest side of the Portage RSF. Two (2) sumps, WEP1 and WP2, located on the North side of the Portage RSF NPAG area, collect contact water from the RSF during freshet to be transferred to the North Cell TSF. The topography surrounding the Vault Rock Storage Facility is anticipated to convey runoff into the Vault Pit and Vault Attenuation Pond (SNC 2013);
- Water Diversion Ditch Systems: Two water diversion systems (East and West diversion ditches) were constructed in 2012 to divert surface water from undisturbed areas on the northern perimeter of the mine site away from the Portage Waste Rock Facility and Tailings Storage Facilities;
- Pit sumps and pumping systems: Sumps will be in place for collecting water draining from pit areas. Water from the Portage and Goose pit sumps are pumped to the Reclaim Pond (former Portage Attenuation Pond). Water from Vault Pit sumps will be pumped as needed to the Vault Attenuation Pond;
- Seepage and runoff collection systems: Water collected by any seepage and runoff collection system is monitored during the operations as per the Meadowbank Water Licence requirements. The main seepage collection systems on site are the Central Dike seepage collection system, the East Dike seepage collection system, the Mill seepage collection system and the RSF Seepage (ST-16) collection system;

- Tailings pipelines: Tailings will be carried as slurry through a pipeline to the TSF and to the pits. Tailings slurry water that does not get trapped within the tailings mass as ice ultimately drains to the Reclaim Pond. The location of the pipelines along the perimeter will be determined by the deposition plan and operational consideration for the development of tailings beaches;
- Vault Attenuation Pond: The pond is collecting runoff from the surrounding drainage basin as well as water drained from the Vault Rock Storage Facility and from the Vault, Phaser/BB Phaser Pits. Collected water is discharged, as needed, after treatment if required for removal of suspended solids, to Wally Lake through the effluent outfall diffuser;
- Reclaim Ponds: The Reclaim Pond is the water body located within the active cell of the Tailings Storage Facilities (i.e., the cell, North or South, where tailings deposition occurs). The current Reclaim Pond is located in the TSF South Cell since 2014. At the end of deposition in the TSF South Cell, the Reclaim Pond will be moved to the Portage Pit. The Portage Pit Reclaim Pond collects runoff water from the Portage RSF, precipitation from the TSF North and South Cells and pit areas and tailings slurry water. A pumping system is used to pump water from the Reclaim Pond to the Mill for ore processing;
- Portage Attenuation Pond: The Portage Attenuation Pond became the Reclaim Pond once the South Cell was used for tailings deposition since 2014. The Portage Attenuation Pond collected water from Goose and Portage Pits, and runoff from the surrounding drainage basin. Water from the former Portage Attenuation Pond was discharged after treatment for removal of suspended solids to Third Portage Lake, through the effluent outfall diffuser;
- Stormwater Management Pond (Tear Drop Lake): This water body receives drainage from the Mill and service area (i.e., treated waste water, runoff from part of the airstrip, accommodation facilities, Mill, power plant, stockpiles and contractor areas). Water from the pond is transferred to the Reclaim Pond as necessary during summer. Water will be directed to the Reclaim Pond and then to the pits, once mining at these locations is completed and flooding starts;
- Freshwater intake and treatment system: This system pumps water from Third Portage Lake for human consumption and for providing fresh make-up water to the Mill for ore processing. Water used for human consumption is treated with chlorination and UV light at the accommodation facilities;
- Waste water treatment system: This system treats domestic sewage from the site. The treated water is then directed to the Stormwater Management Pond. This wastewater treatment plant is a tertiary treatment plant designed to remove organic material and nutrients. It is comprised of a primary clarifier, 3 Rotary Biological Contactors and a final clarifier. The dewatered sludge is disposed of in the Tailings Storage Facilities.

4.4.2.8 Infrastructure at Mill and Service Areas

This section describes the buildings and other infrastructures at the mine site used to provide living quarters to the working population and to support mining processes. These infrastructures are located near the Portage and Goose pits and the Tailings Storage Facilities (Figure 2-1). Additional infrastructures are present near the Vault Pit.

Components of this infrastructure are listed below (modified from Golder, 2014):

- Accommodations: The accommodation facilities include 12 dormitory wings (termed the Main Camp), the construction office, the dry change room, the dispatch office, the drinking water treatment facility, housekeeping and building maintenance facilities, and kitchen (with cafeteria), all connected to each other by arctic corridors that are also linked to the Mill and Service Building. The facilities are constructed of ATCO-style rigid wall modules. The dormitory wings consist of single-occupancy rooms with shared or single washrooms and showers. A twelfth dormitory wing is present, but not linked to the complex by an arctic corridor. A gymnasium coverall was also built as part of the accommodation facilities. Additional structures include Nova Camp (additional year-round living quarters) and the Geology tents;
- Ore processing/Mill: The mining processes involved for the extraction of gold from the raw ore material include crushing, grinding, gravity concentration, thickening, leaching, carbon-in-pulp, carbon stripping and gold recovery. Cyanide destruction, tailings deposition and carbon regeneration processes are also undertaken to support the extraction processes. The crushing process consists of reduction of the raw ore material into coarse ore by using a gyratory crusher (also called the primary crusher), a cone crusher (secondary crusher) and a tertiary cone crusher (pebble crusher). The crushed material is stored in the Ore Dome until conveyed to the mill complex to pass through the extraction processes. A total of four conveyor belts are used to carry the ore from the primary crusher to the Mill. The Mill building is a pre-engineered steel structure supported by concrete foundations and is located beside the accommodation facilities. The ten leach tanks are within bermed secondary containment located outside, on the south side of the mill. The assay lab and SO2 Plant, located besides the mill building, provide support to the mining processes;
- Power, electric grid and fuel: The Power Plant is a diesel-fired infrastructure with six (6) generator sets (i.e., generally with some active and some on standby/service mode) for electrical load bearing flexibility and efficiency, with a capacity for providing the 15.5 MW of energy required for the operation of the mine. The plant is a pre-engineered structure, and both the building and generator assembly are mounted on concrete foundations. A local electrical network is in place to supply buildings and other infrastructure near the power plant (i.e., accommodation facilities, Mill, Service Building, contractor area, fuel tank area, and airstrip). In addition, a network of 5KV cable is installed to reach more remote infrastructure, that is, the freshwater intake pumping station, the Reclaim Pond barge pumping station and the Emulsion Plant. The fuel storage and dispensing area is located beside the contractor area, south of the accommodation facilities and Mill. The primary storage consists of a 5.6 Ml steel tank located within a lined bermed containment structure. A fuel unloading and distribution pump and pipeline module feed a network system throughout the Mill area, supplying fuel to the exterior day tanks at the power plant. A fuel dispensing station for supplying light and heavy vehicles is located adjacent to the storage facility;
- Services: Service infrastructure consists of buildings and structures for activities supporting mining activities, the Mill and the accommodation facilities. The Service Building is the largest service infrastructure and is a pre-engineered steel structure supported on concrete foundations. This building provides offices, a warehouse, medical and emergency service area, and serves as the facility for maintenance of large mobile equipment. A coverall, near the Ore Dome and Mill, is used as a warehouse. The contractor area, located between the fuel storage area and Mill, hosts infrastructure supporting activities by contractors hired for the Project. Infrastructure components in

these areas include trailers, coveralls, and temporary structures providing garages, tool shops and storage space;

- Roads: The road network at the mine site consists of a series of service and haulage roads. The total length of these roads is approximately 22 km. Service and haulage roads to and around the Vault deposit are approximately 12 km in length. The Vault haul road is approximately 8 km long and was constructed between the mine site and the Vault pit in 2012. Culverts were installed at stream crossings. The roads are constructed above grade using NPAG rock from the pits or the Airstrip Quarry. Road width varies from 10 to 20 m for service roads, and up to 40 m for haulage roads;
- Airstrip: The mine site is accessible via overland travel on the AWAR and via chartered aircraft to the airstrip. The airstrip was commissioned for use in January 2009, transporting personnel and freight, such as food and cargo, to the mine site. The airstrip is entirely overland and is located immediately north of the supporting infrastructure on the peninsula that separates the Second and Third Portage Lakes. Agnico Eagle completed the extension of the airstrip in 2013 from 1,495m x 45m to 1,752m x 45m, to accommodate a Boeing 737;
- Airstrip Quarry (Q23): This quarry is located north of the airstrip and provided material for the rockfill foundation of the building infrastructure at the mine site and for the construction of the dikes. It is now used for storage of drill core and associated equipment;
- Emulsion Plant area: This area is approximately 5 km north of the accommodation facilities and includes the Emulsion Plant and two warehouses installed on a rockfill pad for the storage of ammonium-nitrate. Four (4) explosive magazine storages on rockfill pads are also located along the access road between the AWAR and Emulsion Plant. A freshwater intake at the nearby lake is in place to supply water to the Emulsion Plant;
- Vault area infrastructures: A separate mobile power plant was installed in 2013 to service a small maintenance shop, office, and emergency accommodation facilities in the vicinity of the Vault Pit.

4.4.2.9 Waste Management Facilities

This section describes the facilities at the mine site used to store and dispose of hazardous and non-hazardous wastes. The facilities include the components listed below (modified from Golder, 2014):

- Landfill: Landfill #1 is currently being used for the disposal of non-hazardous, non-putrescible, non-salvageable solid waste material from Meadowbank that cannot be incinerated. This landfill is operated as multiple 'sub-landfills' that have been, or will be, built and buried within the footprint of Portage RSF. The elevation and location of these sub-landfills change as the RSF evolves throughout the operations phase of the Project. The sub-landfill area is bounded by a rock fill berm, to act as a wind shield. These sub-landfills are progressively closed and encapsulated in the Portage RSF. A second landfill (closure landfill) will be developed in a 4 m deep depression at the top of the Portage RSF and will serve as the non-hazardous waste disposal site for the closure phase of the Meadowbank Project. It is expected that demolition waste from infrastructures removal/reclamation will be disposed of in Landfill #2. Whale Tail will have a landfill located in the Whale Tail RSF;
- Incinerator: The incinerator is located inside a building adjacent to the fuel storage facility. The unit is a dual chamber high temperature incinerator. The primary objective of the incinerator is to dispose of onsite putrescible materials (such as paper, cardboard, food waste and other organic type

materials), thus diverting materials from the landfill that could create odours, attracting wildlife to the mine site. The incinerator receives waste from Meadowbank and eventually from Whale Tail Pit. The mine site has implemented a waste disposal segregation program to ensure wastes are disposed of in the appropriate manner;

- Hazardous material storage area: An area adjacent to the primary incinerator has been set up for the storage of hazardous wastes and other liquid waste and solid materials, including used waste oil, batteries, and tires. Materials are segregated and stored in drums inside closed secured seacans. Hazardous waste from Whale Tail will eventually be managed before shipping in this area. Annually, materials are transported to the Baker Lake Site Facilities and barged to a southern location for disposal or recycling at a Licenced facility;
- Landfarm: Meadowbank's first landfarm (Landfarm 1) was located on the north-west side of the South Tailings Cell. The South Tailings Cell is currently active; tailings are deposited and water is reclaimed from the cell. The tailings and water level in the South Tailings Cell are increasing in elevation over time and the Landfarm 1 area was flooded with reclaim water and tailings. For this reason, the Landfarm 2, constructed in 2016 and located on the North East side of the TSF South Cell is now in use until the end of operations and also for closure. The Landfarm 2 receives contaminated soil from Meadowbank and will eventually receive contaminated soil from Whale Tail.

5.0 Permanent Closure and Reclamation

5.1 Definition of Permanent Closure and Reclamation

Permanent closure is defined as the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining. Permanent closure indicates that the proponent intends to have no further activity on the site aside from post-closure monitoring and potential contingency actions. Permanent closure does not, however, preclude the proponent or another party from pursuing opportunities at the existing site or in the area at a time beyond the foreseeable future (AANDC/ MVLWB, 2013).

5.2 Permanent Closure and Reclamation Requirements

This section provides the permanent closure and reclamation requirements for each individual component of the Project. The components are categorized in sub-sections for clarity. The specified closure objectives may be revised with subsequent updates to the Interim Closure and Reclamation Plan, but are considered reasonable at this time to guide the advancement of closure planning.

5.2.1 Baker Lake Site Facilities

Baker Lake Facilities are located approximately 2 km east of the Hamlet of Baker Lake. This is the transfer point and temporary storage for all dry shipment and fuel materials arriving by barge prior to overland shipment to the mine site via the AWAR. Baker Lake Facilities are listed below (Golder, 2014):

- Barge Landing;
- Bulk Fuel Storage Facilities: six (6) diesel fuel storage tanks. Fuel is pumped from the barges to the storage tank;
- Dry Freight Storage Facility: terraced gravel base pad to stack sea containers and other equipment;
- Access Road: all-season road that link Baker Lake Site Facilities to the AWAR;
- Water and Power Management: Water accumulation within the berms surrounding the Bulk Fuel Storage Facilities has to be managed as it is release to the environment. Power for facilities is supplied by portable generators and yard lighting is provided by portable diesel powered light towers.

5.2.1.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

The Baker Lake facilities are currently in use and will be until closure or post-closure.

The facilities will be dismantled and reclaimed following best practices put in place during operation and in order to minimize long term disturbance. The facilities could also be transferred to the local community upon interest.

5.2.1.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria for the Baker Lake Site facilities are listed in Table 5-1, along with the specific actions and monitoring associated (modified from AANDC/ MVLWB 2013).

Table 5-1: Closure Objectives and Criteria – Infrastructures at Mill and Camp Areas

Closure Objectives	Closure Criteria	Action / Measurements
Return area to its original state or to a condition compatible with the end land-use targets	Remove all facilities and restore natural/compatible terrain as much as possible	Dismantle and reclaim all infrastructure, fuel reservoirs, chemicals and industrial wastes
Buildings and equipment will not be a source of contamination to the environment or a safety hazard to humans and wildlife	Limit access during closure Remove all facilities and restore natural/compatible terrain as much as possible Remove all hazardous material	Place signs to limit access Dismantle and reclaim all infrastructure, fuel reservoirs and hazardous wastes Remaining areas will be scarified and remaining concrete foundations and slabs will be cut in the pieces and buried Soil and water monitoring Physical inspection
Restore natural drainage patterns where surface infrastructure has been removed	Restore natural/compatible terrain as much as possible	Surface will be regraded to promote natural drainage
Restore the area for natural use by wildlife or traditional use by the community	Restore natural/compatible terrain as much as possible	Surface will be regraded to promote the use for wildlife and safe access for traditional activities

5.2.1.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for Baker Lake facilities closure are provided by the AANDC/ MVLWB (AANDC/ MVLWB, 2013). Closure activities were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Recycling or reusing building materials and equipment where possible to reduce waste;
- Dismantle all buildings that are not necessary to achieve the future land use target;
- Cover foundations with materials conducive to vegetation growth;
- Where approved, break or perforate concrete floor slabs and walls to create a free draining condition in order that vegetation can be established;
- Bury materials in the unsaturated zone or below the active layer;
- Cut, shred, crush, or break demolition debris to minimize the void volume during disposal;
- Decontaminate equipment (free of any batteries, fuels, oils, or other deleterious substances) and reuse or sell it to local community interests;

- Remove all hazardous materials and chemicals prior to demolition to national approved hazardous material treatment facilities, or recycle, reuse, or dispose of in an appropriate manner upon approval from the regulatory authorities.

All the options listed above will be required to address closure and reclamation of the Baker Lake facilities. Details on the implementation of those considerations are provided as applicable in the following section.

5.2.1.4 Engineering Work Associated with Selected Closure Activity

At closure, it is planned to offer the infrastructures of the Baker Lake Site Facilities to local interests. If there is no local interest, the facilities and equipment will be decommissioned, dismantled and removed as appropriate.

As mentioned in the previous Interim Closure and Reclamation Plan (Golder, 2014), Agnico Eagle will return, if possible, the Baker Lake site to pre-development conditions. The site may also be left in a semi-industrial condition if consistent with a different end land use agreed upon with regulators, the Hamlet of Baker Lake, and other local interest.

All remaining bulk fuel on site will first be cleaned and then removed and offered to local interests. Buildings or infrastructure, including office trailers and barge landing, will be emptied and also offered for local use and/or relocation. In the case that there is no local interest for the tanks or remaining infrastructures, the infrastructures will be dismantled, decontaminate and demolition waste will be either transported to the mine site landfill disposal, barged out of Baker Lake to a southern waste disposal or recycling facility or sale for scrap metal.

At closure, scarification of all disturbed areas, including gravel pads and roadways, is planned to loosen the compacted material. To promote surface drainage, areas will be profiled, and culverts will be removed from the roadways to re-establish natural drainage patterns.

It is important to note that any contaminated soils from the facilities will be removed and placed in sealed drums. These will then be transported to the mine site landfarm for biological treatment, or barged out of Baker Lake to a southern destination for treatment and disposal.

5.2.1.5 Predicted Residual Effects

No significant residual effects have been identified for after closure of the supporting buildings but changes to terrain caused by the construction and subsequent reclamation of the facilities could result in some alteration of the natural terrain.

5.2.1.6 Uncertainties

The main uncertainty is related to the local interest for the Baker Lake facilities or equipment.

5.2.1.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring following the closure of the Baker Lake facilities and maintenance strategies as presented by AANDC/ MVLWB (2013):

- Periodic inspections will be performed to visually assess the reclaimed areas; and

- All buildings and equipment left on-site during closure will be maintained until no longer required, at which time they will be removed from the site or demolished and disposed to the mine site landfill disposal or barged out of Baker Lake to a southern waste disposal or recycling facility or for sale or sold as scrap metal.

5.2.1.8 Contingencies

There are no activities proposed as contingencies for the closure of the buildings and equipment in Baker Lake.

5.2.2 All-Weather Access Road

The All-Weather Access Road (AWAR) was constructed to connect the Hamlet of Baker Lake to the mine site. This 108 km long road was constructed above grade, using quarried material from non-acid generating rock.

5.2.2.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

A total of thirty four (38) culverts, and nine (9) bridges are necessary to cross the steams all along the AWAR.

At post-closure, the road will be reclaimed and the natural drainage and terrain will be restored as much as possible. Upon local interest and regulatory approval, the AWAR could be transferred to the local community.

5.2.2.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria for the AWAR are listed in Table 5-2, along with the specific actions and monitoring associated (modified from AANDC/ MVLWB 2013).

Table 5-2: Closure Objectives and Criteria – All Weather Access Road

Closure Objectives	Closure Criteria	Action / Measurements
Preserve the main access road to the site in a sufficient condition to allow post-closure access for monitoring, inspection and maintenance activities		Reclaim the AWAR once post-closure monitoring and site maintenance can be completed with helicopter access
At closure, reclaim road to its original state or to a condition compatible with the end land-use targets	Restore natural/compatible terrain as much as possible	Remove bridges, culverts and pipes; restoring natural stream flow and drainage patterns; stabilizing stream banks by using rip-rap Scarify surfaces Remove other infrastructures along the road, including communication towers
Restore natural drainage patterns	Restore natural/compatible terrain as much as possible	Road embankment will be regraded to promote natural drainage Remove bridges, culverts and pipes; restoring natural stream flow and drainage patterns
Reclaim quarries and borrow area by providing safe long term conditions	Promote natural drainage and ensure wall stability	Quarry walls will be drilled and blasted to ensure long term stability and safety of the quarry walls for wildlife Road embankment will be regraded to promote natural drainage

Other recommendations are presented in the Code of Practice for Metal Mines as follows (adapted from EC, 2009):

- Reclaim roads that will not be preserved for post-closure use (R519) by returning area to its original state or to state compatible with the desired and use.

5.2.2.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for the AWAR closure are provided by the MVLWB/AANDC (MVLWB/AANDC, 2013). Closure activities were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Remove structures including bridges and culverts;
- Reclaim areas to the original topography and drainage or to a new topography or drainage compatible with end land use targets;
- Scarify road surfaces to promote re-vegetation of indigenous species;

- Allow gradual slope failure of quarries involving rock masses or slope pit walls;
- Block quarry access routes with boulder fences, berms and/or inukshuks (guidance from local communities and elders would be sought); and
- Flatten berms and slopes at the side of roads to facilitate wildlife passage.

All the options listed above will be required to address closure and reclamation of the AWAR. Details on the implementation of those considerations are provided as applicable in the following section.

5.2.2.4 Engineering Work Associated with Selected Closure Activity

Agnico Eagle is committed to manage the road as a private road with limited public access during the mine life and to fully decommission the road after closure. Agnico Eagle will consider the option of leaving the AWAR intact if it is deemed in the public interest based on guidance and approval from local communities and regulatory agencies. If agreed upon, road operation and maintenance responsibility would then be transferred to another party (Golder, 2014).

In the case that Agnico Eagle stays the owner of the AWAR, natural drainage courses will be restored by removing culverts and bridges, road fill material and removing in-stream works down to the original channel bed. Where affected watercourses are fish-bearing, channel beds will be re-constructed similar to baseline conditions. Work at these sites will consider appropriate timing for in-stream works and will be completed in accordance with Department of Fisheries and Oceans (DFO) operational statements (Golder, 2014).

The AWAR will also be decommissioned by ripping the road bed to make it as impassable as possible to motorized vehicles, provide favorable conditions for natural drainage, vegetation re-colonization and stabilize the locally steep slopes. The road embankments will also be profiled to better blend with the existing topography to allow safe wildlife passage. All the communication towers will also be decommissioned. Removed equipment will be transported to Baker Lake Site Facilities for shipping or will be disposed in the Meadowbank landfill. The rockfill foundations will be scarified and areas will be grading to blend with the surrounding topography.

The decommissioning details of the 22 quarries are provided in the previous Interim Closure and Reclamation Plan (Golder, 2014):

- All equipment (e.g. crushers) will be decommissioned and removed from the quarries;
- All garbage and other debris will be removed from the quarries and transported either to the Meadowbank Project site or to the Baker Lake Site Facilities for appropriate disposal;
- Remaining quarried rock material will either be used for reclamation purposes elsewhere (e.g., erosion protection at decommissioned stream crossings) or spread over the base of the respective quarry site;
- The quarry high walls will be laid back to a 1H:1V side slope to promote long-term stability;
- The base of the quarries will be graded to provide unrestricted drainage of runoff to the surrounding tundra, and to prevent the ponding or collection of water on the sites;
- If acid generating bedrock is exposed in a rock cut or quarry, these areas will be covered with a minimum 2 m thick layer of non-acid generating cover, graded to direct water away from the bedrock exposure;

- The quarry access roads will be decommissioned by removing any culverts, back-grading the watercourse banks, and ripping the road surface; and
- Access into each quarry area will be blocked by placing a rock pile across the entryway to prevent easy access by wheeled vehicles.

The AWAR will be preserve as the main access road to the site in a sufficient condition to allow post-closure access for monitoring, inspection and maintenance activities. The road will be decommissioned once post-closure monitoring and site maintenance can be completed with helicopter access.

5.2.2.5 Predicted Residual Effects

No significant residual effects have been identified for after closure of the AWAR but changes to terrain caused by the construction and subsequent reclamation of the facilities could result in some alteration of the terrain and or loss of plant populations and plant communities.

5.2.2.6 Uncertainties

The pre-disturbance terrain is covered by discontinuous vegetation interspersed with few bedrock outcroppings. The reclamation plan will be designed to encourage a natural succession of indigenous plant species within disturbed site areas. Grading and contouring would be done, where appropriate, to control soil erosion and to promote re-vegetation by natural colonization.

There are also some uncertainties regarding the transfer of ownership of the road to the local community. If it is deemed in the public interest based on guidance and approval from local communities and regulatory agencies, the AWAR will be left intact. Road operation and maintenance responsibility would then be transferred to another party (Golder, 2014).

5.2.2.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring following the closure of the All-Weather Access Road and maintenance strategies as presented by AANDC/ MVLWB (2013):

- Periodic inspections will be performed to visually assess the reclaimed areas; and
- All roads to be used during closure will be maintained until they are no longer required.

5.2.2.8 Contingencies

There are no activities proposed as contingencies for the closure of the AWAR.

5.2.3 Dikes and Saddle Dams

The dikes and dams are required to isolate mining activities from surrounding lakes (i.e., East, South Camp and Bay-Goose Dikes) or to contain tailings (i.e., Stormwater and Central Dikes, and Saddle Dams 1 to 5).

5.2.3.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

The dewatering dikes were constructed from non-acid generating (NPAG) waste rock materials produced during mining. Once the water quality will meet the defined regulatory guidelines in the pit lakes, it is planned to open some of the dewatering dikes.

The North Cell is contained by Stormwater Dike, Saddle Dam 1, Saddle Dam 2, and rockfill road perimeter structures RF-1 and RF-2. The South Cell is contained by Stormwater Dike, Saddle Dam 3, Saddle Dam 4, Saddle Dam 5, and Central Dike. Those retaining structures will be kept for closure, as they contain the mine tailings, except Saddle Dam 3, which is planned to be opened to conduct the TSF runoff water to the Third Portage Lake, located downstream of the dike, once runoff water quality meets the required discharge criteria.

5.2.3.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria for the dikes and dams are listed in Table 5-3, along with the specific actions and monitoring associated (modified from AANDC/ MVLWB 2013).

Table 5-3: Closure Objectives and Criteria – Dikes and Saddle Dams

Closure Objectives	Closure Criteria	Action / Measurements
Ensure physical stability of residual earth structures for environmental, human, and wildlife safety	Stabilize slopes to minimize erosion and slumping Ensure long-term stability	Conduct a comprehensive risk assessment to evaluate long-term risks associated with possible failure modes for dewatering dikes, and associated impacts, parameters, and management strategies. Routine monitoring and sampling Physical and geotechnical inspection
Meet water quality objectives for the completely flooded open pits	Water Licence criteria for direct discharge to the receiving environment	Prior to opening the dikes and reconnecting the lakes, the water quality will be profiled to confirm it is suitable for release Water treatment will be established if required Routine monitoring as per the Water Licence requirements
Controlled flooding rate of the open pits	Ensure safe water level during flooding to avoid uncontrolled discharge	Integrate water management plan and water balance to control flooding rate and water level Routine monitoring and inspection
Dismantle and remove as much of water management systems as possible and restore natural or establish new drainage patterns	Re-establish natural grade and drainage where possible	Dismantle all water management systems Surface will be regraded to promote natural drainage. Routine monitoring and sampling
Discourage wildlife from entering the facilities	Wildlife will be discouraged from entering the facilities until water quality is acceptable	Limit access to facilities with berms Routine monitoring and sampling
Remove facilities when water treatment is no longer required	Water Licence criteria for direct discharge to the receiving environment	Dismantle all water treatment system when possible Water to be kept into a close circuit until the water quality meets criteria from the water Licence Routine monitoring and sampling

5.2.3.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for the dikes and dams closure are provided by the AANDC/ MVLWB (AANDC/ MVLWB, 2013). Closure activities were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Stabilize embankments by removing weak or unstable materials from slopes and foundations and/or construct toe berms to flatten overall slope;
- Open water retention dams and drain impoundments, avoid post closure impoundment of water when possible; and
- Conduct reclamation risk assessments for design criteria of dams, spillways, and covers.

All the options listed above will be required to address closure and reclamation of the dewatering dikes and permanent structures. Details on the implementation of those considerations are provided as applicable in the following section.

5.2.3.4 Engineering Work Associated with Selected Closure Activity

All dikes and dams were designed for long term stability. Once the Portage and Goose pits, as well as Vault and Phaser pits, will be completely flooded and monitoring has determined that pit lake water meets water quality criteria, South Camp Dike, Bay-Goose Dike and Vault Dike will be opened to reconnect the pit lakes with the adjacent lakes. East Dike will remain intact, preserving the 1 meter difference in elevation between Third Portage Lake and Second Portage Lake.

This opening or partial excavation of the dikes, named ``dike reconnection``, to reconnect the pit lakes with the adjacent lakes, will be designed to ensure long term stability of the structures and protection of the aquatic environment. The controlling condition will occur during late winter, when thick ice conditions are expected to coincide with annual minimum lake levels. The dike reconnection is also discussed in Section 5.2.4 – Open Pits of this report for the permanent closure of the open pits.

As the runoff water from the TSF cover system will convey towards the Reclaim Pond located in the South Cell upstream of Saddle Dam 3, it is planned to open SD3. Central Dike, Saddle Dams 1, 2, 4 and 5 will remain intact, to contain the stored tailings in the TSF.

An update study was performed in 2016 for the design of the dewatering dike opening to reconnect the pit lakes to the adjacent lakes. Table 5-4 presents the general description to each component to be decommissioned.

Table 5-4: General Description of Decommissioning Components – Dike Reconnection

Component	General Description of the reconnection
Bay-Goose Dike Reconnection	Open dike to 3 m below design minimum water level to allow year-round fish passage, facilitate water exchange, and facilitate water movement within the former impoundment; Reconnection at two locations, with an alternate third location to access Portage Pit Lake; Reconnection width of 10 m with 3:1 sideslopes; Erosion protection on exposed shoreline and appropriately sized substrate in reconnection base to satisfy fish habitat requirements for this structure.
South Camp Dike Reconnection	Open dike 1 m below design minimum water level to allow for seasonal fish passage; Reconnection width of 10 m with 3:1 sideslopes; Erosion protection on exposed shoreline and appropriately sized substrate in reconnection base to satisfy fish habitat requirements for this structure.
Vault Dike Reconnection	Reconnection width of 10 m through dike, channel width of 5 m, with 3:1 sideslopes; Erosion protection on exposed shoreline and appropriately sized substrate in reconnection base to satisfy fish habitat requirements for this structure.
Saddle Dam 3	Dike to be opened. Design of opening to be confirmed.
Reference: (Tetra Tech, 2016)	

The final dike reconnection design for the structures will be presented in the Final Closure and Reclamation Plan.

It should be noted that site water will be kept into a close circuit, meaning that the dikes and dams will not be opened, until the water quality meets criteria of the Meadowbank Water Licence (CCME limits or site specific closure criteria to be defined).

5.2.3.5 Predicted Residual Effects

Site water will enter and mix in Third Portage Lake and Phaser Lake. It is predicted that concentrations in post-closure will meet discharge criteria.

5.2.3.6 Uncertainties

There are no major uncertainties related to dikes closure. Uncertainties related to water quality within the pit lakes, prior to dike opening, are addressed in Section 5.2.4.4.

5.2.3.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring following the closure of the dikes and dams, and maintenance strategies as presented by AANDC/ MVLWB (2013):

- Periodic inspections will be performed by a geotechnical engineer to visually assess stability and performance of the structures;
- Instrumentation reading and data interpretation to ensure they are performing as designed.

Regular field inspections of the TSF structures are planned to ensure their adequate performance in closure and post-closure. More details are presented in Section 5.2.6 – Tailings Storage Facilities. The geotechnical monitoring of the dikes and dams in closure and post-closure will be defined in the Final Closure and Reclamation Plan.

More details on the contact water management system in closure are presented in Section 5.2.7.

5.2.3.8 Contingencies

There are no stability issue anticipated for the dewatering dikes, as after closure and dikes opening, the water differential across dewatered dikes surrounding the open pits will be inexistent or minimal. The TSF and the peripheral dams are expected to freeze over time, therefore no stability issues are expected. Regular field inspections of the TSF structures are planned to ensure they are performing adequately in closure and post-closure.

5.2.4 Open Pits

The ore was extracted from the following deposits during the operational lifespan of the mine of the Project:

- Portage deposits (Pit A, B, C, D and E);
- Goose deposit; and
- Vault deposit, including Phaser/BB Phaser.

Open pit development is staged over the course of mining operations. Once mining is completed, Portage and Goose Pits will be used for in-pit deposition of tailings.

5.2.4.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

Portage, Goose, Vault, Phaser and BB Phaser Pits are all located in former lake areas that have been dewatered to allow mining activities. For the development of Portage Pit, the North-East Arm of Second Portage Lake, isolated by East Dike, was dewatered from 2008 to 2011. A portion of Third Portage Lake was dewatered in 2011 following the construction of the Goose Dike, to allow the development of the Goose Pit and the Portage Pit south pushback. The dewatering of Vault Lake was completed in 2013 and 2014 following the construction of the Vault Dike, to develop the Vault Pit. The dewatering of Phaser Lake in 2016 was completed to develop Phaser and BB Phaser Pits.

The Portage and Goose pits were mined first, starting respectively in 2010 and 2011. Mining of Vault pit started early 2014 and Phaser and BB Phaser started in 2017. Mining activities in Goose Pit have been completed since April 2015. Portage, Vault and Phaser/BB Phase Pit are expected to be mined until the third quarter of 2018. At the end of operations, all the pits will be flooded over a period of several years, with an estimated completion by 2026 and 2027.

The open pits are designed to have stable slopes during the mine life and post-closure. The slopes are monitored as part of mine operations and will be progressively modified as required to maintain stability. At the end of active mining operations, rock berms will be placed around exposed perimeters of the pits to restrict access and minimize hazards to people and wildlife.

5.2.4.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria for the Meadowbank open pits are listed in Table 5-5, along with the specific actions and monitoring associated (modified from AANDC/ MVLWB 2013).

Table 5-5: Closure Objectives and Criteria – Open Pits

Closure Objective	Closure Criteria	Actions/Monitoring
Access to the pits are limited, for the safety of humans and wildlife	Install physical barriers to limit access	Maintain or construct waste rock berm until pit area is flooded Inspection of berms during flooding period
Allow emergency access and exit during flooding stage	Safe access and route will be established during flooding for inspection and emergency	A plan will be developed to allow for reasonable exit should inadvertent access occur
The open pit mine walls, slopes and pit shorelines are physically and geotechnically stable or minimize access to unstable areas	Ensure walls and slopes are stable prior to flooding Install physical barriers to limit access	Inspection of berms, walls, slopes and shorelines before and during flooding period Maintain or construct waste rock berm until pit area is flooded
Dust levels are safe for people, vegetation, aquatic life, and wildlife	Control dust emissions during active reclamation period	Implement best practices and conduct air quality monitoring during active reclamation period
Meet water quality objectives for any discharge from pits Water quality in flooded pits is safe for humans, aquatic life, and wildlife	Prior to dike reconnection, the water quality will meet the Water Licence requirements	Prior to open the dikes, the water quality will be profiled to confirm it is suitable for release Water treatment will be established if required Routine monitoring as per the Water Licence requirements
Migration and discharge of contaminated drainage has been minimized and controlled	Prior to dike reconnection, the water quality will meet the Water Licence requirements Ensure safe water level during flooding to avoid uncontrolled discharge Minimize erosion during flooding.	Prior to open the dikes, the water quality will be profiled to confirm it is suitable for release Integrate water management plan and water balance to control flooding rate and water level Routine monitoring and inspection

Closure Objective	Closure Criteria	Actions/Monitoring
Original or desired new surface drainage patterns have been established	Dike reconnection are designed to ensure proper flow	Design and construct dike reconnection with adequate dimensions at proper locations to maintain required water levels and flow
Pit fill rate and opening/reconnection of dewatering dikes do not cause adverse effects on fish, fish habitat, wildlife safety, or water levels in nearby water bodies/watercourses	Respect fresh water consumption limits for pits flooding as per Water Licence Dike reconnection designed as per the NNLP*	Integrate water management plan and water balance to control flooding rate and water level Design and construct dike reconnection with adequate dimensions at proper locations to maintain required water levels and flow, and as per NNLP* requirements
For flooded pits, establish in-pit aquatic habitat where practical and feasible	Fish habitat compensation features planned as per the NNLP*	Construct fish habitat compensation features Biology monitoring programs
Consider community land use expectations and traditional knowledge in the closure planning	Community engagement and traditional knowledge will continue to be implemented in closure planning	Community engagement during closure planning
*NNLP - Agnico Eagle Mines Meadowbank Division No-Net-Loss Plan, October 2012		

Other recommendations are presented in the Code of Practice for Metal Mines as follows (adapted from EC, 2009):

- If it is technically and economically feasible to do so, infrastructure (e.g., crushers, metal structures and air pipes) and equipment (e.g., pumps) should be removed from the site. Any equipment to be left in the pit should be inspected and remediated as appropriate to ensure that there is no risk of leakage of any contaminants (R506);
- During decommissioning, any contamination associated with vehicle and equipment operations and maintenance should be identified and remediated, as appropriate (R507);
- Open pits should be backfilled or flooded to the extent practicable to prevent unauthorized access and to protect public safety. In cases where backfilling or flooding is not practically feasible, fencing should be installed to protect the public. In all cases, signs should be posted warning the public of potential dangers associated with the site (R510);
- The potential for mine water discharges should be assessed. For open pit mines, this may be done using water balance calculations and, in some cases, hydrogeological assessment. Where mine water discharge is predicted, the flow rate should be estimated (R511);

- Where there is the potential of mine water discharge after mine closure, the quality of the discharge should be predicted. Mine water quality should be assessed once closure has been completed to verify the accuracy of the predictions (R512);
- Where there is the potential of mine water discharge of poor quality, measures should be implemented to prevent or control that discharge and to collect the mine water for treatment. Prevention methods may include capping of mine openings to prevent mine water discharge (R513).

5.2.4.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for open pit closure are provided by the AANDC/MVLWB (AANDC/MVLWB, 2013). Closure activities for the pit were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Excavate rock and soil slopes will remain stable during closure and post-closure;
- Open pit backfill with waste rock as operations proceed;
- Flood the pit, with natural and pumped inflows;
- Block open pit access routes and control access;
- Establish in-pit aquatic habitat.

All the options listed above will be required to address closure and reclamation of the open pits. Details on the implementation of those considerations are provided as applicable in the following section.

5.2.4.4 Engineering Work Associated with Selected Closure Activity

Pit walls have been designed for long-term slope stability during operations and closure; therefore, Agnico Eagle does not intend to establish long-term stable slopes by allowing gradual failure of rock masses. In addition, the option for covering slopes with rip rap will not be applied as the priority is for pit flooding given the end land use target of recreating open water areas.

The mined-out sectors of central Portage Pit have been used for the final placement and permanent storage of waste rock since 2015. Waste rock has also been placed in the Goose Pit following the end of the mining activities in 2015. The effects of waste rock disposal in pits water quality have been considered in operational and post-closure water quality forecast assessment, the results of which are presented annually in the Meadowbank Annual Report (Agnico, 2018c), and more specifically in the Meadowbank Water Management Plan and Report (Agnico, 2018a).

At the end of mining, all pit equipment will be removed from the pits and closure activities will proceed. After demobilization and disposal of the equipment, pit access ramps will be blocked using rock barricades and safety berms. A plan will be developed to allow for reasonable exit should inadvertent access occur and emergency egress routes will be provided. At the pit crest, exposed areas will be stabilized and surrounding area contoured so that runoff is directed into the pits, minimizing erosion.

Portage Pits and Goose Pit will be flooded once in-pit tailings deposition is completed and the reclaim water is treated and the aggregate cover is in place. Flooding will occur by allowing the natural accumulation of seepage and groundwater into the pits and surface water drainage reporting to the pit to remain in place. In addition, transfer of water at controlled rates from the surrounding lakes using high-capacity mechanical pump systems or siphons will contribute to the majority of the flooding. Following in-pit tailings deposition in Goose Pit, the reclaim water will be transferred to Portage Pit and flooding will resumed with natural runoff and pumping of approximately 3,500,000 m^3 of water from the Third Portage Lake in summer 2021. For Portage Pit, once in-pit deposition activities are completed, the reclaim water will be treated and discharged to Third Portage Lake and pit flooding will commence with natural runoff from the North and South Cell TSF and surrounding pit area and with the pumping of approximately 21,700,000 m^3 of water from Third Portage Lake, from 2022 to 2027. Both Goose and Portage pits are predicted to reach the same water level as Third Portage Lake (133.6 masl) by 2031 (Agnico Eagle, 2017d).

Vault Pit will be flooded by pumping water from Wally Lake once mining is completed. The pumping of 28,051,096 m^3 from Wally Lake is expected to commence in 2019 and to be completed in 2025. The natural inflow will then allow Vault pit to reach 139.9 masl (natural Wally Lake water level) (Agnico Eagle Water Balance, 2018). Unlike Vault Pit, Phaser Pit and lake are planned to be flooded exclusively from their watershed run off inflows until the target elevation of Wally is reached, expected in summer 2027. From there, those same inflows will be used conjointly with the Vault Attenuation Pond inflows to flood to the same target elevation at 139.9 masl (Wally Lake level).

To minimize impacts to aquatic habitat in the surrounding lakes, it is anticipated that transfers from Third Portage and Wally lakes will be done during periods of higher water in the spring and summer months. Maximum yearly pumping rates will respect the limits specified in the Meadowbank Water Licence to avoid draw down levels in each source lake. Throughout the pit flooding phase, the dikes will remain in place, acting as barriers for water migration between the pit lake and the surrounding lakes and environment.

At closure, the walls of the mined-out open pits will have been exposed for several years during mine operation, and some oxidation will have occurred. This has also been considered in operational and post-closure water quality forecast assessment.

Once the pit flooding completed, the Bay Goose Dike, South Camp Dike and Vault Dike will be opened provided the water quality in the pits meets the Meadowbank Water Licence requirements, e.i. the Canadian Council of Ministers of the Environment (CCME) criteria and/or site specific criteria for parameters not included in the CCME Guidelines. This opening or partial excavation of the dikes, named ``dike reconnection``, to reconnect the pit lakes with the adjacent lakes, will be designed to ensure long term stability of the structures and protection of the aquatic environment.

Water quality forecast modeling is completed yearly, considering the pit flooding, the reclaim water transfer and the natural inflows. The forecast is presented in the Meadowbank Annual Report, and more specifically in the Meadowbank Water Management Plan and Report. The purpose of the water quality forecast is to identify through a mass balance approach the contaminants of concern during the pit flooding process and determine if water treatment will be required on site for closure activities when comparing the final contaminant levels to the CCME guidelines and/or site specific criteria for parameters that are not included in the CCME guidelines. Each yearly update builds on the previous year as new monitoring data is added from the site. Forecasted model values of the prior years are compared with the actual sample results from the following years for model calibration purposes.

A preliminary assessment of the water quality forecast in Goose and Portage pits at closure was conducted taking into account the additional tailings from Whale Tail Pit that will be deposited in the North and South Cells TSF. Based on this preliminary assessment, dissolved copper, dissolved chromium and dissolved selenium were found to be potential parameters of concerns (SNC, 2016). In the latest water quality forecast performed in 2018 (SNC, 2018) and presented in the 2017 Meadowbank Annual Report, total metal concentrations were considered in the model in order to account for both particulate and dissolved forms of these parameters. Considering the processing of Meadowbank ore only, with a LOM finishing in 2018, nine (9) contaminants have been identified as potential parameters of concern that may require treatment, namely total concentrations for aluminium, arsenic, cadmium, chromium, copper, iron, nickel, selenium and fluoride.

As the aforementioned parameters may be of concern prior to dike opening, treatment options for their removal during the pit flooding process will need to be examined and will be assessed in greater detail during the preparation of the Final Closure and Reclamation Plan. These contaminants originate from the TSF reclaim water when transferred to the pit, therefore treatment option for the TSF reclaim water would be considered prior to transfer in the Portage Pit.

The closure phase will also include a number of years following filling where water quality will be monitored prior to opening the dikes. Water quality forecast will be performed during the flooding period. Surface water quality monitoring (parameters to be sampled and frequency) and sampling locations will comply with the Meadowbank Water Licence monitoring requirements.

Fish habitat will be constructed prior to flooding as described in the NNLP (Agnico Eagle, 2012a).

5.2.4.5 Predicted Residual Effects

No discharges will occur to receiving environment during operations and flooding period of the pits since all contact waters will be diverted to the TSF South Cell or the open pits. The Goose, South Camp Dike and Vault dike will only be opened when the level of the flooded pits reaches the same elevation as the adjacent lakes, and pit water quality meets CCME/site specific criteria concentrations as per the Meadowbank Water Licence condition. The dike reconnection will maintain required water levels and flow, and will respect the NNLP (Agnico, 2012a) requirements. No residual effect on Third Portage or Wally Lakes water quality and water level are expected during closure and post-closure.

5.2.4.6 Uncertainties

The following uncertainties have been identified with respect to closure planning of the open pits:

- Water quality of the final pit lakes prior to opening of the dewatering dikes and free mixing with adjacent water bodies;
- Flooding rate for filling the open pits at closure, including natural inflows and lake water transfers, and length of time to achieve target water levels.

Water quality monitoring will continue during operations to expand the available water quality database. Water quality forecast for pit lake water will be performed annually to predict the water quality at closure. Treatment options will be examined and will be assessed in greater detail if required during the preparation of the Final Closure and Reclamation Plan.

The water balance and water management will also be reviewed on an annual basis and in closure to estimate the lake water transfer volume required for flooding, as well as the natural inflows, to ensure adequate water level are maintain into the pits until dike reconnections.

5.2.4.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring following flooding and dike reconnection and maintenance strategies for the open pits as presented by AANDC/MVLWB/ (2013):

- Monitor water level in pit to confirm closure objectives regarding fish, fish habitat, and wildlife safety are being achieved;
- Sample water quality and quantity at controlled pit lake discharge points;
- Inspect aquatic habitat in flooded pits where applicable.

Following opening of the dikes (expected in 2029, or when pit water quality meets the Meadowbank Water Licence requirements), post-closure monitoring and reporting will be conducted for an additional five years, to ensure ongoing compliance and that the pit lakes and dike reconnection are functioning as expected. If water quality continues to be acceptable at that point, then application will be made to regulators to modify or terminate the monitoring program. It is also anticipated that after several years in the post-closure period, monitoring would no longer be required.

In addition to water quality, closure monitoring of the open pits will include a stability and safety component. Visual inspections will be carried out to check for signs of instability, rockfall, changes to groundwater inflows and overall integrity. Safety berms and signage above water level will also be inspected and maintained as required.

Post-closure monitoring program will be defined in details in the Final Closure and Reclamation Plan.

5.2.4.8 Contingencies

The closure plan currently incorporates a water treatment plant as a contingency measure should water in the pit lakes not be suitable for release to the environment. In this case, water would only need to be treated for a short period in order to treat the reclaim water from the TSF until pit water meets closure criteria. The need for water treatment will be determined based on water quality forecast and water quality monitoring before dikes are to be opened.

5.2.5 Rock Storage Facilities

At Meadowbank some of the waste rock generated from the open pit mining is considered potentially acid-generating (PAG) and some non-potentially acid-generating (NPAG). Due to the distance between the Portage mining area and the Vault mining area, two (2) main separate rock storage facilities are required. Waste rock from the Portage and Goose Pits is stored in a storage facility located near to these pits (Portage RSF or mined out areas of Portage and Goose Pits), while waste rock from the Vault, Phaser and BBPhaser Pits is stored in a separate storage facility adjacent to the Vault Pit (Vault RSF).

