

Appendix 16

Whale Tail Landfill and Waste Management Plan Version 4



AGNICO EAGLE

Meadowbank Division

Whale Tail Pit - Landfill and Waste Management Plan

**MARCH 2021
VERSION 4**

EXECUTIVE SUMMARY

This Landfill and Waste Management Plan outline the design of the current operational and a conceptual closure industrial waste landfill as part of the Agnico Eagle Mines Limited (Agnico Eagle) Whale Tail Pit Project in Nunavut.

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

During closure, the Whale Tail landfill will be covered with non-potentially acid generating waste rock to isolate it from the environment and physically stabilize it. The landfill will be encapsulated within the Whale Tail WRSF.

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DOCUMENT CONTROL

Version	Date	Section	Page	Revision
1	January 2017			Landfill and Waste Management Plan as Supporting Document for Type A Water Licence Application, submitted to Nunavut Water Board for review and approval
2	December 2018			For WT expansion permitting process
2	May 2019			For WT expansion permitting process
2	March 2020	All	All	Comprehensive update to reflect the current landfill operation
3	July 2020	Throughout	Throughout	Updated following issuance of Type A Water Licence Amendment 2AM-WTP1830 and Project Certificate No. 008 Amendment 1 for one comprehensive management plan
4	March 2021	All	All	Comprehensive Update to reflect the current landfill operation

Prepared by: Environmental Department
Agnico Eagle Mines Limited – Meadowbank Complex

Approved by:



Alexandre Lavallee
Superintendent – Environment (Interim)

ACRONYMS

Agnico Eagle	Agnico Eagle Mines Limited – Meadowbank Division
GN	Government of Nunavut
NPAG	Non-Potentially Acid Generating
NWB	Nunavut Water Board
WRSF	Waste Rock Storage Facility

UNITS

km	kilometre
km ²	squared kilometre
m	metre
m ³	cubic meter
Mt	million metric tonnes
t	metric tonnes

SECTION 1 • INTRODUCTION

1.1 Project Overview

Agnico Eagle Mines Limited – Meadowbank Division (Agnico Eagle) is currently operating the Whale Tail Pit and Haul Road (Project), a satellite deposit located on the Amaruq property, to continue mine operations and milling at the Meadowbank Mine.

The Amaruq property is a 408 square kilometre (km²) site located on Inuit Owned Land approximately 150 kilometres (km) north of the hamlet of Baker Lake and approximately 50 km northwest of Meadowbank Mine in the Kivalliq Region of Nunavut. The deposits are mined as an open pit (i.e., Whale Tail Pit and IVR Pit), and ore is hauled to the approved infrastructure at Meadowbank Mine for milling. The project also includes an underground development ramp/portal with associated equipment and facilities.

The Landfill and Waste Management Plan outlines the design, operations, and closure of a solid waste landfill as part of Agnico Eagle's Whale Tail Pit Project. It also highlights the waste segregation strategies that are implemented to minimize the quantity of waste to be placed in the proposed landfill.

The objectives of this Plan are summarized as follows:

1. To define the location, design, and operating procedures to be used in the landfill disposal of non-salvageable, non-hazardous, non-putrescible solid waste generated at the Project.
2. To define acceptable/non-acceptable types of solid waste to be placed in the landfill.
3. To describe plans to reduce/reuse/recycle Project wastes.
4. To define monitoring requirements for the proposed landfill.

A landfill is required for the disposal of non-salvageable, non-hazardous, non-putrescible solid industrial wastes that cannot be incinerated and that result from construction, operations, and closure of the Project. It will also be used to dispose of incinerator ash and compost. The Project operated totally independent of, and will not use, any municipal facilities or services for waste management.

On-site storage and remediation have been established as the preferred method for treatment of light petroleum hydrocarbon contaminated soil that may be generated at the Whale Tail site. The landfarm is designed to receive soils, rock, snow, and ice contaminated with light hydrocarbons such as diesel, hydraulic oil, and gasoline. A landfarm is proposed to be located just east of the Fuel Storage Facility and in proximity with the IVR Attenuation Pond (refer to the Landfarm Design and Management Plan).