Some NPAG material is also stored in various smaller RSFs. Suitable waste rock material NPAG is used for construction purposes associated with dikes and roads and will also be used for closure activities.

5.2.5.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

The rock storage facilities on site are currently in operation. The Portage RSF PAG area is being progressively covered with NPAG material to construct the cover required for closure. At the end of operations, the PAG material in the RSF will be entirely encapsulated in NPAG material, and it is expected that the stored NPAG material will be used for closure construction purposes. The Vault RSF includes NPAG material in majority and is not expected to require a cover.

5.2.5.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria related to the closure of the rock storage facilities are taken from the Interim Closure and Reclamation Plan (Golder, 2014) and AANDC/MVLWB (2013) along with the specific actions and monitoring associated are listed in Table 5-6.

Table 5-6: Closure Objectives and Criteria – Rock Storage Facilities

Closure Objectives	Closure Criteria	Action / Measurements
The pile is physically and geotechnically stable for human and wildlife safety in the long-term: minimize erosion, thaw settlement, slope failure, collapse, or the release of contaminants or sediments	The RSF is designed for closure and will account for seismic and permafrost conditions A thermal cover to limit acid generating reactions and migration of contaminants	Place a thermal cover of NPAG rockfill on the RSF surface during progressive reclamation Ensure stable slopes Physical and geotechnical inspection by a qualified engineer Thermal monitoring
Build to blend in with current topography, be compatible with wildlife use, and/or meet future land use targets	Limit RSF elevation to blend into local topography RSF at post-closure will not compromise wildlife safety and safe land use as the RSF will be covered and stable	Place a thermal cover of NPAG rockfill on the RSF surface during progressive reclamation Ensure stable slopes Physical and geotechnical inspection by a qualified engineer
Generation of poor water quality has been minimized, including ARD/ML Surface runoff and seepage water quality is safe for humans and wildlife	Runoff and seepage will meet acceptable discharge criteria to be released to the receiving environment Freezeback of the RSF	The runoff and seepage from the RSF will continue to be collected as needed and monitored for transfer to TSF as per operational practices, and until monitoring results demonstrate that water quality is acceptable for direct discharge Place a thermal cover of NPAG rockfill on the RSF and ensure freezeback Physical inspection, thermal monitoring Routine water quality monitoring and sampling

Dust levels are safe for people, vegetation, aquatic life, and wildlife in the long-term	Best management practices for controlling dust during active reclamation	Implement best management practices as during operation Routine air quality monitoring

Other recommendations are presented in the Code of Practice for Metal Mines as follows (adapted from EC, 2009):

- Carry out detailed inspections and assessments of waste rock piles. The objective of these inspections and assessments is to evaluate the actual performance against design projections related to anticipate post-closure conditions. (R524);
- Conduct a comprehensive risk assessment for mine closure to evaluate the long-term risks associated with possible failure modes for waste rock piles. Identify possible impacts and critical parameters, and develop control strategies. If warranted, implement a long-term monitoring plan. (R525/526);
- Re-evaluate, and revise as necessary, plans for the management of waste rock to prevent, control and treat metal leaching and acidic drainage to ensure that they are consistent with the objectives and plans for mine closure and post closure. If warranted, implement a long-term site-specific monitoring program (R527/538).

5.2.5.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for rock storage facilities closure are provided by the AANDC/MVLWB (AANDC/MVLWB, 2013). Closure activities for the RSF were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Controlled disposal by characterization and segregation PAG materials. Place PAG material within the center of the Vault RFS so permafrost can encapsulate;
- Construct the RSF in lifts with slopes with individual lifts ca be set back to provide long-term stability;
- Controlled runoff water by having sediment collection ponds where required for use during operation and possibly for the initial portion of the closure phase until seepage water quality is proven to be acceptable and stable;
- Minimize contact of clean water with contaminated materials;
- Use TSF as a collection point for impacted runoff from RSF;
- Design and operate the RSF during operation to promote permafrost aggradation.

All the options listed above will be required to address closure and reclamation of the RSF. Details on the implementation of those considerations are provided as applicable in the following section.

Construction/development of RSF with long-term stable slopes and placing thermal cover in a progressive manner is considered the most appropriate closure plan for Meadowbank. Table 5-7 presents various proposed acid mine drainage control strategies for waste rock.

Table 5-7: Acid Mine Drainage Control Strategies of the Arctic for Waste Rock

Strategy	Advantage/Disadvantage
Freeze Controlled	Requires considerable volumes of non-acid waste rock for insulation protection. Better understanding of air and water transport through waste rock required for reliable design.
Climate Controlled	Requires control of convective air flow through waste rock, infiltration control with modest measures and temperature controls. Better understanding of waste rock air, water, and heat transport for reliable design.
Engineered Cover	
Subaqueous Disposal	Very difficult to dispose of waste rock beneath winter ice.
Collection and Treatment	
Segregation and Blending	May be very effective. Research and development on-going.
Reference: (MEND 1.61.2, 1996)	

5.2.5.4 Engineering Work Associated with Selected Closure Activity

Much of the closure and reclamation of the Portage RSF has been completed progressively during operations with the placement of the NPAG cover over the RSF PAG slopes. Approximately 84% of the NPAG cover has been placed over the PAG Portage RSF area from 2011 to 2017. The remaining closure and remediation requirements of the RSF will be completed after operations cease.

Most of the waste rock from the Vault deposit is NPAG; geochemical and water quality monitoring concluded that the Vault RSF is not expected to require NPAG capping in closure. As a precautionary measure, any PAG material encountered at Vault is and will be placed in the middle of the pile and be capped with NPAG waste rock as placement proceeds. The total quantity of waste rock for the Phaser and BB/Phaser Pits will be contained within the Vault RSF. The waste rock from these small pits is similar to Vault Pit waste rock, which is primarily NPAG.

Some of the Portage and Goose Pits waste rock has been placed as backfill into the completed portion of Portage Pit and Goose Pit. As the pits will be flooded at closure, PAG material will become submerged (subaqueous disposal) by a minimum of 4.0 m of water, and the water cover will limit the potential for ARD.

This is also considered as fish habitat compensation in accordance with Agnico Eagle's Meadowbank No Net Loss Plan (Agnico Eagle, 2012a).

It is expected that the NPAG waste rock stockpiled within the different RSFs will be reclaimed for closure construction.

As noted in the previous Interim Closure and Reclamation Plan (Golder, 2014), the RSFs have been designed and constructed to ensure long-term stability in terms of rock lifts, bench heights, and overall slope. At closure, the RSF are consistent with the end-land use of natural conditions and are therefore being left as-is. The ultimate slopes and crest elevations are comparable to the hills of surrounding areas. Although all rock placed in the Portage and Vault RSFs is expected to freeze, the design in terms of permanent physical stability is not dependent on freezing. No additional earthworks at the crest or base of the embankments or re-vegetation of the slopes are required to ensure long-term stability or to meet land use objectives.

The Portage RSF is instrumented for thermal monitoring with thermistors installed in the PAG area and the NPAG cover. Numerical modelling was initiated to estimate the depth of the active layer (layer of materials undergoing freeze-thaw cycles from atmospheric forcing) within the Portage RSF and to confirm that the PAG waste rock will remain frozen, and oxidation rates greatly decreased, for the next 150 years under agreed upon climate change scenarios. Geochemical stability will be maintained by covering PAG materials with suitable NPAG waste rock. The Portage RSF is covered by a 4.0 m layer of NPAG rock to ensure geochemical stability by insulating PAG materials and keeping the waste rock frozen. The cover also controls reactions and the migration of runoff to PAG materials. Thermal data analysis and modelling will continue during operations; the results of the thermal modelling and overall performance of the NPAG cover will be presented in the Final Closure and Reclamation Plan.

The contact water management system for the RSFs will be maintained during the closure period where required. The water collected from the RSFs will be collected and monitored until water quality demonstrates that water flowing from the facilities is acceptable for direct release to the environment.

5.2.5.5 Predicted Residual Effects

The following residual effects are predicted at the RSFs after reclamation:

- The RSFs will be permanent features on the landscape. The vegetation communities which formerly occupied the areas will be permanently lost but it is expected that some of the native community will re-vegetate the RSFs cover surface over time;
- No significant adverse impact on the continued opportunity for traditional and non-traditional use of wildlife in the region is anticipated with the closure of the RSFs;
- Runoff from the RSFs will eventually be discharged in the receiving environment, once water quality demonstrates that water flowing from the facilities is acceptable for direct release. It is predicted that concentrations in post-closure will meet discharge criteria.

5.2.5.6 Uncertainties

As mentioned in the previous Interim Closure and Reclamation Plan (Golder, 2014), the main uncertainty related to the Portage RSF closure is the cover thickness required to ensure adequate aggradation of permafrost, insulation from thaw, and effective long term encapsulation of waste rock.

Thermistors have been installed to monitor temperature and permafrost aggradation within the Portage RSF to monitor the temperature as freezing progresses. Latest results of temperature monitoring indicate that freezeback is occurring in the Portage RSF structures (Updated Waste Rock and Tailings Management Plan, Agnico Eagle 2018b).

5.2.5.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring following the closure of the rock storage facilities and maintenance strategies as presented by AANDC/MVLWB (2013):

- Periodic inspections will be performed by a geotechnical engineer to visually assess stability and performance of the RSFs;
- Ground conditions in the RSFs will be monitored to confirm permafrost conditions are being established as predicted;
- Thermistor data will be monitored where required to determine thermal conditions within the RSFs to confirm predicted permafrost aggradation/encapsulation and to verify that the thickness of the active zone is less than the design thickness of the cover;
- Water quality from controlled discharge points around the RSFs will be monitored to confirm that drainage is performing as predicted and is not adversely affecting the environment; and
- Any seepage areas from the toe of the RSFs will be identified and monitored.

More details on the contact water management system in closure are presented in Section 5.2.7.

5.2.5.8 Contingencies

From thermal monitoring and modelling, NPAG cover design over the Portage RSF could be adjusted if required. On-going monitoring and containment of seepage from the Portage RSF will be the primary contingency until water quality meets criteria for direct discharge to the environment.

5.2.6 Tailings Storage Facilities

At Meadowbank, all tailings are deposited within the Tailings Storage Facilities (TSF) until the end of mine operations. The TSF is divided into the North and South Cells, both of which employ subaerial or subaqueous tailings disposal within a dewatered lake basin. The North Cell is contained by Stormwater Dike, Saddle Dam 1, Saddle Dam 2, and rockfill road perimeter structures RF-1 and RF-2. All these structures are constructed to elevation 150 masl. Tailings were stored in the North Cell from 2010 to 2015. The South Cell is delineated by Stormwater Dike, Saddle Dam 3, Saddle Dam 4, Saddle Dam 5, and Central Dike. All these structures will be constructed to elevation 150 masl. The South Cell has been in use since November 2014 and will be used until tailings reach elevation 149.5 masl.

The general operational management strategy for the TSF involved discharging tailings to a maximum elevation of 149.5m. The operational freeboard required is 2.0m. The North Cell is filled up to its final capacity as the final tailings deposition was completed in October 2015. The reclaim system was put in place in the South Cell in October 2014. While the South Cell is in operation, progressive reclamation and NPAG capping over the tailings was initiated in winter 2015 over the North Cell.

Whale Tail Pit will produce an addition of approximately 8.3 million tons (Mt) of tailings to the Meadowbank TSF for a total of 37.8 Mt, including Meadowbank and Whale Tail. The total Meadowbank tailings production is approximately 29.5 Mt (18.2 Mt in North Cell at elevation 149.5 m and 11.3 Mt in South Cell at elevation 142.5 m). To store the additional volume of tailings from Whale Tail Pit, deposition of approximately 8.3 Mt of tailings will be deposited in Goose Pit and Portage Pit. Deposition of tailings will take place sub-aqueously in Goose Pit until it reaches a level of 80 masl approximately and then switch to the Portage Pit until it reaches a level of approximately 70 masl.

5.2.6.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

The tailings storage facilities are currently in use and will be until the end of operations. The construction of the South Cell peripheral structures are expected to be completed in summer 2018, along with the construction of the North Cell internal structure (upon regulatory approval).

The disposal of tailings from Whale Tail using the existing Meadowbank Mine facilities will reduce potential impacts to the environment by reducing the project footprint and needs for reclamation of additional facilities

Progressive reclamation of the TSF was initiated in 2015 with the NPAG cover placement over the North Cell tailings. Ultimately, both TSF cells will be capped with NPAG material, forming a thermal cover including landforms to support adequate long term water management over the reclaimed TSF.

Tailings stored in the pits could be covered with a NPAG rock cover and a water cover to limit the contact oxygen with the tailings, thus reducing the potential of long term ARD. The NPAG rock cover will be further evaluated for the final closure plan.

5.2.6.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria related to the closure of the TSF taken from the previous Interim Closure and Reclamation Plan (Golder, 2014) and AANDC/MVLWB (2013), along with the specific actions and monitoring associated are listed in Table 5-8.

Table 5-8: Closure Objectives and Criteria – Tailings Storage Facilities

Closure Objectives	Closure Criteria	Action / Measurements
Remnant embankments and surfaces of tailings containment areas are physically and geotechnically stable in the long-term	The TSF is designed for closure and will account for seismic and permafrost conditions A thermal cover to limit acid generating reactions and migration of contaminants	Place a thermal cover of NPAG rockfill on the TSF surface during progressive reclamation Physical /geotechnical inspection by a qualified engineer Monitoring
Build to blend in with current topography, be compatible with wildlife use, and/or meet future land use targets	TSF at post-closure will not compromise wildlife safety TSF will be covered	Cover landform of NPAG rockfill on the TSF surface to be adapted to promote drainage and to blend with the topography Physical inspection
Generation of poor water quality has been minimized, including ARD/ML Surface runoff and seepage water quality is safe for humans and wildlife	Runoff and seepage will meet acceptable discharge criteria to be released to the receiving environment Freeze back of the TSF	The runoff and seepage from the TSF will continue to be collected as needed and monitored as per operational practices, and until monitoring results demonstrate that water quality is acceptable for direct discharge Place a thermal cover of NPAG rockfill on the TSF and ensure freeze back Physical inspection, thermal monitoring Routine water quality monitoring and sampling
Dust levels are safe for people, vegetation, aquatic life, and wildlife in the long-term	Best management practices for controlling dust during active reclamation	Implement best management practices Routine air quality monitoring

Other recommendations are presented in the Code of Practice for Metal Mines as follows (adapted from EC, 2009):

- Carry out detailed inspections and assessments of Tailings Storage Facilities. The objective of these inspections and assessments is to evaluate the actual performance against design projections related to anticipate post-closure conditions (R524);
- Conduct a comprehensive risk assessment for mine closure to evaluate the long-term risks associated with possible failure modes for Tailings Storage Facilities. Identify possible impacts and critical parameters, and develop control strategies (R525). If warranted, implement a long-term monitoring plan (R526);
- Re-evaluate and revise as necessary plans for management of tailings to prevent; and control and treat metal leaching and acidic drainage to ensure that they are consistent with the objectives and

plans for mine closure and post closure (R527). If warranted, implement a long-term site-specific monitoring program (R538).

5.2.6.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for the Tailings Storage Facilities closure are provided by the AANDC/MVLWB (AANDC/MVLWB, 2013). Closure activities for the TSF were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Cover tailings with a cover system to control ARD/ML processes and migration of contaminants;
- Construct a cover system to prevent surface erosion and create a stable landform in the long-term;
- Promote freezing of tailings mass into permafrost;
- Collect water that does not meet the discharge criteria for treatment.

All the options listed above will be required to address closure and reclamation of the TFS. Details on the implementation of those considerations are provided as applicable in the following section.

Table 5-9 presents also various acid mine drainage control strategies for tailings. The freeze and climate control are considered the most suitable strategies for tailings reclamation at the Meadowbank site.

Table 5-9: Acid Mine Drainage Control Strategies of the Arctic for Tailings

Strategy	Advantage/Disadvantage
Freeze Controlled	Total or perimeter freezing options can be considered. Can freeze up to 15 m annually if freezing in thin layers. Freezing rate decreased proportionately with depth. Process chemicals could cause high unfrozen water content.
Climate Controlled	May not be a reliable strategy for saturated tailings.
Engineered Cover	Special consideration for freeze-thaw effects. Availability and cost of cover materials are major impediments.
Subaqueous Disposal	Special considerations for winter ice conditions and pipeline freeze-up.
Collection and Treatment	Costly to maintain at remote locations Long term maintenance cost.
Segregation and Blending	Tailings are normally geochemically homogeneous.
Reference: (MEND 1.61.2, 1996)	

5.2.6.4 Engineering Work Associated with Selected Closure Activity

The overall tailings management approach for long term stability and control of Acid Rock Drainage (ARD) involves encapsulation of the tailings in permafrost. A closure NPAG cover will be placed to insulate the frozen tailings and to protect against erosion (Golder, 2014).

As the Meadowbank Gold Mine is located within the zone of continuous permafrost, freeze control and climate control strategies have been adopted for the reclamation of the TSF. The overall tailings management approach for control of ARD and for long term stability involves encapsulation of the tailings in permafrost. Oxygen diffusion and water infiltration into the tailings, seepage from the tailings, and the generation of acid mine drainage are then limited. The option selected to ensure that the active layer (material going through freeze-thaw cycles, overlying permafrost) remains within the inert material is the construction of a cover system consisting of non-acid generating granular material (NPAG) over the tailings material. Permanent diversions infrastructures, as ditches and spillways, will be constructed where necessary to direct non-contact water to the natural environment. These diversions, as well as the TSF containment dikes, will be designed for long-term physical stability.

Preliminary design work was completed for the TSF cover in 2015 and 2016. The tailings cover will consist of non-acid generating material (NPAG) and ensures that the active layer remains within the cover layer. The objective for the cover system is to keep the tailings under 0°C in most conditions and to maintain saturation above 85%. The TSF North Cell is instrumented for thermal monitoring with thermistors installed in the tailings or the NPAG cover. The South Cell TSF will also be instrumented.

The proposed design for the engineered cover system is a layer of compacted NPAG waste rock with a minimum thickness of 2.0 m. The nominal cover thickness over most of the landform is well over the minimum, as a thickness variation is required to obtain the designed landform and promote the water management.

The surface water management plan for the reclaimed TSF is to minimize erosion, thus reducing suspended sediment loading to the receiving environment, and to safely convey runoff water in the event of a storm event coupled with spring snowmelt. To achieve this, the surface water management system will be constructed using riprap-lined drainage channels and riprap-lined aprons at the outlet of each catchment. It should be noted that runoff water will be kept into a close circuit until the water quality meets criteria from the Meadowbank Water Licence for discharge to the environment (CCME limits or site specific closure criteria to be defined).

The cover landform promotes water shedding and consists of two watersheds for North Cell and one watershed for South Cell. The cover will have a minimum slope of 1% and be graded toward permanent drainage channels with a minimum slope of 0.5%. These drainage channels will be constructed on the cover to direct non-contact water to the environment. The surface water management plan minimizes erosion by using riprap-lined drainage channels and aprons at the outlet of each catchment. In the preliminary design, two (2) outlets located in the south and north-west portions of the North TSF, and the final outlet is located near to Saddle Dam 3. The runoff water from the cover system will convey towards a reclaim pond located upstream Saddle Dam 3. The water will then be release into Third Portage Lake once the runoff water quality meets discharge criteria established by the Meadowbank Water Licence.

A detailed design and construction plan for the closure of the North and South Cells will be provided with the Final Closure and Reclamation Plan.

Following in-pit deposition, the tailings could be covered with NPAG rock cover using the proposed approach developed at a high level by Arcadis Canada for CIRNAC (Arcadis, 2019). The rock cover will be placed on the tailings once the pit is drained and the surface of the tailings are exposed and allowed to freeze. For Goose Pit, reclaim water will be transferred to Portage Pit. For Portage Pit, once tailings deposition is completed, the reclaim water will be treated and discharged to Third Portage Lake. Note that the proposed concept to place a granular rock cover over the tailings in the pits pose certain technical challenges. Agnico Eagle will be reviewing the proposed concept as part of the Final Closure Plan and will evaluate its requirements based on the geochemical stability of the tailings and whether it can support fish habit in the long term. Agnico Eagle will also review the technical feasibility of this concept based on expected field conditions at closure and geotechnical stability of the tailings.

If this concept, as suggested by CIRNAC, is determined not feasible, the ICRP and associated security will be adjusted accordingly.

5.2.6.5 Predicted Residual Effects

The following residual effects are predicted at the TSF after reclamation:

- The TSF will be a permanent feature on the landscape. The vegetation communities which formerly occupied the areas will be permanently lost but it is expected that some of the native community will re-vegetate the TSF cover surface over time;
- No significant adverse impact on the continued opportunity for traditional and non-traditional use of wildlife in the region is anticipated with the closure of the TSF;
- Runoff from the TSF will enter and mix in Third Portage Lake. It is predicted that concentrations in post-closure will meet discharge criteria.

As part of the In-Pit Tailings deposition detailed engineering phase, thermal modelling and hydrogeological modelling were carried out to assess the potential impacts on permafrost and water quality after closure. Thermal modelling results indicate that the existing open talik conditions at Goose Pit and Portage Pit area E will extend and the permafrost pocket at Goose Pit will disappear. In addition, the modelling results suggest of a potential development of an open talik beneath Portage Pit area A and a thawing of its southeastern tip in Second Portage Pit direction. The results also provide a representation of the impact of thermal disturbance due to pit flooding and development of potential groundwater flow paths between pits and the two Portage lakes.

A three-dimensional (3D) hydrogeological model was conducted to assess the long-term migration of selected contaminants in groundwater from in-pit tailings deposition to surrounding Second and Third Portage Lake after mine closure. The contaminant transport modelling results for chloride and arsenic compounds show that Second Portage Lake will be the receptor of contaminant migration in groundwater originating from Goose Pit, Portage Pit. However, in Meadowbank area groundwater flow is minimal due to small head differences between open talik lakes and relatively low bedrock permeability Even though chloride and arsenic fluxes will increase over time due to plume arrival at Second Portage Lake, their concentrations in the lake will remain below CCME guideline for the considered initial tailings pore water concentrations.

The development of an open talik at Portage Pit area A will lead locally to an upward hydraulic gradient, hundred years after closure, and a portion of pore water from the tailings could be released in the overlying

Third Portage Lake. Based on the Water Budget approach and the simulated mass fluxes from the hydrogeological model, forecasted chloride and arsenic concentrations in the Second and Third Portage Lakes do not show significant impacts on fresh water as they remain below CCME guidelines.

5.2.6.6 Uncertainties

As mention in the previous Interim Closure and Reclamation Plan (Golder, 2014), the main uncertainty related to the TSF closure is permafrost encapsulation and the cover thickness required to ensure adequate aggradation of permafrost, insulation from thaw, and effective encapsulation of tailings.

Thermistors have been installed to monitor temperature and permafrost aggradation within the TSF and into the 2.0 m of closure capping placed to date. Latest results of temperature monitoring in each geotechnical structures along the perimeter of the North Cell TSF present frozen conditions of their foundation.

Experimental cells were also built with coarse and fine non-potentially acid generating (NPAG) ultramafic waste rock (soapstone) and are instrumented in order to follow their thermal and hydrogeological behaviors; cells of a 2.0 m and a 4.0 m thick insulation cover as well as a 2.0 m thick cover with capillary barrier effects. The results of the experimental cells have been used so far in the work for the cover design of the TSF North and South Cells. Data collection is still ongoing and results will be used in future studies as needed.

There is also an uncertainty that surface runoff from the TSF covered areas may not be of sufficient quality for release to the environment. This could delay decommissioning of the Reclaim Pond, and/or require additional mitigation such as treatment (Golder, 2014).

5.2.6.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring and maintenance strategies for the tailings storage facilities as presented by AANDC/MVLWB (2013):

- Periodic inspections will be performed by a geotechnical engineer to visually assess stability and performance of the TSF;
- Ground conditions in the TSF will be monitored to confirm permafrost conditions are being established as predicted;
- Thermistor data will be monitored to determine thermal conditions within the TSF to confirm predicted permafrost aggradation/encapsulation and to verify that the thickness of the active zone is less than the design thickness of the cover;
- Water quality from controlled discharge points around the TSF will be monitored to confirm that drainage is performing as predicted and is not adversely affecting the environment; and
- Any seepage areas from the toe of the TSF will be identified and monitored.

Water quality will also be monitored to determine the time that the reclaim pond can be decommissioned to allow the discharge into Third Portage Lake. More detail on the contact water management system in closure is presented in Section 5.2.7.

5.2.6.8 Contingencies

From the thermal monitoring and modelling, NPAG cover design over the TSF could be adjusted if required.

On-going monitoring and treatment of seepage from the TSF will be the primary contingency until water quality meets criteria to direct discharge to the environment.

5.2.7 Water Management Facilities

The water management facilities, which are described in Section 4.4.2.7, were designed to support the construction and operations activities of the mine development. Permanent closure activities for these facilities will involve removal of structural components (i.e., pumps, pipelines and active treatment systems) and establishment of natural drainage conditions.

5.2.7.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a, 2005f). The pre-disturbance site conditions are summarized in Section 3.0 of this plan.

The water management strategy, the dewatering and waterbodies impacted by the pit mining activities are presented in the Meadowbank Gold Project Mine Waste and Water Management (Meadowbank Mining Corporation, 2007b). All mining components have been located to avoid or minimize impact on the local environment to the extent possible.

All water management facilities will be decommissioned at different stages of closure, and natural drainage will be restored as much as possible.

5.2.7.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria for the Meadowbank water management facilities are listed in Table 5-10, along with the specific actions and monitoring associated (modified from AANDC/MVLWB 2013).

Table 5-10: Closure Objectives and Criteria – Water Management Facilities

Closure Objective	Closure Criteria	Actions/Monitoring
The systems are dismantled and removed/disposed of (i.e. pipelines, culverts, pump systems, WTP) Systems have been stabilized and protected from erosion and failure for the long-term Remove all hazardous wastes	Remove all components above ground or buried	Components or materials will be cleaned up and salvageable materials removed, shipped or disposed at the landfill Concrete slabs on grade will be perforated and covered or removed and the area re-graded to avoid erosion and promote natural drainage Hazardous wastes will be removed for disposal by Licenced handler as per operation practices Physical inspection to confirm removal
To the extent possible, natural drainage patterns have been re-established	Re-establish natural grade where possible	Disturbed surfaces will be re-graded to promote natural drainage Physical inspection
Stable release of water discharge to the environment is maintained at designated discharge points	Maintain controlled release from dike opening, ditches and all points of water discharge to the environment Long term water management structures are properly designed for long term stability	Design and construct dike reconnection, diversion structures and TSF long term water management structures with adequate dimensions at proper locations Routine monitoring and inspection
Post-closure water quality objectives in receiving water bodies are met	Prior to dike reconnection the water quality will meet the Water Licence requirements Minimize erosion	Routine water quality monitoring and inspection
Systems are physically and geotechnically stable for the safety of humans and wildlife	Limit access until water quality is acceptable	Place berms and signs to limit access Physical inspection

As recommended by EC (2009), at the end of the mine operations phase, water management plans should be evaluated and revised as necessary to ensure that they are consistent with the objectives and plans for mine closure and post closure (R351). This final plan will determine the infrastructure components that will be removed, those that will be left in place, and those that will be modified, as well as the monitoring requirements to measure compliance with the closure and reclamation objectives (Golder, 2014).

5.2.7.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for open pit closure are provided by the AANDC/MVLWB (AANDC/MVLWB, 2013). Closure activities for the water management facilities were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- For any water management structures that may be required post-closure, select design parameters to reflect the need to maintain stability in the long term;
- Design water management systems to minimize the migration of potential contaminants;
- Treat non-compliant water in storage and subsequently release upon achievement of discharge criteria;
- Open and level/contour of embankments, dikes and culverts not required for long-term use and restore the pre-disturbance drainage network to the extent possible;
- Locate permanent spillways in competent rock or material;
- Drain and backfill all sumps and collection trenches;
- Drain, dismantle, and remove tanks and pipelines from the site;
- Ensure any remnant embankments or other water management structures have appropriate erosion control measures in place to maintain stability post-closure.

All the options listed above will be required to address closure and reclamation of Project water management infrastructure. Details on the implementation of those considerations are provided as applicable to each infrastructure component in the following section.

5.2.7.4 Engineering Work Associated with Selected Closure Activity

<u>Dewatering systems</u>

The Second Portage Lake and Goose dewatering system was used to pump water from the North-East arm of Second Portage Lake and the Goose impoundment area into Third Portage Lake to permit operations at the Portage Pit, Tailings Storage Facilities and Goose Pit respectively. The system included pumps connected to surface high-density polyethylene (HDPE) pipelines that conveyed water to the Portage Water Treatment Plant (WTP) for the removal of suspended solids prior to discharge to Third Portage Lake. The dewatering system for Portage and Goose was then used for the Portage Attenuation Pond but is no longer in operation. The pumps, WTP and some pipelines have been dismantled and re-purposed and the remaining will be removed and disposed in the on-site landfill at closure. The diffuser located into Third Portage Lake will be removed at closure.

A similar dewatering system was implemented in Vault Lake in September 2013 to pump water from Vault Lake to Wally Lake to permit operations in the Vault Pit. The system includes HDPE pipelines, pumps and a WTP. Following the dewatering of Vault, the system has been used to manage the water from the Vault Attenuation Pond. The system was also used to complete the dewatering of Phaser Lake in 2016. The pipelines used for the Vault dewatering system will be decommissioned at closure, once mining operations are completed and the Vault Attenuation Pond is no longer active. The Vault WTP has been partially dismantled and will be used for Whale Tail Pit. The rest of the system will be dismantled at closure.

Portage and Vault Attenuation Pond

The Portage Attenuation Pond was active in the TSF South Cell while tailings were deposited in the North Cell. Once tailings deposition was initiated in the South Cell, the Portage Attenuation becomes the Reclaim Pond. The Portage Attenuation Pond was in used from 2011 to 2014, to manage contact water on site. The contact water was treated in the Portage WTP and discharged in Third Portage Lake though the diffuser. Following the conversion of the Portage Attenuation Pond into the TSF South Cell Reclaim Pond in 2014, some of the dewatering equipment was used for water management in the pits or in the Reclaim Pond. No water is discharged from the Reclaim Pond to the environment.

The Vault Attenuation pond occupies a portion of the former Vault Lake and is used to manage the contact water from Vault pit since 2014. Once dewatering was completed, the pumps and the WTP have been re-purposed to discharge water from the Attenuation Pond to Wally Lake through the diffuser. Once mining operations will be complete and the Attenuation Pond is no longer active, all of the dewatering equipment will be dismantled and either shipped from the mine site or disposed of in the on-site landfill. The diffuser located into Wally Lake will be removed at closure.

Reclaim Pond

The Reclaim Pond was initially located in the TSF North Cell, during tailings deposition. Once tailings deposition shifted from the North Cell to the South Cell in November 2014, the Portage Attenuation Pond became the Reclaim Pond as mentioned above. Once tailings deposition switches to in-pit deposition, the Reclaim Pond will be re-located in the pits. The water in the Reclaim Pond consists of processed water and is reclaimed for use at the mill during operations.

During operations, the water in excess in the TSF North Cell is transferred to the TSF South Cell Reclaim Pond during summer months. The TSF South Cell Reclaim Pond will remain in operation until completion of tailings deposition in the South Cell. Once in-pit deposition has started, the process water stored at the TSF South Cell Reclaim pond will be transferred to Portage Pit Reclaim Pond. When in-pit tailings deposition is completed in Goose Pit, the process water in the pit will be transferred to the Portage Pit Reclaim Pond. At closure, once in-pit deposition is completed in Portage Pit. the reclaim water will be treated to a level suitable for discharge to Third Portage Lake.

The reclaim system which includes HDPE pipelines and pumps will be dismantled at closure, decontaminated and disposed at the on-site landfill.

Tailings Pipelines

The tailings slurry pipelines are located on the peripheral structures of the TSF and around the pits during in-pit deposition, and joint the mill located South West from the TSF. The tailings pipelines will be flushed and drained following completion of ore processing at the mill in closure, in accordance with International Cyanide Management Code requirements. The tailings pumps are located in the mill. The booster pump, located on the Stormwater Dike will be dismantled, decontaminated and disposed in the on-site landfill or shipped from the mine site at closure. The pipelines and related components (like the booster pump) will then either be shipped from the mine site or disposed in the on-site landfill after decontamination.

Pit sump and pumping systems

Pumps and piping used for the conveyance of water from the pit sumps to the Reclaim Pond or Vault Attenuation Pond will be removed before the pits flooding occurs. These pieces of equipment will be dismantled and disposed in the on-site landfill.

Seepage and runoff collection systems

Water collected by any seepage and runoff collection system is or will be monitored during the operations, closure and post-closure phases of the Project as per the Meadowbank Water Licence requirements. The main seepage collection systems on site are the Central Dike seepage collection system, the East Dike seepage collection system, the Mill seepage collection system and the RSF Seepage (ST-16) collection system. When seepage will have resorbed or when water quality is demonstrated acceptable for release to the receiving environment without further management, these systems will be removed; pipelines and pumps will be decommissioned and disposed in the on-site landfill. The sumps will be backfilled where required and the landscape will be re-contoured to allow natural drainage.

Culverts

Culverts will be maintained as required in closure until site water quality monitoring results indicate that water can be released to the environment without further management and without erosion. Culverts on site, on the AWAR and on Vault Road will be dismantled and disposed of in the on-site landfill when no longer required. Reclaimed areas will be re-graded to promote natural drainage.

Water Diversion Ditch

The water diversion ditch system located in the northern periphery of the North Cell TSF and Portage RSF are designed to be permanent features part of the natural landscape, and will therefore remain in place after closure. The diversion ditch diverts non-contact water away from the TSF during operations and will convey part of the TSF runoff water in closure and post-closure to the receiving environment, when the runoff water quality is demonstrated acceptable for release to the receiving environment without further management. Some work may be required on the structure to ensure slope stability and minimize snow management.

Freshwater intake, potable water treatment system and wastewater treatment system

Following ore processing and the period of active closure completed, the freshwater intake located in Third Portage Lake, the freshwater pipeline, the potable water treatment plant, the sewage treatment plant and the wastewater system will be decommissioned. Structural components (i.e., pumps, tanks and piping) will be decontaminated and either be shipped from the mine site or disposed in the on-site landfill. Sludge from the sewage treatment plant will be buried in the Tailings Storage Facilities as during operations.

Stormwater Management Pond (Tear Drop Lake)

The Stormwater Management Pond receives treated water from the sewage treatment plant and other waste water. The water is transferred to the Reclaim Pond every summer during operations. At closure, the pond will be pumped to the Reclaim Pond and will be transferred to the Portage Pit with the reclaim water as part of flooding. The pipelines and related components will be decontaminated and disposed in the on-site landfill.

Flooding systems

Similar to the dewatering systems, the pits flooding system equipment (i.e., pumps, syphons and piping) will be removed once pit flooding is complete. All equipment will be dismantled, and either be shipped from the mine site or disposed of in the on-site landfill.

5.2.7.5 Predicted Residual Effects

No significant residual effects have been identified for closure of the water management facilities, but some changes to terrain caused by the construction and subsequent reclamation (excavation, re-grading) of the facilities could result in some alteration to the original terrain.

5.2.7.6 Uncertainties

Water quality and treatment requirements of the Reclaim Pond water, prior to discharge to the pit lakes, represent an area of uncertainty. Treatment of the Reclaim Pond water before transfer may be required as discussed in Section 5.2.4.4. Updates to the water balance model and water quality predictions will be completed prior to mine closure to determine the need and the type of water treatment, if required, and presented in the Final Closure and Reclamation Plan.

Seepages from the Central Dike or the Mill may affect closure and post-closure conditions and monitoring requirements. Investigation and controlled strategy will continue to be developed in operation to define the closure and post-closure strategy for the seepage collection systems.

The work to complete on the diversion ditch for closure and post-closure will be defined and presented in the Final Closure and Reclamation Plan.

5.2.7.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring and maintenance strategies for the water management facilities as presented by AANDC/MVLWB (2013):

- Periodically inspect the remaining water management structures to assess their performance;
- Continue monitoring climatic conditions at site to compare them to design assumptions (e.g., regarding storm events) and performance of selected closure activities;
- Monitor the performance of erosion protection on embankment structures, such as riprap, and the physical stability of water management systems including permafrost integrity where applicable;
- Monitor water quality, quantity, and flows to ensure system is working as predicted and water quality objectives are being met;
- Evaluate post-closure drainage patterns and confirm that they compare to pre-development patterns as described in the closure objectives;
- Sample surface and groundwater if site- specific conditions.

Water management infrastructure will be decommissioned at various times in the overall closure and post-closure phases depending on their function and location. During closure, the frequency of monitoring (inspection, water quality monitoring) will be as specified by the Meadowbank Water Licence, and will focus on the physical state and performance of structures and components. Once the water management facilities are no longer needed, they will be decommissioned, natural drainage patterns will be re-established as much as possible, and monitoring is expected to decrease. Post-closure monitoring will involve annual inspections of permanent diversions as well as general site grading and establishment of proper/natural drainage patterns. Post-closure monitoring program will be defined in details in the Final Closure and Reclamation Plan.

Monitoring of receiving lakes will be conducted in accordance with the Meadowbank Water Licence requirements and the Core Receiving Environment Monitoring Plan (Azimuth, 2015) to confirm Project activities do not contribute to long term adverse effects on the receiving environment. A detailed plan will be developed prior to the mine closure that will provide details on the locations, frequencies and parameters that are to be monitored, and will be presented in the Final Closure and Reclamation Plan.

5.2.7.8 Contingencies

The closure plan currently incorporates a water treatment plant as a contingency measure should water in the pit lakes not be suitable for release to the environment. The water management for the site will remain a close system (no discharge to the receiving environment) until the pit lakes water, the TSF runoff water and seepage water have demonstrated acceptable water quality for release to the receiving environment without further management.

5.2.8 Infrastructures at Mill and Camp Areas

During the life of mine, surface infrastructures were required at different period in time for the mining, accommodation, water treatment, etc. Most of the infrastructures are located near the Portage and Goose pits and the Tailings Storage Facilities. Additional infrastructures were built near the Vault Pit. All infrastructures are listed in Section 4.4.2.8.

5.2.8.1 Pre-Disturbance, Existing, and Final Site Conditions

Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a). The pre-disturbance site conditions are also summarized in Section 3.0 of this plan.

The Meadowbank infrastructures are currently in use and will be until closure or post-closure.

The facilities will be dismantled and reclaimed following best practices put in place during operation and in order to minimize long term disturbance. The facilities could also be transferred to the local community upon interest.

5.2.8.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria related to the closure of the Meadowbank infrastructures taken from the previous Interim Closure and Reclamation Plan (Golder, 2014) and AANDC/MVLWB (2013) along with the specific actions and monitoring associated are listed in Table 5-11.

Table 5-11: Closure Objectives and Criteria – Infrastructures at Mill and Camp Areas

Closure Objectives	Closure Criteria	Action / Measurements
Return area to its original state or to a condition compatible with the end land-use targets	Remove all facilities and restore natural/compatible terrain as much as possible	Dismantle and reclaim all infrastructure, fuel reservoirs, chemicals and industrial wastes
Buildings and equipment will not be a source of contamination to the environment or a safety hazard to humans and wildlife	Limit access during closure Remove all facilities and restore natural/compatible terrain as much as possible Remove all hazardous material	Place signs to limit access Dismantle and reclaim all infrastructure, fuel reservoirs and hazardous wastes Remaining areas will be scarified and remaining concrete foundations and slabs will be cut in the pieces and buried Soil and water monitoring Physical inspection
Maintain required site infrastructure during active reclamation	Promote early decommissioning	Reduce the use of facilities after closure
Ensure runoff is channelled through the watershed	Restore natural/compatible terrain as much as possible	Surface will be regraded to promote natural drainage
Ensure the remaining surface areas are safe for wildlife use and access	Restore natural/compatible terrain as much as possible	Surface will be regraded to promote the use for wildlife
Control dust generation from demolition and active reclamation activities	Best management practices for controlling dust during active reclamation	Implement best management practices Routine air quality monitoring

Other recommendations are presented in the Code of Practice for Metal Mines as follows (adapted from EC, 2009; Golder, 2014):

- On-site facilities and equipment that are no longer needed should be removed and disposed of in a safe manner. Efforts should be made to sell equipment for reuse elsewhere or to send equipment for recycling, rather than disposing of it in landfill facilities. (from R514);
- The walls of on-site buildings should be razed to the ground. Foundations should be removed or covered with a sufficiently thick layer of soil to support re-vegetation. (from R515);
- Any remaining structures and foundations should be inspected to ensure that no contamination is present. If contamination is found, it should be remediated as necessary to ensure public health and safety for post-closure land use. (from R516);
- Support infrastructure, such as fuel storage tanks, pipelines, conveyors and underground services, should be removed. (from R517);
- The main access road to the site (or runway in the case of remote sites) and other on-site roads, as appropriate, should be preserved in a sufficient condition to allow post-closure access for monitoring, inspection and maintenance activities. (from R518);

- Roads and runways that will not be preserved for post-closure use should be reclaimed. Bridges, culverts and pipes should be removed, natural stream flow should be restored, and stream banks should be stabilized by re-vegetating or by using rip-rap. Surfaces, shoulders, escarpments, steep slopes, regular and irregular benches, etc., should be rehabilitated to prevent erosion. Surfaces and shoulders should be scarified, blended into natural contours, and re-vegetated. (from R519);
- Electrical infrastructure, including pylons, electrical cables and transformers, should be dismantled and removed. (from R520).

5.2.8.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for infrastructures decommissioning are provided by the AANDC/MVLWB (AANDC/MVLWB, 2013) and the previous ICRP (Golder, 2014). Closure activities for the water management facilities were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Recycling or reusing building materials and equipment where possible to reduce waste and importation of materials to site;
- Dismantle all buildings that are not necessary to achieve the future land use target;
- Raze/level all walls to the ground and remove foundations;
- Remove buildings and equipment during the winter to minimize damage to the land where appropriate;
- If disposing on site, decontaminate building materials (free of any batteries, fuels, oils, bulk process chemicals, or other deleterious substances), and use toxicity characteristic leaching procedure testing to confirm suitability for non-hazardous disposal;
- Cut, shred, crush, or break demolition debris to minimize the void volume during disposal;
- Maintain photographic records of major items placed into landfills, as well as a plan showing the location of various classes of demolition debris (e.g., concrete, structural steel, piping, metal sheeting, and cladding);
- Remove and dispose of concrete in an approved hazardous waste landfill if it contains contaminants that may pose a hazard over time;
- Backfill/grade all excavations to achieve the final desired surface contours to re-establish the original drainage or a new acceptable drainage;
- Backfill excavations in permafrost to limit permafrost degradation;
- Control dust emission during demolition of buildings that contain or contained asbestos, lead paint, hazardous chemicals, or other deleterious material;
- Remove buried tanks, where they already exist, to prevent subsidence;
- Dispose of wastes in quarries, borrow pits, underground mine workings, tailings impoundments, and waste rock piles;
- Decontaminate equipment (free of any batteries, fuels, oils, or other deleterious substances) and reuse or sell (local communities may have interests in some of the materials);

- Remove structures including bridges, culverts, pipes, buried wires and power lines and fill ditches in if no longer required and evaluate the area for potential contaminants;
- Reclaim areas to the original topography and drainage or to a new topography or drainage compatible with end land use targets;
- Scarify abandoned road/runway surfaces to promote re-vegetation of indigenous species;
- Leave roads, airstrips, bridges, or railways intact if it is in the public interest to do so (ownership liability will need to be considered); and
- Flatten berms and slopes at the side of roads to facilitate wildlife passage.

All the options listed above will be required to address closure and reclamation of Project infrastructures. Details on the implementation of those considerations are provided as applicable to each infrastructure component in the following section.

5.2.8.4 Engineering Work Associated with Selected Closure Activity

The relevant engineering works associated with the permanent closure activities for the infrastructures at the mill and main camp removal are taken from the Interim Closure and Reclamation Plan (Golder, 2014) and discussed below.

- Equipment used for closure activities and long-term maintenance (e.g., trucks, backhoes, etc.) will be removed from the site once they are no longer required. Most of the mobile equipment will be removed once the closure stage is complete. A small subset of equipment will be retained on-site for a portion of the post-closure stage;
- Remaining bulk fuel and empty portable fuel storage tanks will be transported back to the Baker Lake Site Facilities and offered to community interests. The tanks will be emptied, cleaned, and dismantled for disposal in the site landfill or shipped south. Any contaminated soil will be excavated and taken to the landfarm for treatment;
- All buildings and structures will be decontaminated, decommissioned and dismantled at closure. If required, the process plant may be temporarily converted to treat water in the Reclaim Pond. Demolition waste that cannot be reused, recycled or provided to local interests will be disposed of in the on-site landfill. Salvageable material will be removed off site;
- Hazardous wastes will be removed for disposal by a Licenced handler;
- Any above grade concrete structures will be demolished and the rubble will be disposed of in the landfill. Any slabs on grade will be punctured and then left in place and covered with soil or non-potentially acid generating/non-metal leaching waste rock. Any subgrade foundations will be left in place;
- All disturbed site areas will be re-graded to suit the surrounding topography. In areas where the original ground surface was lowered for site grading or structural requirements, the slopes will be stabilized and contoured. Cover materials may be required for erosion and dust control.

If not properly reclaimed, wildlife maybe injured by entering reclaimed areas with depressions and if subsidence occurs. Environmental design features and mitigation, as well as current wildlife management practices used in other mining projects will be implemented at the Project to limit wildlife injury such as re-contouring reclaimed areas to reduce hazards to wildlife. Buildings and equipment not required for post-closure activities will be removed from the site. Proper reclamation is also required to leave the site in appropriate conditions that do not present safety risks for humans. This is considered the most appropriate closure plan based on the Meadowbank Mine experience.

5.2.8.5 Predicted Residual Effects

No significant residual effects have been identified for after closure of the supporting buildings but changes to terrain caused by the construction and subsequent reclamation of the facilities could result in some alteration of the natural terrain.

5.2.8.6 Uncertainties

No major uncertainties are related to the closure of the Meadowbank infrastructures. The pre-disturbance terrain was covered by discontinuous vegetation interspersed with few bedrock outcroppings. The reclamation plan will be designed to encourage a natural succession of indigenous plant species within disturbed site areas. Grading and contouring would be done, where appropriate, to control soil erosion and to promote natural drainage.

5.2.8.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring and maintenance strategies for the Meadowbank infrastructures as presented by AANDC/MVLWB (2013):

- Periodic inspections will be performed to visually assess the reclaimed areas; and
- All buildings and equipment left on-site during closure will be maintained until no longer required, at which time they will be removed from the site or demolished and disposed in the on-site landfill.

5.2.8.8 Contingencies

There are no activities proposed as contingencies for the closure of the infrastructures.

5.2.9 Waste Management Facilities

The waste management facilities include the landfill, landfarm, incinerator and hazardous waste management area.

5.2.9.1 Pre-Disturbance, Existing, and Final Site Conditions

The pre-disturbance site conditions are summarized in Section 3.0 of this plan. Pre-disturbance conditions are based on baseline data collection programs presented in the Meadowbank FEIS (Cumberland, 2005a).

The landfill and landfarm are currently in use at Meadowbank and will be until post-closure. The incinerator and the hazardous waste management area are also operating at Meadowbank and will be until the end of active closure.

The waste management facilities will be reclaimed following best practices put in place during operation and in order to minimize long term disturbance.

5.2.9.2 Closure Objectives and Criteria

The closure relevant objectives and closure criteria for the Meadowbank waste management facilities are listed in Table 5-6, along with the specific actions and monitoring associated (modified from AANDC/MVLWB 2013).

Table 5-12: Closure Objectives and Criteria – Waste Management Facilities

Closure Objectives	Closure Criteria	Actions/Monitoring
Inadvertent access to landfill debris by humans and wildlife has been prevented	Limit access to facility Dispose only appropriate waste type in landfill	Limit access to the RSF with berms and signs Avoid food waste in landfill that could attract wildlife Routine inspection of the facilities
Waste disposal areas are not and will not become a source of contamination to the environment	Dispose only appropriate waste type in landfill Treat light hydrocarbon contaminated soil Remove all hazardous waste	Manage and dispose waste in landfill as per operation best practices Treat light hydrocarbon contaminated soil in the Meadowbank Mine landfarm Hazardous wastes will be removed for disposal by Licenced handler as per operational practices Routine inspection of the facilities
Erosion and effects to the ground thermal regime have been controlled to ensure physical stability The risk for the occurrence of ARD and leachate has been minimized	Appropriate cover and drainage over the landfarm and landfill	The landfill and landfarm area will be covered with NPAG waste rock at the end of active closure stage Surfaces will be re-graded to promote natural drainage Inspection during cover construction
Surface runoff and seepage water quality is safe for humans and wildlife	Water quality meets Water Licence requirements	Water quality monitoring
Return area to its original state or to a state compatible with the desired end land use	Human land use of the reclaimed area at post closure will not compromise people and wildlife health	Routine monitoring and physical inspection

The Code of Practice for Metal Mines also provides the following recommendations related to the closure of waste facilities and to the handling of contaminated materials (adapted from EC 2009; Golder, 2014):

- Waste from the decommissioning of ore processing facilities and site infrastructure, such as waste from the demolition of buildings and the removal of equipment, should be removed from the site and stored in an appropriate waste disposal site or disposed of on site in an appropriate manner in accordance with relevant regulatory requirements. If material is disposed of on site, the location and contents of the disposal site should be documented. (from R522);

- Sampling and analysis of soils and other materials should be conducted to ensure that none of the material is contaminated, e.g., with asbestos and mercury from buildings. If contaminated materials are identified, they should be handled and disposed of in an appropriate manner in accordance with all applicable regulatory requirements. (from R523)

5.2.9.3 Consideration of Closure Options and Selection of Closure Activities

Considerations for waste management facilities closure are provided by the AANDC/MVLWB (AANDC/MVLWB, 2013). Closure activities for the waste management facilities were selected in consideration of the closure aspects listed below, related to mine design stage, closure and post-closure periods.

- Plan activities to limit the amount of waste generated throughout the life of the mine;
- Locate waste management facilities away from waterways to minimize environmental impacts that could result from leachate generation/migration;
- Select location and design that will have minimal impact on wildlife habitat and therefore require minimal reclamation effort;
- Divert runoff around waste disposal area with ditches or berms to minimize migration of contaminants;
- Burn domestic waste and special waste (i.e., waste oil) in an approved incinerator;
- Remove hazardous waste to an approved on-site waste storage facility prior to shipping for off-site disposal;
- Cover landfill/landfarm with an appropriately designed cover system to limit infiltration to acceptable levels. The surface of the landfill cover should comprise erosion resistant materials, and the surface landform should be sustainable in the long-term.

All the options listed above will be required to address closure and reclamation of waste management infrastructure. Details on the implementation of those considerations are provided as applicable to each infrastructure component in the following section.

5.2.9.4 Engineering Work Associated with Selected Closure Activity

Landfill

The operational landfill (Landfill #1) is currently in operation at the mine site and consists of multiple sub-landfills that have been or will be built in the Portage RSF. Waste from the Meadowbank site is disposed in the Landfill #1. As these sub-landfills are filled the waste is compacted and then encapsulated with waste rock in the Portage RSF, as per the Landfill Management Plan (Agnico, 2017c). Landfill #1 will cease operating at the end of active mining activities.

During the closure phase of the Project, demolition and non-hazardous waste from the Meadowbank site will be deposited in the demolition Landfill (Landfill #2), located on top of the Portage RSF. The demolition landfill will be located in an estimated 4.0 m deep depression on the top of the Portage RSF. The demolition landfill will ultimately be encapsulated within the waste rock. It will be covered with a 4.0 m layer of coarse NPAG rock as part of the closure plan for the RSF.

The depression will be constructed by waste rock trucks discharging their loads in a controlled manner, forming berms on the last rock lift. The area to receive waste will be bounded by a 2.0 m high rockfil berm. The rockfill berm will act as a wind shield to reduce the amount of windblown debris, while providing material for intermediate cover of the landfill.

The protocol for materials placement within the closure landfill includes dismantling, stacking in a stockpile, cutting to manageable sizes, and transport and placement. Waste will be placed in layers then covered. Procedures will be developed to ensure materials segregation, placement, and closure are conducted in an appropriate manner.

Layered waste will not exceed 4.0 m in thickness. Waste will then be covered by a 0.3 to 1.0 m thick layer of rockfill, before being covered with an additional 4.0 m of coarse acid-buffering ultramafic NPAG waste rock material to fill voids.

The area of the landfill is estimated at 36,043 m^2 and the estimated available volume is 144,172 m^3 based on waste placed 4.0 m high. With the current RSF design, sufficient space will be available at the top of the RSF at closure.

At closure, the landfill will accept the same types of material as during operations. As per the Landfill Design and Management Plan (Agnico, 2017c), the following types of materials can be sent to the closure landfill:

- Plastic (except expanded polystyrene);
- Metals (steel, copper, aluminum, iron);
- White goods and small appliances;
- Building materials (wire, wood, fiberglass insulation, fiberglass, roofing, bricks,
- ceramics, empty caulking tubes, hardened caulking, glass, gyprock, bricks);
- Surface materials (asphalt, concrete, carpet);
- Vehicles and machinery provided all liquids, grease, batteries, and electronics have been removed; and
- Other materials (ceramics, rubber, clothing, cooled ash).

In addition to domestic and organic waste, the following materials will not be accepted at the closure landfill:

- Food containers and wrappings (unless cleaned);
- Whole tires;
- Hazardous waste;
- Electronics;
- Petroleum products, and petroleum-contaminated products; and
- Expanded polystyrene.

<u>Incinerator</u>

The incinerator receives food, domestic and organic waste from Meadowbank and Whale Tail Pit Project. At the end of the active closure phase, the incinerator will be decommissioned, barged out of the Baker Lake Site Facilities to a southern destination for re-use or sale, or dismantled and disposed at the on-site landfill. The incinerator building will be emptied and offered for local use and/or relocation. If there is no local interest, the infrastructure will be demolished and taken to the on-site landfill for disposal or barged out of the Baker Lake Site Facilities to a southern waste disposal facility.

Hazardous Material

As presented in the Hazardous Material Management Plan (Agnico Eagle, 2013e), hazardous materials used during mine site operations and closure include:

- Fuel, paints and Lubricants – diesel fuel, oils, greases, anti-freeze, paints, and solvents for equipment operation and maintenance;
- Mill Consumables – sodium cyanide, sulphur (or metabisulphide), hydrochloric acid, lime, flocculants, and anti-scalants for mineral extraction;
- Explosives – ammonium nitrate and high explosives for blasting in the mine; and,
- Laboratory Wastes – various by-products classified as hazardous waste and chemicals used in the assay laboratory (including nuclear sources).

These materials will be managed in operations such that minimal quantities remain on site at closure. Any remaining hazardous materials that cannot be used during closure activities will be transported to Licenced disposal facilities in the south, as is currently being done, in accordance with the Hazardous Material Management Plan (Agnico Eagle, 2013e). Used oil is an exception and will be incinerated on site during operations, as is currently being done. Any remaining cyanide reagents will be packaged and transported to Licenced facilities in the south or other Agnico Eagle divisions in accordance with the International Cyanide Management Code, and the Hazardous Materials Management Plan. Batteries and electronics will be shipped south for recycling in appropriate facilities.

Landfarm

A landfarm will be required during the closure period for petroleum-contaminated soil. The Landfarm 2, constructed in 2016 and located on the North East side of the TSF South Cell, is now in use until the end of operations and also for the closure period. The Landfarm 2 receives contaminated soil from Meadowbank and will eventually receive contaminated soil from Whale Tail.

Based on the Landfarm Design and Management Plan (Agnico, 2017b) the area of Landfarm 2 is 3,815 m^2. Based on landfarm specifications of other northern mines, contaminated material can be stockpiled up to 4.0 m high. Accounting for a 25% loss of area due to sloping at that windrow height, the landfarm area will allow for the storage of a maximum of 11,445 m^3. This will readily accommodate total of contaminated soil already on site, should all of it need to be stored until closure, and the additional soil from the remaining operation and closure periods. In addition, ample room will be available to accommodate a designated area for spreading of contaminated coarse-grained material that cannot be bioremediated.

The following products may be treated in the landfarm if used onsite and spilled on soil:

- Diesel fuel;

- Gasoline;
- Aviation fuel (Jet A);
- Hydraulic oil;
- Other light oil e.g. engine oil, lubricating oil.

Contaminated soil will be treated in the landfarm at closure. Soil heavily contaminated or not treatable at the landfarm will be shipped south as hazardous material. After removal of all remediated soil and prior to abandonment/closure of the landfarm, the berm and base will be sampled on a 10.0 m grid, including at a depth of 1.0 m in representative locations, to determine if these soils are free from petroleum hydrocarbon contaminated (PHC) contamination. Results of this analysis will be compared to Government of Nunavut criteria. Since this area will form part of the TSF at closure, no excavation is necessary if industrial criteria are not met. The landfarm is located within the South Cell TSF and will be capped with 4.0m of NPAG waste rock material to ensure freeze-back encapsulation.

5.2.9.5 Predicted Residual Effects

No significant residual effects have been identified for closure of the waste management facilities other than changes to terrain caused by the construction and subsequent reclamation of the facilities.

5.2.9.6 Uncertainties

No major uncertainties have been identified in regards to closure of the waste management facilities.

5.2.9.7 Post-Closure Monitoring, Maintenance, and Reporting

The overall post-closure monitoring, maintenance program and reporting for the Meadowbank Project are discussed in Section 9.0 along with the general reporting requirements. The following presents the relevant post-closure monitoring and maintenance strategies for the waste management facilities as presented by AANDC/MVLWB (2013):

- Test water quality and quantity to measure the success of the selected closure activities for landfills and waste disposal areas;
- Monitor the ground thermal regime and the cover system performance to determine if permafrost has aggraded into the landfill and if the seasonal active zone remains within the cover;
- Inspect surface of landfill cover systems for cracking or slumping of the cover and for the underlying waste material's migrating to surface;
- Monitor wildlife and human use to ensure the selected closure activities have been effective in preventing access to these areas.

The landfill will be integrated within the surrounding RSF permafrost so no leachate is expected to occur in the long term. During the transition period (freezing), the leachate from the landfill is expected to have a very low strength (dilute) or is simply absent due to controls on materials placed in the landfill, and thus site-specific landfill leachate management is expected not to be required. Any leachate generated by the landfill will naturally be directed to the TSF. Landfill inspections and thermal monitoring will likely be required to ensure the freezeback of the RSF and landfill. The landfill will be inspected for cracking or slumping, for underlying waste material pushing its way up through the cover and to establish if buried materials are being pushed to the surface as a result of frost heaving. The thermal monitoring program will be part of the monitoring of the Portage RSF.

Landfarm monitoring and sampling during closure for contaminated soil remediation will follow the procedure specified in the Landfarm Design and Management Plan (Agnico, 2017b). The water contained in the sump in the landfarm will be released in a controlled manner to the TSF once confirmed it meets regulatory criteria. At closure, all remediated soils in the landfarm will be removed and handled as per the Landfarm Design and Management Plan. As the landfarm will be covered with NPAG waste rock as part of the TSF and integrated to the permafrost, no leachate is expected in post-closure.

Hazmat disposal will be audited in closure or post-closure to ensure all material have been disposed off site in appropriate facilities.

A detailed post-closure monitoring program for the waste management facilities has not been developed to date; however, such a plan is anticipated to be similar to the monitoring developed for the operations phase and will comply with the monitoring requirements outlined in the Meadowbank Water Licence.

5.2.9.8 Contingencies

No specific activities are proposed as contingencies for the closure of the waste management facilities.

6.0 Progressive Reclamation

6.1 Definition of Progressive Reclamation

Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may provide valuable experience on the effectiveness of certain measures that might be implemented during permanent closure (AANDC/MVLWB 2013).

The Code of Practice for Metal Mines includes the following recommendations related to progressive reclamation (adapted from EC 2009):

- Progressive reclamation, including that of waste rock piles, tailings management facilities and mine site infrastructure, should be undertaken during the mine operations phase to the extent feasible;
- Progressive reclamation activities should be consistent with the site-specific objectives and intended post closure land use for the site. Planning and implementation should consider final contouring, final drainage, cover requirements, and re-vegetation;
- The project schedule should be used to monitor the status of progressive reclamation, and the schedule should be updated on a regular basis.

6.2 Opportunities for Progressive Reclamation

Best management practices, including progressive closure, have been incorporated in the Meadowbank operation period. The current mine plan includes progressive closure associated with the following components:

- Open pits;
- Portage RSF;
- Tailings Storage Facilities;
- Water management infrastructures.

The key closure activities that have been identified for progressive reclamation are summarized in the following sections for each individual component of the Project. The progressive reclamations activities provided in this ICRP will be updated in future versions of the plan to include new opportunities for progressive reclamation identified during operations.

Details related to schedule of progressive reclamation is included in the closure schedule presented in Appendix P.

6.2.1 Baker Lake Site Facilities

No progressive reclamation activities have been identified for the Baker Lake site facilities at this time, as the facilities will be required throughout the operation period and the active closure.

6.2.2 All-Weather Access Road

The quarries and granular borrow sites no longer required for operations will be progressively reclaimed during operation, as equipment and resources are available. Specific timeline for quarries progressive reclamation during operation will be eventually defined.

6.2.3 Dikes and Saddle Dams

No progressive reclamation activities have been identified for the dikes and permanent structures this time. Dewatering structures are required for operations in the open pits and also to maintain the pits isolated during the flooding period and prior to opening the dewatering dikes. The TSF structures are required during operations to contain the tailings and will remain in place in the long term.

6.2.4 Open Pits

Following the end of mining activities in Goose Pit in 2015, natural flooding started. No active pumping system is operating in Goose pit and part of the system has been decommissioned. From 2015 to the end of 2017, approximately 1,581,806 m^3 of water have flooded the Goose Pit. This volume includes natural flooding (run off water, seepage, groundwater) and also transfer from the downstream seepage of Central Dike. The flooding of Vault and Phaser/BB Phaser pits are planned at the end of their operation starting in 2020 while the Mill will still be processing ore from Whale Tail Pit and in pit tailings deposition will continue in Portage Pit.

6.2.5 Rock Storage Facilities

Closure and reclamation of the Portage RSF occurred progressively during operations with the placement of the NPAG cover over the side slopes of the PAG RSF. Refer to Section 5.2.5.4 for cover design details. Approximately 84% of the Portage PAG RSF has been covered as of the end of 2017.

The RSF is designed for long-term stability. Thus no additional re-grading or construction will be required for stability. It will not be possible to progressively reclaim the uppermost bench or the top surface of the Portage RSF as the demolition landfill is located on the RSF. This will be completed in closure.

Open pit backfill with waste rock also occurred during operations at Goose and Portage pits, in the mined out sectors.

Finally, the RSFs containing NPAG waste rock will be reclaimed in operation or in active closure for closure construction requirements.

6.2.6 Tailings Storage Facilities

Progressive reclamation by capping the tailings in the North Cell was undertaken in winter of 2015 following the completion of the tailings deposition. The construction continued in 2016 and 2017. Capping occurred in sections (perimeter areas) where the tailings were at elevation 149.5 m (design level). This consisted of capping with 2.0 m of NPAG material and represents 750,743 m^3 of placed material. Progressive closure in the North Cell is planned to continue in winter 2018 and 2019. During in-pit deposition, there is an opportunity to progressively close the South Cell TSF. This option will be further evaluated by Agnico Eagle based on the current site condition and operating considerations at that time.

As part of the closure and reclamation planning, Agnico Eagle has undertaken a research program in collaboration with the RIME (Research Institute in Mine and Environment). The focus of this research program is the reclamation of the tailings storage and rock storage facilities. Test pads were constructed over the North Cell and instrumented to test various type of cover. Additional details are available in Appendix E.

6.2.7 Water Management Facilities

Following conversion of the Portage Attenuation Pond into the Reclaim Pond (South Tailings Cell) in 2014, some of the dewatering equipment from the North Cell reclaim system (i.e. dewatering pipelines, reclaim barge, effluent diffuser pipelines, and pumps) has been dismantled and removed. This activity occurred in 2015. Water management facilities or equipment not used or deemed not necessary could be removed during operations.

6.2.8 Infrastructure at Mill and Camp Area

Potential progressive reclamation activities for the buildings and equipment at Vault could occur during operation after the mining activities. Specific timeline for progressive reclamation at Vault during operation will be eventually defined.

Efforts are also made to reduce inventories of consumables leading up to the end of operations.

6.2.9 Waste Management Facilities

The landfill will be in active use throughout the operation period and also during the closure period in order to receive debris from decommissioning. Operation landfills are progressively closed in the Portage RSF during operation, but final closure of the demolition landfill will occur at the end of the active closure stage. The landfarm will be required in operations and active closure for soil decontamination. No specific progressive reclamation activities have been identified for the other waste disposal areas.

7.0 Temporary Closure

Temporary closure occurs when an advanced mineral exploration or mining operation ceases with the intent of resuming activities in the near future. Temporary closure could be due to an unplanned closure or a planned closure of certain facilities in a complex mining project (AANDC/MVLWB, 2013).

The Project operation is planned to be continuous for the full proposed operating period. However, the mine may need to shut down for a short-term or indefinitely (long-term) due to economic, environmental and/or social factors. The plans for both of these closure periods are discussed below. Notification of temporary closure would be presented to the staff and the local population with at least 30 days' notice; if the conditions allow, a longer notice period will be provided where possible.

7.1 Temporary Closure Goal and Closure Objectives

The goal of temporary closure is ongoing protection of the environment, and regulatory compliance during the shutdown period. Temporary closure measures deemed necessary will depend upon the duration and extent of site activities/presence during the temporary closure. It is anticipated that water management and treatment facilities will function at the same level during temporary shutdown periods as during operations.

The objectives of temporary closure activities are to:

- Maintain all operating facilities and programs necessary to protect humans, wildlife, and the environment, including necessary environmental monitoring;
- Make available appropriate financial resources to continue environmental monitoring and reporting during temporary closure;
- Keep care and maintenance staff at the site and in sufficient number and expertise to care for the site and any potential problems that may arise;
- Make available sufficient equipment and supplies on site for any maintenance or reclamation activities that may need to take place; and
- Comply with all applicable federal and territorial laws and regulations, in addition to the operator's Land Use Permits, Land Leases and Water Licence, will be ensured.

7.2 Temporary Closure Activities

The proposed short-term and long-term temporary closure activities are presented in the following subsections. The extent to which the activities listed will be implemented depends on the site conditions at the time of the temporary closure, and the anticipated length of the closure (short-term or long-term). In all cases, access to the sites, buildings, and all other infrastructures will be secured and restricted to authorized personnel only.

In most circumstances, planned temporary closure activities are expected to occur as described above and in the following sections. Should a situation arise in which temporary closure cannot be executed as planned (e.g. major fire at the processing Mill, dam important break/breach, etc.), the affected features will be subject to alternative temporary closure measures, with the planned temporary closure activities resuming as soon as practical. Also, temporary closure will not affect the AWAR as it is used as the overland transportation route from Baker Lake to the mine site for supplies. Regular maintenance and monitoring activities will be maintained at the same frequency as that of operations during short-term temporary closure and at a reduced frequency as required during long-term temporary closure.

7.2.1 Short-term Temporary Closure

Short term shut down or closure period is defined as a period of less than one year and could last for a period of weeks or several months (up to 12 months) based on economic, environmental, and social factors. The following Table (Table 7-1) summarizes the measures that will be taken as required during a short-term temporary closure (adapted from Golder 2014 and 2016a).

Table 7-1 : Short-term Temporary Closure Activities

Sites	Closure Activities
Open pits	Warning signs and berms will be erected as needed around the pit perimeter
	Dewatering/flooding of the pit will continue as conducted during operations
Monitoring	Monitoring of water quality of the collection ponds will continue as per during operations
	Environmental monitoring and sampling will continue at regular intervals as set out in the Project operations and monitoring program and in accordance with all applicable Licences, permits, and authorizations
	Routine geotechnical stability monitoring and maintenance will continue at a reduced rate compared to that conducted during operations. The pit area will be inspected routinely to check for rock falls, changes to groundwater inflows and overall integrity
Water Management	Surface water management facilities will be maintained to manage contact water runoff
	Unused water distribution lines will be drained, but would be left in place
TSF	Maintenance of water management infrastructures supporting the TSF to operational levels and required freeboard
Infrastructures and services areas	All mobile equipment except for small service equipment required for pit inspections will be removed and placed in secure on-site storage
	Fuel, lubricants, and hydraulic fluids will be removed from the pit area and stored in designated areas
	Fluid levels in all fuel tanks will be recorded and monitored regularly for leaks, or fuel will be removed from the site
	An inventory of chemicals and reagents, petroleum products, and other hazardous materials will be conducted. These materials will be secured appropriately, or the materials will be removed from the site
	All explosives will be relocated to the main powder magazine and secured, disposed of, or removed from the site
	Minimum staffing levels will be maintained to carry out care and maintenance
	The accommodations will be operated at reduced staffing level
	Critical facilities will have nominal heat to prevent freezing of the facilities and possible damage
	The sewage treatment plant and potable water treatment plant will continue to operate as needed
	Hazardous wastes on-site will be collected and stored in an appropriate area for annual disposal to a registered disposal facility

7.2.2 Long-term temporary closure

Long-term temporary closure (indefinite shutdown) is a cessation of mining and processing operation for an indefinite period of time greater than one year. The intention is that the mine will resume operations as soon as possible after the cause for the indefinite shutdown has been addressed. The site must maintain safety and environmental stability during this time. Possible causes for an indefinite shutdown could include prolonged adverse economic conditions or extended labor disputes. A decision on the estimated length of the indefinite shutdown would be made after the initial one year period. Decisions on possible extensions to the indefinite shutdown would be made every 6 months thereafter and would be based on the conditions at that time. At present, the maximum length of time or number of extensions for interim shutdown before moving to final closure has not been defined. Table 7-2 summarizes the measures that will be taken as required **in addition** to the short-term temporary closure activities (Table 7-1) during a long-term temporary closure (adapted from Golder 2014 and 2016a).

Table 7-2 : Long-term Temporary Closure Activities

Category	Closure Activities
Open pits	Pumps in the pit will be relocated and the pit will be allowed to flood passively (from rainfall and groundwater inflow)
Monitoring	Environmental and geotechnical monitoring and sampling will continue at the regular level as set out in the mine operations and monitoring program, and in accordance with all applicable Licences, permits and authorizations
RSF	If necessary, the working face of the RSFs slopes will be graded to ensure stability and drainage to the contact water management system adjacent to the rock storage facilities. As the RSFs will be designed and operated for long-term stability, it is anticipated that any grading required will be localized and minimal. The RSFs will be monitored to ensure the site stays in compliance with any permits and/or Licences
TSF	The tailings surface area will be re-graded, if needed, to promote slope stability. Erosion control measures will be implemented, if required, to reduce the potential mobilization of tailings by wind (spraying water to keep the tailings surface wet and/or covering the tailings surface with a layer of gravel). The TSF will be subject to routine geotechnical stability monitoring and maintenance. Monitoring will be at the same frequency as that of operations. Maintenance will be completed as required.
Dikes/dams	The dikes/dams will be monitored and maintained, and none of the dikes/dams will be opened and reconnected to adjacent lakes
Water Management	Surface water control structures will be maintained as required. In areas where water quality is suitable for discharge, natural drainage courses may be re-established
	Unused water distribution lines will be drained. Unused lines on surface will be removed and placed in a secure lay down area to reduce impacts on wildlife

7.3 Temporary Closure Monitoring, Maintenance, and Reporting

Monitoring and reporting during the short-term and long-term temporary closure will continue at the regular level as set out in the mine operations and monitoring program, and in accordance with all applicable Licences, permits and authorizations. Adjustment of monitoring frequencies for long term temporary closure might be made only following approval from the licensing and permitting authorities concerned.

The numbers of personnel on-site would be reduced to reduce operation costs. The staff present at site during temporary closure would be sufficient in number and expertise to successfully carry out care, maintenance and monitoring duties, and to address and remediate any potential problems that may arise. Sufficient equipment and supplies/reagents would be left on-site for any maintenance or reclamation activities that may need to take place.

As required by the Meadowbank Water Licence 2AM-MEA1525, Part J, items 4 and 5; *the Licencee shall notify the NWB in writing, at least sixty (60) days prior to, or as soon as practically possible, any intent to enter into a Care and Maintenance Phase. The Licencee shall provide the NWB, within thirty (30) days of the Licencee providing notice of intent to enter into Care and Maintenance under Part J, Item 4, a Care and Maintenance Plan that details the Licencee's plans for maintaining compliance with the Terms and Conditions of the Licence.*

The reclamation security deposit will also be kept up to date during temporary closure.

7.4 Temporary Closure Contingency Program

The key staff present at site during temporary closure would be sufficient in number and expertise to successfully address and remediate any conditions or unforeseen events that may arise through the monitoring programs. The key staff at the site would also have access to external consultants and advisors, as required.

The contingency options and actions for events or incidents defined for operations would be also implemented during the temporary closure (i.e., spill responses and reports).

7.5 Temporary Closure Schedule

Mining activities during short-term closure are typically stopped. However, activities such as care-and maintenance, monitoring, intermittent testing, periodic operation of equipment and appropriate facilities will be on-going as described above. Activities related to ensuring public and wildlife safety would be a priority, and would focus upon maintenance and monitoring of all facilities and equipment to maintain physical and chemical stability. A sufficient number of care-and-maintenance staff would be present on site, and an appropriate level of security would be implemented at selected facilities. Access to temporarily inactive facilities would be restricted to authorized personnel only.

The temporary closure schedule would depend on when temporary closure occurs (i.e., what year of the operations stage) and its duration, both of which are commonly uncertain. Therefore, the schedule for the activities presented in Section 7.2 would be developed as temporary closure advances. Establishing a temporary closure schedule inherently contains uncertainty as this is not a planned activity, and the duration of a temporary closure will vary based on the cause for closure. As a result, the schedule will be progressive.

The sequence of activities for short-term and long-term temporary closure would, in summary, be as follows:

- Restrict access to the site, buildings, and infrastructures to authorized personnel as required;
- Carry out an inventory of chemicals and reagents, petroleum products, and other hazardous materials and secure the inventory appropriately or remove some of it from site;
- Post warning signs and berms as needed around the open pits perimeter;
- Remove all mobile equipment except for small service equipment required for open pits and site inspections and place them in secure on-site storage;
- Temporary closure of unnecessary facilities and systems;

- Continue with environmental and geotechnical monitoring and sampling required for care, maintenance and monitoring at the regular level as set out in the mine operations and monitoring program, and in accordance with all applicable Licences, permits, and authorizations.

8.0 Integrated Schedule of Activities

Reclamation of the Meadowbank site can be divided into the following three general stages (Golder, 2014):

- Operations: during which time progressive rehabilitation measures may be undertaken;
- Active Closure/Closure: during which time the major reclamation measures are undertaken; and
- Post Closure: all major construction activities have been completed and ongoing monitoring and maintenance is required, with minimal activity on-site.

The preliminary schedule of the Meadowbank closure is presented in Appendix P and provides a schedule detailing the closure stages of major components of the Meadowbank progressive closure, active closure/closure and post closure. The main key periods included in the schedule are presented in Table 8-1.

Table 8-1 : Meadowbank - Closure and Post-Closure Main Phases

Period	Operations/Closure Main Phases
2017 to September 2018	Mining operations at Meadowbank
2019 Q3 to January 2022	Mining operations at Whale Tail (ore processing at Meadowbank)
2017 to January 2022	Progressive closure
2022 to 2024	Active Closure - Demolition
2021 to 2027	Active pits flooding where in-pit deposition is completed
2030	Dikes opening/reconnection
2022 to 2030	Active Closure and Closure monitoring
2031 to 2032	AWAR closure
2031 to 2041	Post-Closure Monitoring

It is anticipated that the schedule will be refined throughout the Project life as the designs for closure are advanced and the closure methods and strategies are further developed. The schedule is subject to changes following mine plan and development as well as market conditions.

9.0 Post-Closure Site Assessment

The ICRP is a "living" document and includes a commitment to adaptive management and monitoring during all stages of the mine life to demonstrate the safe performance of the Project facilities and to reduce any contamination on the site or in the adjacent area after operations cease. Monitoring during operations and in closure will identify non-compliant conditions; allow timely maintenance and clean up as needed; allow timely planning for adaptive and corrective measures; and enable successful completion of the ICRP.

Monitoring programs is already ongoing and reviewed on yearly basis to provide additional baseline information on which to base the Final Closure and Reclamation plan (FCRP) document. The adaptive management plans to be used in closure will follow the actions completed during operations, and will be coordinated with the existing operational monitoring programs to set appropriate trigger levels, and mitigation plans and actions.

Monitoring and maintenance programs that are implemented during the closure and post-closure phases of the Project life will use the data collected during operational monitoring. The data collected in operation will assist with defining measures of success at closure and the performance of the reclamation and closure efforts. The data collected during post-closure monitoring will allow the procedures and activities to be adjusted or modified as necessary to confirm ongoing environmental protection, and ultimately will determine when final closure is complete, the closure objectives for the Project have been achieved, and the Project site and affected areas have been returned to viable and, wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment and with human activities.

Monitoring programs will be initiated during pre-development and operations to provide additional baseline information on which to base the FCRP document. The adaptive management plans to be used in closure and post-closure will follow the actions completed during operations, and will be coordinated with the operational monitoring programs (e.g., the Aquatic Effects Monitoring Plan (AEMP) and the Terrestrial Environment Management Plan (TEMP)) to set appropriate trigger levels, and mitigation plans and actions.

Monitoring and maintenance programs that are implemented during the closure and post-closure phases of the Project life will use the data collected during operational monitoring to assess the performance of the reclamation and closure procedures, and to identify long-term maintenance requirements, if any. The data collected during post-closure monitoring will allow the procedures and activities to be adjusted or modified as necessary to confirm ongoing environmental protection.

Regarding in-pit tailings deposition at Goose Pit and Portage Pit, groundwater monitoring network was implemented in 2018 with monitoring wells to assess groundwater quality of the in-pit tailings deposition both during the operation phase and after closure. Tailings pore water quality will be monitored in each pit to assess its chemical evolution. The thermal modelling, hydrogeological modelling and contaminant transport simulations will awbe updated after in-pit tailings deposition and will be used as a predictive tool, along with field observations, to adapt the post-closure groundwater monitoring program (well locations, frequency, parameters). In addition, additional monitoring wells will be installed to monitor the groundwater flow paths. Breakthrough curves to predict concentrations of contaminant over time will be produced with the hydrogeological model to support the selection of monitoring wells screen location and depth. As part of the final closure plan, Agnico Eagle will adapt well characteristics at closure to ensure plume interception and explore the potential of installing a groundwater monitoring station in the vicinity of Portage Pit area A, where an open talik is expected to develop over the years. Agnico Eagle will review, optimize and adapt the location of the monitoring wells as part of the final closure plan in collaboration with the regulators. In addition, available thermistors and piezometer across the site will inform the thermal and hydrogeological model.

Post closure general arrangement is presented in Appendix O.

9.1 Operational Monitoring Strategies

The overall objectives during operations of the AEMP and the TEMP are to provide programs to identify and mitigate potential adverse Project-related impacts so that construction and operational activities do not cause any undue harm to water quality, sediment quality, vegetation, biota, wildlife, and wildlife habitats. Both the AEMP and the TEMP provide the basis for integrating monitoring efforts with future revisions to the Closure and Reclamation Plan to verify compliance with regulatory instruments and agreements, both federally and territorially.

The AEMP and the TEMP will be reviewed and updated in the final year of operations to reflect conditions at the site as the mine approaches closure. The changes would allow the basic portions of the plans to continue to be used to cover the closure period activities.

9.2 Closure and Post-Closure Strategies

Development of monitoring and maintenance programs is an iterative process in consultation with communities and regulators as the Project advances. The closure and post-closure monitoring and maintenance programs will be extensions of efforts undertaken during the operations phase and would reflect the success of the management of the site during operations to limit contamination.

The actual conditions or impact from the operations within the mine footprint would be understood at closure and this information would be used to modify monitoring plans moving to closure and post closure. It is anticipated that monitoring and maintenance will be carried out during the active closure stage at frequencies similar to those required during operations. Post closure monitoring and maintenance will be carried out at a reduced frequency depending on the results of the monitoring and the measures of success selected for closure. Guidance on monitoring and maintenance programs for closure and post-closure is provided in AANDC/MVLWB (2013). The frame work for the relevant strategies for the back-flooded area identified at this time is discussed below:

- Visual inspections of the reclaimed areas;
- Sample surface water and profiles of the back-flooded area; and
- Inspect fish habitat in back-flooded area.

As the closure effort is completed and the post-closure period begins, the AEMP and the TEMP would be reviewed and updated again to cover the remaining (post-closure) monitoring period. It is also anticipated that after several years in the post-closure period, monitoring would no longer be required.

It is planned that the haul road would be maintained for a sufficient period to enable access to the site for minor maintenance required in the initial portion of the post-closure period. The haul road will be decommissioned once maintenance requirements at the Project site are anticipated to be minor and could be achieved with small crews sent to site via helicopter in the summer. It is anticipated that the need for ongoing maintenance would be reduced with time and will not be required once the site is physically and chemically stable.

9.3 Reporting

The preparation of the following reports is required by the AANDC/MVLWB (2013) guidelines for closure and reclamation of all components of mine sites:

- Annual Closure and Reclamation Plan Progress Report: The general purpose of these annual reports is to provide an opportunity for all parties to track, modify, and report on reclamation. The annual review of research results also provides an opportunity to identify missing research tasks, which allows the research plans to continually evolve. The progress reports keep all parties informed about closure planning and allow the NWB to confirm that the proponent has remained on schedule. Any proposed changes to the CRP should be presented with supporting rationale in these reports for NWB approval;
- Reclamation Completion Report: The general purpose of the reclamation completion report is to provide details, including figures, of the actual reclamation work completed, and an explanation of any work that deviated from the original or approved CRP. The report should also provide a preliminary assessment on whether appropriate closure objectives and criteria have been achieved. With each reclamation completion report, there may be an opportunity to revise the financial security estimate depending on the stage of the operation and the current CRP;
- Performance Assessment Report: A performance assessment report is prepared at the completion of the reclamation work and following submission of the reclamation completion report. The general purpose of the performance assessment report is to provide a detailed comparison of conditions at the site against the appropriate closure objectives and closure criteria. With each performance assessment report, there may be an opportunity to revise the security estimate depending on the stage of the operation and the current ICRP.

The timelines for preparation and submission to NWB of the above described reports will be according to the Meadowbank Mine approved Licence requirements.

10.0 Financial Security

A permanent closure and reclamation financial security cost estimate has been prepared with the present Project layout and infrastructure. The cost estimate covers the closure and reclamation of all Project facilities as described in this report and was prepared using RECLAIM Version 7.0, March 2014, for permanent closure of the Project.

Reclamation of the Meadowbank Gold Project facilities can be divided into the following three general stages, as presented in the integrated schedule of closure activities presented in Appendix P:

- Operations: during which time progressive rehabilitation measures may be undertaken;
- Active Closure: during which time the major reclamation measures are undertaken;
- Post Closure: all major construction activities have been completed and ongoing monitoring and maintenance is required, with minimal activity on-site.

Agnico Eagle is required to submit a detailed financial security cost estimate for the Meadowbank ICRP - Update 2019 to Indigenous and Northern Affairs Canada (INAC) and to the Kivallik Inuit Association (KIA) to support land use and water licensing requirements. RECLAIM Version 7.0 workbook has been used for this estimate, as per the Guidelines for Closure and Reclamation Cost Estimates for Mines, issued by Indigenous and Northern Affairs Canada, Mackenzie Valley Land and Water Board and the Government of the Northwest Territories (INAC, MVLWB, GNWT, 2017).

This cost estimate provides for the closure measures described in detail in the Meadowbank ICRP – Update 2019. Most closure activities will occur within the active closure period, from 2022 to 2024. The schedule of closure activities presented in Appendix P outlines the major closure measures and their expected timeline.

For the purpose of this financial security cost estimate, only progressive rehabilitation measures which have already been completed to date are considered in the calculations.

The updated 2019 estimated closure and reclamation costs for the Meadowbank Project represent a total of $89,427,746. This total includes $62,269,580 of direct costs and $ 27,158,166 of indirect costs. The financial security cost estimate assumptions and methodology used for the calculations, along with the complete RECLAIM 7.0 spreadsheets are presented in Appendix Q.

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12.0 Personnel

This report is an update of the report 2018 Meadowbank Interim Closure and Reclamation Plan (654769-5000-4EER-0001 Rev 00). The update was by Nina Quan, Philippe Lemieux and Guillaume Comeau, and reviewed by Anh-Long Nguyen and Dominic Tremblay.

We trust that this report is to your satisfaction. Should you have any question, please do not hesitate on contacting us.

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Appendix A

Glossary of Terms and Definitions

The following terms are utilized in this document following the definitions provided in the Mine Site Reclamation Guidelines for the Northwest Territories (INAC 2007), the Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories (AANDC/MVLWB, 2013) and the Meadowbank Gold Project Type “A” Water Licence 2AMMEA1525.

This Appendix includes discipline-specific technical terms and key closure and reclamation planning terms (Adapted from Golder, 2014).

Abandonment: The permanent dismantlement of a facility so it is permanently incapable of its intended use. This includes the removal of associated equipment and structures.

Acid Rock Drainage (ARD): Acid rock drainage/metal leaching. The production of acidic leachate, seepage or drainage from underground workings, open pits, ore piles, waste rock or construction rock that can lead to the release of metals to groundwater or surface water during the life of the Project and beyond closure.

Active layer: The layer of ground above the permafrost which thaws and freezes annually.

Adaptive management: A management plan that describes a way of managing risks associated with uncertainty and provides a flexible framework for mitigation measures to be implemented and actions to be taken when specified thresholds are exceeded.

All-Weather Access Road (AWAR): The all-weather access road and associated water crossings between the Hamlet of Baker Lake and the Meadowbank Gold Project mine site.

Aquatic Effects Monitoring Plan (AEMP): A monitoring program designed during the Environmental Impact Statement stage of the Project to determine the short and long-term effects in the aquatic environment resulting from the Project, to evaluate the accuracy of impact predictions, to assess the effectiveness of planned impact mitigation measures and to identify additional impact mitigation measures to avert or reduce environmental effects. An overarching “umbrella” program that conceptually provides an opportunity to integrate results of individual, but related, monitoring programs in accordance with the Water Licence.

Backfill: Material excavated from a site and reused for filling the surface or underground void created by mining.

Background: An area near the site under evaluation not influenced by chemicals released from the site, or other impacts created by onsite activity.

Baker Lake Site Facilities: The facilities associated with the Meadowbank Gold Project, located within the Hamlet of Baker Lake, which includes the barge landing, a dry freight storage area, a fuel tank farm, and associated access roads.

Baseline: A surveyed condition and reference used for future surveys.

Bay-Goose Dike: The structure, along with South Camp Dike, designed to isolate the Portage and Goose Island open pit mining areas from Third Portage Lake.

Berm: A mound or wall, usually of earth, used to retain substances or to prevent substances from entering an area.

Appendix A

Glossary of Terms and Definitions

Best management practices: Any program, technology, process, operating method, measure, or device that controls, prevents, removes, or reduces pollution and impact on the environment.

Biodiversity: The variety of plants and animals that live in a specific area.

Bioremediation: The use of microorganisms or vegetation to reduce contaminant levels in soil or water.

Borrow pit: A source of fill or embanking material.

Canadian Council of the Minister of Environment (CCME): The organizations of Canadian Ministers of Environment that set guidelines for environmental protection across Canada such as the Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life.

Care and maintenance: A term to describe the status of a mine when it undergoes a temporary closure. In respect of a mine, means the status of the facility when the Licencee ceases production or commercial operation temporarily for an undefined period of time

Central Dike: The structure designed to isolate the Tailings Storage Facility from Second Portage Lake for the purpose of retaining tailings.

Closure: When a mine ceases operations without the intent to resume mining activities in the future.

Closure criteria: Details to set precise measures of when the objective has been satisfied.

Closure objectives: Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles. Closure objectives are typically specific to project components, are measurable and achievable, and allow for the development of closure criteria.

Commercial operation: In respect of a mine, an average rate of production that is equal to or greater than 25% of the design capacity of the mine over a period of ninety consecutive days.

Construction: Activities undertaken to construct or build any components of, or associated with, the development of the Meadowbank Gold Project.

Contact water: Any water that may be physically or chemically affected by mining activities.

Contaminant: Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds background levels or which is not naturally occurring in the environment.

Contouring: The process of shaping the land surface to fit the form of the surrounding land.

Core Receiving Environmental Monitoring Program (CREMP): A monitoring program designed to determine the short and long-term effects in the aquatic environment resulting from the Project, to evaluate the accuracy of impact predictions, to assess the effectiveness of planned impact mitigation measures and to identify additional impact mitigation measures to avert or reduce environmental effects.

Cumulative Effects: The combined environmental impacts that accumulate over time and space as a result of a series of similar or related actions or activities.

Decommissioning: The process of permanently closing a site and removing equipment, buildings and structures. Rehabilitation and plans for future maintenance of affected land and water are also included.

Appendix A

Glossary of Terms and Definitions

Deleterious substances: A substance as defined in section 34(1) of the Fisheries Act.

Dike: Retaining structure designed for water control to enable safe open pit mining and for containing tailings impoundments.

Discharge: The release of any water or waste to the receiving environment.

Disposal: The relocation, containment, treatment or processing of unwanted materials. This may involve the removal of contaminants or their conversion to less harmful forms.

Domestic waste: All solid waste generated form the accommodations, kitchen facilities and all other site facilities, excluding those hazardous wastes associated with the mining and processing of ore.

Drainage: The removal of excess surface water or groundwater from land by natural runoff and permeation, or by surface or subsurface drains.

East Dike: The structure designed to isolate the Portage Pit area from Second Portage Lake.

Effluent: Treated or untreated liquid waste material that is discharged into the environment from all site water management facilities or from a structure such as a settling pond or a treatment plant.

End land use: The allowable use of disturbed land following reclamation. Municipal zoning and/or approval may be required for specific land uses.

Engagement: The communication and outreach activities a proponent is required to undertake with affected communities and Aboriginal organizations/governments prior to and during the operation of a project, including closure and reclamation phases.

Engineered structure: Any facility, which was designed and approved by a Professional Engineer registered with the Association of Professional Engineers, Geologists and Geophysicists of Nunavut.

Environment: The components of the Earth, and includes: land, water and air, including all layers of the atmosphere; all organic and inorganic matter and living organisms; and the interacting natural systems that include the aforementioned components.

Environmental assessment: An assessment of the environmental effects of a project that is conducted in accordance with the Canadian Environmental Assessment Act and its regulations.

Environmental management system: A management system that incorporates environmentally and socially responsible practices into the project operations.

Erosion: The wearing away of rock, soil or other surface material by water, rain, waves, wind or ice; the process may be accelerated by human activities.

Final discharge point: In respect of an effluent, an identifiable discharge point of a mine beyond which the operator of the mine no longer exercises control over the quality of the effluent (Metal Mining Effluent Regulations).

Fish habitat: Areas used by fish for spawning, nursery, rearing, foraging and overwintering.

Geotechnical Engineer: A professional engineer registered with the Association of Professional Engineers, Geologist and Geophysicists of Nunavut and whose principal field of specialization with the engineering properties of earth materials in dealing with man-made structures and earthworks that will be built on a site. These can include shallow and deep foundations, retaining walls, dams, and embankments.

Geothermal analysis: The analysis of temperature below the ground surface.

Glacial till: Unsorted and unlayered rock debris deposited by glacier.

Goose Island Pit: The open pit developed for mining the Goose Island ore deposit.

Greywater: The component of effluent produced from domestic use (i.e. washing, bathing, food preparation and laundering), excluding sewage.

Ground thermal regime: Temperature conditions below the ground surface; a condition of heat losses and gains from geothermal sources and the atmosphere.

Groundwater: All subsurface water that occurs beneath the water table in rocks and geologic formations that are fully saturated. Water that occupies pores and fractures in rock and soil below the ground surface in a liquid or frozen state.

Habitat: The place where animal or plant naturally lives and grows.

Hazardous materials/waste: A contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage. Materials or contaminant which are categorized as dangerous goods under the Transportation of Dangerous Good Act (1992) and/or that is no longer used for their original purpose and is intended for recycling, treatment, disposal or storage.