1.2 Landfill Siting

The landfill is sited within the Whale Tail Waste Rock Storage Facility (WRSF), which is located north of the Mammoth Lake. The location of the landfill will change for every 20m increase in elevation to allow access at all time of the landfill. Each landfill will respect the same specifications as the one in Appendix A. The landfill incorporation schematic is in Appendix B. The following criteria were considered in determining its location:

- Drainage – sites that will drain into areas where water will be collected and monitored as part of the overall site plan were preferred.
- Disturbed areas – sites within or near areas that will be disturbed as part of the future overall mine plan were preferred to minimise the environmental footprint of the Project.
- Access – sites located close to existing service or haul roads were preferred.
- The landfill site had to be large enough to accommodate non-salvageable, non-hazardous, non-putrescible solid industrial wastes for the life of the Project, including the closure period.

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

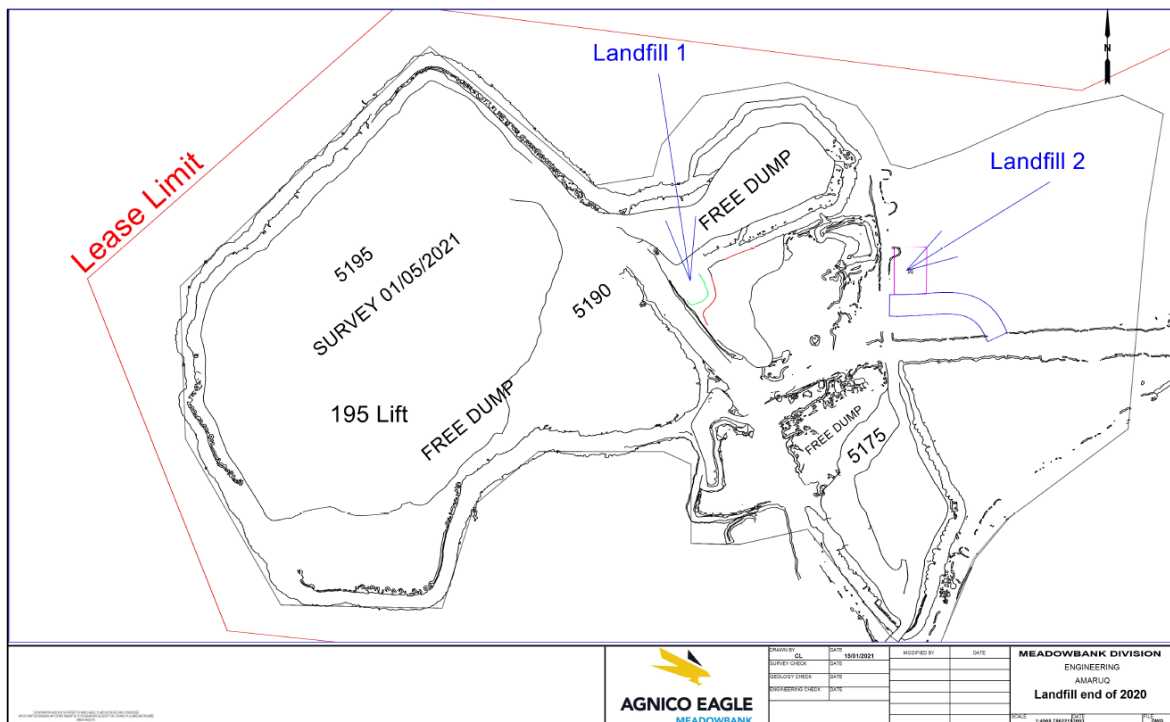


Figure 1.0 Landfill Location for Whale Tail Pit

1.3 Schedule

The landfill will be used for the operations and closure phases. It will not be required for post-closure. During construction, material was either stored inside of the overburden waste rock berm or transported to the approved Meadowbank Mine landfill until the landfill for the mine has been constructed and becomes operational.

The area set aside for the landfill will be large enough to accommodate all non-salvageable, non-hazardous, non-putrescible solid industrial wastes expected to be landfilled over the life of the Project. Expansion will be possible vertically and to the north, if required.