Hydrology: The science that deals with water, its properties, distribution and circulation over the Earth's surface.

In situ treatment: A method of managing or treating contaminated soils, sludges and waters "in place" in a manner that does not require the contaminated material to be physically removed or excavated from where it originated.

Incinerator: The dual chamber, high temperature facility designed with the capacity to service the camp.

Interim Closure and Reclamation Plan (ICRP): A conceptual detailed plan on the reclamation of mine components which will not be closed until the end of the mining operations, and operational detail for components which are to be progressively reclaimed throughout the mine life.

Landfarm: The lined, engineered facility designed to treat petroleum hydrocarbon contaminated snow and soil that may be generated during mining activities using bioremediation.

Landfill: An engineered waste management facility at which waste is disposed by placing it on or in land in a manner that minimizes adverse human health and environmental effects.

Leachate: Water or other liquid that has washed (leached) from a solid material, such as a layer of soil or water; leachate may contain contaminants.

Metal leaching: The mobilization of metals into solution under neutral, acidic or alkaline conditions.

Migration: The movement of chemicals, bacteria, and gases in flowing water or vapour.

Mine design: The detailed engineered designs for all mine components stamped by a design engineer.

Appendix A

Glossary of Terms and Definitions

Mine plan: The plan for the development of the mine, including the sequencing of the development.

Mine water: Any water, including groundwater, which is pumped or flows out of any underground workings or open pit.

Mitigation: The process of rectifying an impact by repairing, rehabilitating or restoring the affected environment, or the process of compensating for the impact by replacing or providing substitute resources or environments.

Monitoring: Observing the change in geophysical, hydrogeological or geochemical measurements over time.

No net loss: A term found in Canada's Fisheries Act. It is based on the fundamental principle of balancing unavoidable losses of fish habitats with habitat replacement on a project-by-project basis in order to prevent depletion of Canada's fisheries resources.

Non-contact water: The runoff originating from areas unaffected by mining activity that does not come into contact with developed areas.

Nunavut Land Claims Agreement: The "Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada," including its preamble and schedules, and any amendments to that agreement made pursuant to it.

Objectives: Objectives describe what the reclamation activities are aiming to achieve. The goal of mine closure is to achieve the long-term objectives that are selected for the site.

Operations: The set of activities associated with mining, ore processing and recovery of gold; excluding construction and decommissioning activities.

Operator: The person who operates, has control or custody of, or is in charge of a mine or recognized closed mine.

Passive Treatment: Treatment technologies that can function with little or no maintenance over long periods of time.

Permafrost: Permafrost is defined as ground that remains at or below 0°C for at least two years. Permafrost does not necessarily contain ice; rather, the definition is based solely on temperature criteria of the mineral or organic parent material.

Permafrost Aggradation: A naturally or artificially caused increase in the thickness and/or area extent of permafrost.

Permanent Closure: Final closure of the mine site after mining has ceased, when no further exploration, mining, or processing activities are anticipated at the site.

Permeability: The ease with which gases, liquids, or plant roots penetrate or pass through soil or a layer of soil. The rate of permeability depends upon the composition of the soil.

pH: A measure of the alkalinity or acidity of a solution, related to hydrogen ion concentration; a pH of 7.0 being neutral.

Piezometer: An instrument used to monitor pore water pressure.

Appendix A

Glossary of Terms and Definitions

Pore water pressure: The pressure of groundwater held within the spaces between sediment particles.

Pore water: The groundwater present within the spaces between sediment particles.

Portage Attenuation Pond: The pond located in the South Cell of the TSF (prior to the start of tailings deposition in that cell) where mine site contact water will be discharged, and where water in the pond will be reclaimed to satisfy mill process water make up requirements with any excess water being treated if required and discharged to Third Portage Lake.

Portage Pit: The open pit developed for mining the Portage ore deposits.

Portage Rock Storage Facility: The facility designed to store waste rock from the Portage and Goose Island open pits.

Post-closure: The period of time after active closure of the mine.

Progressive Reclamation: Actions that can be taken during mining operations before permanent closure, to take advantage of cost and operating efficiencies by using the resources available from mine operations to reduce the overall reclamation costs incurred. It enhances environmental protection and shortens the timeframe for achieving the reclamation objectives and goals.

Project: The Meadowbank Gold Project as outlined in the Final Environmental Impact Statement and supplemental information submitted by Cumberland Resources Limited, Meadowbank Mining Corporation and subsequently Agnico Eagle Mines Ltd. to the Nunavut Impact Review Board (NIRB) and the Nunavut Water Board. It comprises an open pit mine, an All Weather Private Access Road from Baker Lake to the mine site, and site facilities in the Hamlet of Baker Lake.

Quarry: The areas of surface excavation for extracting rock material for use as construction materials along the All Weather Private Access Road and facilities at the mine site.

Receiving environment: The aquatic and terrestrial environments that receive any discharge resulting from the Project.

Reclaim Pond: The pond located within the active zone of the Tailings Storage Facility, designed to contain process (tailings related) water, and where water in the pond will be used to satisfy mill process water make up requirements.

Reclamation: The process of returning a disturbed site to its natural state or one for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety.

Reclamation Research: Literature reviews, laboratory or pilot-scale tests, engineering studies, and other methods of resolving uncertainties. Proponents conduct reclamation research to answer questions pertaining to environmental risks; the design of reclamation research plans aims to provide data and information which will reduce uncertainties for closure options, selected closure activities, and/or closure criteria.

Rehabilitation: Activities to ensure that the land will be returned to a form and productivity in conformity with a prior land use plan, including a stable ecological state that does not contribute substantially to environmental deterioration and is consistent with surrounding aesthetic values.

Appendix A

Glossary of Terms and Definitions

Remediation: The removal, reduction, or neutralization of substances, wastes or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future.

Restoration: The renewing, repairing, cleaning-up, remediation or other management of soil, groundwater or sediment so that its functions and qualities are comparable to those of its original, unaltered state.

Re-vegetation: Replacing original ground cover following a disturbance to the land.

Ripping: A method of loosening rock or soil using steel tynes attached to the rear of a bulldozer. The tynes are lowered into the ground and as the bulldozer moves forwards the soil or blocks of rock are displaced by the tynes.

Runoff: Water that is not absorbed by soil and drains off the land into bodies of water.

Saddle Dams: Structures located around the Tailings Storage Facilities.

Scarification: Seedbed preparation to make a site more amenable to plant growth. This is typically conducted with a grader.

Security deposit: Funds held by the Crown or land owner that can be used in the case of abandonment of an undertaking to reclaim the site, or carry out any ongoing measures that may remain to be taken after the abandonment of the undertaking.

Sediment: Solid material, both mineral and organic, that has been moved by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Seepage: Any water that drains through or escapes from any structure designed to contain, withhold, divert or retain water or waste. Seepage also includes any flows that have emerged through open pits, runoff from rock storage facilities, ore stockpile areas, quarries, and landfill or landfarm areas.

Seismic: Relating to an earthquake or to other tremors of the Earth, such as those caused by large explosions.

Sewage: All toilet wastes and greywater.

South Camp Dike: The structure, along with Bay-Goose Dike, designed to isolate the Portage and Goose Island open pit mining areas from Third Portage Lake.

Stakeholders: Industry, federal agencies, the territorial government, Aboriginal organizations/governments, land owners, affected communities, and other parties with an interest in a project.

Stormwater Dike: The structure designed to divide the North and South cells of the Tailings Storage Facility.

Sump: An excavation in impermeable soil for the purpose of catching or storing water or waste.

Surface water: Natural water bodies such as river, streams, brooks, ponds and lakes, as well as artificial watercourses, such as irrigation, industrial and navigational canals, in direct contact with the atmosphere. Sustainable development: Industrial development that does not detract from the potential of the natural environment to ensure benefits for future generations.

Tailings: Material rejected from a mill after most of the recoverable valuable minerals have been extracted.

Appendix A

Glossary of Terms and Definitions

Tailings Storage Facility: The facility designed to permanently contain the solid fraction of the mill tailings, located in the northwest arm of the partially dewatered Second Portage Lake. The facility includes the Reclaim Pond, the Central Dike, Saddle Dams, and the Stormwater Dike.

Taliks: Unfrozen zones that can exist within, below, or above permafrost layers. They are usually located below deep water bodies.

Temporary closure: When a mine ceases operations with the intent to resume mining activities in the future. Temporary closures can last for a period of weeks, or for several years, based on economical, environmental, political, or social factors.

Total dissolved solids: A measure of the amount of dissolved substances in a waterbody.

Total suspended solids: A measure of the particulate matter suspended in the water column.

Traditional knowledge: A cumulative, collective body of knowledge, experience, and values built up by a group of people through generations of living in close contact with nature. It builds upon the historic experiences of a people and adapts to social, economic, environmental, spiritual and political change. The practical knowledge that has been gathered through the experience of living in close contact with nature and has been passed along or communicated orally, and handed down from generation to generation.

Turbidity: The degree of clarity in the water column typically reflected as the amount of suspended particulate matter in a waterbody.

Vault Attenuation Pond: The pond located in the Vault mining area where contact water including pit water will be discharged and treated, if required, prior to final discharge to Wally Lake.

Vault Dike: The structure designed to isolate Vault Lake from Wally Lake, for the purpose of developing the Vault Pit and allowing for storage of effluent in the Vault Attenuation Pond.

Vault haul road: The road that connects the Portage mining area to the Vault mining area.

Vault haul road crossing: The crossing located at the outlet of Turn Lake to Drill Tail Lake along the road that connects the Portage mining area to the Vault mining area.

Vault Pit: The open pit developed for mining the Vault ore deposit.

Vault Rock Storage Facility: The facility designed to store waste rock from the Vault Pit.

Waste rock: All rock materials, except ore and tailings that are produced as a result of mining operations. All unprocessed rock materials that are or were produced as a result of mining operations and have no current economic value.

Wastewater: The water generated by site activities or originates on-site that requires treatment or any other water management activity.

Wastewater treatment system: A tertiary treatment plant designed to remove organic material and nutrients.

Watershed: A region or area bordered by ridges of higher ground that drains into a particular watercourse or body of water.

Water table: The level below where the ground is saturated with water.

Appendix B

List of Acronyms, Abbreviations, Units, and Symbols

List of Acronyms and Abbreviations

2PL	Second Portage Lake
3PL	Third Portage Lake
Agnico	Agnico Eagle Mines Ltd.
AEMP	Aquatic Environmental Management Plan
AANDC	Aboriginal Affairs and Northern Development Canada
ARD	Acid rock drainage
AWAR	All-Weather Access Road
Brodie	Brodie Consulting Limited
CCME	Canadian Council of Ministers for the Environment
COSEWIC	Committee on the Status or Endangered Wildlife in Canada
Cumberland	Cumberland Resources Limited
DFO	Department of Fisheries and Oceans (Fisheries and Oceans Canada)
ELC	Ecological Land Classification
FMA	FMA Heritage Resources Consultants Inc.
GHG	Greenhouse gases
GN	Government of Nunavut
Golder	Golder Associates Ltd.
HADD	Harmful alteration, disruption or destruction (of fish habitat)
ICRP	Interim Closure and Reclamation Plan
IF	Iron formation rock
INAC	Indian and Northern Affairs Canada
IPCC	Intergovernmental Panel on Climate Change
IV	Intermediate volcanic (rock)
KIA/KivIA	Kivalliq Inuit Association
LSA	Local study area
masl	Meters above sea level
ML	Metal leaching
MMC	Meadowbank Mining Corporation
MMER	Metal Mining Effluent Regulations

Appendix B

List of Acronyms, Abbreviations, Units, and Symbols

MW	Mega-Watts
NEC	Nunavut Environmental Consulting
NIRB	Nunavut Impact Review Board
NO^2	Nitrogen dioxide
NPAG	Non-potentially acid generating
NRC	Natural Resources Canada
NWB	Nunavut Water Board
PAG	Potentially acid generating
PM10	Particulate Matter (concentrations less than 10 µg/m3)
PM2.5	Particulate Matter (concentrations less than 2.5 µg/m3)
MGP	Meadowbank Gold Project
SARPR	Species at Risk Public Registry
SO^2	Sulphur dioxide
SNC	SNC-Lavalin Group
TSF	Tailings Storage Facilities
TSP	Total Suspended Solids

List of Units and Symbols

centimetre	cm
megawatt	MW
cubic centimetre	cm^3
metre	m
cubic metre	m^3
cubic metre per tonne	m^3/t
metres per minute	m/min
metres per second	m/s
metric ton (tonne)	t
milligram	mg
degrees Celsius	°C

Appendix B

List of Acronyms, Abbreviations, Units, and Symbols

milligrams per litre	mg/L
gram	g
millilitre	mL
grams per litre	g/L
millimetre	mm
grams per tonne	g/t
million	M
greater than	> (use only in tables)
Million cubic meters	Mm^3
hectare (10 000 m^2)	ha
million tonnes	Mt
million litre	Ml
hour	h
hours per day	h/d
parts per billion	ppb
hours per week	h/wk
parts per million	ppm
hours per year	h/y
kilograms per cubic metre	kg/m^3
square centimetre	cm^2
kilograms per hour	kg/h
square kilometre	km^2
kilometre	km
Tonnes per day	t/day
kilometres per hour	km/h
Tonnes per cubic metre	t/m^3
less than	< (use only in tables)
litre	L

Appendix C

Record of Engagement

This is a table that outlines all engagement specific to closure that has occurred to date. No issue has been identified.

Engagement specific to closure
Following the end of mining activities in Goose Pit in 2015, natural flooding started. No active pumping system is operating in Goose pit and part of the system has been decommissioned. From 2015 to 2017, approximately 1,581,806 m^3 of water have reflooded the Goose Pit.
Closure and reclamation of the Portage RSF occurred progressively during operations with the placement of the NPAG cover over the side slopes of the PAG RSF. Refer to Section 5.2.5.4 for cover design details. Approximately 84% of the Portage PAG RSF has been covered as of the end of 2017.
At the TSF, capping the tailings in the North Cell was undertaken in winter of 2015 following the completion of the tailings deposition. The construction continued in 2016 and 2017. Capping occurred in sections (perimeter areas) where the tailings were at elevation 149.5 m (maximum design level). This consisted of capping with 2.0 m of NPAG material. Progressive closure in the North Cell is planned to continue in winter 2018 and 2019.
Following conversion of the Portage Attenuation Pond into the Reclaim Pond (South Tailings Cell) in 2014, some of the dewatering equipment from the North Cell reclaim system (i.e. dewatering pipelines, reclaim barge, effluent diffuser pipelines, and pumps) has been dismantled and removed. This activity occurred in 2015.

Appendix D

Lessons Learned from Other Projects

This summary table present lessons from similar projects that would have direct application for the Meadowbank closure and reclamation. This table will be updated during further states of the Project, during the next revision of the Interim Closure and Reclamation Plan and for the Final Closure and Reclamation Plan.

Development	Activity which led to lesson learned	Lesson learned	Adaptive management results
Ekati, Diavik, and Snap Lake mine sites	Open pit mining	Wildlife injury or mortality may occur by entering the open pit	A rock berm(s) will be constructed around the open pit during the operations stage
Ekati, Diavik, and Snap Lake mine sites	Mine site infrastructure	Wildlife injury or mortality may occur by entering mine site facilities	Disturbed areas will be recontoured at closure reducing hazards to wildlife

(Modified from Golder, 2016a)

Reference to similar projects:

DDMI (Diavik Diamond Mines Incorporated). 2009. Interim Closure and Reclamation Plan, Version 3. Yellowknife, December.

Golder Associates Ltd., 2016. Whale Tail Interim Closure and Reclamation Plan. Report No. 1541520. Report to Agnico Eagle Mines Ltd. June 2016.

Agnico Eagle, 2015. Meliadine Gold Project Preliminary Closure and Reclamation Plan, Version 1.0, 6513-CRP-01

Appendix E

Research Projects

<u>Summary of On-Going Field Trials – TSF and RSF</u>

A research project in collaboration with the Research Institute of Mines and Environment (RIME) was initiated in 2014 at Meadowbank. The Research Institute on Mines and Environment, through the NSERC-UQAT Chair on Mine Site Reclamation, is mandated to evaluate the performance of three field experimental cells constructed in 2014 and 2015 on Meadowbank's North Cell TSF. The three experimental cells that were built on Meadowbank's TSF are two insulation covers and one thermal cover with capillary barrier effects (CCBE).

The tested experimental cells are a 2m and a 4m thick insulation cover as well as a 2m thick cover with capillary barrier effects. The cells were built with coarse and fine non-potentially acid generating (NAG) ultramafic waste rock (soapstone) and are instrumented in order to follow their thermal and hydrogeological behaviors.

Results have been reviewed by the RIME and Agnico Eagle. The results of the experimental cells have been used so far in the work for the cover design of the TSF North and South Cell. Data collection was still ongoing in 2017 and results will be used in future studies as needed.

Also in collaboration with the RIME, in 2016 a laboratory testing program was developed to obtain a good overview of the effects of freeze/thaw (F/T) and wet/dry (W/D) cycles on the soapstone. The developed experimental program is primarily focused towards the evaluation of the resistance to F/T and W/D of the soapstone to be used as cover materials for the TSF and RSF. Testing was completed to evaluate the effects of F/T and W/D on rock cores and rock slabs, the effects of F/T on various soapstone grain size fractions, and the effects of F/T on the permeability of a compacted soapstone layer. Based on the testing results and weathering criteria available in the literature, it seems that Meadowbank's soapstone has a good resistance to F/T and W/D cycles.

Other laboratory work (such as frost heave or bearing capacity tests) could be conducted in the future if required for other engineering purposes.

(Agnico Eagle Mines Limited. 2018c. Meadowbank Gold Project 2017 Annual Report. 278 p. May 2018)

<u>Contributions to Regional Monitoring</u>

In 2017, Agnico Eagle worked with a group of researchers from the University of Manitoba (Dr. Jorg Stetefeld and team) who are initiating a study on use of eDNA for predicting presence/absence and/or changes in relative abundance of northern fish species. Furthermore, Agnico continues to discuss current methods of evaluating fish habitat and productivity of a fishery under the DFO Fisheries Act and fisheries protection policy with consultants, academic researchers and has provides all raw fishout data and habitat mapping to DFO scientists for use by any interested parties. At a regional level, the information, monitoring tools, monitoring data and modelling that is used at Meadowbank has been applied by Agnico Eagle and other consultants at other proposed projects in Nunavut including, the Meliadine Gold Project and Amaruq Whale Tail Pit project.

In addition, Agnico Eagle Mines has participated as a technical advisory group member of the Inu'tutit project since 2014. The Inu'tutit Initiative is part of longer term plan that is being led by a secretariat of key players made up of the NGMP, KivIA, INAC and Nunavut Water Board (NWB), and is being implemented through partnerships between the KivIA, federal and territorial governments, industry (Areva Resources and Agnico

Eagle Mines), the Hamlet of Baker Lake and eventually, universities and academic institutions. More specifically, the Kivalliq Inuit Association (KivIA) has partnered with Indigenous and Northern Affairs Canada (INAC) and the Nunavut General Monitoring Plan (NGMP) to develop an Aquatic Cumulative Effects Monitoring Program (CEMP) for the Baker Lake Basin under the auspices of the Inu'tutit Initiative.

Although the intent of the Inu'tutit CEMP is not to determine the influence of a particular point source at this time, the concept of gradients of exposure from point sources have influenced site selection in addition to a broader effects-based study design to monitor the condition of the subwatersheds. Sites selected for the Inu'tutit CEMP incorporate concepts of both stressor and effects base study design, and include locations to monitor the aquatic environment at the project, watershed and basin scales.

Finally, Agnico is supporting a study by University of Manitoba researchers (Dr. Charles Wong & team) in the Hamlet of Baker Lake, focusing on assessment of municipal wastewater impacts to the surrounding water quality. Field work for this study will begin in 2018. Agnico is also looking to expand the study to work with the Hamlet and include assessment of current treatment system performance, design and evaluation of a new treatment system, as well as measurements of impacts to lower trophic levels and fish health.

Meadowbank continues to contribute to the GN DOE caribou collaring program which started in 2009. Six deployments have been completed in the area around Baker Lake since Agnico Eagle became involved in the collaring program. Nine (2008), twenty one (2009; shared with AREVA), thirteen (2011), fifteen (2013; shared with AREVA), ten (2015) and 13 (2016) caribou collars were deployed (greater than $250 000). In early 2011, Meadowbank contributed additional funding toward the GN-led program to estimate the number of breeding females in the Beverly herd of taiga-wintering barren-ground caribou. In 2013, Agnico Eagle finalized discussions with the GN and entered into a new Memorandum of Understanding (MOU) to commit to another long term (3 years) contribution in support of the regional GN caribou monitoring program. This agreement will continue to assist the GN- DOE- Wildlife branch in directing the implementation, data analysis and management of caribou populations in the Kivalliq region. Agnico Eagle renewed the MOU in 2016.

In addition, in 2017 Agnico Eagle worked with the GN to evaluate the Zone of Influence of the Meadowbank Mine, as it relates to caribou. Seasonal ranges are important to understand as Barren-ground caribou exhibit migratory behaviour between calving and wintering areas. Migratory animals use a variety (seasonal) of habitats to meet life-history requirements as they move across the landscape and sensory disturbance from development is hypothesized to reduce selection of preferred habitats. In 2017, in collaboration with Agnico Eagle staff, Golder biologists and statisticians worked to determine a zone of influence for the Meadowbank mine, or evaluate if it is affecting a large number of individuals. It is predicted that reduced use of preferred habitats should reduce herd size (from lower survival and reproduction). Data analysis was completed and hypotheses were tested, documents were provided to regulators and reviewed, presentations were made at the GeoScience Forum and publications are expected in 2018. To reach consensus on research projects, needs for future monitoring and research, gain approval and ensure consistent endpoints of success, a Terrestrial Advisory Group (TAG) was also developed and a series of workshops were developed.

Finally, Agnico is also working with raptor researcher Dr. Alastair Franke from the University of Alberta to document presence of raptors in the Meadowbank area. Dr. Franke's Arctic Raptors group will be tracking changes that may occur as a result of mining activity and sharing results across the scientific community through publications.

(Agnico Eagle Mines Limited. 2018c. Meadowbank Gold Project 2017 Annual Report. 278 p. May 2018)

Appendix F

Site Photos

Photo 1 : Meadowbank Site Facilities, summer 2014

Photo 2 : Meadowbank Portage RSF, summer 2014

Photo 3 : Meadowbank Portage and Goose Pits, summer 2014

Photo 4 : Meadowbank TSF area, summer 2016

Photo 5 : Meadowbank TSF area, North and South Cell, summer 2016

Photo 6 : Vault area, summer 2016

Photo 7: Vault Pit and RSF, summer 2016

Photo 8: TSF North Cell, NPAG Cover construction, winter 2016

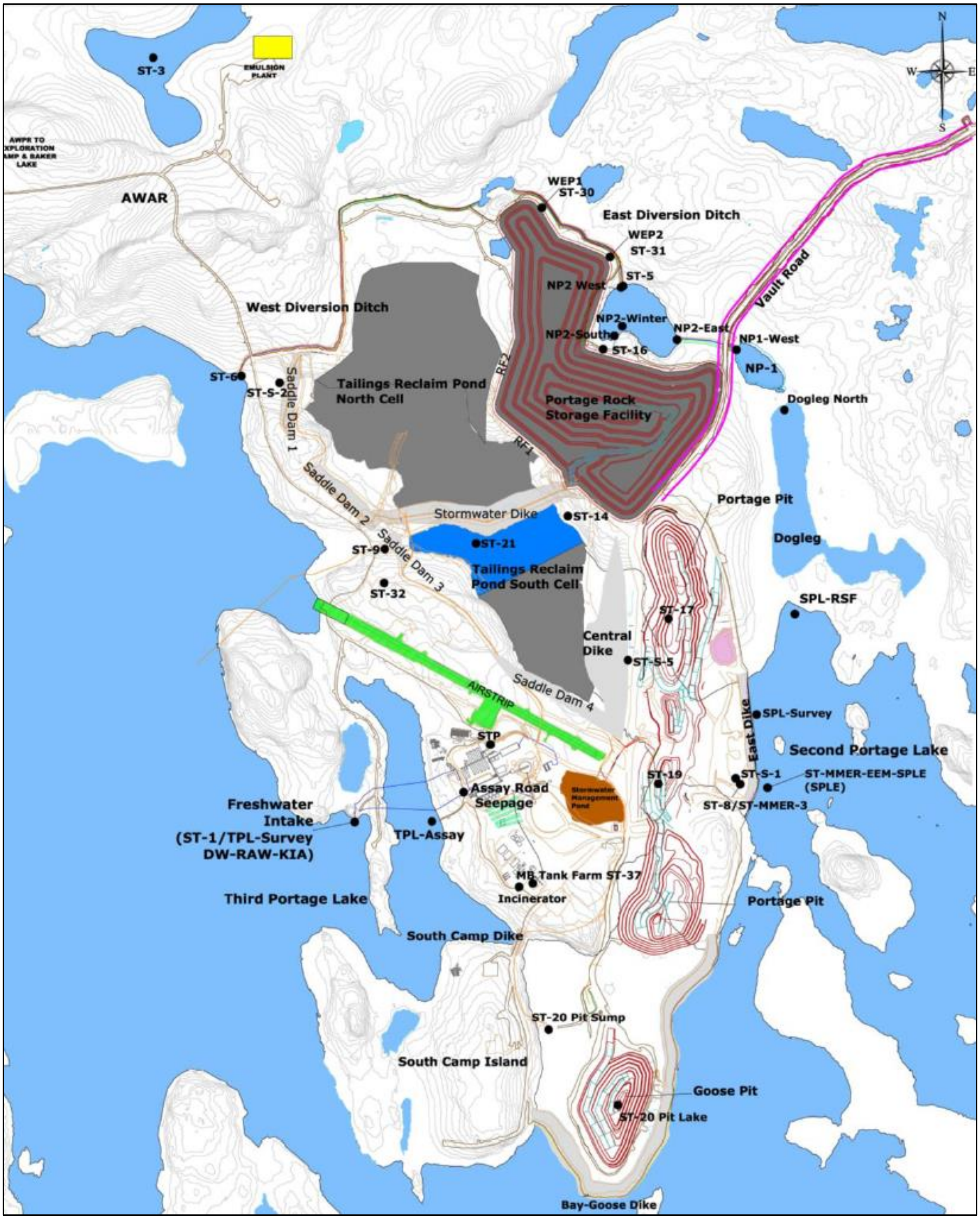
Photo 9: TSF North Cell, NPAG Cover construction, winter 2016

Appendix G

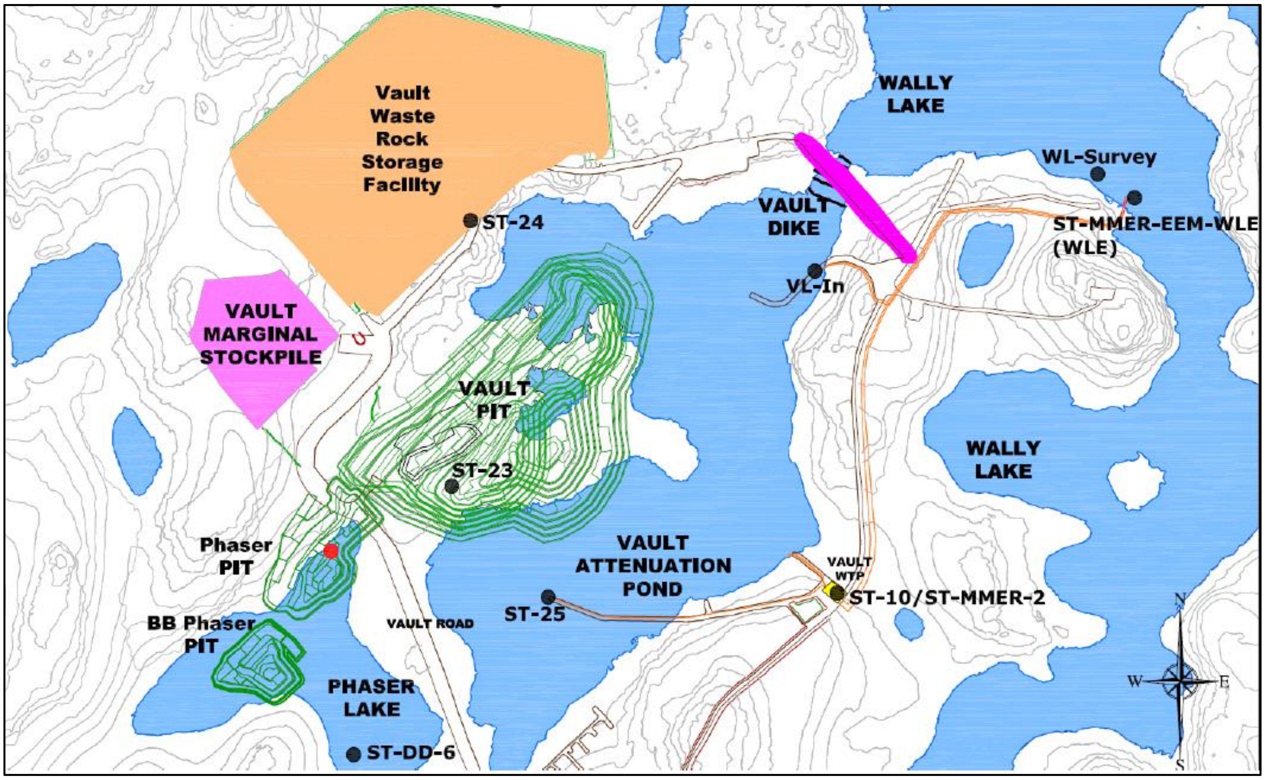
Meadowbank Site Monitoring Water Quality Stations

Meadowbank Water Quality Monitoring Stations

Portage Area



Vault Area



Vault
Waste
Rock
Storage
Facility
WALLY
LAKE
WL-Survey
VAULT
DIKE
ST-24
ST-MMER-EEM-WLE
(WLE)
VL-In
VAULT
MARGINAL
STOCKPILE
VAULT
PIT
WALLY
LAKE
ST-23
Phaser
PIT
VAULT
ATTENUATION
POND
VAULT
WTP
ST-10/ST-MMER-2
ST-25
BB Phaser
PIT
VAULT ROAD
PHASER
LAKE
ST-DD-6
N
W
E
S

Appendix H

Regulatory Instruments

TABLE H-1: PRIMARY APPLICABLE ACTS, REGULATIONS, AND GUIDELINES APPLICABLE TO CLOSURE AND RECLAMATION (MODIFIED FROM GOLDER, 2016A)

Acts	Regulations	Guidelines
Federal		
Canadian Environmental Protection Act (1999 c.33)	*Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations (SOR/2008-197)* *Environmental Emergency Regulations* (SOR/2003-307) *Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations* (SOR/2002-301) *Release and Environmental Emergency Notification Regulations* (SOR/2011-90)	Canadian Council of the Ministers of Environment - Environmental Code of Practice for Aboveground and Underground Storage Tank Systems Containing Petroleum and Allied Petroleum Products Notice with respect to substances in the National Pollutant Release Inventory Canada-Wide Standards for Particulate Matter (PM) and Ozone Canada-Wide Standards for Petroleum Hydrocarbons (PHC) In Soil
Canada Wildlife Act (1985 w9)		
Species at Risk Act (2002 c.29)		Species at Risk Policies
Canadian Transportation Accident Investigation and Safety Board Act (S.C. 1989, c. 3)	*Transportation Safety Board Regulations* (SOR/92-446)	
Navigable Waters Protection Act (R.S. 1985 c. N-22)	*Navigable Waters Works Regulations* (C.R.C., c. 1232) *Navigable Waters Bridges Regulations* (C.R.C., c. 1231)	
Fisheries Act (R.S.C. c. F-14) 35. (1) No person shall carry on any work, undertaking or activity that results in serious harm to fish that are part of a commercial, recreational or Aboriginal fishery, or to fish that support such a fishery. Projects that have the potential to obstruct fish passage, modify flow or result in the entrainment of fish may also	*Metal Mining Effluent Regulations* (SOR/ 2002-2222) *Marine Mammal Regulations* (SOR/93-56)	The Policy for the Management of Fish Habitat The Fisheries Protection Policy Statement, 2013 Fisheries Productivity Investment Policy: A Proponent's Guide to Offsetting

TABLE H-1 : PRIMARY APPLICABLE ACTS, REGULATIONS, AND GUIDELINES APPLICABLE TO CLOSURE AND RECLAMATION (CONTINUED-1)

Acts	Regulations	Guidelines
cause serious harm to fish. In these situations, an authorization under Subsection 35(2) is required. Proponents are responsible for avoiding and mitigating serious harm to fish that are part of or support commercial, recreational or Aboriginal fisheries. When proponents are unable to completely avoid or mitigate serious harm to fish, their projects will normally require authorization under Subsection 35(2).		
Canada Labour Code (R.S.C., 1985, c. L-2)	*Canada Labour Standards Regulations* (C.R.C., c. 986) *Canada Occupational Health and Safety Regulations* (SOR/86 304)	
Territorial Lands Act (R.S. 1985, c. T-7)	*Northwest Territories and Nunavut Mining Regulations* (C.R.C., c. 1516) *Territorial Land Use Regulations* (C.R.C. 1524) *Territorial Quarrying Regulations* (C.R.C. c. 1527)	
Nunavut Waters and Nunavut Surface Rights Tribunal Act (2002, c. 10)	*Northwest Territories Waters Regulations* (SOR/93/303)	
Nunavut Act (1993 c.28)	*Nunavut Archaeological and Paleontological Sites Regulations* (SOR/2001-220)	
Nunavut Land Claims Agreement Act (1993, c. 29)		

Table H-1 : Primary Applicable Acts, Regulations, and Guidelines Applicable to Closure and Reclamation (continued-2)

Acts	Regulations	Guidelines
Territorial – Nunavut		
Environmental Protection Act (RSNWT (Nu) 1988, c E-7)	*Spill Contingency Planning and Reporting Regulations* (NWT Reg (Nu) 068-93)	Guideline on Dust Suppression Guideline for the General Management of Hazardous Waste in Nunavut Environmental Guideline for Waste Asbestos Guideline for Industrial Waste Discharges in Nunavut Guideline for Industrial Projects on Commissioner's Land
Historical Resources Act (RSNWT (Nu) 1988, c H-3)		
Territorial Parks Act (RSNWT (Nu) 1988, c T-4)	*Territorial Parks Regulations* (RRNWT (Nu) 1990 c T-13)	
Wildlife Act (RSNWT (Nu) 1988, c W-4)	*Wildlife General Regulations* (NWT Reg (Nu) 026-92) *Wildlife Licences and Permits Regulations* (NWT Reg (Nu) 027-92) *Wildlife Management Barren-Ground Caribou Areas Regulations* (NWT Reg (Nu) 099-98) *Wildlife Management Zones Regulations* (RRNWT (Nu) 1990 c W-17) *Wildlife Regions Regulations* (NWT Reg (Nu) 108-98)	
Commissioner's Land Act (RSNWT 1988, c C-11)	*Commissioner's Land Regulations* (RRNWT 1990, c C-13)	
Mine Health and Safety Act (SNWT (Nu) 1994, c 25)	*Mine Health and Safety Regulations* (NWT Reg (Nu) 125-95)	

Table H-2 : List of Licenses/Permits for the Project (Modified From Golder, 2016a)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
66A/8-71-2	Land Lease	INAC	All Weather Private Access Road construction, operation, maintenance and reclamation	Active	01-Jan-07	31-Dec-21	
66A/8-72-5	Land Lease	INAC	Quarrying for the AWPAR	Active	01-Jan-07	31-Dec-27	
08-HCAA-CA7-00039	Freshwater Intake Pipe Screen Approval	DFO	Freshwater Intake Pipe at Exploration Camp	Active	06-Jan-09		No obligations or renewal deadlines. Approval does not have expiry date.
08-HCAA-CA7-00040 (NU-08-0040)	Freshwater Intake Pipe Screen Approval	DFO	Freshwater Intake Pipe at Meadowbank Camp	Active	06-Jan-09		No obligations or renewal deadlines. Approval does not have expiry date.
NU 03-191 s30	Freshwater Intake	DFO	Freshwater Intake at Emulsion plant	Active	16-Nov-09		No obligations or renewal deadlines. Approval does not have expiry date.
FWISL-ACC-07-08-056	Animal Use Protocol	DFO		Expired		31-Mar-08	
FWI-ACC-2009-027	Animal Use Protocol	DFO		Expired	04-Jun-09	31-Dec-09	
FWI-ACC-2008-2009-054	Animal Use Protocol	DFO		Expired	07-Jul-08	31-Mar-09	
FWI-ACC-2008-2009-064	Animal Use Protocol	DFO		Expired	31-Jul-08	31-Mar-09	
FWI-ACC-2010-022	Animal Use Protocol	DFO		Expired	09-Jun-10	31-Dec-10	
FWI-ACC-2011-025	Animal Use Protocol	DFO		Expired	17-Jun-11	31-Dec-11	
FWI-ACC-2012-038	Animal Use Protocol	DFO		Expired	13-Jun-12	01-Oct-12	
FWI-ACC-2013-033	Animal Use Protocol	DFO		Expired	11-Jun-13	01-Nov-13	
FWI-ACC-2015-021	Animal Use Protocol	DFO		Expired	11-Jun-15	01-Dec-15	

TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-1)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
S-08/09-1042-NU	Licence to fish for scientific purposes	DFO		Expired	11-Aug-08	31-Oct-08	
S-08/09-1040	Licence to fish for scientific purposes	DFO		Expired	14-Jul-08	30-Sep-08	
S-09/10-1027-NU	Licence to fish for scientific purposes	DFO		Expired	24-Jun-09	30-Sep-09	
S-10/10-1011-NU	Licence to fish for scientific purposes	DFO		Expired	17-Jun-10	15-Oct-10	
S-11/12-1015-NU	Licence to fish for scientific purposes	DFO		Expired	15-Jun-11	15-Oct-11	
S-11/12-1042-NU	Licence to fish for scientific purposes	DFO		Expired	10-Aug-11	31-Aug-11	
S-12/13-1023-NU	Licence to fish for scientific purposes	DFO		Expired	15-Jun-12	30-Sep-12	
S-13/14-1010-NU	Licence to fish for scientific purposes	DFO	AWPAR and on-site fisheries monitoring including CREMP	Expired	15-Jun-13	15-Oct-13	
S-13/14 3018-YK	Licence to fish for scientific purposes	DFO	Vault Fishout	Expired	15-Jul-13	31-Mar-14	
S-15/16-1012-NU	Licence to fish for scientific purposes	DFO	AWAR and habitat compensation work	Expired	30-Jun-15	31-Jan-16	
NU-03-0190	HADD Authorization - AWPAR (amendment #1 and #2)	DFO	AWPAR - Infilling of fish habitat as a result of water crossing construction affecting a total of 0.53 HU / 2,793 m^3 of fish habitat	Expired	02-May-07	31-Dec-08	
NU-03-0191	HADD Authorization - Mine Site. *Fisheries Act* Authorization	DFO	Infilling of fish habitat as a result of infilling and dewatering of Second	Expired	30-Jul-08	15-Dec-15	

TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-2)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
			and Third Portage Lakes - dikes and pits + airstrip extension				
NU-03-0191.02	s.32 *Fisheries Act* Authorization - Meadowbank Dewatering Bay Goose	DFO	Authorization for the fish destruction by means other than fishing during the dewatering of Bay Goose impoundment area in Third Portage Lake	Expired	22-Feb-11	31-Jul-12	
NU-03-0191.03	Portage Pit and Bay Goose *Fisheries Act* Authorization	DFO	Second Portage Lake: Dewatering, excavation, dike and road footprint (east and central dikes) and in water placement of coarse material Third Portage Lake : Dewatering, excavation, road footprint, Bay Goose and South Camp Dike footprints and in water placement of coarse material	Expired	05-Mar-13	31-Dec-17	
NU-03-0191.04	Vault *Fisheries Act* Authorization	DFO	Dewatering, excavation, dike construction and placement of course material in Vault Lake basin	Expired	02-Apr-13	31-Dec-17	
NU-08-0013	HADD Authorization - Western Channel	DFO	Infilling of fish habitat as a result of a temporary culvert installation	Expired	28-May-08	13-Jun-08	

TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-3)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
			affecting 1.01 HU on the westernmost channel connecting 2PL and 3PL				
NU-08-0052	Authorization for destruction of fish	DFO	*Fisheries Act* Sec.32 - destruction of fish arising from dewatering of NW arm of 2PL	Expired	02-Mar-09	31-Dec-10	
NU-10-0049	Vault Culvert Crossing	DFO	Vault Culvert Crossing	Active	25-Jan-11		No end term
MMER Sec 27.1 Approval TIA (08-HCAA-CA7-00191)	Letter of Approval	DFO	Authorization for deposition of tailings in TIA. Approval of Compensation Plan.	Active	14-Jan-10		TIA Habitat Compensation Plan
DvlptPA	Development Partnership Agreement	GN	700,000 m^3/annually - mining, milling & associated activities, operation of Baker Lake Facilities, operation of AWPAR	Active	17-Feb-07	17-Feb-22	As per article 11.1, Agreement remains in force until completion of Closure and Reclamation
L-51260	Baker Lake Marshalling Area	GN	Marshalling Facility; tank farm, explosive area, access road.	Active	01-Mar-10	01-Mar-13	Permit renewal on going
L-51261	Baker Lake Marshalling Area, Land Lease	GN	Baker Lake Spud Barge	Active	01-Mar-10	01-Mar-20	
L-51262	Baker Lake All Weather Private Access Road Section	GN	Municipal Lands portion of Tahek Lake AWPAR, Baker Lake, Nunavut	Active	01-Mar-10	01-Mar-20	
LUP-06-603-001 (a)	Land use permit	GN	AWPAR construction	Expired			
QP-06-603-001 (a)	Quarry Permit	GN	AWPAR Quarry 1 : authorization to take 85,388m^3 of quarries bedrock - granite	Expired			

Table H-2 : List of Licenses/Permits for the Project (Continued-4)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
603-0-LUP-07-001	Land use permit	GN	Baker Lake Marshalling Area	Expired	01-May-07	01-May-08	
WL-2012-050	Wildlife Research Permit	GN	Ground survey of birds, nest, raptors, other animals, and wildlife signs. Must submit report at end of study	Expired	01-Jun-12	31-May-12	
WL-2014-055	Wildlife Research Permit	GN	Ground survey of birds, nest, raptors, other animals, and wildlife signs. Must submit report at end of study	Expired	1-Aug-14	31-Jul-15	
WL-2015-058	Wildlife Research Permit	GN	Ground survey of birds, nest, raptors, other animals, and wildlife signs. Must submit report at end of study	Expired	1-Jun-15	1-Jun-16	
WL-2016-044	Wildlife Research Permit	GN	Ground survey of birds, nest, raptors, other animals, and wildlife signs. Must submit report at end of study	Active	1-Jun-16	30-Jun-17	
Memorandum of Understanding	Wildlife Research	GN	GN has requested that the Proponent participate in the Kivalliq Ungulate Monitoring Program and the Proponent desires to work collaboratively and in good faith to increase the common knowledge	Expired*	11-Sep-13	11-Sep-16	

TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-5)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
			of caribou and muskoxen for mutual benefit.				
IIBA	Inuit Impact Benefit Agreement	KIA	Inuit Impact Benefit Agreement	Expired	25-Mar-06	23-Jun-11	Reviewed every third year for material change and automatically renewed for a subsequent 3 year term
IIBA	Inuit Impact Benefit Agreement	KIA	Inuit Impact Benefit Agreement	Expired	23-Jun-11	23-Jun-14	Reviewed every third year for material change and automatically renewed for a subsequent 3 year term
IIBA	Inuit Impact Benefit Agreement	KIA	Inuit Impact Benefit Agreement	Expired**	23-June-14	23-June-17	Reviewed every third year for material change and automatically renewed for a subsequent 3 year term
KVCA06Q11	Quarry Permit - AWPAR	KIA	Quarrying for All Weather Private Access Road, 254,546 m^3 of material	Active	02-Feb-07	02-Feb-22	Permit expires in 2022 or when the specified amount of material has been quarried
KVCA09Q09	Quarry Permit	KIA	Removal of 50,000 m^3 of gravel material - sand quarry for concrete production	Expired	03-Mar-09	03-Mar-11	Expires within 24 months or when material has been quarried
KVCA08Q10	Quarry Permit	KIA	Removal of 250,000 m^3 of gravel, sand, loam,	Expired	15-May-08	15-May-12	Expires 12 months from the date hereof

* Memorandum of Understanding	Wildlife Research	GN-ENV		Active	01-Mar-17	01-Mar-20
** IIBA	Inuit Impact Benefit Agreement	KIA	Inuit Impact Benefit Agreement	Active	17-Feb-17	Project Termination Date

TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-6)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
			mining backfill or shot rock from the land				or when material has been quarried
KVPL08D280	Surface Production Lease (Amendment #1 and #2)	KIA	Surface Production Lease: Construction, operation and closure of the mine on Inuit owned land	Active	24-Jul-08	31-Dec-27	Production Lease Amended #1 Feb. 9th, 2009 ; Production Lease Amended #2 May 2, 2013
KVRW06F04	Right of Way Agreement - AWPAR (amendment #1)	KIA	All Weather Private Access Road (and Quarry - KVCA06Q11)	Active	01-Jan-07	31-Dec-21	
KVRW09F05	Right of Way Authorization	KIA	Winter Access Road for sand quarry	Expired	03-Mar-09	31-May-11	ROW expires one year before the sand quarry
Mine Water Comp Agrmt	Water Compensation Agreement - Mine	KIA	Compensation for water consumption at Meadowbank site and any changes in water quality, quantity or flow due to project activities	Active	14-Apr-08		Agreement terminates with C&R when KIA provides a letter of clearance
Road Water Comp Agrmt	Water Compensation Agreement - Road (amendment #1)	KIA	Compensation where development and operation of AWPAR has substantial effect on water quality, quantity or flow	Active	29-Jan-08		Agreement terminates following C&R of the road and all IOL affected by road
PC_NIRB-004	Project Certificate + modification condition 32	NIRB	Approval for the Meadowbank Project to proceed subject to its Terms & Conditions	Active	30-Dec-06		change in Condition 32 in September 15, 2010 (ATV access on AWPAR) Removal of condition 48 and changes to

TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-7)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
							condition 49 and 53 related to Phaser Lake (NIRB decision on April 18, 2016)
03-023-10N-M	Scientific Research License	NRI	Wind Data Collection	Expired	01-Jan-10	31-Dec-10	Multi-year license for January 1, 2010 - October 29, 2011 but needs to renewed each year
BL14-001-PL Vault	Subsurface Production Lease	NTI	Vault	Active	01-Jul-12	30-Jun-22	
2AM-MEA0815	Water License + Modification East Dike + Modification Airstrip + Amendment Fuel Tank Baker Lake	NWB	700,000 m^3 annually - Milling, mining and associated activities at the Meadowbank Project site Amendment freshwater use permit – 1,870,000 m^3 in 2013 and 1,150,000 m^3 thereafter	Expired	10-Jul-08	31-May-15	Approved by the Minister on July 10, 2008 Modification East Dike approve on July 3, 2013 Modification Airstrip approved in 2012 Amendment Fuel Tank Baker Lake on May 5, 2010
2AM-MEA0815	Short Term Water Licence	NWB	Same conditions as the approved 2008 water licence and amendment	Expired	20-April-15	27-Nov-15	Short term licence while waiting for the water licence renewal

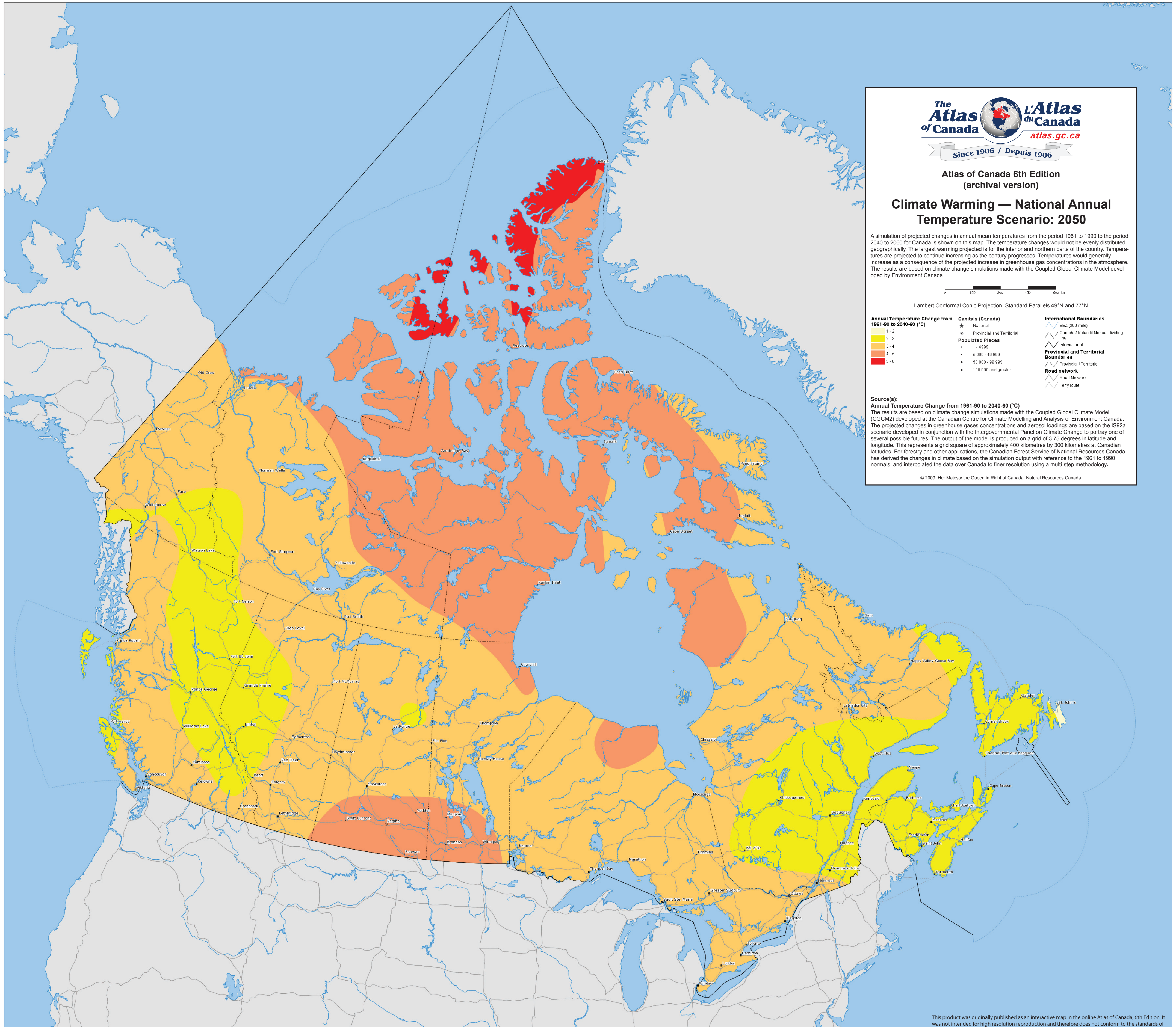
TABLE H-2 : LIST OF LICENSES/PERMITS FOR THE PROJECT (CONTINUED-8)

Permit/License	Type	Licensor	Approved Ops	Status	Begin of Term	End of Term	Comments
2AM-MEA1525	Renewed Water Licence	NWB	2,350,000 m^3 annually up to December 31 2017 and 4,935,000 m^3 annually starting in 2018 through to the Expiry of the License- Milling, mining and associated activities at the Meadowbank Project site	Active	23-Jul-15	22-Jul-25	

INAC = Indigenous and Northern Affairs Canada (formally Aboriginal Affairs and Northern Development Canada); DFO = Fisheries and Oceans Canada; GN = Government on Nunavut; KIA = Kivalliq Inuit Association; NRI = Nunavut Research Institute; NTI = Nunavut Tunngavik Incorporated; NWB = Nunavut Water Board; m^3 = cubic metres.

Appendix I

Permafrost Map



The Atlas of Canada / L'Atlas du Canada
atlas.gc.ca
Since 1906 / Depuis 1906

Atlas of Canada 6th Edition
(archival version)

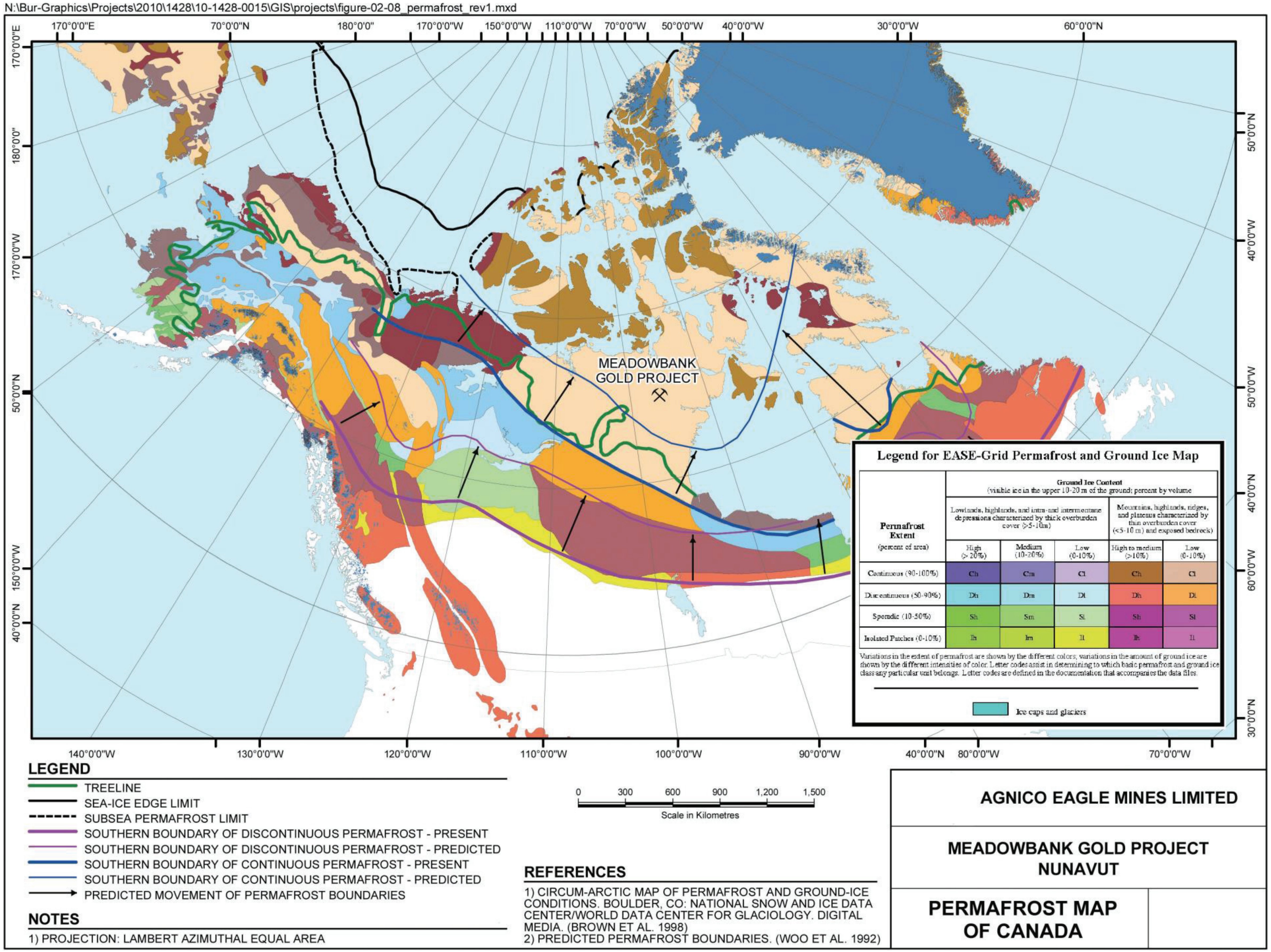
Climate Warming — National Annual Temperature Scenario: 2050

A simulation of projected changes in annual mean temperatures from the period 1961 to 1990 to the period 2040 to 2060 for Canada is shown on this map. The temperature changes would not be evenly distributed geographically. The largest warming projected is for the interior and northern parts of the country. Temperatures are projected to continue increasing as the century progresses. Temperatures would generally increase as a consequence of the projected increase in greenhouse gas concentrations in the atmosphere. The results are based on climate change simulations made with the Coupled Global Climate Model developed by Environment Canada

Lambert Conformal Conic Projection. Standard Parallels 49°N and 77°N

Source(s):
Annual Temperature Change from 1961-90 to 2040-60 (°C)
The results are based on climate change simulations made with the Coupled Global Climate Model (CGCM2) developed at the Canadian Centre for Climate Modelling and Analysis of Environment Canada. The projected changes in greenhouse gases concentrations and aerosol loadings are based on the IS92a scenario developed in conjunction with the Intergovernmental Panel on Climate Change to portray one of several possible futures. The output of the model is produced on a grid of 3.75 degrees in latitude and longitude. This represents a grid square of approximately 400 kilometres by 300 kilometres at Canadian latitudes. For forestry and other applications, the Canadian Forest Service of National Resources Canada has derived the changes in climate based on the simulation output with reference to the 1961 to 1990 normals, and interpolated the data over Canada to finer resolution using a multi-step methodology.

Natural Resources Canada / Ressources naturelles Canada
Canada

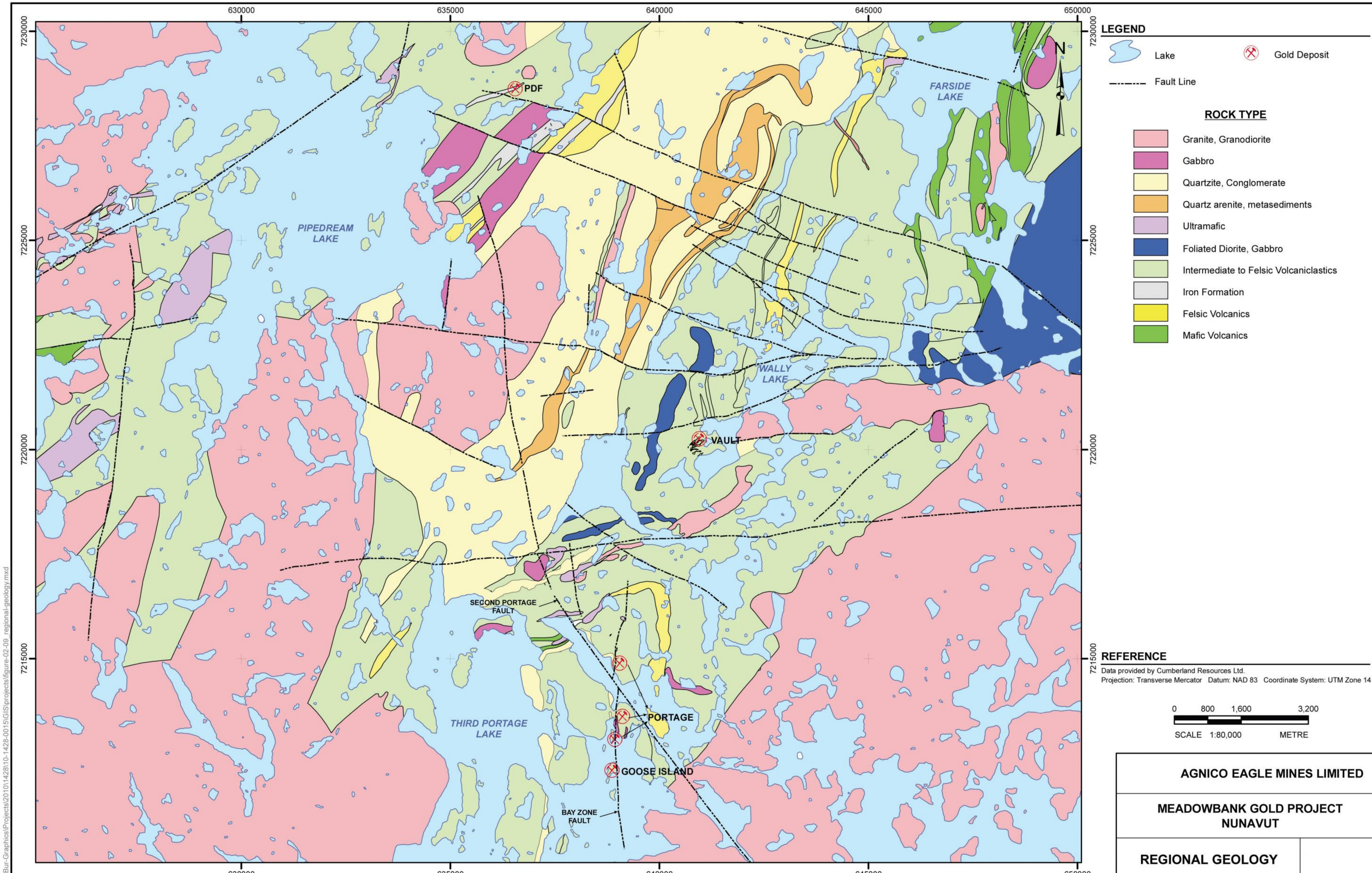


Source: Cumberland 2005b

Appendix J

Meadowbank Geology, Seismic Zone, Groundwater Flow and Bathymetry

(Golder, 2014)



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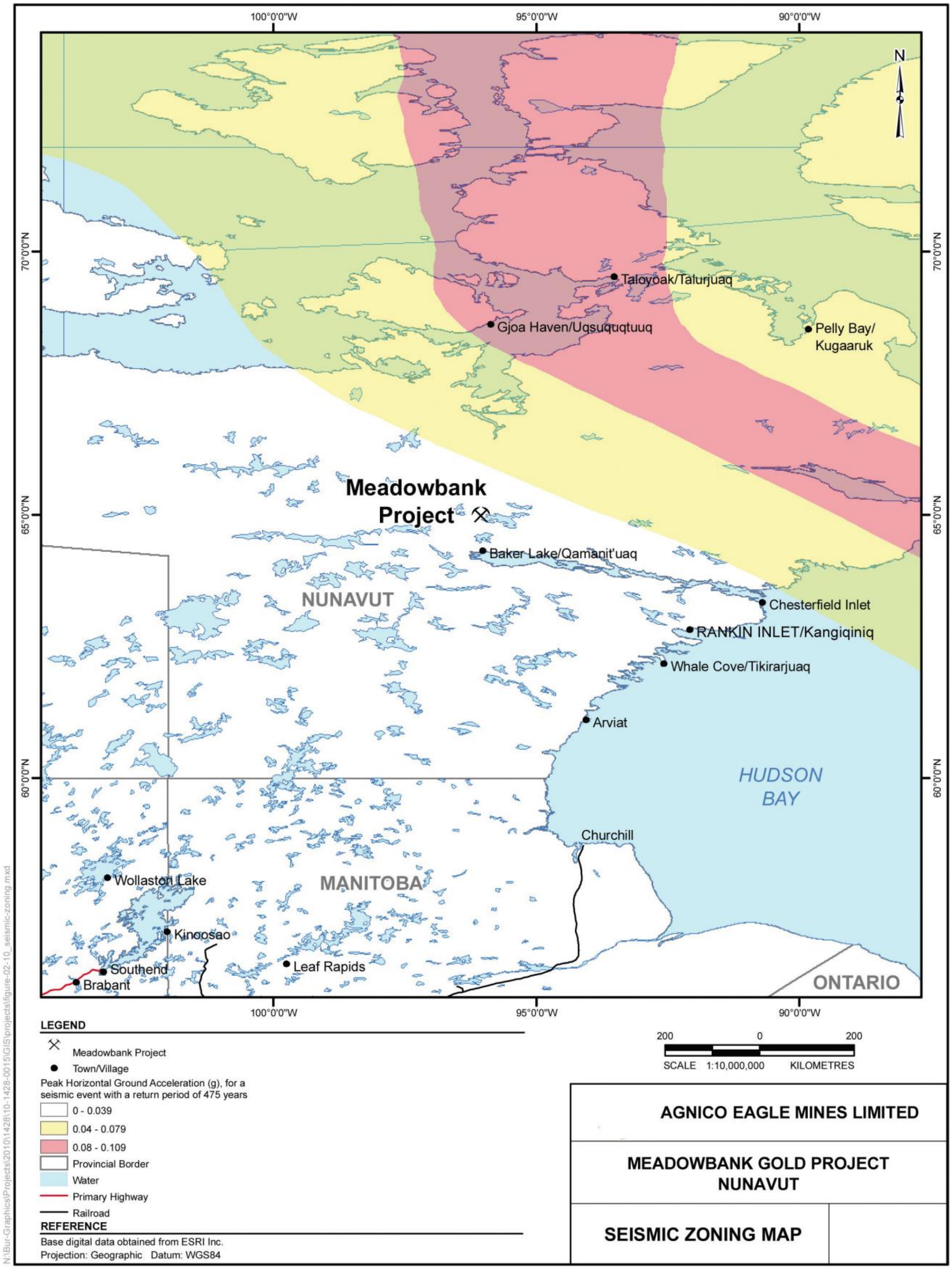
100°0'0"W
95°0'0"W
90°0'0"W
70°0'0"N
65°0'0"N
60°0'0"N
N
Taloyoak/Talurjuaq
Gjoa Haven/Uqsuqtuuq
Pelly Bay/
Kugaaruk
Meadowbank
Project
Baker Lake/Qamanit'uaq
NUNAVUT
Chesterfield Inlet
RANKIN INLET/Kangiqiniq
Whale Cove/Tikirarjuaq
Arviat
HUDSON
BAY
Churchill
Wollaston Lake
MANITOBA
Kinoosao
Southend
Brabant
Leaf Rapids
ONTARIO
LEGEND
Meadowbank Project
Town/Village
Peak Horizontal Ground Acceleration (g), for a seismic event with a return period of 475 years
0 - 0.039
0.04 - 0.079
0.08 - 0.109
Provincial Border
Water
Primary Highway
Railroad
REFERENCE
Base digital data obtained from ESRI Inc.
Projection: Geographic Datum: WGS84
200
0
200
SCALE 1:10,000,000
KILOMETRES
AGNICO EAGLE MINES LIMITED
MEADOWBANK GOLD PROJECT
NUNAVUT
SEISMIC ZONING MAP
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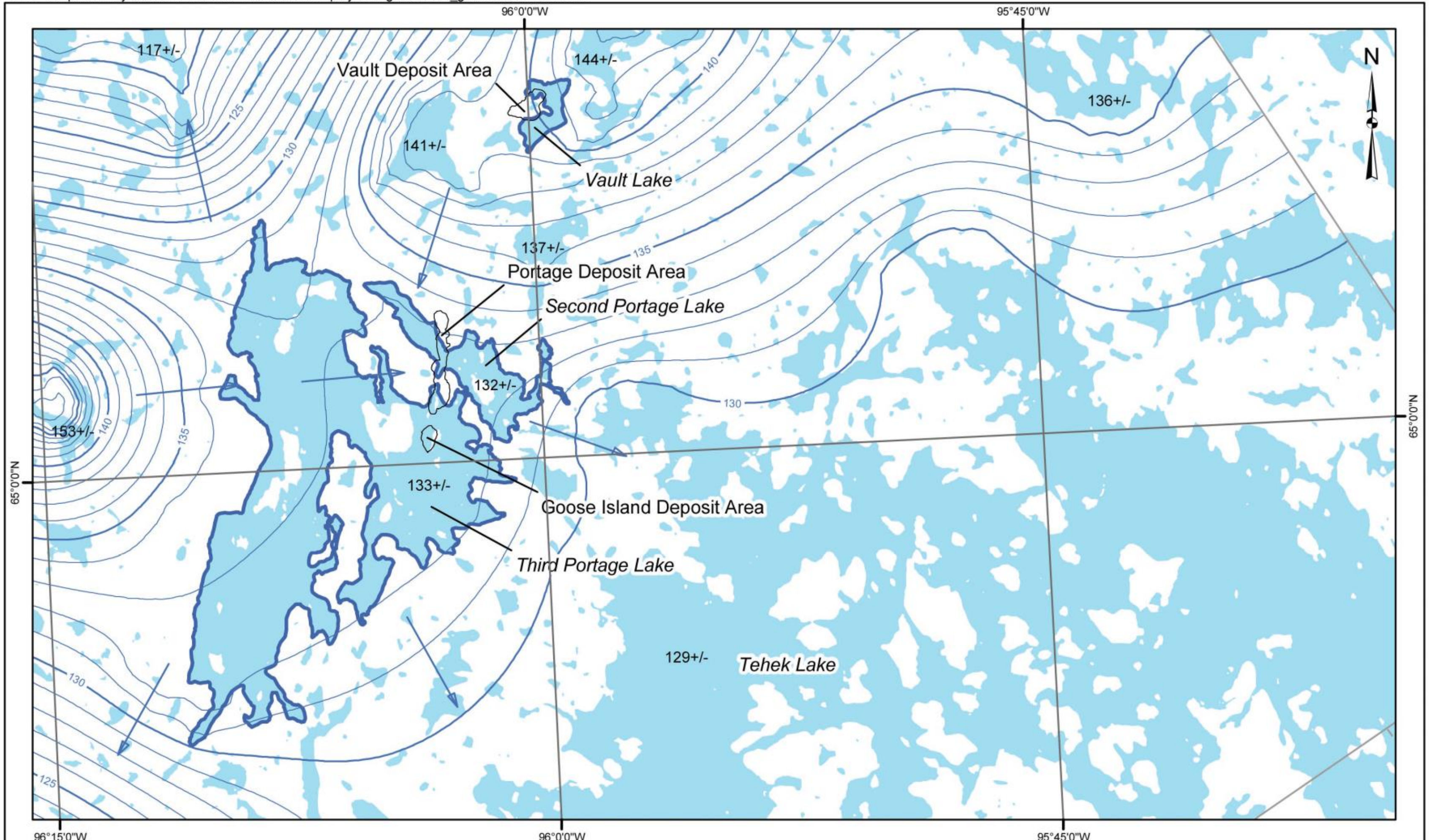
N:\Bur-Graphics\Projects\2010\1428\10-1428-0015\GIS\projects\figure-02-11_groundwater-flow.mxd



LEGEND

- Proposed Open Pit Crest
- Inferred Groundwater Contour (1 m interval)
- Inferred Groundwater Contour (5 m interval)
- Inferred Groundwater Flow Line
- 133 Waterbody (elevation in masl)

0 1,000 2,000 4,000 Meters

Scale - 1:125,000

REFERENCE

District of Keewatin, Northwest Territories, Department of Energy, Mines and Resources, Mapsheets 66A/16, 56E/04, 66H/01, 56D/13. Pit Footprint obtained from Golder Drawing 1.2.
Datum: NAD83 Projection: UTM Zone 14

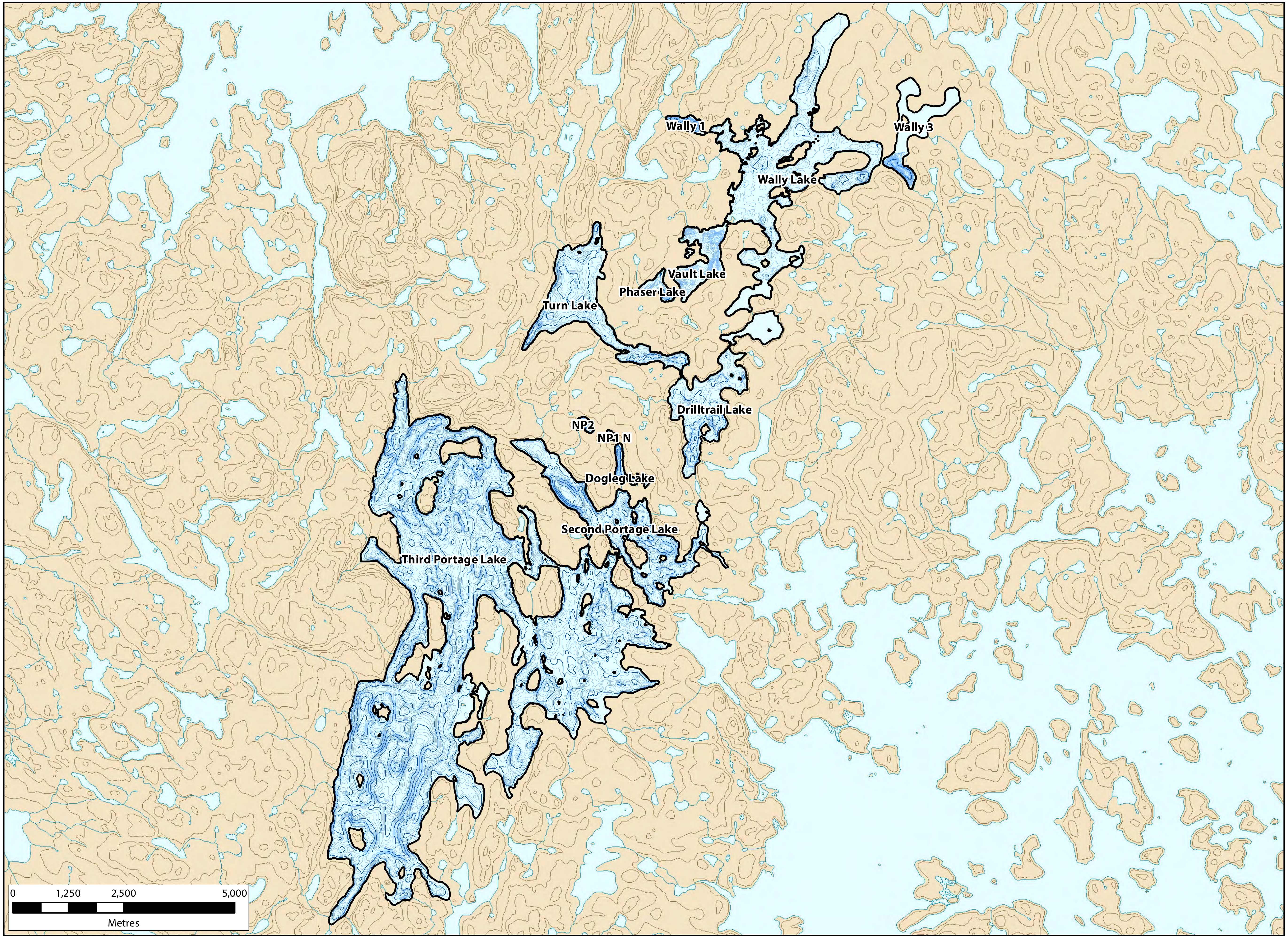
NOTE

Water levels vary annually and may differ from recently surveyed elevations.

AGNICO EAGLE MINES LIMITED

MEADOWBANK GOLD PROJECT
NUNAVUT

INFERRED REGIONAL GROUNDWATER FLOW



Legend

- Study Lakes
- Major Contour
- Minor Contour

Bathymetry Contours

DOUGAN & ASSOCIATES
ECOLOGICAL CONSULTING & DESIGN
77 Wyndham Street South • Guelph ON N1E 5R3
T 519.822.1609 • F 519.822.5389 • www.dougan.ca

PROJECT: DA11-062-02

CLIENT: Agnico-Eagle Mines Ltd., Meadowbank Div.

N / W / E / S
UTM Zone 14 NAD83

DATE: FEBRUARY 2011

SCALE: 1:80,000

DRAWN BY: LW

CHECKED BY:

FIGURE:

A1

Appendix K

Water Balance

APPENDIX K - WATER BALANCE

MILL / RECLAIM AND FRESH WATER

Month-Year	# Days/mth (Days/mth)	Year	Mth	S/W	MILL: Mill Throughput (t/mth) (t/month)	Mill daily throughput (TPD)	Cumulative Mill Throughput (t) (t)	TAILINGS DEPO. POINT: NORTH CELL	SOUTH CELL	PORTAGE PIT A	PORTAGE PIT E	GOOSE PIT	RECLAIM AND FRESH WATER: Reclaim Water Flow (m3/hr)	Total Reclaim Volume (m3/mth)	From SC	From Pit A	From Pit E	From Goose Pit	Water in ore (m3/mth)	Fresh Water for Camp (m3/mth)	Fresh Water to Make 54% w/w slurry (m3/mth)	Fresh Water for Mill Process (m3/mth)	Total Fresh Water Volume for Mill and Camp (m3/mth)
December/16	31	2016	12	winter																			
January/17	31	2017	1	winter	331,887	10,706			1				339	252,232	1				2,522	3,623	45,066	0	48,689
February/17	28	2017	2	winter	314,269	11,224			1				346	232,324	1				2,483	3,144	41,354	0	44,498
March/17	31	2017	3	winter	279,684	9,022			1				333	247,752	1				2,573	3,444	30,042	0	33,486
April/17	30	2017	4	winter	328,392	10,946			1				316	227,667	1				1,576	3,490	49,518	0	53,008
May/17	31	2017	5	winter	344,962	11,128			1				331	246,010	1				3,312	3,692	49,458	0	53,150
June/17	30	2017	6	winter	322,937	10,765			1				344	247,773	1				3,197	3,697	35,112	0	38,809
July/17	31	2017	7	summer	336,222	10,846			1				338	251,576	1				4,371	3,818	39,665	0	43,483
August/17	31	2017	8	summer	326,409	10,529			1				347	257,796	1				3,199	3,433	34,758	0	38,191
September/17	30	2017	9	summer	275,754	9,192			1				335	241,501	1				2,454	3,389	30,710	0	34,099
October/17	31	2017	10	winter	348,657	11,247			1				350	260,400	1				3,452	2,945	41,695	0	44,640

NORTH CELL (152.9 ha) / SOUTH CELL TSF WATER BALANCE (84.3 ha)

Month-Year	NC Input: Runoff to NC (m3/mth)	Interception sump to NC (m3/mth)	WEP + SD1 to NC (from ST-S-2) (m3/mth)	Waste rock seep to NC (from ST-16) (m3/mth)	NC Output: Transfer to SC (m3/mth)	SC Input: Transfer from NC (m3/mth)	Transfer from Portage Pit (m3/mth)	Net Transfer from Central Dike Seep (m3/mth)	SD3-4-5 to SC (m3/mth)	Stormwater Mgmt Pond (m3/mth)	Runoff to SC (m3/mth)	SC Output: SC To Portage Pit (m3/mth)	To Portage Pit A	To Portage Pit E	SC To Mill (m3/mth)	Pond Volume: SC Total Water Volume (Free+Ice) (m3)	SC Free Water Volume (m3)	% Ice Ratio (%)	Cummulative Volume (Tailings + Pond) (m3)	Volume Available Remaining (m3)	Water or Tails elevation (m)	SC Water Surface (m2)	Chk WB
December/16																1,541,679	1,284,203		6,697,170	9,535,349	133.39	246217	
January/17	0	0	0	0	0	0	7,698	-67,422		0	0				252,232	1,400,620	1,134,503	19%	6,811,409	9,421,110	133.67	246217	0
February/17	0	0	0	0	0	0	0	1,972		0	0				232,324	1,327,680	982,483	26%	6,980,214	9,252,305	134.07	246217	0
March/17	0	0	0	0	0	0	10,351	-87,024		0	0				247,752	1,163,064	755,992	35%	7,048,668	9,183,851	134.21	246217	0
April/17	0	0	0	0	0	0	0	-25,135		0	0				227,667	1,069,156	566,653	47%	7,228,420	9,004,099	134.60	246217	0
May/17	142,381	72,377	5,197	16,692	236,647	0	15,345	122,329	19,901	33,664	75,146				246,010	1,283,738	1,283,738	0%	7,689,404	8,543,115	135.60	218919	0
June/17	-75,388	90,538	1,767	20,881	37,798	172,533	86,268	-181,472	20,713	9,576	0				247,773	1,355,284	1,355,284	0%	7,976,241	8,256,278	136.20	218919	0
July/17	-28,959	17,160	1,402	5,025	-5,372	0	21,273	1,591	2,111	28,193	-18,494				251,576	1,339,398	1,339,398	0%	8,184,503	8,048,016	136.61	218919	0
August/17	10,455	3,120	2,848	4,804	21,227	0	3,823	45,619	565	0	617	26,889			257,796	1,306,449	1,306,449	0%	8,375,122	7,857,397	136.99	218919	0
September/17	-52,609	6,365	4,806	2,804	-38,634	66,229		49,762	2,348	0	2,655	258,065			241,501	1,114,649	1,114,649	0%	8,367,158	7,865,361	136.98	218919	0
October/17	0	0	0	0	0	0				0	-21				260,400	1,037,556	985,678	5%	8,554,199	7,678,320	137.35	218919	0

PORTAGE PIT A WATER BALANCE

Month-Year	INPUT – Non-Contact Water: 3PL to Pit A (m3/mth)	SC Runoff to Pit A (m3/mth)	Stormwater Mgmt Pond to Pit A (m3/mth)	Runoff to Pit A (m3/mth)	Infiltation to Pit A (m3/mth)	East Dike Seepage to Pit A (m3/mth)	Transfer Goose to Pit A (m3/mth)	WTP Treated Water from Pit E (m3/mth)	Transfer Pit E to Pit A (m3/mth)	Tailings: Tailing Reclaim Water to Pit A (m3/mth)	%Water Content / Tails (% w/w)	Net Reclaim Water to Pit A (m3/mth)	Tails to Pit A (t/mth)	Tailings volume in-situ in Pit A (m3/mth)	Cumulative tailings volume in Pit A (m3)	Cumulative tailings tonnage in Pit A (t)	OUTPUT: Pit A Reclaim Water to Mill (m3/mth)	Pit A to WTP (m3/mth)	Pit A to Pit E Elev > 90 m (m3/mth)	Pit A to Pit E Elev < 90 m (m3/mth)	PIT VOLUME: Pit A + CD Water Volume (m3)	Pit A+CD Water + Tail Volume (m3)	Pit A Tails Elevation (m)	Pit A+CD Water Elevation (m)	Pit A Water Volme (m3)	CD_Pit A Water Volume (m3)	Pit A Water Surface (m2)	Pit A Water Depth above Tails (m)	Chk WB	3PL to Pit E (m3/mth)
December/16																					18,193	18,193	-3.00	5.15	18,193	0				
January/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
February/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
March/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
April/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
May/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
June/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
July/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
August/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
September/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	
October/17						0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	18,193	18,193	-3.00	5.15	18,193	0	6063	8.15	0	

[illegible]

APPENDIX K - WATER BAL

PORTAGE PIT E WATER BALANCE

Month-Year	SC Runoff to Pit E	Stormwater Mgmt Pond to Pit E	Runoff to Pit E	Infiltration to Pit E	East Dike Seepage to Pit E	Transfer Goose to Pit E	WTP Treated Water from Pit A	Transfer Pit A to Pit E	Tailing Reclaim Water to Pit E	%Water Content / Tails	Net Reclaim Water to Pit E	Tails to Pit E	Tailings volume in-situ in Pit E	Cumulative tailings volume in Pit E	Cumulative tailings tonnage in Pit E	Pit E Reclaim Water to Mill	Pit E to WTP	Pit E to Pit A Elev > 90 m	Pit E to Pit A Elev < 90 m	Pit E + CD Water Volume	Pit E + CD + Water + Tail Volume	Pit E Tails Elevation	Pit E +CD Water Elevation	Pit E Water Volme	CD_Pit E Water Volume	Pit E Water Surface	Pit E Water Depth above Tails	Chk WB
	INPUT – Non-Contact Water								INPUT – Tailings							OUTPUT				PIT VOLUME								
	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	% w/w	m3/mth	t/mth	m3/mth	m3	t	m3/mth	m3/mth	m3/mth	m3/mth	m3	m3	m	m	m3	m3	m2	m	
December/16																				82,881	82,881	-13.00	4.47	81,352	1,529			
January/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
February/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
March/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
April/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
May/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
June/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
July/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
August/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
September/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0
October/17					0	0	0	0	0	67%	0	0	0	0	0	0	0	0	0	82,881	82,881	-13.00	4.47	81,352	1,529	16836	17.47	0

6 PORT. PIT E

7 PORTAGE PIT (A+E+CD)

GOOSE PIT WATER BALANCE

Month-Year	3PL to Goose Pit	Stormwater Mgmt to Goose Pit	Runoff Goose Pit	Infiltration to Goose Pit	Treated Water from WTP	SC Reclaim Water to Goose Pit	Tailing Reclaim Water to Goose Pit	%Water Content / Tails	Net Reclaim Water to Goose Pit	Tails to Goose Pit	Tailings volume in-situ in Goose Pit	Cumulative tailings volume in Goose Pit	Cumulative tailings tonnage in Goose Pit	Transfer Goose Pit to Portage Pit	To Pit A	To Pit E	To WTP	Reclaime Water to Mill	Total Free Pond Volume in Goose Pit (Pit+Dump)	Water + Tails Volume in Goose Pit	Goose Pit Tails Elevation	Water Elev. Goose Pit + Dump	Goose Pit Water Volme	Goose Pit Dump Water Volme	Goose Pit Water Surface	Goose Pit Water Depth above Tails	Chk WB
	INPUT – Non Contact Water				INPUT – Contact Water		INPUT – Tailings							OUTPUT					PIT VOLUME								
	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	m3/mth	% w/w	m3/mth	t/mth	m3/mth	m3	t	m3/mth			m3/mth	m3/mth	m3	m3	m	m	m3	m3	m2	m	
December/16																			753,149	753,149	-3.00	57.32	520,198	232,951	42973	60.32	
January/17			42,000				0	67%	0	0	0	0	0					0	795,149	795,149	-3.00	58.65	553,018	242,131	42973	61.65	0
February/17			19,313				0	67%	0	0	0	0	0					0	814,462	814,462	-3.00	59.25	568,233	246,229	42973	62.25	0
March/17			19,131				0	67%	0	0	0	0	0					0	833,593	833,593	-3.00	59.84	583,376	250,217	42973	62.84	0
April/17			11,131				0	67%	0	0	0	0	0					0	844,724	844,724	-3.00	60.18	592,219	252,505	43243	63.18	0
May/17			102,000				0	67%	0	0	0	0	0					0	946,724	946,724	-3.00	63.18	674,224	272,500	47759	66.18	0
June/17			120,000				0	67%	0	0	0	0	0					0	1,066,724	1,066,724	-3.00	66.47	772,685	294,039	52722	69.47	0
July/17			30,000				0	67%	0	0	0	0	0					0	1,096,724	1,096,724	-3.00	67.24	797,572	299,152	53877	70.24	0
August/17			-10,000			26,889	0	67%	0	0	0	0	0					0	1,113,613	1,113,613	-3.00	67.65	811,609	302,004	54494	70.65	0
September/17		32,461	32,000			258,065	0	67%	0	0	0	0	0					0	1,436,139	1,436,139	-3.00	74.46	1,082,826	353,313	63662	77.46	0
October/17							0	67%	0	0	0	0	0					0	1,436,139	1,436,139	-3.00	74.46	1,082,826	353,313	63662	77.46	0

8 GOOSE PIT

Month-Year	EAST DIKE SEEPAGE – East Dike Seepage	To 2PL	To Pit A	To Pit E	CENTRAL DUMP – CD_Pit A Volume	CD_Pit E Volume	CD Total Volume	MIXED PITS QUALITY – Total Load in Mixed Portage Pit and Goose Pit	Total Free Water in Mixed Portage Pit and Goose Pit	Concentration in Mixed Pits	STORMWATER MGMT POND – STORMWATER MANAGEMENT POND	To SC	To Pit A	To Pit E	To Goose Pit
	m3/mth				m3	m3	m3	kg	m3	mg/L	m3/mth				
December/16					0	1,529	1,529	74,201	854,223	n/a					

9 EAST DIKE SEEP.

10 CENTRAL DUMP

11 MIXED PITS

12 STORMWATER MGMT POND

PERIOD 1: MBK TAILINGS DEPOSITION

GAP PERIOD

PERIOD 2: WHALE TAIL TAILINGS IN-PIT DEPOSITION

PERIOD 3: ACTIVE PIT FLOODING

BREACH IN 2030

Appendix L

Ecological Land

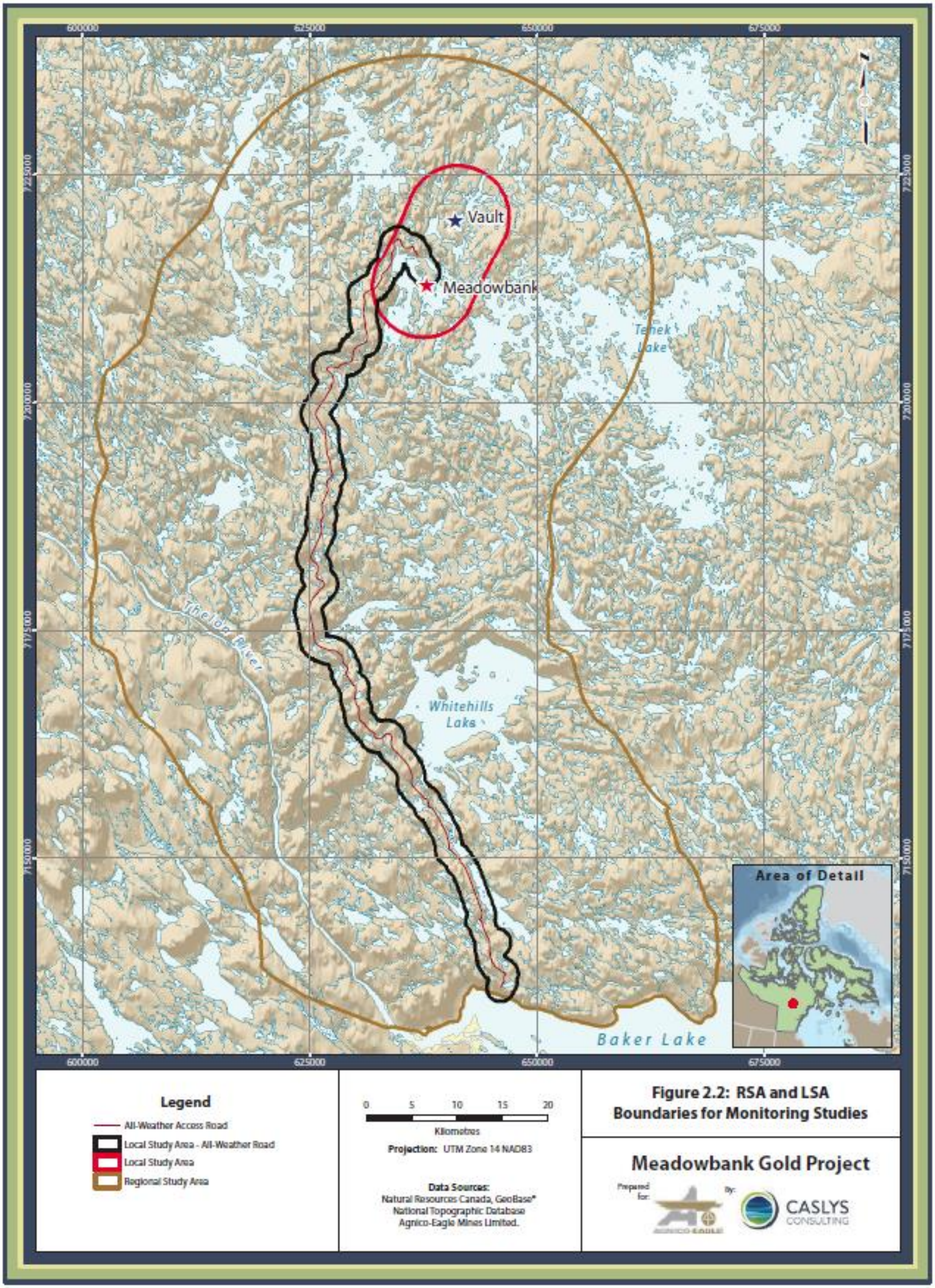
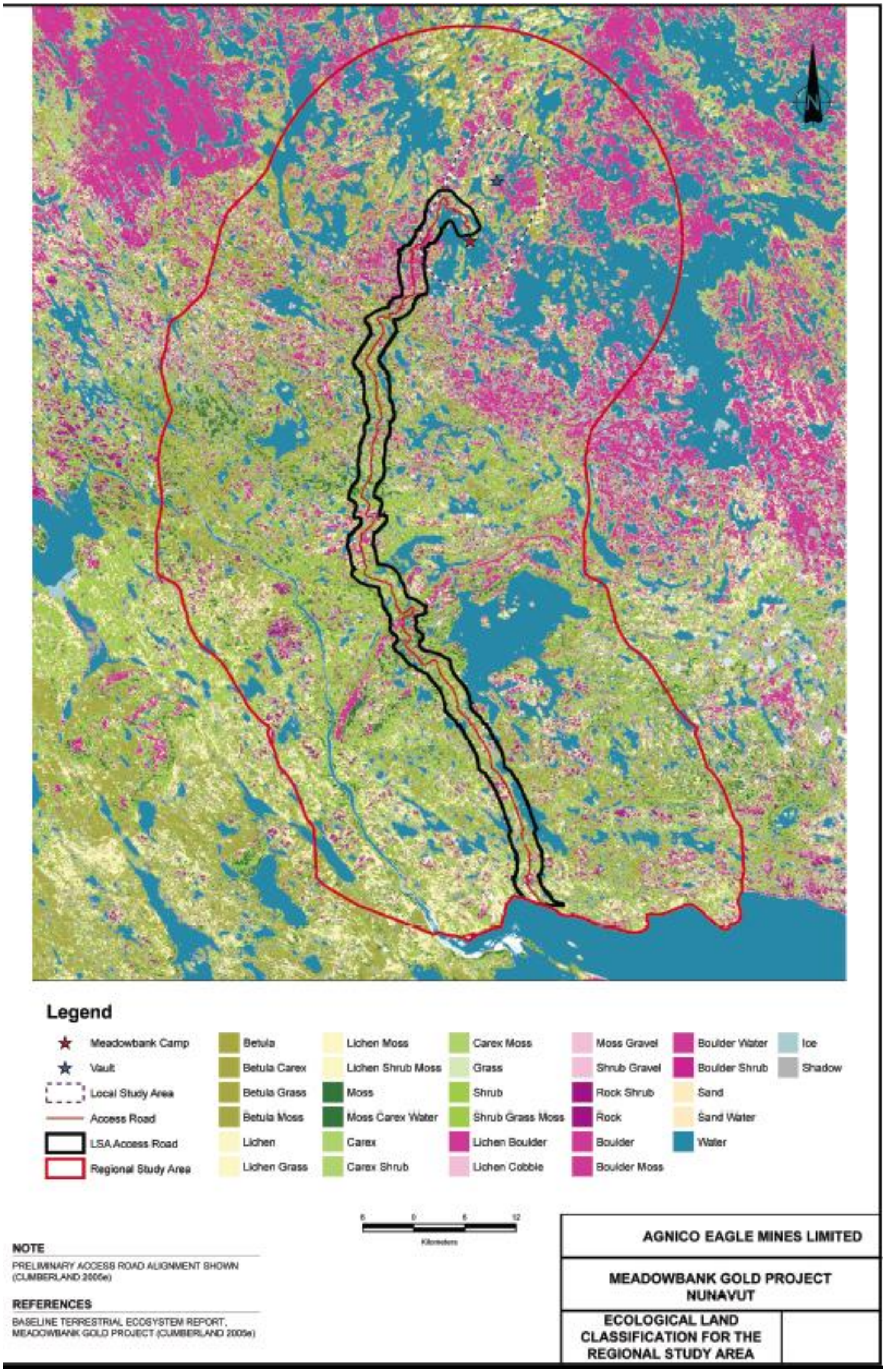


Figure 2.2: RSA and LSA Boundaries for Monitoring Studies



Source : Cumberland, 2005e

Table L-1: Ecological Land Classification Unit Definition (Cumberland, 2005)

ECL Unit	Definition
Betula Community	The Betula (dwarf birch) community is associated with sites with near mesic regimes on a variety of slope positions; this unit is characterized by a moderate to high cover of dwarf birch.
Betula–Carex Community	The dwarf birch-sedge community is associated with sites with near mesic to hygric moisture regimes. It is found on flat (level) to gently sloping sites with hummocky or tussocky surfaces. Dwarf birch is a dominant species; a number of sedge species may be present in the troughs.
Betula–Grass Community	The dwarf birch-grass community is characterized by sites that have dwarf birch and grass (Hierochloe sp.) as dominant species.
Betula–Moss Community	The dwarf birch-moss community is also found on sites with near mesic moisture regimes often with a hummocky surface expression. These sites generally have a moderate cover of dwarf birch (>20%), however at least one other shrub is also dominant along with mosses.
Boulder	Exposed boulders have a very high reflectance value in imagery, and are very easy to identify. The variable size and shape of boulders add texture to the imagery that allows it to be distinguished from the bedrock association. Lichens are generally associated with the boulders.
Boulder–Moss	This unit is similar to the boulder unit in texture, however mosses are found in spaces between the boulders.
Boulder–Water	This unit is also similar to the boulder unit in texture, however standing (or flowing) water is found in interstitial spaces between the boulders. It is situated in depressions or adjacent to water bodies.
Boulder – Shrub Community	The boulder-shrub unit consists of boulder fields where the spaces between the clusters or individual boulders have become covered with mats of heath forming plants. Various shrubs (i.e., crowberry, bearberry, bilberry, dwarf birch) as well as lichens are present in the spaces.
Carex Community	Carex (sedge) communities generally occur in poorly drained areas and around water features. The vegetation composition and the high water content characteristics provide a unique spectral signature that is easily recognizable from other vegetation classes; however, this ELC unit can be highly confused with

	shallow water. These sites are generally dominated by sedges and/or cotton-grasses.
Carex –Shrub Community	Sedge-shrub communities generally occur in flat, poorly drained areas and around water features. Sedges are dominant along with willows.
Carex –Moss Community	Sedge-moss communities generally occur in flat, poorly drained areas and around water features. Sedges are dominant along with mosses.
Grass Community	The grass community is found on mesic sites. *Hierochloe alpina* (alpine holygrass) is the dominant plant species.
Lichen Community	The lichen community occurs on a variety of well-drained landforms on xeric to submesic sites. Lichens generally occupy over 60% of the ground surface.
Lichen–Boulder Community	The lichen-boulder community is found in boulder fields and on morainal deposits throughout the project area. The surface is rough and broken. Boulder cover varies form between 20 to 80%. Hair lichens can be common on the "tundra" between the boulders while crustose lichens are found on the boulder surfaces.
Lichen–Cobble Community	This unit is similar to the lichen-boulder community; however, the surface is not as rough. The cover of vascular plants is low in this unit.
Lichen–Grass Community	This ground cover in this community is dominated by a combination of lichens and grasses; alpine holygrass is generally common.

ECL Unit	Definition
Lichen–Moss Community	The lichen-moss community generally occurs on well-drained morainal material. The ground surface is covered by a variety of lichens and mosses; the cover of vascular plants is low.
Lichen–Shrub-Moss Community	This unit is found on morainal material on mesic sites. It is somewhat similar to the Shrub and Moss units. The lichen and moss layers each cover over 20% of the ground surface. The moderately developed shrub layer is dominated by Labrador tea with lesser amounts of lingonberry and cloudberry and a low cover of dwarf birch.
Moss –Carex - Water	This community is associated with level sites and depressions. It is often found on the edge of ponds and lakes.
Moss Community	The moss community occurs on a variety of landforms but most often on mesic sites on moraine. Mosses are a dominant ground cover; most sites have a moderate cover of ericaceous shrubs (no single species is a dominant) and low cover of dwarf birch, herbs, graminoids and lichens.
Moss -Gravel Community	The moss-gravel community occurs on well-drained sites. It is characterised by a high cover of exposed gravel on the soil surface and with moss cover over 20%.
Rock	Bedrock outcrops have a very high reflectance value in imagery, similar to boulders. The outcrops are generally in a linear orientation and make up a relatively small proportion of the total classified area. Lichens and a variety of low shrubs are generally associated with bedrock.
Rock – Shrub Community	The rock-shrub community occurs on areas of bedrock outcrop on upper and crest of slope positions. Bedrock cover is generally greater than 40%; *Empetrum nigricans* (crowberry) is usually a dominant although the cover of ericaceous shrubs also is greater than 20%.
Sand – Water	Beaches, sand banks and shallow water deltas are identified in the image. Sand has a very high reflectance value and is easily identified in the classification.
Shadow	Shadows in the image are generally from cloud cover and tend to black out the spectral signature of the land beneath it. Areas under shadows cannot be
Shrub Community	The shrub community is generally found on xeric to mesic sites on morainal parent material. Low shrubs are dominant in this unit; however, any one of several shrub species may be common on an individual site. These sites also have a low to moderate cover of forbs, graminoids, lichens, and mosses.
Shrub – Grass – Moss	This community is found on mesic sites. It is dominated by a combination of shrubs, graminoids, and mosses.
Shrub – Gravel Community	The shrub-gravel community is uncommon and is found on well drained, coarse textured soils. It is associated with eskers or gravelly, morainal ridges.
Water	Characterized by standing water. Deepwater areas are easily interpreted due to the spectral energy being absorbed by the water with very little reflectance. However, shallow water (2 m or less) can be confused with wetlands. In areas of shallow water, the bottom of the waterbody reflects the spectral energy. Shallow water is very closely related to the wetland community class (sedge community) because of the high water content, therefore, the separation of these classes can be highly confused.
Disturbed Sites	There is very little disturbed land in the area being classified. The class includes any urban area (Baker Lake) or camp settlements large enough to be detected in the imagery. Due to the characteristics of this class, it cannot be automatically classified; therefore, these areas were added manually. This class represents a very small proportion of the total classified area.
Ice	Ice has a very high reflectance value and is easily identified in the classification. There are a few areas with ice floating on waterbodies.
Unclassified	A very small percentage of cells within the imagery do not fall within a defined class. These cells have been grouped as unclassified.
Ridge Crest Community	This ELC unit is typically associated with eskers. Vegetation cover is often non-contiguous as the environment is dry and unstable. Two associations were mapped in the LSA (i.e., ridge crest community – sand association and ridge crest community – cobble association). The vegetation in this unit occurs in dense mats, which may include bog blueberry, lingonberry, crowberry, black bearberry, or prickly saxifrage. Moss campion, snow cinquefoil, grasses (e.g., purple reedgrass), and xeric woodrushes (e.g., confused woodrush) may be present. Lichens are sparse in this unit. The ridge crest community - cobble association is similar to the lichen-rock community – boulder association.

Appendix M

Baseline Water Quality Results

Table M-1 Average Baseline Water Quality in Third Portage, Second Portage and Wally (Golder, 2014)

Parameter	Units	Third Portage Lake (N=18)	Second Portage Lake (N=14)	Wally Lake (N=3)
Conventional parameters				
Hardness	mg/L	5.3	8.9	17.2
pH	pH units	6.8	7.5	7.3
Dissolved anions				
Total alkalinity	mg/L	4	7	13
Chloride	mg/L	0.5	0.6	0.7
Fluoride	mg/L	0.07	0.07	0.05
Sulphate	mg/L	1.3	2.8	5.3
Nutrients				
Ammonia nitrogen	mg/L	0.01	0.02	0.02
Total kjeldahl nitrogen	mg/L	0.09	0.08	0.11
Nitrate nitrogen	mg/L	0.004	0.007	0.024
Nitrite nitrogen	mg/L	0.001	0.001	0.001
Total phosphate	mg/L	0.002	0.003	0.003
Total phosphorus	mg/L	0.002	0.003	0.003
Organic parameters				
Dissolved organic carbon	mg/L	1.4	1.7	2.2
Cyanides				
Total cyanide	mg/L	<0.005	<0.005	<0.005
Total metals				
Aluminum	mg/L	0.006	0.007	0.008
Antimony	mg/L	<0.0005	<0.0005	<0.0005
Arsenic	mg/L	<0.0005	<0.0005	<0.0005
Barium	mg/L	<0.02	<0.02	<0.02
Beryllium	mg/L	<0.001	<0.001	<0.001
Boron	mg/L	0.1		0.1
Cadmium	mg/L	<0.00005	<0.00005	<0.00005
Calcium	mg/L	1.2	2.3	4.6
Chromium	mg/L	<0.001	<0.001	<0.001
Cobalt	mg/L	<0.0003	<0.0003	<0.0003
Copper	mg/L	0.001	0.001	0.002
Iron	mg/L	<0.03	<0.03	<0.03
Lead	mg/L	0.0006	0.0009	0.0007
Lithium	mg/L	<0.005	<0.005	<0.005
Magnesium	mg/L	0.5	0.8	1.3
Manganese	mg/L	0.001	0.0016	0.0013
Mercury	mg/L	<0.00005	<0.00005	<0.00005

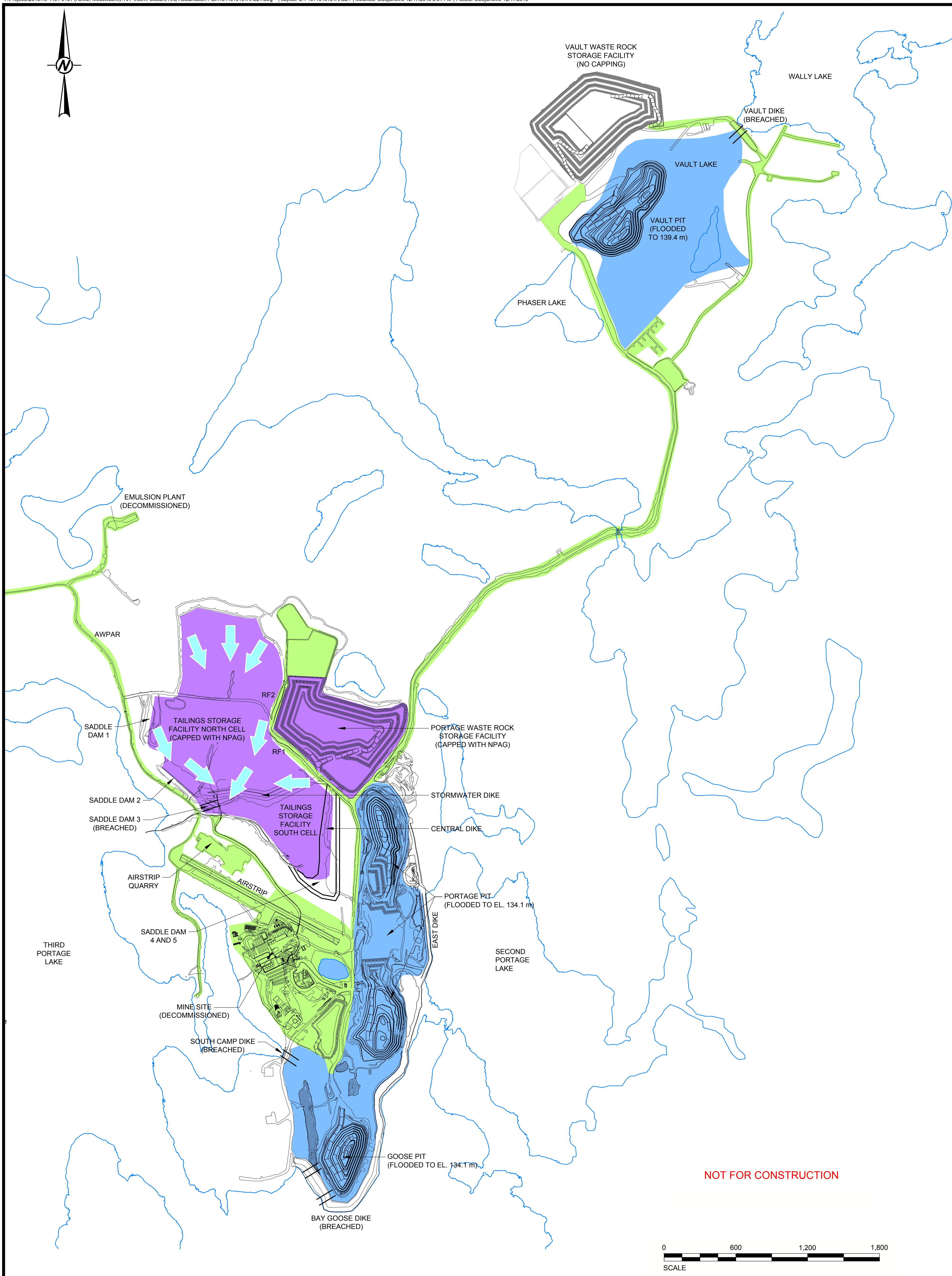
Table M-1 Average Baseline Water Quality in Third Portage, Second Portage and Wally (Golder, 2014), continued

Parameter	Units	Third Portage Lake (N=18)	Second Portage Lake (N=14)	Wally Lake (N=3)
Molybdenum	mg/L	<0.001	<0.001	<0.001
Nickel	mg/L	<0.001	<0.001	<0.001
Potassium	mg/L	2	2	2
Selenium	mg/L	<0.001	<0.001	<0.001
Silver	mg/L	<0.00002	<0.00002	<0.00002
Sodium	mg/L	2	2	2
Thallium	mg/L	<0.0002	<0.0002	<0.0002
Tin	mg/L	<0.0006	<0.0005	<0.0005
Titanium	mg/L	<0.01	<0.01	<0.01
Uranium	mg/L	<0.0002	<0.0002	<0.0002
Vanadium	mg/L	<0.03	<0.03	<0.03
Zinc	mg/L	0.005	0.005	0.013

Note: N = number of samples used to calculate average values.

Appendix N

Post Closure General Site Layout



REFERENCE

- NPAG COVER
- REHABILITATED DISTURBED AREA
- PIT LAKES/POND
- BREACHED DIKES/DAMS
- DIRECTION OF SURFACE RUNOFF FLOW

NOTES

1. BASE PLAN PROVIDED IN DIGITAL FORMAT BY AGNICO EAGLE MINES LTD., FILE NO. PORTAGE_GOOSE_VAULT_END2018_LOM2013_V4D-WITH LABEL.DWG, RECEIVED OCTOBER 7, 2013.

PROJECT

AGNICO EAGLE MINES LTD.
MEADOWBANK GOLD PROJECT
INTERIM CLOSURE AND RECLAMATION PLAN

TITLE

GENERAL MINE LAYOUT POST - CLOSURE

Golder Associates

PROJECT No.		13-1151-0131	FILE No.	1311510131AA021
DESIGN			SCALE	AS SHOWN
CADD	DD	2013-12-17	FIGURE	
CHECK	BR	2013-12-17		2.1
REVIEW	RG	2013-12-17		

Appendix O

Closure Integrated Schedule

(Golder, 2014)

Meadowbank - Closure and Post-Closure Schedule

Main Project Facilities	Operations/Closure Main Phases	2017	2018 Q1/Q2/Q3	2018 Q4	2019 - Q1/Q2	2019 Q3/Q4	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
		Operations at MBK		Transition Period		Operations at WT (ore processing at Meadowbank)			Demolition								Dike Reconnection	AWAR Closure										
				Open Pits Active Flooding																								
		Progressive Closure							Active Closure/Closure Monitoring									Post-Closure Monitoring										
Open Pits	Goose - Pit Flooding						Flooding																					
	Portage - Pit Flooding								Flooding																			
	Reclaim Water Transfer from South Cell TSF to Portage Pit					Reclaim Transfer																						
	Vault - Pit Flooding					Flooding																						
	Phaser/BB Phaser- Pit Flooding					Flooding (natural)																						
	Water Treatment Plant (if required)								Water Treatment																			
Dikes and Dams	Dike and Dam Reconnection (Baygoose, South Camp, Vault, SD3)																Reconnection											
RSF	Portage RSF Operations	RSF Operation																										
	Portage RSF- NPAG Cover	Cover Construction										Cover Construction																
	NPAG RSFs - Waste rock reclaim for closure			NPAG Reclaim					NPAG Reclaim																			
TSF	North Cell - Tailings Deposition					Deposition																						
	North Cell - NPAG cover	Cover Construction							Cover Construction																			
	South Cell - Tailings Deposition	Deposition																										
	South Cell - NPAG cover								Cover Construction																			
Water Management	Mine Site Water Management in Closure - TSF and Open Pits								Water Management																			
	Water Management Facilities Closure				Closure of Unused Facilities																							
Waste Management Facilities	Demolition Landfill Operation								Waste Deposition																			
	Closure Landfill - NPAG Cover and Closure											Cover Construction																
	Landfarm Operation								Contaminated Soil Treatment																			
	Closure Landfill - NPAG Cover and Closure											Cover Construction																
	Hazmat Management - Closure								Hazmat Management for Closure																			
Meadowbank Infrastructures	Surface Infrastructures Demolition - Mill, Power Plant, Services Building								Demolition																			
	Accommodations								Demolition																			
	Equipment Demobilization								Demobilization or Landfilled								Demob.											
	Fuel tanks and others facilities								Demolition																			
	Site roads and Vault Road									Road Closure																		
	Airstrip																Closure											
Baker Lake Facilities	Surface Infrastructures Demolition - Marshalling area and fuel tanks								Closure of Unused Facilities																			
AWAR	AWAR, Roads, Quarries and Pads Dismantling																	AWAR closure										
Monitoring	Closure Active Monitoring								Active Closure/Closure Monitoring																			
	Post-closure Monitoring																	Post-Closure Monitoring										

Notes:
1. It is anticipated that the schedule will be refined throughout the Project life as the designs for closure are advanced and the closure methods and strategies are further developed. The schedule is subjected to changes following mine plans and development as well as market conditions.
2. Only the main closure activities are presented in this schedule.
3. Water treatment if required will be for the reclaim water volume store in the pit at the end of in-pit deposition.
4. Pit flooding includes natural pit flooding (runoff, groundwater inflow and seepage) and active flooding (pumping water from adjacent lake).
5. Water management is required in operations; this schedule only presents the water management related to closure activities.
6. Waste management is required in operations; this schedule only presents the water management related to closure activities.
7. Baker Lake facilities will be decommissioned as required in active closure and closure.
8, Whale Tail operations expected from Q3 2019 to January 2022.

Appendix P

Financial Security Cost Estimate Assumptions and Reclaim Spreadsheet

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Memorandum

Certifiée ISO 9001

TO:	Michel Groleau Agnico Eagle Mines Ltd.	**DATE:**	Mai 17, 2019
C.C.:	Dominic Tremblay, Anh Long Nguyen, Nina Quan SNC Lavalin		
FROM:	Philipe Lemieux SNC Lavalin	**REF.:**	662987-5000-4EER-0001_00
SUBJECT:	Meadowbank ICRP 2019 Appendix P – Financial Security Cost Estimate Assumptions Update		

1.0 INTRODUCTION

Agnico Eagle Mines Ltd. (Agnico Eagle) Meadowbank gold open pit mine (Meadowbank, or the Project) currently in operation, located 70 km north of Baker Lake, Nunavut, achieved commercial production in March 2010. The mine plan at Meadowbank mine is expected to extend the production into January 2022, with the processing and tailings deposition of ore coming from Whale Tail Pit.

Agnico Eagle is required to submit a detailed financial security cost estimate for the Meadowbank Gold Project Interim Closure and Reclamation Plan (ICRP) to Indigenous and Northern Affairs Canada (INAC) and to the Kivallik Inuit Association (KIA) to support land use and water licensing requirements. RECLAIM 7.0 workbook has been used for this estimate, as per the Guidelines for Closure and Reclamation Cost Estimates for Mines, issued by Indigenous and Northern Affairs Canada, Mackenzie Valley Land and Water Board and the Government of the Northwest Territories (INAC, MVLWB, GNWT, 2017).

As the Whale Tail project is going through the permitting process, it is understood that all operations components of Whale Tail Pit and Amaruq Exploration/Hauling Road are included specifically in the Whale Tail Interim Closure and Reclamation Plan (Golder, 2016). Only the activities covered under the Meadowbank Type A Water License 2 AM-MEA1525 are included in the updated Meadowbank Interim Closure and Reclamation Plan (ICRP)—Update 2019 and in the herein financial security cost estimate.

Furthermore, in order to accommodate the tailings produced from the development of the Whale Tail Pit Project, AEM is looking to proceed to a tailings in-pit deposition in order to reduce quantities of tailings deposited in the current tailings storage facilities (TSF). Consequently, the infrastructures related to the tailings deposition are also considered in the analysis, as well as the site water management and the quantities required for the TSF and in-pit cover.

2.0 CLOSURE MEASURES AND CONSIDERATIONS

The cost estimate presented in this memo covers the closure and reclamation of all facilities currently identified within the Meadowbank Project property including the following:

- Open pits;
- Tailings Storage Facilities (TSF);
- Rock Storage Facilities (RSF);

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- Support facilities on the property including accommodations, process plant (mill), power plant, bulk fuel storage facility, service building, contractor facilities, warehouses and cold storage, assay Lab, emulsions plant, incinerators, airstrip, borrow areas, on-site roads and laydown areas;
- The Baker Lake Site Facilities and All Weather Access Road (AWAR).

The present updated Meadowbank ICRP and cost estimate are based on the current Life of Mine (LOM) of Meadowbank, including the mining activities planned at the Meadowbank site, as well as the activities related to ore processing and tailings deposition. The additional ore from Whale Tail Pit processed and its tailings deposited at Meadowbank are also considered in the update of the Meadowbank ICRP 2019.

This cost estimate provides for the closure measures described in detail in the Meadowbank ICRP-Update 2019. Most closure activities will occur within the active closure period, from 2022 to 2024. The schedule of closure activities presented in Appendix O of the Meadowbank ICRP-Update 2018 outlines the major closure measures and their expected timeline.

For the purpose of this financial security cost estimate, only progressive rehabilitation measures which have already been completed to date are considered in the calculations.

3.0 COST ESTIMATE

3.1 Model

RECLAIM is a model developed in Microsoft Excel used to calculate the estimation of reclamation costs for mine sites in Northern Canada. It provides line items for each reclamation activity which might be required at a given site. For each, the model presents the “quantity” of work multiplied by the appropriate “Unit Cost” provided in the model.

RECLAIM version 7.0 consists of eleven (11) reclamation costing worksheets used to compute the overall closure cost estimate. These include direct costs associated with the following mine components:

- Open pit;
- Underground mine;
- Tailings impoundment;
- Rock pile;
- Buildings and equipment;
- Chemicals, hazardous materials and contaminated soils;
- Water treatment;
- Water management;
- Interim care and maintenance.

It also includes the following indirect costs:

- Post-closure monitoring and maintenance;
- Mobilization and demobilization.

Additional cost factors such as contingency, engineering, project management, health and safety/QA-QC/engagement and bonding are automatically calculated in the cost summary worksheet, with percentages applied to the total direct cost.

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3.2 Summary of Costs

The updated 2019 estimated closure and reclamation costs for the Meadowbank Project using RECLAIM Version 7.0 represents a total of $89,427,746. This total includes $62,269,580 of direct costs and $27,158,166 of indirect costs. The costs are summarized in Table 1 presented below.

Table 1 Summary Financial Security Cost Estimate

Cost Item	Subtotal (Land and Water Liability)
Direct Costs	
Open pit	$6,480
Portage	*$3,240*
Goose	*$1,080*
Vault	*$1,080*
Phaser	*$1,080*
Underground Mine	$0
Tailings Facility	$38,680,308
Rock Pile	$2,737,534
Portage	*$2,707,534*
Vault	*$30,000*
Buildings and Equipment	$10,683,256
Meadowbank	*$8,029,508*
Baker Lake	*$1,660,670*
AWAR	*$993,078*
Chemicals and Contaminated Soil Management	$1,316,981
Surface and Groundwater Management	$7,997,222
Interim Care and Maintenance	$847,800
Subtotal Direct Costs	**$62,269,580**
Indirect Costs	
Mobilization/Demobilization	$5,589,160
Post-Closure Monitoring and Maintenance	$4,133,524
Engineering (5%)	$3,113,479
Project Management (5%)	$3,113,479
Health and Safety Plans/Monitoring, QA/QC and Engagement Costs (2%)	$1,245,392
Bonding/Insurance (1%)	$622,696

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Contingency (15%)	$9,340,437
Market Price Factor Adjustment (0%)	$0
Subtotal Indirect Costs	**$27,158,166**
GRAND TOTAL	**$89,427,746**

Refer to Appendix A for the RECLAIM spreadsheets, presenting the detailed breakdown of closure costs by mine components.

The assumptions used for the calculations of the direct costs and the indirect cost calculations are explained in the sections below.

3.3 Direct Cost Assumptions

The direct costs include the cost related to the physical work activities to be completed for the various project components, as well as the care and maintenance requirements.

In most cases, costs have been developed using unit rates provided by the RECLAIM 7.0 template applied to calculated quantities. Where an appropriate RECLAIM supplied rate was not available, an independent rate was used from Meadowbank operational data or from precedent data for similarly sized projects located in similar conditions. Unit rates used assume third party contractor pricing.

Specific assumptions and quantities used for the financial security cost estimate are provided for each closure component in sections 3.3.1 to 3.3.8.

3.3.1 Open Pits

For this component, it is assumed that the entrance and some perimeter areas of each pit will be blocked with non-acid generating material (NPAG) berms to control access of wildlife and motorized vehicles in the open pits during flooding. The length of berms was estimated from “MBK Site map FEB 2018 for NI43101.dwg” provided by Agnico Eagle, April 2018. Berms are assumed to be 1.5 m high, with 2H:1V side slopes, and made of NPAG rockfill.

Berms at ramp entrances and at exposed Portage Pit crest:

- 300 m long x 1.5 m tall with 2H:1V side slopes = 1350 m^3;

Berms at Goose, Vault and Phaser ramp entrances:

- 100 m long x 1.5 m tall with 2H:1V side slopes = 450 m^3.

3.3.2 Tailings Storage Facilities

TSF configuration from the last interim closure and reclamation plan were reviewed and adjusted with the projected elevation of tailings at closure with the new LOM. Preliminary design work was completed for the TSF cover in 2015 and 2016. The tailings cover will consist of NPAG waste rock, with a minimum thickness of 2.0 m. The cover for the South and North Cell will include landforms to promote water shedding and consists of two watersheds for North Cell and one watershed for South Cell. The nominal cover thickness over most of the landforms will be well over the minimum, as a thickness variation is required to obtain the designed landforms and promote adequate water management.

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Quantities of rockfill required for the cover of the North Cell was adjusted to consider the construction of the internal structure required for the tailings deposition of Whale Tail Pit. These structures and the additional tailings deposited will reduce the quantity of NPAG material required for the construction of the cover and the landforms. For the South Cell, quantities were calculated to cover an area with tailings at El. 149.5 m.

For the TSF North Cell cover, the cover portion constructed between 2015 and 2017 in progressive closure was considered and subtracted from the total material required.

The construction of water diversion ditches within the cover and sedimentation ponds for management of the runoff water over the TSF were also included in the calculation. The runoff water from the cover system will convey towards a reclaim pond located upstream Saddle Dam 3. The water will then be released into Third Portage Lake once the runoff water quality meets discharge criteria. To release runoff water, the Saddle Dam 3 will be opened, which is also considered in the calculations. The quantities considered in the calculations for the construction are presented below.The aggregate cover for the tailings in-pit deposition will consist of NPAG waste rock, with a meter-thick layer placed over the deposition area of Portage Pit A, Pit E and Goose pit, once all tailings have been placed and frozen. Quantities of aggregate cover are based on the following cover surface areas:

- Goose Pit: 120,000 m²;
- Portage Pit A: 174,000 m² and;
- Portage Pit E: 84,000 m².

The cover surface areas have been estimated at a high level by Arcadis Canada for CIRNAC (Arcadis, 2019). However, this option will need to be validated in subsequent phases.

A total of 16.0 km (16,035 m) of piping was added to consider the tailings in-pit deposition. These lines will be dismantled, decontaminated and buried in the on-site landfill. These quantities come from the Material take-off list – Tailings In-pit Deposition project produced by SNC-Lavalin on September 6th, 2018 (SNC-Lavalin, 2017).

Finally, it is assumed that 7.0 km (7,000m) the tailings discharge piping will also be dismantled, decontaminated and buried in the on-site landfill. A total of 4,500 m of North Cell and South Cell tailings discharge piping will be reused for the tailings in-pit deposition to reduce over quantity of piping (data from AEM Construction Plan, December 2018). The booster pump will also be dismantled.

Geotechnical instrument installation or maintenance of the existing instruments was also considered in the estimate.

NPAG Cover Tailings Storage Facility:

North Cell:

- Tailings maximum elevation considered at El. 153.5 m;
- Volume of NPAG rockfill required for North Cell NPAG cover: 6,376,000 m³;
- Volume of NPAG cover constructed between 2015 and 2017 (progressive closure): 750,743 m³;
- Volume of internal structure and tailings deposition to El.153.5m: 2,397,535 m³;
- Remaining volume NPAG rockfill required for North Cell NPAG cover: 3,227,722 m³ (data provided by Agnico Eagle, 2018).

South Cell:

- Tailings maximum elevation considered at El. 149.5 m;
- Volume NPAG rockfill required for South Cell NPAG cover for tailings at El.149.5 m: 2,783,838 m³.

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Runoff Water Ditches:

North Cell:

- Volume of till excavation: 6,428 m³;
- Volume of rock excavation: 23,512 m³;
- Volume of NPAG waste rockfill: 9,935 m³.

South Cell:

- Volume of till excavation: 20,764 m³;
- Volume of rock excavation: 31,745 m³;
- Volume of NPAG waste rockfill: 25,527 m³.

Sedimentation Ponds:

North Cell:

- Volume of till excavation: 17,428 m³;
- Volume of rock excavation: 32,472 m³;
- Volume of NPAG waste rockfill: 3,510 m³.

South Cell:

- Volume of till excavation: 36,176 m³;
- Volume of rock excavation: 74,308 m³;
- Volume of NPAG waste rockfill: 5,394 m³.

Saddle Dam 3 Opening:

- Volume of opening excavation: 25,000 m³;
- Volume of NPAG waste rockfill: 9,000 m³.

Cover Tailings:

- Volume of aggregate cover for Goose Pit: 120,000 m³;
- Volume of aggregate cover for Portage Pit A: 174,000 m³;
- Volume of aggregate cover for Portage Pit E: 84,000 m³.

Removal of Piping added for In-pit Deposition:

- Provided for removal of 16.0 km of HDPE, with on-site disposal. The piping includes the following :
  - Transfer pipes from Goose pit to junction to pits A and E ;
  - Transfer pipes from Goose pit to junction to pit E ;
  - Transfer pipes from Goose pit to junction to pit A ;
  - Reclaim water from pit E to junction to mill ;

- Reclaim water from pit A to junction to mill ;
- Reclaim water from junction to tie in ;
- Tailing pipes (portage pit E) ;
- Tailing pipes (portage pit A) ;
- Pig launcher discharge lines (Goose pit, Pit A, Pit E).

Removal of Tailings Discharge Line:

- Provided for removal of 7.0 km of HDPE, with on-site disposal;
- Lump sum of $15,630 for decommissioning of associated booster pump system/building.

Specialized Items:

- Lump sum of $50,000 for the installation/or maintenance of instrumentation.

3.3.3 Rock Storage Facilities

The configuration of the Portage RSF has not changed since 2014. The Portage RSF cover occurred progressively during operations between 2011 and 2017. Presently, it is considered that 84% of the RSF PAG area has been covered with 4.0 m of NPAG material (data from Agnico Eagle, May 2018). No cover is considered required for Vault RSF as the waste rock is mainly NPAG, and the portion of PAG material is encapsulated in the center of the RSF as needed.

The cost estimate also includes the cover of collection sumps around the Portage RSF.

Geotechnical instrument installation or maintenance of the existing instruments was also considered in the estimate.

Cover Portage Rock Storage Facility:

- Volume of NPAG cover required (total): 3,214,286 m³;
- Volume of NPAG cover constructed between 2011 and 2017 (progressive closure): 2,700,000 m³;
- Volume of NPAG cover remaining: 514,285 m³.

Cover Portage Rock Storage Sumps:

- Additional 6,800 m³ of cover provided for backfilling/covering sumps WEP1, WEP2 and RSF (ST-16) sumps.

Specialized Items:

- Lump sum of $50,000 for installation/or maintenance of instrumentation at Portage RSF;
- Lump sum of $30,000 for installation/or maintenance of instrumentation at Vault WRSF.

3.3.4 Buildings and Equipment

The areas and footprints of buildings and infrastructures for Meadowbank site and Baker Lake provided in the ICRP 2014 were reviewed and adjusted if changes were required. The following changes were made:

- The airstrip area was increased due to the extension completed in 2013;
- The site road area was increased due to additional access roads built;

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- The number of containers (sea cans) remaining on-site after closure is estimated at 1,400 containers;
- A total of 18 Jet-A Fuel tanks at Baker Lake;
- A total of 38 culverts and 9 bridges are considered for the AWAR.

Building and infrastructures footprints are listed in Table 2 available at the end of this memo (modified from Golder, 2014).

Removal of Buildings and Scarification of Foundations:

- Building footprints are listed in Table 2, with demolition areas scaled for heights assuming 3 m stories. Buildings with concrete foundations requiring puncturing assumed;
- A total of 18 Jet-A Fuel tanks at Baker Lake is considered instead of 20 tanks, as 2 were demobilized in 2016.

Reclaim Roads and Laydown Areas:

- Road/Laydown areas for the mine site and Baker Lake are listed in Table 2 and will be scarified. The AWAR will be ripped to promote natural revegetation and re-contoured to promote natural drainage;
- The airstrip length increases from 1495 to 1752 m, for an additional area of 6,000 m² and a total area of 4.1 ha;
- The site road area was increased by 20,000 m² due to additional access roads built estimated at 2.0 km, for a total area of 12 ha;
- Removal of 21 culverts on site including Vault area is considered with a lump sum allowance of $4,000 per culvert removal. Lump sum allowance of $40,000 for the installation of water breaks and erosion control is also provided.

Containers:

- In 2015, the total number of containers estimated on site represented 4,850 containers. It is estimated that between 2015 and 2022, 250 containers per year will be sent south (for a total of 2,000 containers) and that 250 containers will be donated to the community. For demobilization during 2023, 2024 and 2025, 400 containers per year will be required to transport some material and waste. At the end of active closure period, it is estimated that 1,400 containers will have to be disposed in the on-site landfill. Assuming 2.5 metric tons per container, this represents a total of 3,500 metric tons to cut and landfill.

Reclaim Quarries:

- Quarry slopes setback to 1H:1V slope, assuming cut/fill with blasted rock from the upper slope used to form lower slope;
- A total volume of 14,319 m^3 of blasted rock will be required. No change was made from ICRP 2014 (Golder, 2014) in the blasted rock quantities for the rehabilitation of quarries along the AWAR;

AWAR Water Crossing Removal:

- Lump sum allowances of $4,000 per culvert removal and $25,000 per bridge removal. A total of 38 culverts and 9 bridges are considered for the AWAR.

Decontaminate and Dispose Mobile Equipment in Landfill:

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- Assumed a number of 136 mobile equipment, with 8 hours per equipment to decontaminate and disposed in the on-site landfill (1088 hours total), with 50% of equipment transferred to the local community or relocalized (Golder, 2014).

3.3.5 Chemicals and Soil Management

Chemicals and soil management were reviewed in accordance with the information available in the Landfarm Design and Management Plan (Agnico Eagle, 2017), the Hazardous Materials Management Plan (Agnico Eagle, 2013) and the Meadowbank Annual Report 2017 (Agnico Eagle, 2018).

Building Decontamination:

- Building decontamination was considered for the maintenance shop, the power plant, the fuel storage and the emulsion plant. A total cost of $33,000 was estimated for decontamination including 33 mandays.

Hazardous Material:

- No waste oil is considered in the cost estimate as the oil will be burned progressively for energy during operations;
- Fuel dregs assumed to be 0.5% of bulk fuel storage capacity (60 million liters of diesel and 1.8 million liters of Jet Fuel) and burned on site with waste oil, for a total of 309,000 liters;
- One-year accumulation of oily and glycol contaminated waste water is considered, for a total of 58,456 liters (as per the Meadowbank Annual Report 2017, Agnico Eagle 2018);
- A lump sum of $3,000 is considered for battery disposal;
- Mill and water treatment reagents at closure assumed to be 5% of annual consumption and are summarized in Table 3 at the end of this memo;
- A total of 10,000 kg of assay lab and environmental reagents are assumed (Golder, 2014);
- A lump sum of $20,000 is considered for the disposal of various waste such as machine shop paints, solvents and filters;
- A total of 16,170 liters of glycol is considered based on the quantity on site reported (Hazardous Materials Management Plan, Agnico Eagle, 2013).

Contaminated soil:

- A contingency of 2,745 m^3 of hydrocarbon contaminated soil requiring on-site remediation at closure is considered, based on the reported total for 2017 (Meadowbank Annual Report 2017, Agnico Eagle 2018);
- An allowance of 5% of the total contaminated soil (137 m^3) is considered for heavily contaminated soil not treatable on site, to be managed as hazmat material;

Audit

- An allowance of $7,500 and $50,000 has been provided for Audit Phase 1 and 2 investigations, respectively. Hazmat removal audit is considered covered under these audits.

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3.3.6 Water Management

The cost estimate includes the open pits flooding, the construction of the dike reconnections (opening) and closure of the water management facilities.

The volumes of water required for Portage, Goose and Vault pits flooding and the period of flooding come from the water balance presented in the 2016 Water Management Report and Plan Update issued in November 2017 by Agnico Eagle (Agnico Eagle, 2017) and from the information provided in the site water balance (Agnico Eagle, 2018). The operation and the maintenance of the pumping system were considered for an active flooding period of 5 years.

The preliminary design of the dike reconnections for Baygoose, South Camp and Vault dikes was developed in 2016. The construction quantities required for the reconnections were estimated from the preliminary design.

Correction work on the diversion ditches was considered required in closure to ensure long term stability and minimize snow management.

The fresh water barge and pipeline for the fresh water intake will be decommissioned. Water management pipelines will also be removed and landfilled, as well as the Third Portage Lake and Wally Lake diffusers.

The construction of a water treatment plant to treat the reclaim water prior to its transfer to Portage Pit is considered in the estimate, as well as its decommissioning. Due to the water quality forecast results, the additional parameters that may require treatment and the technology, the cost estimate for the water treatment plant was adjusted compared to the ICRP 2014 (Golder, 2014).

The annual cost for operation of the water treatment plants is also calculated. The water treatment plants are planned to operate during the first year of closure before flooding is initiated.

Portage, Goose and Vault Pits Flooding:

- Data extracted from the site water balance of 2016 (Agnico Eagle, 2017) and 2018 (Agnico Eagle, 2018);
- Total volume of water pumped to Portage Pit over 6 years (2022-2027): 21.70Mm³ of water pumped from Third Portage Lake and from the Reclaim Pond;
- Total volume of water pumped to Goose Pit over 2 summers (2020 and 2021): 3.50 Mm³ of water pumped from Third Portage Lake;
- Total volume of water pumped to Vault Pit over 7 years (2019–2025): 28.05 Mm³ of water pumped from Wally Lake;
- Remaining volume of flooding for the open pits will be covered by natural flooding (groundwater inflows, seepage, runoff), with no cost associated;
- Phaser and BB Phaser Pits will be flooded by natural flooding, with no cost associated;
- Considered pumping unit cost of $0.02/m³ (Golder, 2014);
- For pump maintenance and operation—2 (two) labourers working 12-hour days, 7 days per week, during active pumping period (4 months/year over 5 years), with associated accommodation costs;
- Annual pump servicing provided by two (2) manufacturer consultants for 1 week site visit per year over 5 years, with associated travel allowance costs.

Dike Opening:

Bay-Goose Dike Reconnection (South, East and North):

- Opening of the dike with the lake to 3 m below design minimum water level to allow year-round fish passage, facilitate water exchange, and facilitate water movement within the former impoundment;
- Reconnection at two locations, with an alternate third location to access Portage Pit Lake;
- Reconnection width of 10 m with 3:1 side slopes;
- Erosion protection on exposed shoreline and appropriately sized substrate in reconnection base to satisfy fish habitat requirements for this structure;
- Volume of reconnection excavation = 94,000 m^3;
- Volume of rock placement for capping and transition material, shoreline protection and fish substrate = 27,900 m^3.

South Camp Dike Reconnection:

- Opening of the dike with the lake to 1 m below design minimum water level to allow for seasonal fish passage;
- Reconnection width of 10 m with 3:1 side slopes;
- Erosion protection on exposed shoreline and appropriately sized substrate in reconnection base to satisfy fish habitat requirements for this structure;
- Volume of reconnection excavation = 24,000 m^3;
- Volume of rock placement for capping and transition material, shoreline protection and fish substrate = 9,500 m^3.

Vault Pit to North Phaser Pit Channel:

- Channel invert 7 m below design minimum water level to allow for year-round fish passage;
- Opening width of 10 m with 3:1 side slopes;
- Erosion protection on exposed shoreline and appropriately sized substrate in opening base to satisfy fish habitat requirements for this structure;
- Volume of channel excavation = 7,000 m^3;
- Volume of rock placement for capping and transition material, shoreline protection and fish substrate = 2,300 m^3.

Vault Dike Reconnection:

- Channel invert 3 m below design minimum water level to allow for year-round fish passage;
- Reconnection width of 10 m through dike, channel width of 5 m, with 3:1 side slopes;
- Erosion protection on exposed shoreline and appropriately sized substrate in opening base to satisfy fish habitat requirements for this structure;
- Volume of channel excavation = 27,000 m^3;
- Volume of rock placement for capping and transition material, shoreline protection and fish substrate = = 10,800 m^3.

Removal or Correction of Water Management Structures:

- Volume for correction work on the diversion ditches—backfill/recountour (consider work on 1000 m of diversion ditch, on an area of 4 m^2 per linear meter, 1 m deep excavation) = 4,000 m^3;
- Lump sum for removal of the fresh water barge of $3,000;
- Lump sum for removal of each diffuser of $3,000;
- Length of pipeline to remove: 1,000 m for the fresh water supply system and 2,000 m for general water pipelines.

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Temporary Water Treatment Plants Construction:

- Installation assumes repurposing an existing structure;
- The cost estimated for the tanks and mechanical components in the ICRP 2014 (Golder, 2014) was increased to account for the type of technology required for treatment, for a total of $1,240,000;
- Piping, electrical, instrumentation and controls, and equipment installation costs have been estimated as percentages of the total tanks and equipment cost, for respectively 30%, 15%, 15% and 35%, for a total of $1,178,000;
- The decommissioning is accounted for demolishing a structure of 1,500 m^2 and scarification of the footprint;
- The decommissioning of the system includes 540 man hours (3 labours,12 hours/day for 15 days), with associated accommodation costs.

Temporary Water Treatment Plants Operation:

- Operation of the temporary water treatment plants considered for treatment of reclaim water during 6 months per year, over 1 year (treatment required of 3,400,000 m^3). The volume of water to be treated is based on Agnico Eagle's 2016 Water management plan update (Agnico Eagle, 2017). The volume corresponds to the approximate quantity of reclaim water stored in Portage Pits A & E at the end of the deposition in 2022;The water treatment will be completed for one (1) year only with two (2) treatment plants that can treat up to 12 000 m^3/day each;
- Considered pumping unit cost of $0.07/m³ with diesel pump;
- A lump sum allowance of $500,000 for reagents is provided, based on the costs presented in the ICRP 2014 (Golder, 2014) increased to account for the type of technology required for treatment and due to the potential higher volume of water to be treated;
- For operation, one (1) skilled labour considered for 12 hours/day during 6 months per year over 1 year;
- Annual plant servicing provided by two (2) manufacturer consultants for a 7 days site visit per year (168h) over 1 year, with associated travel allowance costs.

3.3.7 Interim Care and Maintenance

Interim care and maintenance is considered in this cost estimate as this is a requirement from INAC. The estimate is based on a 3 years period and includes the annual surveillance, surveillance and monitoring costs (active closure), presented in the "Post-Closure Monitoring and Maintenance", in Section 3.4.2.

- Treatment costs are in water management costs as treatment is required and not considered as if necessary;
- The annual cost related maintenance, surveillance, monitoring and inspection of the active closure period is estimated at $282,600 (as presented in the" Post Closure Monitoring and Maintenance");
- The total cost for 3 years of care and maintenance is evaluated at $847,800.

3.4 Indirect Costs

The indirect costs include the cost related to post-closure monitoring and maintenance, mobilization and demobilization, as well as some cost factors such as contingency, engineering, project management, health and safety/QA-QC/engagement costs, bonding/insurance and contingency.

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3.4.1 Mobilization/Demobilization

During the active closure stage, mobilization costs have been accounted for by allowing costs for mobilization and demobilization of equipment from Baker Lake, the mobilization of workers to perform the closure work, in addition to one barge trip into and out of Baker Lake exclusively for Meadowbank closure.

- Mobilization and demobilization of heavy mobile equipment for demolition is based on a distance of 110km along the AWAR from Baker Lake to Meadowbank;
- A seasonal work force of 50 workers over 3 years (2022 to 2024) for a 6 months per year demolition/rehabilitation seasons is considered, with associated accommodation and transportation costs (4 trips per year at $2,500 both ways, with 6 hours paid per trip);
- Mobilization, camp and accommodation during 95 days, as suggested by Arcadis Canada for CIRNAC (Arcadis, 2019), to complete the aggregate placement work for the tailings in-pit deposition (based that 4,000 m^3 can be placed in a day);
- Lump sum for one barge trip into and out of Baker Lake of $1,000,000 is considered.

3.4.2 Post-Closure

The post-closure costs are separated in two (2) main periods; the active closure/closure from 2022 to 2030 (9 years) and the post-closure from 2031 to 2041 (11 years). The costs related to site monitoring/inspection and maintenance/surveillance are presented below.

The annual operation cost of the interim water treatment plan is not included in the post-closure costs as it is already accounted for in “Interim care and maintenance” for the required period of 3 years.

Monitoring and Inspection Active Closure/Closure (2022 to 2030):

- An annual lump sum of $100,000 for general monitoring programs (i.e. aquatic, wildlife, air quality, noise monitoring program) is considered;
- One annual geotechnical inspection if planned per year for $20,800—one week visit by one engineer, 7 days, 12h per day at $150/hour, plus $5,000 of reporting and associated travel and accommodation fees;
- A lump sum of $10,000 for groundwater monitoring;
- A lump sum of $15,500 of regulatory fees including annual reporting, management plans and progress reports;
- An estimated annual cost of $73,100 for the water quality monitoring on site, based on operational laboratory costs and the Meadowbank Water License 2 AM-MEA1525 requirements (Schedule 1, Table 2), as presented in Table 4.

Monitoring and Inspection Post-Closure (2031 to 2041):

- A lump sum of $100,000 every 2 years for general monitoring programs (i.e. aquatic, wildlife, air quality, noise monitoring program) is considered;
- One annual geotechnical inspection if planned per year for $20,800—one week visit of one engineer, 7 days, 12h per day at $150/hour, plus $5,000 of reporting and associated travel and accommodation fees);
- A lump sum of $10,000 for groundwater monitoring;

- A lump sum of $15,500 of regulatory fees including annual reporting, management plans and progress reports;
- An estimated annual cost of $49,432 for the water quality monitoring on site, based on operational laboratory costs and the Meadowbank Water License 2 AM-MEA1525 requirements (Schedule 1, Table 2), as presented in Table 4.

Maintenance and Surveillance:

- Two (2) site caretakers provided with biweekly overnight visits, 12 hours per day, 5 months of the year, along with annual allowances for a site vehicle and equipment ($20,000) and site maintenance ($10,000).

The discount rate for calculation of net present value of post-closure cost is considered at 3%.

3.4.3 Other Indirect Costs

Other indirect costs are calculated based on the direct costs total. The percentage for each indirect cost is automatically imposed by the RECLAIM model.

- Project management and engineering fees are assumed at 5% each of the direct closure costs;
- Health and safety plans/monitoring, QA&QC and engagement costs (communication with stakeholders from the community) are assumed as 2% of the direct closure costs;
- Bonding/insurance fees are assumed as 1% of the direct closure costs;
- Finally, due to the current level of engineering and uncertainties, a contingency of 15% of the direct closure costs has been provided for.

3.5 Comparison with 2014 Estimate

Table 5 summarizes the items updated from the original version of the estimate to incorporate the tailings in-pit deposition. (Updated Items from ICRP of June 2018 vs ICRP including Tailings In-Pit Deposition of April 2019)

Table 6 lists the key differences between this cost estimate and the cost estimate prepared in the 2014 ICRP (Golder, 2014).

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Table 2 Buildings List and Dimensions

Building/Infrastructure	Footprint (m²)	Stories (3 m Height)	Total Demolition Volume Scaled for Height (m³)	Concrete Foundation Area (m²)
Meadowbank				
Mill	7,560	5	37,800	4,560
Leech Tanks (10)	2,500	5	12,500	2,500
Primary and Secondary Crusher	246	3	740	246
Pebble Crusher	325	2	650	325
Conveyors	975	2	1,950	
Assay Lab	440	1	440	
Accommodation Complex (Inc. Nova Camp)	11,744	1	11,744	
Kitchen and Cafeteria	2,630	2	5,259	
Services Building	3,270	4	13,080	3,270
Site Services Building	500	1	500	3,270
Dome Warehouse	1,427	2	2,854	
Ore Dome	3,000	7	21,000	
Power Plant	2,485	3	7,455	
Cat Warehouse	1,345	2	2,690	
Toromont Facilities	925	1	925	
Fountain Tire	330	1	330	
White Coverall	1,395	2	2,790	
Batch Plant	1,050	2	2,100	
Environmental Office	140	1	140	
Dike Dewatering Shop	755	1	755	
Incinerator	280	1	280	
Talbon Shop	235	1	235	

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Table 2 Buildings List and Dimensions (cont.)

Building/Infrastructure	Footprint (m²)	Stories (3 m height)	Total Demolition Volume Scaled for Height (m³)	Concrete Foundation Area (m²)
Blue Coverall	354	2	710	
Gate House	100	1	100	
Fuel Dispensing Station	165	1	165	
Emulsion Plant	1,000	2	2,000	
5.6 ML Bulk Fuel Tank	955	2	1,910	
Airstrip	41,000			
Access roads (~10 m x 12 km)	120,000			
Haul roads (~25 m x 14.5 km)	363,000			
Portage/Goose Disturbed Area	406,000			
Vault Disturbed Area	65,000			
Sea cans (each)	1,432			
Baker Lake				
10 ML Bulk Fuel Tanks (6 tanks)	5,295	4	21,180	6,095
100,000 L Jet Fuel Tanks (18 tanks)	720	1	720	
Scarify laydown areas	500,000			
AWAR				
Road surface (8 m x 105 km)	840,000			
Remove culverts (each)	34			
Remove bridge (each)	11			
Reclaim quarries (m³)	14,319			

Source: Modified from Golder 2014, Operational data from Agnico Eagle.

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Table 3 Mill and Water Treatment Reagent Consumption

Assuming 5% of annual consumption	Annual usage (t)	5% assumed at closure (t)
Activated Carbon	140	7
Anti-Scalant	10	0.5
Borax	22	1.1
Silica	11	0.55
Calcium Oxide (Quicklime)	3150	157.5
Calcium Peroxide	1	0.05
Copper Sulfate	585	29.25
Flocculant	120	6
Hydrochloric Acid	75	3.75
Hydrochloric Acid[1]	1825 gallons	0.35
Hydrogen Peroxide	1	0.05
Lead Acid Batteries	24	1.2
Nitric Acid	18	0.9
Paints[1]	100 gallons	0.02
Sodium Cyanide	1540	77
Sodium Hydroxide	8	0.4
	Total	**286**

Source: ICRP 2014 (Golder, 2014), verified with Hazardous Materials Management Plan (Agnico Eagle, 2013).

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Table 4 Water Quality Monitoring Estimated Costs

Station	Closure		Post-Closure	
	Cost $/Year		Cost $/Year	
Drinking water	$	3,120	$	3,120
EEM2 a	$	508	$	508
EEM3 a	$	508	$	508
EEM2 b	$	7,748	$	7,748
EEM2c (TPN/Wally Lake)	$	3,136	$	3,136
EEM3c (SPL)	$	1,568	$	1,568
Incinerator ash	$	400	$	—
ST-37	$	324	$	—
ST-5	$	1,875	$	1,875
ST-6	$	1,875	$	1,875
ST-8	$	162	$	162
ST-20 Pit Lake	$	3,279	$	3,279
ST-24	$	1,527	$	1,527
ST-40.1 ST- 40.2 ST-38	$	1,458	$	—
ST-MMER 3a	$	15,548	$	15,548
ST-MMER 3b	$	4,518	$	4,518
STP	$	5 616	$	-
ST-S- 2	$	1,527	$	—
ST-S-5	$	4,242	$	—
ST-16	$	4,242	$	—
Mill Seepage	$	4,242		
WEP	$	1,527	$	—
Ground water	$	4,060	$	4,060
Total	**$**	**73,010**	**$**	**49,432**

Based on operational laboratory costs and the Meadowbank Water License 2 AM-MEA1525 requirements (Schedule 1, Table 2).

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Table 5 Comparison between 2018 and 2019 ICRP Cost Estimate

Reclamation costs worksheet	Activity	Item	Quantities (June 2018)	Updated quantities (April 2019)
Tailings	Tailings in-pit deposition with aggregate cover	Portage Pit A	0 m³	174,000 m³
		Portage Pit E	0 m³	84,000 m³
		Goose Pit	0 m³	120,000 m³
	Remove piping added for in-pit deposition	Removing piping	0 m	16,035 m
	Remove tailings discharge piping	Removing piping	11,500 m	7,000 m
Buildings & Equipment	Reclaim roads, laydown areas & airstrip	Remove culverts	15	21
Water Management	Flood pits	Pumped pit flooding water (3rd Portage Lake and Reclaim Pond) – Portage Pit	31,710,609 m³	21,700,000 m³
		Pumped pit flooding water (3rd Portage Lake) – Goose Pit	3,182,704 m³	3,500,000 m³
		Pump maintenance and operation	7 years	5 years
		Maintain pumps	20,832 manhours	14,880 manhours
		Annual Pump Servicing	1,176 manhours	840 manhours
		Pump Servicing Travel Allowance	14 visits	10 visits
		Camp Accomodations	1,834 days	1,310 days
	Construct temporary water treatment plan	Storage, Prep and Reactor Tanks/Silos	1 unit	2 units
		Mech. Equip. (Metering Pumps and Air)	1 unit	2 units
Water Treatment	Operate temporary water treatment plant	Direct pumping cost	177,089 m³	3,400,000 m³
		Number of years of water treatment	3 years	1 year
Mobilization/Demobilization	Mobilization, camp and accomodation	Mobilization, camp and accomodation to complete the aggregate placement work for the in-pit deposition	0 days	95 days

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Table 6 Comparison between 2014 and 2019 ICRP Cost Estimate

Component Group	ICRP 2019 - Cost Estimate ($)	ICRP 2014 (Golder, 2014) - Cost Estimate ($)	Differences between 2019 and 2014 estimates ($)	Main Difference Explanations between 2019 and 2014 estimates
Open pit	$6 480	$5 400	$1 080	
Portage	*$3 240*	*$2 700*	*$540*	Length of safety berms reviewed in version 00 of 2018 and berms included for Vault and Phaser.
Goose	*$1 080*	*$2 700*	*-$1 620*	
Vault	*$1 080*	*$0*	*$1 080*	
Phaser	*$1 080*	*$0*	*$1 080*	
Underground Mine	$0	$0	$0	
Tailings Facility	$38 680 308	$38 716 200	-$35 892	Current TSF configuration and tailings elevation considered in in version 00 of 2018. For the North Cell, integration of the Internal Structure and progressive reclamation from 2015 to 2017 (750,743 m3) on the NPAG cover construction considered with the preliminary cover design including landforms. For the South Cell, preliminary cover design including landforms considered and adjusted for the maximum tailings elevation. Water management structures and SD3 reconnection from preliminary cover design considered in 2018. Removal costs for tailings pipes and booster pump reviewed in original version 2018. Instrumentation installation and maintenance for closure included in version 00 of 2018. Volume of aggregate to cover in-pit tailings deposition added for Portage and Goose in 2019. Removal of piping for in-pit deposition and tailings discharge piping reviewed in 2019.
Rock Pile	$2 737 534	$6 004 827	-$3 267 293	
Portage	*$2 707 534*	*$6 004 827*	*-$3 297 293*	Considered in version 00 of 2018 that 84% of the RSF PAG area have been covered in progressive reclamation with 4.0m of NPAG material between 2011 and 2017 (2,700,000 m^3) and subtracted from the total cover required. Cover for Portage RSF sumps reviewed in version 00 of 2018. Instrumentation installation and maintenance for closure included in version 00 of 2018.
Vault	*$30 000*	*$0*	*$30 000*	Instrumentation installation and maintenance for closure included in version 00 of 2018.
Buildings and Equipment	$10 683 256	$10 574 770	$108 486	
Meadowbank	*$8 029 508*	*$7 919 428*	*$110 080*	The airstrip area was increased in version 00 of 2018 by 6,000m² due to the extension completed in 2013. The site road area was increased in version 00 of 2018 by 20,000m² due to additional access roads built estimated at 2.0 km. The number of containers remaining on site after closure is estimated at 1400 containers in version 00 of 2018. Removal of culverts was reviewed in 2019.
Baker Lake	*$1 660 670*	*$1 664 270*	*-$3 600*	A total of 18 Jet-A Fuel tanks at Baker Lake is considered in version 00 of 2018 instead of 20 tanks.
AWAR	*$993 078*	*$991 072*	*$2 006*	Lump sum allowances of 4,000$ (instead of 10,000$ in 2014) per culvert removal and $25,000 per bridge removal is considered in 2018. A total of 38 culverts and 9 bridges are considered for the AWAR in 2018, compared to 15 culverts and 9 bridges in 2014.
Chemicals and Contaminated Soil Management	$1 316 981	$1 208 184	$108 797	Building decontamination was considered for some infrastructures in 2018. Hazmat costs reviewed in 2018, no waste oil considered. Contaminated soil increased in 2018 (1245 m^3 additional), including an allowance for heavily contaminated soil.
Surface and Groundwater Management	$7 997 222	$5 198 311	$2 798 911	Pits flooding volumes adjusted (decreased compared to 2014) with water balance of 2016 and 2018. Dike reconnection preliminary design quantities considered in 2018. Duration of Pump maintenance and operation was reviewed in 2019. Cost for WTP construction and operation increased in 2019 due to the type of technology that may be required for treatment of reclaim water prior to transfer in the pits and due to the higher volume of water to be treated. Treatment costs are now in 2019 water management costs as treatment is required and not considered as if necessary;
Interim Care and Maintenance	$847 800	$0	$847 800	Interim care and maintenance considered in 2019, as this is a requirement from INAC. Cost estimate based annual surveillance, surveillance and monitoring costs (active closure), for a 3 years period.
Subtotal Direct Costs	**$62 269 580**	**$61 707 692**	**$561 888**	

Table 7 Comparison between 2014 and 2019 ICRP Cost Estimate (cont.)

Component Group	ICRP 2019 - Cost Estimate ($)	ICRP 2014 (Golder, 2014) - Cost Estimate ($)	Differences between 2019 and 2014 estimate ($)	Main Difference Explanations
Mobilization/Demobilization	$5 589 160	$4 762 500	$826 660	Mobilization and demobilization of equipment from Baker Lake considered in version 00 of 2018. Cost of barge increased in version 00 of 2018. Mobilization, camp and accomodation cost to complete the aggregate placement work for the in-pit deposition added in 2019.
Post-Closure Monitoring and Maintenance	$4 133 524	$2 972 373	$1 161 151	In version 00 of 2018, 2 main periods considered for monitoring from 2022 to 2030 and from 2031 to 2041. Cost for general monitoring programs included in version 00 of 2018 - annually in closure and every 2 years post-closure. Cost for geotechnical inspection reviewed in version 00 of 2018. Cost for water quality monitoring reviewed in version 00 of 2018.
Engineering (5%)	$3 113 479	$3 085 385	$28 094	Adjusted with direct costs in 2019.
Project Management (5%)	$3 113 479	$3 085 385	$28 094	Adjusted with direct costs in 2019.
Health and Safety Plans/Monitoring, QA/QC and Engagement Costs (2%)	$1 245 392	$0	$1 245 392	Not considered in 2014, 2% of direct costs considered in version 2019, including engagement costs with stakeholders.
Bonding/Insurance (1%)	$622 696	$0	$622 696	Not considered in 2014, 1% of direct costs considered in 2019.
Contingency (15%)	$9 340 437	$9 256 154	$84 283	Considered 15% of direct costs in 2014 and 2018. Adjusted with direct costs in 2019.
Market Price Factor Adjustment (0%)	$0	$0	#VALEUR!	No change.
Subtotal Indirect Costs	**$27 158 166**	**$23 161 796**	**$3 996 370**	
GRAND TOTAL	**$89 427 746**	**$84 869 488**	**$4 558 259**	

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Appendix A—RECLAIM 7.0 Spreadsheets

SUMMARY OF COSTS

CAPITAL COSTS	COMPONENT NAME	COST	LAND LIABILITY	WATER LIABILITY
OPEN PIT	Portage	$3 240	$1 620	$1 620
	Goose	$1 080	$540	$540
	Vault	$1 080	$540	$540
	Phaser	$1 080	$540	$540
UNDERGROUND MINE		$0	$0	$0
TAILINGS FACILITY		$38 680 308	$19 340 154	$19 340 154
ROCK PILE	Portage	$2 707 534	$1 353 767	$1 353 767
	Vault	$30 000	$15 000	$15 000
BUILDINGS AND EQUIPMENT	Meadowbank	$8 029 508	$4 014 754	$4 014 754
	Baker Lake	$1 660 670	$830 335	$830 335
	AWAR	$993 078	$496 539	$496 539
CHEMICALS AND CONTAMINATED SOIL MANAGEMENT		$1 316 981	$658 491	$658 491
SURFACE AND GROUNDWATER MANAGEMENT		$7 997 222	-	$7 997 222
INTERIM CARE AND MAINTENANCE		$847 800	-	$847 800
	SUBTOTAL: Capital Costs	**$62 269 580**	**$26 712 279**	**$35 557 301**
	PERCENT OF SUBTOTAL		**43%**	**57%**

INDIRECT COSTS		COST	LAND LIABILITY	WATER LIABILITY
MOBILIZATION/DEMOBILIZATION		$5 589 160	$2 397 627	$3 191 533
POST-CLOSURE MONITORING AND MAINTENANCE		$4 133 524	$1 773 191	$2 360 333
ENGINEERING	5%	$3 113 479	$1 335 614	$1 777 865
PROJECT MANAGEMENT	5%	$3 113 479	$1 335 614	$1 777 865
HEALTH AND SAFETY PLANS/MONITORING, QA/QC & ENGAGEMENT COSTS	2%	$1 245 392	$534 246	$711 146
BONDING/INSURANCE	1%	$622 696	$267 123	$355 573
CONTINGENCY	15%	$9 340 437	$4 006 842	$5 333 595
MARKET PRICE FACTOR ADJUSTMENT	0%	$0	$0	$0
	SUBTOTAL: Indirect Costs	**$27 158 166**	**$11 650 255**	**$15 507 911**

TOTAL COSTS	**$89 427 746**	**$38 362 535**	**$51 065 212**

4 **Open Pit Name:** Portage **Pit #** *1*

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0,00	$0		$0	$0
Signs		each		#N/A	$0,00	$0		$0	$0
Berm at crest and rock barricade at ramp		m3	1350	DRH	$2,40	$3 240	50%	$1 620	$1 620
Block roads		m3							
Other				#N/A	$0,00	$0		$0	$0
STABILITY STUDY									
Conduct stability and setback study		allow		#N/A	$0,00	$0		$0	$0
STABILIZE SLOPES									
Off-load crest, soil A		m3		#N/A	$0,00	$0		$0	$0
Off-load crest, soil B		m3		#N/A	$0,00	$0		$0	$0
Doze/trim overburden at crest		m3		#N/A	$0,00	$0		$0	$0
Drill & blast pit crest		m3		#N/A	$0,00	$0		$0	$0
Buttress slope		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER/CONTOUR SLOPES									
Place fill, soil A		m3		#N/A	$0,00	$0		$0	$0
Place fill, soil B		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Vegetate slopes		ha		#N/A	$0,00	$0		$0	$0
Vegetate pit floor		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
CONSTRUCT SPILLWAY									
Excavate channel		m3		#N/A	$0,00	$0		$0	$0
Concrete		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
RECLAIM QUARRIES									
Contour slopes		m3		#N/A	$0,00	$0		$0	$0
Place overburden		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m3		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Captital									
Remove stationary equipment (sump pumps)		each		#N/A	$0,00	$0		$0	$0
Remove dewatering pipeline		m		#N/A	$0,00	$0		$0	$0
Remove power lines		each		#N/A	$0,00	$0		$0	$0
Construct diversion ditches		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l A		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l B		m3		#N/A	$0,00	$0		$0	$0
Construct embankment/dam		m3		#N/A	$0,00	$0		$0	$0
Supply/install pump station		each		#N/A	$0,00	$0		$0	$0
Supply/install piping system		m		#N/A	$0,00	$0		$0	$0
Remove pump post-closure		each		#N/A	$0,00	$0		$0	$0
Remove pipeline post-closure		m		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Annual Cost									
Operate pumps (power)		m3		#N/A	$0,00	$0		$0	$0
Maintain pump/pipeline		allow		#N/A	$0,00	$0		$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0,00	$0		$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0,00	$0		$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Passive/biological additives		$/ha		#N/A	$0,00	$0		$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
			Annual pumping costs			$0			
Number of years of pump flooding		years							
			Total pumping costs			$0		$0	$0
					Total	$3 240		$1 620	$1 620
					% of Total			50%	50%

Open Pit Name: **Goose** **Pit # 2**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0,00	$0		$0	$0
Signs		each		#N/A	$0,00	$0		$0	$0
Berm at crest and Rock barricade at ramp		m3	450	DRH	$2,40	$1 080	50%	$540	$540
Block roads		m3							
Other				#N/A	$0,00	$0		$0	$0
STABILITY STUDY									
Conduct stability and setback study		allow		#N/A	$0,00	$0		$0	$0
STABILIZE SLOPES									
Off-load crest, soil A		m3		#N/A	$0,00	$0		$0	$0
Off-load crest, soil B		m3		#N/A	$0,00	$0		$0	$0
Doze/trim overburden at crest		m3		#N/A	$0,00	$0		$0	$0
Drill & blast pit crest		m3		#N/A	$0,00	$0		$0	$0
Buttress slope		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER/CONTOUR SLOPES									
Place fill, soil A		m3		#N/A	$0,00	$0		$0	$0
Place fill, soil B		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Vegetate slopes		ha		#N/A	$0,00	$0		$0	$0
Vegetate pit floor		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
CONSTRUCT SPILLWAY									
Excavate channel		m3		#N/A	$0,00	$0		$0	$0
Concrete		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
RECLAIM QUARRIES									
Contour slopes		m3		#N/A	$0,00	$0		$0	$0
Place overburden		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m3		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Captital									
Remove stationary equipment (sump pumps)		each		#N/A	$0,00	$0		$0	$0
Remove dewatering pipeline		m		#N/A	$0,00	$0		$0	$0
Remove power lines		each		#N/A	$0,00	$0		$0	$0
Construct diversion ditches		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l A		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l B		m3		#N/A	$0,00	$0		$0	$0
Construct embankment/dam		m3		#N/A	$0,00	$0		$0	$0
Supply/install pump station		each		#N/A	$0,00	$0		$0	$0
Supply/install piping system		m		#N/A	$0,00	$0		$0	$0
Remove pump post-closure		each		#N/A	$0,00	$0		$0	$0
Remove pipeline post-closure		m		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Annual Cost									
Operate pumps (power)		m3		#N/A	$0,00	$0		$0	$0
Maintain pump/pipeline		allow		#N/A	$0,00	$0		$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0,00	$0		$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0,00	$0		$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Passive/biological additives		$/ha		#N/A	$0,00	$0		$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
			Annual pumping costs			$0			
Number of years of pump flooding		years							
			Total pumping costs			$0		$0	$0
					Total	$1 080		$540	$540
					% of Total			50%	50%

Open Pit Name: Vault **Pit #** 3

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0,00	$0		$0	$0
Signs		each		#N/A	$0,00	$0		$0	$0
Berm at crest and Rock barricade at ramp		m3	450	DRH	$2,40	$1 080	50%	$540	$540
Block roads		m3							
Other				#N/A	$0,00	$0		$0	$0
STABILITY STUDY									
Conduct stability and setback study		allow		#N/A	$0,00	$0		$0	$0
STABILIZE SLOPES									
Off-load crest, soil A		m3		#N/A	$0,00	$0		$0	$0
Off-load crest, soil B		m3		#N/A	$0,00	$0		$0	$0
Doze/trim overburden at crest		m3		#N/A	$0,00	$0		$0	$0
Drill & blast pit crest		m3		#N/A	$0,00	$0		$0	$0
Buttress slope		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER/CONTOUR SLOPES									
Place fill, soil A		m3		#N/A	$0,00	$0		$0	$0
Place fill, soil B		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Vegetate slopes		ha		#N/A	$0,00	$0		$0	$0
Vegetate pit floor		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
CONSTRUCT SPILLWAY									
Excavate channel		m3		#N/A	$0,00	$0		$0	$0
Concrete		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
RECLAIM QUARRIES									
Contour slopes		m3		#N/A	$0,00	$0		$0	$0
Place overburden		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m3		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Captital									
Remove stationary equipment (sump pumps)		each		#N/A	$0,00	$0		$0	$0
Remove dewatering pipeline		m		#N/A	$0,00	$0		$0	$0
Remove power lines		each		#N/A	$0,00	$0		$0	$0
Construct diversion ditches		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l A		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l B		m3		#N/A	$0,00	$0		$0	$0
Construct embankment/dam		m3		#N/A	$0,00	$0		$0	$0
Supply/install pump station		each		#N/A	$0,00	$0		$0	$0
Supply/install piping system		m		#N/A	$0,00	$0		$0	$0
Remove pump post-closure		each		#N/A	$0,00	$0		$0	$0
Remove pipeline post-closure		m		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Annual Cost									
Operate pumps (power)		m3		#N/A	$0,00	$0		$0	$0
Maintain pump/pipeline		allow		#N/A	$0,00	$0		$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0,00	$0		$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0,00	$0		$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Passive/biological additives		$/ha		#N/A	$0,00	$0		$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
			Annual pumping costs			$0			
Number of years of pump flooding		years							
			Total pumping costs			$0		$0	$0
					Total	$1 080		$540	$540
					% of Total			50%	50%

Open Pit Name: **Phaser** **Pit #** **4**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0,00	$0		$0	$0
Signs		each		#N/A	$0,00	$0		$0	$0
Berm at crest and rock barricade at ramp		m3	450	DRH	$2,40	$1 080	50%	$540	$540
Block roads		m3							
Other				#N/A	$0,00	$0		$0	$0
STABILITY STUDY									
Conduct stability and setback study		allow		#N/A	$0,00	$0		$0	$0
STABILIZE SLOPES									
Off-load crest, soil A		m3		#N/A	$0,00	$0		$0	$0
Off-load crest, soil B		m3		#N/A	$0,00	$0		$0	$0
Doze/trim overburden at crest		m3		#N/A	$0,00	$0		$0	$0
Drill & blast pit crest		m3		#N/A	$0,00	$0		$0	$0
Buttress slope		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER/CONTOUR SLOPES									
Place fill, soil A		m3		#N/A	$0,00	$0		$0	$0
Place fill, soil B		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Vegetate slopes		ha		#N/A	$0,00	$0		$0	$0
Vegetate pit floor		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
CONSTRUCT SPILLWAY									
Excavate channel		m3		#N/A	$0,00	$0		$0	$0
Concrete		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
RECLAIM QUARRIES									
Contour slopes		m3		#N/A	$0,00	$0		$0	$0
Place overburden		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m3		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Captital									
Remove stationary equipment (sump pumps)		each		#N/A	$0,00	$0		$0	$0
Remove dewatering pipeline		m		#N/A	$0,00	$0		$0	$0
Remove power lines		each		#N/A	$0,00	$0		$0	$0
Construct diversion ditches		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l A		m3		#N/A	$0,00	$0		$0	$0
-Ditch, mat'l B		m3		#N/A	$0,00	$0		$0	$0
Construct embankment/dam		m3		#N/A	$0,00	$0		$0	$0
Supply/install pump station		each		#N/A	$0,00	$0		$0	$0
Supply/install piping system		m		#N/A	$0,00	$0		$0	$0
Remove pump post-closure		each		#N/A	$0,00	$0		$0	$0
Remove pipeline post-closure		m		#N/A	$0,00	$0		$0	$0
FLOOD PIT-Annual Cost									
Operate pumps (power)		m3		#N/A	$0,00	$0		$0	$0
Maintain pump/pipeline		allow		#N/A	$0,00	$0		$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0,00	$0		$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0,00	$0		$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Passive/biological additives		$/ha		#N/A	$0,00	$0		$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
				Annual pumping costs		$0			
Number of years of pump flooding		years							
				Total pumping costs		$0		$0	$0
					Total	$1 080		$540	$540
					% of Total			50%	50%

1 **Tailings Impoundment Name:** **Pond # 1**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0,00	$0		$0	$0
Signs		each		#N/A	$0,00	$0		$0	$0
Berm		m3		#N/A	$0,00	$0		$0	$0
Block roads		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
STABILIZE EMBANKMENT(S)									
Toe buttress, drainage layer		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, bulk fill		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Raise crest		m3		#N/A	$0,00	$0		$0	$0
Flatten slopes		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER TAILINGS - North Cell									
NPAG UM waste rock cover (4 m thick)		m3	3227722	SB3L	$5,10	$16 461 382	50%	$8 230 691	$8 230 691
Grade/shape tailings surface		m3		#N/A	$0,00	$0		$0	$0
Liner bedding		m3		#N/A	$0,00	$0		$0	$0
Subgrade preparation - compact		m2		#N/A	$0,00	$0		$0	$0
Supply geotextile/geosynthetic		m2		#N/A	$0,00	$0		$0	$0
Install geotextile/geosynthetic		m2		#N/A	$0,00	$0		$0	$0
Soil cover		m3		#N/A	$0,00	$0		$0	$0
Rock cover		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m2		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
DITCHES - North Cell									
DITCHES excavate soil		m3	6428	SB2L	$4,60	$29 569	50%	$14 784	$14 784
DITCHES excavate rock		m3	23512	RB2L	$12,05	$283 320	50%	$141 660	$141 660
NPAG waste rockfill		m3	9935	SB4L	$5,50	$54 643	50%	$27 321	$27 321
SEDIMENTATION POND - North Cell									
POND excavate soil		m3	17428	SB2L	$4,60	$80 169	50%	$40 084	$40 084
POND excavate rock		m3	32472	RB2L	$12,05	$391 288	50%	$195 644	$195 644
NPAG waste rockfill		m3	3510	SB4L	$5,50	$19 305	50%	$9 653	$9 653
COVER TAILINGS - South Cell									
NPAG UM waste rock cover (4 m thick)		m3	2783838	SB4L	$5,50	$15 311 109	50%	$7 655 555	$7 655 555
Grade/shape tailings surface		m3		#N/A	$0,00	$0		$0	$0
Liner bedding		m3		#N/A	$0,00	$0		$0	$0
Subgrade preparation - compact		m2		#N/A	$0,00	$0		$0	$0
Supply geotextile/geosynthetic		m2		#N/A	$0,00	$0		$0	$0
Install geotextile/geosynthetic		m2		#N/A	$0,00	$0		$0	$0
Soil cover		m3		#N/A	$0,00	$0		$0	$0
Rock cover		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m2		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER TAILINGS - Portage and Goose Pits (1 m of crushed waste rock)									
Recover, load, haul and crush	Goose Pit	m3	120000	SB1L	$4,30	$516 000	50%	$258 000	$258 000
Load, haul, spread and compact	Goose Pit	m3	120000	SB3L	$5,10	$612 000	50%	$306 000	$306 000
Recover, load, haul and crush	Portage Pit A	m3	174000	SB1L	$4,30	$748 200	50%	$374 100	$374 100
Load, haul, spread and compact	Portage Pit A	m3	174000	SB3L	$5,10	$887 400	50%	$443 700	$443 700
Recover, load, haul and crush	Portage Pit E	m3	84000	SB1L	$4,30	$361 200	50%	$180 600	$180 600
Load, haul, spread and compact	Portage Pit E	m3	84000	SB3L	$5,10	$428 400	50%	$214 200	$214 200
DITCHES - South Cell									
DITCHES excavate soil		m3	20764	SB2L	$4,60	$95 513	50%	$47 756	$47 756
DITCHES excavate rock		m3	31745	RB2L	$12,05	$382 531	50%	$191 265	$191 265
NPAG waste rockfill		m3	25527	SB4L	$5,50	$140 399	50%	$70 199	$70 199
SEDIMENTATION POND - South Cell									
POND excavate soil		m3	36176	SB2L	$4,60	$166 410	50%	$83 205	$83 205
POND excavate rock		m3	74308	RB2L	$12,05	$895 406	50%	$447 703	$447 703
NPAG waste rockfill		m3	5394	SB4L	$5,50	$29 667	50%	$14 833	$14 833
BREACH SADDLE DAM 3									
Excavate Breach Saddle Dam		m3	25000	SB2L	$4,60	$115 000	50%	$57 500	$57 500
Rock placement		m3	9000	SB4H	$11,00	$99 000	50%	$49 500	$49 500
REMOVE PIPING ADDED FOR IN-PIT DEPOSITION									
Removing Piping		m	16035	PLRL	$22,00	$352 770	50%	$176 385	$176 385
REMOVE TAILINGS DISCHARGE									
Removing Piping		m	7000	PLRL	$22,00	$154 000	50%	$77 000	$77 000
Dismantle Booster Pump		allow	1	OPS	$15 630,00	$15 630	50%	$7 815	$7 815
BURY PAG ROCK									
Relocate PAG rock		m3		#N/A	$0,00	$0		$0	$0
Place cover over PAG rock		m3		#N/A	$0,00	$0		$0	$0
Raise crest of dam		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
STABILIZE DECANT SYSTEM									
Excavate and replace		m3		#N/A	$0,00	$0		$0	$0
Plug/backfill with concrete or clay		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
REMOVE TAILINGS DISCHARGE									
Cyclones		m3		#N/A	$0,00	$0		$0	$0
Pipe		m3		#N/A	$0,00	$0		$0	$0
Remove reclaim barge		allow		#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
FLOOD TAILINGS									
Doze tailings to final contour		m3		#N/A	$0,00	$0		$0	$0
Raise crest of dam		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
UPGRADE SPILLWAY									
Excavate channel, rock		m3		#N/A	$0,00	$0		$0	$0
Excavate channel, soil		m3		#N/A	$0,00	$0		$0	$0
Concrete		m3		#N/A	$0,00	$0		$0	$0
Rip rap		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
CONSTRUCT SEEPAGE COLLECTION POND									
Excavate seepage collection pond		m3		#N/A	$0,00	$0		$0	$0
Doze & spread excavated material		m3		#N/A	$0,00	$0		$0	$0
Vegetate spread material		ha		#N/A	$0,00	$0		$0	$0
Bedding layer		m3		#N/A	$0,00	$0		$0	$0
Supply geomembrane		m2		#N/A	$0,00	$0		$0	$0
Install geomembrane		m2		#N/A	$0,00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0,00	$0		$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m3		#N/A	$0,00	$0		$0	$0
Install pumping wells		m3		#N/A	$0,00	$0		$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0,00	$0		$0	$0
SPECIALIZED ITEMS									
Install permanent instrumentation, supply & technican		each		#N/A	$0,00	$0		$0	$0
Install permanent instrumentation and drilling		each	5	OPS	$10 000,00	$50 000	50%	$25 000	$25 000
TREAT SEEPAGE - see "Water Management" and "Water Treatment"									
TREAT SUPERNATANT									
Pump water (to pit, U/G)		m3		#N/A	$0,00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0,00	$0		$0	$0
Supply reagents		tonne		#N/A	$0,00	$0		$0	$0
				Annual treatment costs		$0			
Number of years of treatment		years							
				Total treatment costs		$0			$0
					Total	$38 680 308		$19 340 154	$19 340 154
					% of Total			50%	50%

* for construction of passive treatment system refer to "Water Management"

2 **Rock Pile Name:** **Portage**

ACTIVITY/MATERIAL	**Notes**	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
STABILIZE SLOPES									
Flatten slopes with dozer		m3		#N/A	$0,00	$0		$0	$0
Flatten "bubble dump" areas		m3		#N/A	$0,00	$0		$0	$0
Divert runon, ditch mat'l A		m3		#N/A	$0,00	$0		$0	$0
Divert runon, ditch mat'l B		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, drain mat'l		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, fill mat'l A		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, fill mat'l B		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER ROCK PILE									
NPAG UM waste rock cover (4 m thick)		m3	514285	SB3L	$5,10	$2 622 854	50%	$1 311 427	$1 311 427
Subgrade preparation - doze surface		m3		#N/A	$0,00	$0		$0	$0
Soil cover - excavate,haul,spread&compact		m3		#N/A	$0,00	$0		$0	$0
Rock cover - excavate,haul & spread		m3		#N/A	$0,00	$0		$0	$0
Excavate downslope drainage channel & chute		m3		#N/A	$0,00	$0		$0	$0
Rip rap drainage channel and chute		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER SUMPS									
NPAG UM waste rock cover (4 m thick)		m3	6800	SB3L	$5,10	$34 680	50%	$17 340	$17 340
Other				#N/A	$0,00	$0		$0	$0
VERY LOW PERMEABILITY COVER (in addition to above)									
Liner subgrade preparation - compact		m2		#N/A	$0,00	$0		$0	$0
Supply geomembrame		m2		#N/A	$0,00	$0		$0	$0
Install geomembrane		m2		#N/A	$0,00	$0		$0	$0
Protective cover - excavate,haul,spread&compact		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
CONSTRUCT SEEPAGE COLLECTION POND									
Excavate seepage collection pond		m3		#N/A	$0,00	$0		$0	$0
Doze & spread excavated material		m3		#N/A	$0,00	$0		$0	$0
Vegetate spread material		ha		#N/A	$0,00	$0		$0	$0
Bedding layer		m3		#N/A	$0,00	$0		$0	$0
Supply geomembrane		m2		#N/A	$0,00	$0		$0	$0
Install geomembrane		m2		#N/A	$0,00	$0		$0	$0
Erosion protection layer		m3							
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m3		#N/A	$0,00	$0		$0	$0
Install pumping wells		m3		#N/A	$0,00	$0		$0	$0
Install pumps/pipelines/power supply		allow		#N/A	$0,00	$0		$0	$0
RELOCATE DUMPS									
Load, haul, dump or doze		m3		#N/A	$0,00	$0		$0	$0
Add lime		tonne		#N/A	$0,00	$0		$0	$0
Contour reclaimed area		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
SPECIALIZED ITEMS									
Install permanent instrumentation		each	5	OPS	$10 000,00	$50 000	50%	$25 000	$25 000
Install permanent instrumentation, drilling		each		#N/A	$0,00	$0		$0	$0
TREAT ROCK PILE SEEPAGE - see "Water Treatment"									
HEAP LEACH SEEPAGE TREATMENT - Cyanide Detox									
Cyanide destruction water treatment pumping		m3		#N/A	$0,00	$0		$0	$0
Reagents		tonnes		#N/A	$0,00	$0		$0	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0,00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0,00	$0		$0	$0
				Annual treatment costs		$0			
Number of years of treatment		years							
				Total treatment costs		$0			$0
HEAP LEACH SEEPAGE TREATMENT - ARD/ML**									
Upgrade/modify pumping system - report to WTP		allow		#N/A	$0,00	$0			$0
					Total	$2 707 534		$1 353 767	$1 353 767
					% of Total			50%	50%

* For construction of passive treatment system refer to "Water Management". ARD/ML seepage treatment becomes post-closure water treatment cost

**Heap leach ARD/ML seepage treatment becomes post-closure water treatment cost

Rock Pile Name:		Vault				1			
ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
COVER ROCK PILE									
Flatten slopes with dozer		m3		#N/A	$0,00	$0		$0	$0
Flatten "bubble dump" areas		m3		#N/A	$0,00	$0		$0	$0
Divert runon, ditch mat'l A		m3		#N/A	$0,00	$0		$0	$0
Divert runon, ditch mat'l B		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, drain mat'l		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, fill mat'l A		m3		#N/A	$0,00	$0		$0	$0
Toe buttress, fill mat'l B		m3		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER ROCK PILE									
NPAG UM waste rock cover (4 m thick)		m3	0	SB3L	$5,10	$0		$0	$0
Subgrade preparation - doze surface		m3		#N/A	$0,00	$0		$0	$0
Soil cover - excavate,haul,spread&compact		m3		#N/A	$0,00	$0		$0	$0
Rock cover - excavate,haul & spread		m3		#N/A	$0,00	$0		$0	$0
Excavate downslope drainage channel & chute		m3		#N/A	$0,00	$0		$0	$0
Rip rap drainage channel and chute		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
COVER SUMPS									
NPAG UM waste rock cover (4 m thick)		m3	0	#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
VERY LOW PERMEABILITY COVER (in addition to above)									
Liner subgrade preparation - compact		m2		#N/A	$0,00	$0		$0	$0
Supply geomembrame		m2		#N/A	$0,00	$0		$0	$0
Install geomembrane		m2		#N/A	$0,00	$0		$0	$0
Protective cover - excavate,haul,spread&compact		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0,00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0,00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0,00	$0		$0	$0
CONSTRUCT SEEPAGE COLLECTION POND									
Excavate seepage collection pond		m3		#N/A	$0,00	$0		$0	$0
Doze & spread excavated material		m3		#N/A	$0,00	$0		$0	$0
Vegetate spread material		ha		#N/A	$0,00	$0		$0	$0
Bedding layer		m3		#N/A	$0,00	$0		$0	$0
Supply geomembrane		m2		#N/A	$0,00	$0		$0	$0
Install geomembrane		m2		#N/A	$0,00	$0		$0	$0
Erosion protection layer		m3							
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m3		#N/A	$0,00	$0		$0	$0
Install pumping wells		m3		#N/A	$0,00	$0		$0	$0
Install pumps/pipelines/power supply		allow		#N/A	$0,00	$0		$0	$0
RELOCATE DUMPS									
Load, haul, dump or doze		m3		#N/A	$0,00	$0		$0	$0
Add lime		tonne		#N/A	$0,00	$0		$0	$0
Contour reclaimed area		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
SPECIALIZED ITEMS									
Install permanent instrumentation		each	3	OPS	$10 000,00	$30 000	50%	$15 000	$15 000
Install permanent instrumentation, drilling		each		#N/A	$0,00	$0		$0	$0
TREAT ROCK PILE SEEPAGE - see "Water Treatment"									
HEAP LEACH SEEPAGE TREATMENT - Cyanide Detox									
Cyanide destruction water treatment pumping		m3		#N/A	$0,00	$0		$0	$0
Reagents		tonnes		#N/A	$0,00	$0		$0	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0,00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0,00	$0		$0	$0
				Annual treatment costs		$0			
Number of years of treatment		years							
				Total treatment costs		$0			$0
HEAP LEACH SEEPAGE TREATMENT - ARD/ML**									
Upgrade/modify pumping system - report to WTP		allow		#N/A	$0,00	$0			$0
					Total	$30 000		$15 000	$15 000
					% of Total			50%	50%

* For construction of passive treatment system refer to "Water Management". ARD/ML seepage treatment becomes post-closure water treatment cost

**Heap leach ARD/ML seepage treatment becomes post-closure water treatment cost

3 **Building / Equip Name:** **Meadowbank** **Bldg / Equip #:** **1**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site		allow		#N/A	$0,00	$0		$0	$0
Decontaminate and dispose on-site		manhours	1088	MECHL	$49,00	$53 312	50%	$26 656	$26 656
Other				#N/A	$0,00	$0		$0	$0
REMOVE BUILDINGS - see note below									
Mill Complex:									
Mill		m2	37800	BRS1H	$65,00	$2 457 000	50%	$1 228 500	$1 228 500
Leech Tanks		m2	12500	BRS1H	$65,00	$812 500	50%	$406 250	$406 250
Primary and Secondary Crusher		m2	740	BRS1H	$65,00	$48 100	50%	$24 050	$24 050
Pebble Crusher		m2	650	BRS1H	$65,00	$42 250	50%	$21 125	$21 125
Conveyors		m2	1950	BRS1H	$65,00	$126 750	50%	$63 375	$63 375
Assay Lab		m2	440	BRS1L	$45,00	$19 800	50%	$9 900	$9 900
Accomodation Complex (Inc. Nova Camp)		m2	17005	BRS1L	$45,00	$765 225	50%	$382 613	$382 613
Services Building		m2	13080	BRS1L	$45,00	$588 600	50%	$294 300	$294 300
Site Services Building		m2	500	BRS1L	$45,00	$22 500	50%	$11 250	$11 250
Dome Warehouse		m2	2854	BRS1L	$45,00	$128 430	50%	$64 215	$64 215
Ore Dome		m2	21000	BRS1L	$45,00	$945 000	50%	$472 500	$472 500
Power Plant		m2	7455	BRS1H	$65,00	$484 575	50%	$242 288	$242 288
Cat Warehouse		m2	2690	BRS1L	$45,00	$121 050	50%	$60 525	$60 525
Toromont Facilities		m2	925	BRS1L	$45,00	$41 625	50%	$20 813	$20 813
Fountain Tire		m2	330	BRS1L	$45,00	$14 850	50%	$7 425	$7 425
White Coverall		m2	2790	BRS1L	$45,00	$125 550	50%	$62 775	$62 775
Batch Plant		m2	2100	BRS1L	$45,00	$94 500	50%	$47 250	$47 250
Environmental Office		m2	140	BRS1L	$45,00	$6 300	50%	$3 150	$3 150
Dike Dewatering Shop		m2	755	BRS1L	$45,00	$33 975	50%	$16 988	$16 988
Incinerator		m2	280	BRS1L	$45,00	$12 600	50%	$6 300	$6 300
Talbon Shop		m2	235	BRS1L	$45,00	$10 575	50%	$5 288	$5 288
Blue Coverall		m2	710	BRS1L	$45,00	$31 950	50%	$15 975	$15 975
Gate House		m2	100	BRS1L	$45,00	$4 500	50%	$2 250	$2 250
Fuel Dispensing Station		m2	165	BRS1H	$65,00	$10 725	50%	$5 363	$5 363
Emulsion Plant		m2	2000	BRS1H	$65,00	$130 000	50%	$65 000	$65 000
Bulk Fuel Tank		m2	1910	BRS1H	$65,00	$124 150	50%	$62 075	$62 075
Containers to Landfill		mt	3500	OPS	$20,00	$70 000	50%	$35 000	$35 000
Other				#N/A	$0,00	$0		$0	$0
BREAK BASEMENT SLABS									
Puncture Concrete Foundations		m2	25211	BRCS	$6,00	$151 266	50%	$75 633	$75 633
LANDFILL FOR DEMOLITION WASTE									
Place rock cover	Blast rock fill	m3		#N/A	$0,00	$0		$0	$0
Place soil cover	Soil Cap - Landfill and Septic Field	m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
GRADE AND CONTOUR PADS									
Accomodation Complex		ha		#N/A	$0,00	$0		$0	$0
Process Facilities		ha		#N/A	$0,00	$0		$0	$0
Offices, Repair, Lab, Warehouse		ha		#N/A	$0,00	$0		$0	$0
Storage Facilites		ha		#N/A	$0,00	$0		$0	$0
Water and Wastewater Treatment Facilities		ha		#N/A	$0,00	$0		$0	$0
U/G Heating Plant		ha		#N/A	$0,00	$0		$0	$0
Emulsion Plant		ha		#N/A	$0,00	$0		$0	$0
Warehouse, Shops and Other		ha		#N/A	$0,00	$0		$0	$0
Place rock cover		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
PUNCTURE LINED SUMPS									
Puncture liner and place soil cover		m3		#N/A	$0,00	$0		$0	$0
RECLAIM ROADS, LAYDOWN AREA & AIRSTRIP									
Remove culverts		each	21	OPS	$4 000,00	$84 000	50%	$42 000	$42 000
Install Water Breaks		allow	1	OPS	$40 000,00	$40 000	50%	$20 000	$20 000
Scarify airstriip		ha	4,1	SCFYL	$4 300,00	$17 630	50%	$8 815	$8 815
Scarify laydown areas		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify access roads (~10 m x 12 km)		ha	12	SCFYL	$4 300,00	$51 600	50%	$25 800	$25 800
Scarify haul roads (~25 m x 14.5 km)		ha	36,3	SCFYL	$4 300,00	$156 090	50%	$78 045	$78 045
Scarify Portage/Mill Disturbed Area		ha	40,6	SCFYL	$4 300,00	$174 580	50%	$87 290	$87 290
Scarify Vault Disturbed Area		ha	6,5	SCFYL	$4 300,00	$27 950	50%	$13 975	$13 975
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
SPECIALIZED ITEMS									
Dispose of misc. debris and laydown area refuse				#N/A	$0,00	$0		$0	$0
					Total	$8 029 508		$4 014 754	$4 014 754
					% of Total			50%	50%

Note: Unit costs are based on 3m high, single storey building. Scale larger building areas accordingly. E.g. 10m high building multiply area by 3.3 (10/3)

Building / Equip Name: **Baker Lake** **Bldg / Equip #:** **2**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site		allow		#N/A	$0,00	$0		$0	$0
Decontaminate and dispose on-site		allow		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
REMOVE BUILDINGS - see note below									
Mill Complex:									
Mill		m2		#N/A	$0,00	$0	50%	$0	$0
Leech Tanks		m2		#N/A	$0,00	$0	50%	$0	$0
Primary and Secondary Crusher		m2		#N/A	$0,00	$0	50%	$0	$0
Pebble Crusher		m2		#N/A	$0,00	$0	50%	$0	$0
Conveyors		m2		#N/A	$0,00	$0	50%	$0	$0
Assay Lab		m2		#N/A	$0,00	$0	50%	$0	$0
Accomodation Complex (Inc. Nova Camp)		m2		#N/A	$0,00	$0	50%	$0	$0
Services Building		m2		#N/A	$0,00	$0	50%	$0	$0
Site Services Building		m2		#N/A	$0,00	$0	50%	$0	$0
Dome Warehouse		m2		#N/A	$0,00	$0	50%	$0	$0
Ore Dome		m2		#N/A	$0,00	$0	50%	$0	$0
Power Plant		m2		#N/A	$0,00	$0	50%	$0	$0
Cat Warehouse		m2		#N/A	$0,00	$0	50%	$0	$0
Toromont Facilities		m2		#N/A	$0,00	$0	50%	$0	$0
Fountain Tire		m2		#N/A	$0,00	$0	50%	$0	$0
White Coverall		m2		#N/A	$0,00	$0	50%	$0	$0
Batch Plant		m2		#N/A	$0,00	$0	50%	$0	$0
Environmental Office		m2		#N/A	$0,00	$0	50%	$0	$0
Dike Dewatering Shop		m2		#N/A	$0,00	$0	50%	$0	$0
Incinerator		m2		#N/A	$0,00	$0	50%	$0	$0
Talbon Shop		m2		#N/A	$0,00	$0	50%	$0	$0
Blue Coverall		m2		#N/A	$0,00	$0	50%	$0	$0
Gate House		m2		#N/A	$0,00	$0	50%	$0	$0
Fuel Dispensing Station		m2		#N/A	$0,00	$0	50%	$0	$0
Emulsion Plant		m2		#N/A	$0,00	$0	50%	$0	$0
Bulk Fuel Tank		m2		#N/A	$0,00	$0	50%	$0	$0
Containers to Landfill		each		#N/A	$0,00	$0	50%	$0	$0
10,000,000L Diesel Fuel Tanks		m2	21180	BRS1H	$65,00	$1 376 700	50%	$688 350	$688 350
100,000L Jet Fuel Tanks		m2	720	BRS1L	$45,00	$32 400	50%	$16 200	$16 200
Other				#N/A	$0,00	$0		$0	$0
BREAK BASEMENT SLABS									
Puncture Concrete Foundations		m2	6095	BRCS	$6,00	$36 570	50%	$18 285	$18 285
LANDFILL FOR DEMOLITION WASTE									
Place rock cover	Blast rock fill	m3		#N/A	$0,00	$0		$0	$0
Place soil cover	Soil Cap - Landfill and Septic Field	m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
GRADE AND CONTOUR PADS									
Accomodation Complex		ha		#N/A	$0,00	$0		$0	$0
Process Facilities		ha		#N/A	$0,00	$0		$0	$0
Offices, Repair, Lab, Warehouse		ha		#N/A	$0,00	$0		$0	$0
Storage Facilites		ha		#N/A	$0,00	$0		$0	$0
Water and Wastewater Treatment Facilities		ha		#N/A	$0,00	$0		$0	$0
U/G Heating Plant		ha		#N/A	$0,00	$0		$0	$0
Emulsion Plant		ha		#N/A	$0,00	$0		$0	$0
Warehouse, Shops and Other		ha		#N/A	$0,00	$0		$0	$0
Place rock cover		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
PUNCTURE LINED SUMPS									
Puncture liner and place soil cover		m3		#N/A	$0,00	$0		$0	$0
RECLAIM ROADS, LAYDOWN AREA & AIRSTRIP									
Remove culverts		each		#N/A	$0,00	$0	50%	$0	$0
Scarify and install water breaks		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify airstriip		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify laydown areas		ha	50	SCFYL	$4 300,00	$215 000	50%	$107 500	$107 500
Scarify access roads (~10 m x 10 km)		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify haul roads (~25 m x 14.5 km)		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify Portage/Mill Disturbed Area		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify Vault Disturbed Area		ha		#N/A	$0,00	$0	50%	$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
SPECIALIZED ITEMS									
Dispose of misc. debris and laydown area refuse				#N/A	$0,00	$0		$0	$0
					Total	$1 660 670		$830 335	$830 335
					% of Total			50%	50%

Note: Unit costs are based on 3m high, single storey building. Scale larger building areas accordingly. E.g. 10m high building multiply area by 3.3 (10/3)

Building / Equip Name: AWAR **Bldg / Equip #:** 3

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
DISPOSE MOBILE EQUIPMENT									
Decontaminate and ship off-site		allow		#N/A	$0,00	$0		$0	$0
Decontaminate and dispose on-site		allow		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
REMOVE BUILDINGS - see note below									
Mill Complex:									
Mill		m2		#N/A	$0,00	$0	50%	$0	$0
Leech Tanks		m2		#N/A	$0,00	$0	50%	$0	$0
Primary and Secondary Crusher		m2		#N/A	$0,00	$0	50%	$0	$0
Pebble Crusher		m2		#N/A	$0,00	$0	50%	$0	$0
Conveyors		m2		#N/A	$0,00	$0	50%	$0	$0
Assay Lab		m2		#N/A	$0,00	$0	50%	$0	$0
Accomodation Complex (Inc. Nova Camp)		m2		#N/A	$0,00	$0	50%	$0	$0
Services Building		m2		#N/A	$0,00	$0	50%	$0	$0
Site Services Building		m2		#N/A	$0,00	$0	50%	$0	$0
Dome Warehouse		m2		#N/A	$0,00	$0	50%	$0	$0
Ore Dome		m2		#N/A	$0,00	$0	50%	$0	$0
Power Plant		m2		#N/A	$0,00	$0	50%	$0	$0
Cat Warehouse		m2		#N/A	$0,00	$0	50%	$0	$0
Toromont Facilities		m2		#N/A	$0,00	$0	50%	$0	$0
Fountain Tire		m2		#N/A	$0,00	$0	50%	$0	$0
White Coverall		m2		#N/A	$0,00	$0	50%	$0	$0
Batch Plant		m2		#N/A	$0,00	$0	50%	$0	$0
Environmental Office		m2		#N/A	$0,00	$0	50%	$0	$0
Dike Dewatering Shop		m2		#N/A	$0,00	$0	50%	$0	$0
Incinerator		m2		#N/A	$0,00	$0	50%	$0	$0
Talbon Shop		m2		#N/A	$0,00	$0	50%	$0	$0
Blue Coverall		m2		#N/A	$0,00	$0	50%	$0	$0
Gate House		m2		#N/A	$0,00	$0	50%	$0	$0
Fuel Dispensing Station		m2		#N/A	$0,00	$0	50%	$0	$0
Emulsion Plant		m2		#N/A	$0,00	$0	50%	$0	$0
Bulk Fuel Tank		m2		#N/A	$0,00	$0	50%	$0	$0
Containers to Landfill		each		#N/A	$0,00	$0	50%	$0	$0
Other				#N/A	$0,00	$0		$0	$0
BREAK BASEMENT SLABS									
Puncture Concrete Foundations		m2		#N/A	$0,00	$0	50%	$0	$0
LANDFILL FOR DEMOLITION WASTE									
Place rock cover	Blast rock fill	m3		#N/A	$0,00	$0		$0	$0
Place soil cover	Soil Cap - Landfill and Septic Field	m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
GRADE AND CONTOUR PADS									
Accomodation Complex		ha		#N/A	$0,00	$0		$0	$0
Process Facilities		ha		#N/A	$0,00	$0		$0	$0
Offices, Repair, Lab, Warehouse		ha		#N/A	$0,00	$0		$0	$0
Storage Facilites		ha		#N/A	$0,00	$0		$0	$0
Water and Wastewater Treatment Facilities		ha		#N/A	$0,00	$0		$0	$0
U/G Heating Plant		ha		#N/A	$0,00	$0		$0	$0
Emulsion Plant		ha		#N/A	$0,00	$0		$0	$0
Warehouse, Shops and Other		ha		#N/A	$0,00	$0		$0	$0
Place rock cover		m3		#N/A	$0,00	$0		$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
PUNCTURE LINED SUMPS									
Puncture liner and place soil cover		m3		#N/A	$0,00	$0		$0	$0
RECLAIM QUARRIEST									
Drill and blast slopes to 1:1		m3	14319	RB3H	$17,80	$254 878	50%	$127 439	$127 439
RECLAIM ROADS									
Remove culverts		each	38	OPS	$4 000,00	$152 000	50%	$76 000	$76 000
Remove bridges (clear Span bridges and HADD bridges)		each	9	OPS	$25 000,00	$225 000	50%	$112 500	$112 500
Scarify and install water breaks		ha	84	SCFYL	$4 300,00	$361 200	50%	$180 600	$180 600
Scarify airstriip		ha		#N/A	$0,00	$0	50%	$0	$0
Scarify laydown areas		ha		#N/A	$0,00	$0	50%	$0	$0
Vegetate		ha		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
SPECIALIZED ITEMS									
Dispose of misc. debris and laydown area refuse				#N/A	$0,00	$0		$0	$0
					Total	$993 078		$496 539	$496 539
					% of Total			50%	50%

Note: Unit costs are based on 3m high, single storey building. Scale larger building areas accordingly. E.g. 10m high building multiply area by 3.3 (10/3)

1 **Chemicals/Soil Area Name:**

Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
HAZARDOUS MATERIALS AUDIT									
Hazardous materials audit		mandays	1	#N/A	$0,00	$0		$0	$0
BUILDING DECONTAMINATION & CONSOLIDATION OF HAZARDOUS MATERIALS									
Environmental technician/coordinator		mandays		#N/A	$0,00	$0		$0	$0
Decontaminate: oil, fuel		mandays		#N/A	$0,00	$0		$0	$0
Decontaminate maintenance shop		mandays	10	OPS	$1 000,00	$10 000	50%	$5 000	$5 000
Decontaminate power plant		mandays	10	OPS	$1 000,00	$10 000	50%	$5 000	$5 000
Decontaminate bulk fuel storage		mandays	10	OPS	$1 000,00	$10 000	50%	$5 000	$5 000
Decontaminate ANFO plant		mandays	3	OPS	$1 000,00	$3 000	50%	$1 500	$1 500
Decontaminate offices/warehouse/accom		mandays		#N/A	$0,00	$0		$0	$0
Removal of asbestos siding on buildings		m2		#N/A	$0,00	$0		$0	$0
Removal of friable asbestos on equipment		m2		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
HAZARDOUS MATERIALS REMOVAL									
Waste oils		litre	0	#N/A	$0,00	$0		$0	$0
Waste fuel		litre	309000	ORL	$0,43	$132 870	50%	$66 435	$66 435
Oily/Glycol contaminated water		litre	58456	ORL	$0,43	$25 136	50%	$12 568	$12 568
Waste batteries		each	1	OPS	$3 000,00	$3 000	50%	$1 500	$1 500
Assay & environmental lab reagents		kg	10000	PCRH	$2,50	$25 000	50%	$12 500	$12 500
Mill and Water Treatment Reagents		kg	285614	PCRH	$2,50	$714 035	50%	$357 018	$357 018
Machine shop paints, solvents, filters etc		each	1	OPS	$20 000,00	$20 000	50%	$10 000	$10 000
Glycol		kg	16170	PCRH	$2,50	$40 425	50%	$20 213	$20 213
Process reagents		kg		#N/A	$0,00	$0		$0	$0
Nuclear sources		allow		#N/A	$0,00	$0		$0	$0
Other hazardous materials		allow		#N/A	$0,00	$0		$0	$0
HAZARDOUS MATERIALS									
Transportation to disposal facility		allow		#N/A	$0,00	$0		$0	$0
Disposal fees		allow		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
CONTAMINATED SOILS									
Contam. soil investigation - Phase 1		each	1	CS1L	$7 500,00	$7 500	50%	$3 750	$3 750
Contam. soil investigation - Phase 2		each	1	CS2L	$50 000,00	$50 000	50%	$25 000	$25 000
CONTAMINATED SOIL REMOVAL									
Excavate and transport to onsite facility		m3	0	#N/A	$0,00	$0		$0	$0
Manage hydrocarbon remediation at facility		m3	2745	CSRL	$47,00	$129 015	50%	$64 508	$64 508
Reagents/stabilizing agent		m2		#N/A	$0,00	$0	50%	$0	$0
Excavate and transport to offsite facility		m3	137	OPS	$1 000,00	$137 000	50%	$68 500	$68 500
Contour decontaminated area		m3		#N/A	$0,00	$0		$0	$0
CONTAMINATED SOIL VERY LOW PERMEABILITY COVER									
Supply geomembrame, HDPE, ES3, GCL		m2		#N/A	$0,00	$0		$0	$0
Upper and lower bedding layers		m3		#N/A	$0,00	$0		$0	$0
Install geomembrane, HDPE, ES3, GCL		m2		#N/A	$0,00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0,00	$0		$0	$0
Vegetate		m2		#N/A	$0,00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0,00	$0		$0	$0
Other				#N/A	$0,00	$0		$0	$0
OTHER									
				#N/A	$0,00	$0		$0	$0
					Total	$1 316 981		$658 491	$658 491
					% of Total			50%	50%

1 **Capital Expenditures and Short Term Water Treatment identified in 'Instructions' worksheet**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
FLOOD PITS						
Repurpose/Install dewatering pumps and piping for pit flooding		Allow	1	OPS	$100 000,00	$100 000
Pumped pit flooding water (Third portage Lake and Reclaim Pond) - Portage Pit		m3	21700000	OPS	$0,02	$434 000
Pumped pit flooding water (Third portage Lake) - Goose Pit		m3	3500000	OPS	$0,02	$70 000
Pumped pit flooding water (Wally Lake) - Vault Pit		m3	28051096	OPS	$0,02	$561 022
Pump maintenance and operation (5 yrs)						
Maintain pumps (2 skilled labourer x 12hr days, 4months/yr, 5yrs)		manhours	14880	LAB-SH	$49,60	$738 048
Annual Pump Servicing (2 x Manufacturer Consultant x 7days/year x 5 years)		manhours	840	OPS	$120,00	$100 800
Pump Servicing Travel Allowance (Round Trip Flight/person)		visits	10	OPS	$4 000,00	$40 000
Camp Accomodations		days	1310	ACCML	$100,00	$131 000
DYKE RECONNECTION						
Bay-Goose Dike Reconnection (1-2-3)		m3	94000	SB2L	$4,60	$432 400
Rock placement Bay-Goose (1-2-3)		m3	27900	SB2H	$7,30	$203 670
South Camp Dike Reconnection		m3	24000	SB2L	$4,60	$110 400
Rock placement South Camp Dike		m3	9500	SB2H	$7,30	$69 350
Channel Vault Pit to North Phaser		m3	7000	SB2L	$4,60	$32 200
Rock placement Channel Vault Pit		m3	2300	SB2H	$7,30	$16 790
Vault Pit to Wally Lake Reconnection		m3	27000	SB2L	$4,60	$124 200
Rock Placement Vault Pit Reconnection		m3	10800	SB2H	$7,30	$78 840
Remove fill		m3		#N/A	$0,00	$0
Contour water intake area		m3		#N/A	$0,00	$0
STABILIZE SEDIMENT PONDS/WATER MANAGEMENT PONDS						
Place soil cover		m3		#N/A	$0,00	$0
Doze & spread excavated material		m3		#N/A	$0,00	$0
Vegetate spread material		ha		#N/A	$0,00	$0
Rip rap in channel base		each		#N/A	$0,00	$0
REDIRECT RUNOFF/CONSTRUCT DIVERSION DITCHES						
Excavate ditches -soil		m3		#N/A	$0,00	$0
Excavate ditches -rock		m3		#N/A	$0,00	$0
Stabilize side slopes		m3		#N/A	$0,00	$0
Rip rap in channel base		m3		#N/A	$0,00	$0
BREACH DITCHES (Diversion ditch)						
Excavate breaches		m3		#N/A	$0,00	$0
Backfill/recontour (consider work on 1000m of diversion ditch: 1000m x 4m²)		m3	4000	SB2L	$4,60	$18 400
Install flow dissipation		m3		#N/A	$0,00	$0
Vegetate remainder of ditch		m2		#N/A	$0,00	$0
DECOMISSION FRESH WATER SUPPLY						
Breach embankment		m		#N/A	$0,00	$0
Remove pump/barge		Allow	1	OPS	$3 000,00	$3 000
Remove pipeline		m	1000	PLRL	$22,00	$22 000
WATER CONTROL IN RECLAMATION QUARRY						
Install pumping system		LS		#N/A	$0,00	$0
Remove pumping system		LS		#N/A	$0,00	$0
REMOVE PIPELINES						
Remove pipes		m	2000	PLRL	$22,00	$44 000
Concrete plug deep pipes		m3		#N/A	$0,00	$0
Other - diffuser		each	2	OPS	$3 000,00	$6 000
GROUNDWATER COLLECTION SYSTEM						
Excavate/install sumps		m3		#N/A	$0,00	$0
Install pumping wells		m3		#N/A	$0,00	$0
Install pumps/pipelines/power supply		LS		#N/A	$0,00	$0
CONSTRUCT CONTAMINATED WATER STORAGE POND						
Excavate pond		m3		#N/A	$0,00	$0
Doze & spread excavated material		m3		#N/A	$0,00	$0
Vegetate spread material		ha		#N/A	$0,00	$0
Bedding layer		m3		#N/A	$0,00	$0
Supply geomembrane		m2		#N/A	$0,00	$0
Install geomembrane		m2		#N/A	$0,00	$0
Erosion protection layer		m3		#N/A	$0,00	$0
CONSTRUCT PASSIVE TREATMENT SYSTEM (e.g. Constructed Wetland)						
Construct access roads		km		#N/A	$0,00	$0
Install HDPE piping system from collection pond		m		#N/A	$0,00	$0
Inter-cell flow structures		allow		#N/A	$0,00	$0
Install liners		m2		#N/A	$0,00	$0
Install growth media		m3		#N/A	$0,00	$0
Wetland vegetation		ha		#N/A	$0,00	$0
CONSTRUCT TEMPORARY WATER TREATMENT PLANT						
Build treatment plant		LS		#N/A	$0,00	$0
Build sludge containment facility		LS		#N/A	$0,00	$0
Storage, Prep and Reactor Tanks/Silos		Allow	2	OPS	$855 000,00	$1 710 000
Mech. Equip. (Metering Pumps and Air)		Allow	2	OPS	$385 000,00	$770 000
Piping		%	30		$372 000,00	$372 000
Electrical		%	15		$186 000,00	$186 000
Instrumentation and Controls		%	15		$186 000,00	$186 000
Equipment Installation Costs		%	35		$434 000,00	$434 000
DECOMMISION TEMPORARY WATER TREATMENT PLANT (If Necessary)						
Decontaminate and dispose equipment on site		manhours	540	LAB-USL	$31,00	$16 740
Camp Accomodations		days	45	ACCML	$100,00	$4 500
Demolish Structure		m2	1500	BRS1L	$45,00	$67 500
Scarify Footprint		ha	0,15	SCFYH	$6 030,00	$905
SHORT TERM WATER TREATMENT*						
Annual water treatment cost, from "Water Treatment"		yr	1		$913 457,60	$913 458
					Total	$7 997 222

For cost of long-term/post-closure water treatment see "WATER TREATMENT" Worksheet"

1 **Water Treatment**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
OPERATE TEMPORARY WATER TREATMENT PLANT						
Reagent Allowance		allow	1	OPS	$500 000,00	$500 000
Direct Pumping cost		m3	3400000	OPS	$0,07	$238 000
Skilled Labourer (1 skilled labourers X 12hr/day, 6 Months/year)		manhours	2160	OPER-WTH	$59,86	$129 298
Annual Treatment Plant Servicing (2 Consultants x 7days/year)		manhours	168	OPS	$120,00	$20 160
Treatment Plant Servicing Travel Allowance (Round Trip Flight/person)		visits	2	OPS	$4 000,00	$8 000
Camp Accomodations		days	180	ACCML	$100,00	$18 000
ADDITION OF REAGENTS						
H2O2		kg		#N/A	$0,00	$0
lime		kg		#N/A	$0,00	$0
ferric sulphate		kg		#N/A	$0,00	$0
ferrous sulphate		kg		#N/A	$0,00	$0
flocculents		kg		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
LABOUR AND SUPPLIES						
Annual fuel		litres		#N/A	$0,00	$0
Annual power		kW-h		#N/A	$0,00	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0,00	$0
Equipment maintenance and parts		allow		#N/A	$0,00	$0
Misc. supplies, hoses, tools		allow		#N/A	$0,00	$0
Communications		allow		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
WATER SAMPLING AND ANALYSES						
Sampling equipment		allow		#N/A	$0,00	$0
Analyses		allow		#N/A	$0,00	$0
Shipping to laboratory		allow		#N/A	$0,00	$0
Reporting		allow		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
SITE ACCESS						
Road maintenance (incl. snow removal)		allow		#N/A	$0,00	$0
Winter road tariff		allow		#N/A	$0,00	$0
Truck rental		allow		#N/A	$0,00	$0
Air support		allow		#N/A	$0,00	$0
					Annual water treatment costs	$913 458
Number of years of water treatment		years	1			
					Total	$913 458

1 **Interim Care and Maintenance**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
INTERIM CARE & MAINTENANCE						
on-site caretaker		manmonths		#N/A	0	$0
extra personnel		manmonths		#N/A	0	$0
-electrician		manmonths		#N/A	0	$0
-mechanic		manmonths		#N/A	0	$0
annual fuel		litre		#N/A	0	$0
misc. supplies		allow		#N/A	0	$0
pick-up truck		each		#N/A	0	$0
small dozer		allow		#N/A	0	$0
small excavator		allow		#N/A	0	$0
snow machine		allow		#N/A	0	$0
communications		allow		#N/A	0	$0
SNP/AEMP water sampling & reporting		each		#N/A	0	$0
geotechnical assessment		each		#N/A	0	$0
interim water treatment				#N/A		$0
Maintenance, Surveillance, Monitoring and inspection - Active Closure				#N/A		$282 600
other		each		#N/A	0	$0
			Annual	Interim C&M Cost		$282 600
Number of years of ICM		years	3		**Total**	$847 800

m Post-Closure Monitoring & Maintenance:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MONITORING & INSPECTIONS **- ACTIVE CLOSURE (2022 to 2030)**						
Monitoring programs (Meadowbank and AWAR)		each		#N/A	$0,00	$0
- Active closure		each	1	OPS	$100 000,00	$100 000
- Post-closure		each		#N/A	$0,00	$0
Annual geotechnical inspection		each		#N/A	$0,00	$0
- Active closure (1 eng, 7 days, 150$/h, + report at 5000$, 2500$ of transport, 700$ of accommodation)		each	1	OPS	$20 800,00	$20 800
- Post-closure		each		#N/A	$0,00	$0
Groundwater monitoring		each	1	OPS	$10 000,00	$10 000
Survey inspection		each		#N/A	$0,00	$0
Regulatory costs*		each	1	OPS	$15 500,00	$15 500
Site water monitoring		each		#N/A	$0,00	$0
- Active closure		each	1	OPS	$73 100,00	$73 100
- Post-closure		each		#N/A	$0,00	$0
Air Quality Monitoring Program (AQMP)		each		#N/A	$0,00	$0
Wildlife Effects Monitoring Program (WEMP)		each		#N/A	$0,00	$0
Vegetation Monitoring		each		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
COVER MAINTENANCE **- ACTIVE CLOSURE (2022 to 2030)**						
Repair erosion - infill gullies		allow		#N/A	$0,00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0,00	$0
Remove problem vegetation		allow		#N/A	$0,00	$0
Repair animal damage		allow		#N/A	$0,00	$0
Repair/upgrade access controls		allow		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
SPILLWAY MAINTENANCE **- ACTIVE CLOSURE (2022 to 2030)**						
Repair erosion		m3		#N/A	$0,00	$0
Clear spillway		each		#N/A	$0,00	$0
CWTS MAINTENANCE **- ACTIVE CLOSURE (2022 to 2030)**						
Maintain flow, restore vegetation		allow		#N/A	$0,00	$0
MAINTENANCE AND SURVEILLANCE **- ACTIVE CLOSURE (2022 to 2030)**						
Site care-taker		manhours	480	OPERH	$65,00	$31 200
Site Vehicle and equipment		allow	1	OPS	$20 000,00	$20 000
Accommodations		mandays	20	ACCML	$100,00	$2 000
Site Maintenance		allow	1	OPS	$10 000,00	$10 000
Subtotal, Annual active-closure costs						$282 600
Discount rate for calculation of net present value of active-closure cost, %				3,00%		
Number of years of active-closure activity				9	years	
Present Value of payment stream (at Year 2022) - Active closure (2022 to 2030)						$2 200 354
MONITORING & INSPECTIONS **- POST CLOSURE (2031 to 2041)**						
Monitoring programs (Meadowbank and AWAR)		each		#N/A	$0,00	$0
- Active closure		each		#N/A	$0,00	$0
- Post-closure		each	0,5	OPS	$100 000,00	$50 000
Annual geotechnical inspection		each		#N/A	$0,00	$0
- Active closure		each		#N/A	$0,00	$0
- Post-closure (1 eng, 7 days, 150$/h, + report at 5000$, 2500$ of transport, 700$ of accommodation)		each	1	OPS	$20 800,00	$20 800
Groundwater monitoring		each	1	OPS	$10 000,00	$10 000
Survey inspection		each		#N/A	$0,00	$0
Regulatory costs*		each	1	OPS	$15 500,00	$15 500
Site water monitoring		each		#N/A	$0,00	$0
- Active closure		each		#N/A	$0,00	$0
- Post-closure		each	1	OPS	$49 432,00	$49 432
Air Quality Monitoring Program (AQMP)		each		#N/A	$0,00	$0
Wildlife Effects Monitoring Program (WEMP)		each		#N/A	$0,00	$0
Vegetation Monitoring		each		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
COVER MAINTENANCE **- POST CLOSURE (2031 to 2041)**						
Repair erosion - infill gullies		allow		#N/A	$0,00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0,00	$0
Remove problem vegetation		allow		#N/A	$0,00	$0
Repair animal damage		allow		#N/A	$0,00	$0
Repair/upgrade access controls		allow		#N/A	$0,00	$0
Other				#N/A	$0,00	$0
SPILLWAY MAINTENANCE **- POST CLOSURE (2031 to 2041)**						
Repair erosion		m3		#N/A	$0,00	$0
Clear spillway		each		#N/A	$0,00	$0
CWTS MAINTENANCE **- POST CLOSURE (2031 to 2041)**						
Maintain flow, restore vegetation		allow		#N/A	$0,00	$0
MAINTENANCE AND SURVEILLANCE **- POST CLOSURE (2031 to 2041)**						
Site care-taker		manhours	480	OPERH	$65,00	$31 200
Site Vehicle and equipment		allow	1	OPS	$20 000,00	$20 000
Accommodations		mandays	20	ACCML	$100,00	$2 000
Site Maintenance		allow	1	OPS	$10 000,00	$10 000
Subtotal, Annual post-closure costs						$208 932
Discount rate for calculation of net present value of post-closure cost, %				3,00%		
Number of years of post-closure activity				11	years	
Present Value of payment stream (at Year 2022) - Post closure (2031 to 2041)						$1 933 169
POST-CLOSURE WATER TREATMENT**						
Annual water treatment cost, from "Water Treatment"						$913 458
Subtotal, Annual post-closure costs						$913 458
Discount rate for calculation of net present value of post-closure cost, %				3,00%		
Number of years of post-closure activity (included in ICM, 3 YEARS)				0	years	
Present Value of payment stream (at Year 2022)						$0
Present Value of payment stream - TOTAL at Year 2022						$4 133 524

*Regulatory costs - annual reporting, management plans, progress reports etc.

1 **Mobilization/Demobilization:**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MOBILIZE HEAVY EQUIPMENT						
Barge to/from Baker Lake		each	2	OPS	500000	$1 000 000
Excavators	5	km	550	mherh	10,25	$5 638
Dump trucks	3	km	330	mherh	10,25	$3 383
Dozers	3	km	330	mherh	10,25	$3 383
Demolition shears	3	km	330	mherh	10,25	$3 383
Crane	1	km	110	mherh	10,25	$1 128
Loader	2	km	220	mherh	10,25	$2 255
Compactor	1	km	110	mherh	10,25	$1 128
Elavator equipements	3	km	330	mherh	10,25	$3 383
other	4	km	440	mherh	10,25	$4 510
Light duty vehicles	4	km	440	mherh	10,25	$4 510
MOBILIZE MISC. EQUIPMENT						
Pump shipping		each		#N/A	0	$0
Pipe shipping		m		#N/A	0	$0
Minor tools and equipment		allow		#N/A	0	$0
Truck tires		allow		#N/A	0	$0
Other	1 lot	each	1	OPS	50000	$50 000
MOBILIZE CAMP						
Reclamation activities		allow		#N/A	0	$0
Long term reclamation activities (eg pump flooding)		allow		#N/A	0	$0
MOBILIZE AND HOUSE WORKERS						
Maintain Camp Accomodations (50 workers, 180 per year, 3 years)		days	27000	accml	100	$2 700 000
Reclamation activities - travel time (50 workers, 4 trips per year, 6h per trip)		hour	1200	lab-usl	31	$37 200
Reclamation activities - transport cost (50 workers, 4 trips per year, 3 years)		each	600	#N/A	2500	$1 500 000
Long term reclamation activities (eg pump flooding) - transport		each		#N/A	0	$0
Long term reclamation activities (eg pump flooding) - travel time		each		#N/A	0	$0
Monitoring Airfare		each		#N/A	0	$0
WORKER ACCOMODATIONS						
Reclamation activities		manmonths		#N/A	0	$0
Long term reclamation activities (eg pump flooding)		each	0		0	$0
Long term reclamation activities (eg pump flooding)		manhours	0	#N/A	0	$0
Reclamation activities (placement of aggregate cap - 95 days crew of ten)		manmonths	30	accmh	5425	$162 750
Reclamation activities - travel time (10 workers, 3 trips per year, 6h per trip)		hour	180	lab-usl	31	$5 580
Reclamation activities - transport cost (10 workers, 3 trips per year)		each	30	#N/A	2500	$75 000
MOBILIZE FUEL						
Fuel freight - reclamation activities		litre		#N/A	0	$0
Fuel freight - long term reclamation activities		litre		#N/A	0	$0
Fuel freight accomodations		litre		#N/A	0	$0
WINTER ROAD						
Construction and operation		km		#N/A	0	$0
Limited winter use		km		#N/A	0	$0
Winter road tarriff		km		#N/A	0	$0
DEMOBILIZE HEAVY EQUIPMENT						
Excavators	4	km	440	MHERH	10,25	$4 510
Dump trucks	6	km	660	MHERH	10,25	$6 765
Dozers	3	km	330	MHERH	10,25	$3 383
Demolition shears	2	km	220	MHERH	10,25	$2 255
Crane	1	km	110	MHERH	10,25	$1 128
Loader	2	km	220	MHERH	10,25	$2 255
Compactor	1	km	110	MHERH	10,25	$1 128
Light duty vehicles	4	km	440	MHERH	10,25	$4 510
Other						$0
DEMOBILIZE CAMP						
		allow		#N/A	0	$0
DEMOBILIZE WORKERS						
crew travel time		mandays		#N/A	0	$0
crew transportation		each		#N/A	0	$0
WINTER ROAD						
Construction and operation		km		#N/A	0	$0
Limited winter use		km		#N/A	0	$0
Winter road tarriff		km		#N/A	0	$0
					Total	$5 589 160

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

Filter by unit

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	COMMENTS
Accomodation							
		ACCM	manday	100,00	175,00		
Buildings - Decontaminate							
	Asbestos	BDA	m2	25,60	51,20		Low: removal of asbestos siding & flooring; High: removal of insulated pipes, friable asbestos
Buildings - Remove							Unit costs are based on 3m high, single storey building. Scale areas accordingly.
	Wood	BRW	m2	27,50	41,00		
	Concrete	BRC	m2	40,00	65,00	6,00	Specified: puncture concrete foundation slabs
	Steel - teardown	BRS1	m2	45,00	65,00		
	Steel - for salvage	BRS2	m2	67,00	100,00		
Concrete work							
	Small pour	CSF	m3	426,50	639,75		Low: YK; High=1.5xLow
	Large pour	CLF	m3	353,50	530,25	2 130,00	Specified: concrete crown pillar
Contaminated Soils							
	ESA Phase 1	CS1	each	7500,00			Low: small, "clean" site
	ESA Phase 1	CS2	each	50000,00			Low: small, "clean" site
	Remediate on site	CSR	m3	47,00	146,00		
Dozing							
	doze rock piles	DR	m3	1,05	2,40		Low cost: doze crest off dump
	doze overburden/soil piles	DS	m3	0,95	3,80		High cost: push up to 300 m
Excavate Rock; Low Spec's and QA/QC							
	drill/blast/load/short haul	RB1	m3	11,40	17,05		Low:quarry operations for bulk fill
	drill/blast/load/long haul	RB2	m3	12,05	17,80		
	RB1 + spread and compact	RB3	m3	12,05	17,80		
	RB2 + spread and compact	RB4	m3	12,50	30,75		
	Specified activity	RBS	m3				
Excavate Rock; High Spec's and QA/QC							(e.g. ditch/spillway excavation)
	drill/blast/load/short haul	RC1	m3	12,05	17,80		Low:foundation excavation;High:spillway excavation
	drill/blast/load/long haul	RC2	m3	12,70	18,40		
	RC1 + spread and compact	RC3	m3	12,70	18,40		e,g, cover construction
	RC2 + spread and compact	RC4	m3	13,50	19,20		e,g, cover construction
	Specified activity	RCS	m3			175,00	Specified-drift excavation
Excavate Rip Rap							
	drill/blast/load/short haul/place	RR1	m3	13,50	17,75		High: quarry & place rip rap in channel
	drill/blast/load/long haul/place	RR2	m3	14,20	20,65		
	source is waste dump/short haul	RR3	m3	7,00			cost includes sorting
	source is waste dump/long haul	RR4	m3	7,60			
	Specified activity	RRS	m3				
Excavate Soil; Low Spec's and QA/QC							
	clear & grub	SBC	m2	3,40	5,00		
	excavate/load/short haul	SB1	m3	4,30	5,90		
	excavate/load/long haul	SB2	m3	4,60	7,30		
	SB1 + spread and compact	SB3	m3	5,10	8,90		Low: non-engineered; High:engineered
	SB2 + spread and compact	SB4	m3	5,50	11,00		Low: non-engineered; High:engineered
	Specified activity	SBS	m3	3,20	6,30		Low: rehandle waste rock dump by dozing; High:rehandle waste rock by hauling
	Tailings	SBT	m3	1,35	3,70	15,50	High:contour surface - wet or frozen; Specified:haul/place wet infill
Excavate Soil, High Spec's and QA/QC							
	excavate/load/short haul	SC1	m3	6,80	9,30		
	excavate/load/long haul	SC2	m3	7,10	11,75		
	SC1 + spread and compact	SC3	m3	8,90	14,20		Low: non-engineered; High:engineered
	SC2 + spread and compact	SC4	m3	9,30	23,20		Low: non-engineered; High:engineered (e.g. complex covers, low volume dam construction)
	Specified activity	SCS	m3			18,80	Backfill adit with waste rock
Fence							
		FNC	m	13,55	203,00		
Fuel and Electricity							
	Fuel cost - gas	FCG	litre	1,05	1,40		
	Fuel cost - diesel	FCD	litre	0,99	1,39		
	Fuel mobilization	FCM	litre	0,22	0,42		High: winter road usage
	Electricity	FCE	kW-h	0,17	0,19	0,49	Low and High:Yellowknife; Specified:diesel generator
Geo-Synthetics							
	geotextile	GST	m2	3,44			Supply and install
	geogrid	GSG	m2	5,75			
	liner, HDPE	GSHDPE	m2	7,95			Supply and install; large quantity
	liner, ES3	GSES3	m2	20,20			FOB Yellowknife
	geosynthetic installation	GSI	m2	3,16	14,00		Low:geotextile; High:ES3 or HDPE
	bentonite soil ammendment	GSBA	tonne	308,30	348,50		FOB Edmonton, add shipping & mixing
Grouting (/m3 of rock grouted)							
		grout	m3	236,55	286,75		High: cement, FOB Yellowknife
Labour & Equipment Rates							
	Site manager	sman	$/hr	125,00	152,00		
	Supervisor	super	$/hr	52,00	91,84		
	Registered engineer	eng	$/hr	95,00	220,00		
	Environmental coordinator	envco	$/hr	74,16	130,00		
	Evironmental technologist	envtech	$/hr	36,00			
	Electrician	elec	$/hr	74,00	95,00		
	Journeyman - various	journey	$/hr	44,00	71,79		
	Labour - skilled	lab-s	$/hr	41,00	49,60		

Labour - unskilled	lab-us	$/hr	31,00	43,98		
Equipment operator	oper	$/hr	41,00	65,00		
Heavy duty mechanic	mech	$/hr	49,00	72,85		
Water treatment plant operator	oper-wt	$/hr	41,00	59,86		
Security / first aid	safety	$/hr	36,00	66,97		
Administative staff	admin	$/hr	38,00	57,89		
Equipment rates include operator and fuel						
Loader - 4 cu.yd (3.06m3)	load-s	$/hr	175,00			
Loader - 7 cu.yd (5.35m3)	load-l	$/hr	315,00			
Excavator - 26.76-30.84 tonnes	exc-s	$/hr	190,00			
Excavator - 68.95+tonnes	exc-l	$/hr	420,00			
Grader	grad	$/hr	190,00			
Dump truck off hwy 30-50 tonnes	truck-s	$/hr	225,00			
Dump truck off hwy 55-75 tonnes	truck-l	$/hr	300,00			
dozer, small	dozers	$/hr	205,00	260,00		
dozer, large	dozerl	$/hr	490,00	565,00		
smooth drum compactor	comp	$/hr	155,00			
scooptram, 6 yd3 bucket	scoop	$/hr	170,00			
flat bed truck with hiab	hiab	$/hr	155,00			
fuel truck	ftruck	$/hr	150,00			
water truck	wtruck	$/hr	58,00	150,00		
Mobilize Heavy Equipment						
Road access	MHER	kmtonne	3,40	10,25		
Air access	MHEA	kmtonne	12,00			cargo rate>500lb
Mobilize Camp						
Road access	MCR	each	50000,00			refurbish existing camp
Mobilize Workers						
flight	MW	each	4500,00	9100,00		Low:e.g. 8 passenger; High: Dash 7
Oil Removal						
oil removal	OR	litre	0,43	1,20		Low:waste oil heater; High: ship offsite
PCB Removal						
Remove from site	PCBR	litre	40,20	46,90		Low: shipping, handling & disposal from Yellowknife
Pipes, small (<6in dia.)						
remove/dispose on site	PSR	m	1,00	24,00		Low: remove/dispose on site; High: remove/re-use
supply	PSS	m	6,10	11,10		Low:supply; High:supply and ship
install	PSI	m	25,00			
Pipes, large (>6in dia.)						
remove/dispose on site	PLR	m	22,00	72,00		Low: remove/dispose on site; High: remove/re-use
supply	PLS	m	129,00	143,00		Low:supply; High:supply and ship
install	PLI	m	50,00			
Power Lines						
remove/dispose on site	POWR	m	25,50			
Process Chemicals						
Remove from site	PCR	kg	0,45	2,50		Low: shipping, handling & disposal from Yellowknife
Pumps						
Pump capital cost	PC	each	195000,00			
Pump shipping	PS	each	2500,00			
Pump operating cost	POC	m3	0,12			pump operating costs should be calculated based on pump capacity, fuel costs, etc.
Pump maintenance	PM	allow	25000,00			
Pump sand BackFill						
	PBF	m3	85,00	300,00		
Scarify - road/mine site						
	SCFY	ha	4300	6030	2150	
Shaft, Raise & Portal Closures						
Shaft & Raises	SR	m2	645,00	2132,00		Low:pre-cast concrete slabs, little site prep. Area=shaft+>1m all around
Portals	POR	m3	18,80	250,00	1200,00	Low:unit cost code SCS;High:excavate & backfill collapsed portal;Spec: installed pressure plug
Site Inspection Report						
	RPT	each	10000,00	20000,00		
SpillWay - Clear						
	SW	each	3000,00	7000,00		
Survey/Instrumentation						
	SI	each	1800,00	3600,00		2 person crew
Treatment Plant - Construct						
Small (< 1000 m3/d)	TPS	lump sum	9000000	15000000		
Large (> 1000 m3/d)	TPL	lump sum	15000000	46000000		
Constructed Wetland	CWTS	ha	200000	300000		
Treatment Plant - Operate						
	TPO	m3	0,35	2,00		
Treatment Chemicals						
ferric sulphate	ferric	kg	1,19			
ferrous sulphate	ferrous	kg	1,32			
lime	lime	kg	0,56			
hydrogen peroxide, 35%	hperox	kg	1,50			
Sodium Metabisulfate	Nametab	kg	1,18			
Caustic soda, 50%	caustic	kg	0,74			
Sulfuric acid, 93%	sulfuric	kg	0,31			
flocculant	flocc	kg	6,00			
copper sulphate	copper	kg				
shipping	shipping	kg	0,20			
Vegetation						
Hydroseed, Flat	VHF	ha	4000,00			

Hydroseed, Sloped	VHS	ha	4500,00			
Veg. blanket/erosion mat	VB	ha	13000,00			
Tree planting	VT	ha	2600,00	6000,00		
Wetland species	VW	ha			47,72	Specified= /m3, Wetland Growth Media Substrate mixed and installed (sand, biochar and fertilizer, woodchips)
Water Sampling/Analysis/Reporting						
	WS	each	7000,00	10000,00		
Winter Road						
Construction	WRC	km	2000,00	11500,00		
Usage	WRU	kmtonne	0,29			