The schedule for the Whale Tail Pit landfill is as follows:

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

SECTION 2 • REGULATORY SETTING

Waste management in Nunavut is regulated under the *Nunavut Public Health Act*, the *Nunavut Environmental Protection Act*, the federal *Environmental Protection Act*, and the federal *Transport of Dangerous Goods Act*. Agnico Eagle is also bound by the terms and conditions of its production lease with the Kivalliq Inuit Association and its Water Licence from the NWB.

In addition to mandatory requirements, several waste management guidelines are commonly used in the Northwest Territories and Nunavut. The most recent of these was developed for municipal solid waste and is titled: “*Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the NWT*” (Ferguson Simek Clark 2003). *Environmental Guideline for Industrial Waste Discharge into Municipal Solid Waste and Sewage Treatment Facilities* (GN 2011c) were also used (Appendix B). While not all the recommendations provided in these guidelines are appropriate for the management of industrial waste expected at the proposed Project, principles considered applicable have been adopted in this Plan.

In addition, the *Guidance for the Preparation of Waste Management Plans* (Inuvialuit Water Board 2014) and the *Mine Site Reclamation Guidelines for the Northwest Territories* (INAC 2007) were followed regarding specific landfill design and mitigation for potential impacts pertaining to waste.

SECTION 3 • PLAN FOR THE ON-SITE DISPOSAL OF SOLID WASTE

3.1 Approach

Waste¹ at the Project is divided into the following categories:

1. Domestic waste: general waste materials coming from the kitchen, cafeteria, lunchrooms, dormitories, and offices. Bins are in high traffic areas for segregating wastes destined for incineration, landfilling, or recycling.
2. Medical waste: medical waste generated in the first aid/health room require special handling and are placed in easily identifiable single use medical waste containers. Both the containers and its contents will be incinerated.
3. Industrial waste: waste arising from operations in the truck shop, explosive magazine, and warehouses. Each work area has specially marked bins for segregating waste for incineration, recycling, or disposal. Special bins or areas are set aside for hazardous waste. Large bulky items that cannot be incinerated are prepared for shipment south for recycling or be cleaned of any hydrocarbon contamination and have the electronics removed before disposal in the landfill.
4. Sewage: wastewater from the accommodation complex are treated in the Sewage Treatment Plant before being directed to Whale Tail Attenuation Pond. Sewage sludge removed from the Sewage Treatment Plant are transported and added to the landfarm (Meadowbank Mine) as nutrient amendment on an as needed basis. Excess sludge produced from the Whale Tail Camp are disposed of in the Whale Tail Waste Rock Storage Facility and buried right away as per procedure.
5. Used oil and waste fuels: used engine oil, hydraulic fluids, and fuels that do not meet specifications for designated use are stored and shipped south to an approved facility. It does not include solvents or paints. If it is found acceptable, the used oil and waste fuels will be consumed in Whale Tail Pit waste oil burners and if not used there will be transported to Meadowbank Mine and used in waste oil burners.
6. Hazardous waste: all hazardous materials are packaged for shipment to a certified waste management company for treatment, recycling, and/or disposal; refer to the Hazardous Materials Management Plan for details. Hazardous wastes are not placed in the proposed landfill.

¹ In accordance with the NWB, waste rock and overburden are also considered waste materials. The Whale Tail Pit Waste Rock Plan & The Meadowbank Mine Waste Rock and Tailings Management Plan

Waste management begins by keeping all materials that can be economically recycled out of the waste stream destined for the landfill or incineration. The three R's of waste management - reduce, reuse, and recycle - is encouraged within the waste management program.

Reduce, reuse, and recycle initiatives are developed at the Project to minimize the quantity of waste incinerated or directed to the landfill. To support these initiatives, operating procedures are developed to maximize the volume of materials that are recycled and/or reused. This includes eliminating the use of disposable materials where possible, and segregating waste destined for reuse, and recycle alternatives.

Minimizing or avoiding the creation of pollutants and wastes can be more effective in protecting the environment than treating or cleaning them up after they have been created (Environment Canada 2003). Waste management for the Project includes effort directed to eliminating, where practicable, the use of disposable materials in everyday use, such as disposable cups, plates, and table ware. Workers are encouraged to use ceramic mugs and stainless-steel cutlery in the cafeteria or lunchrooms, and to carry their personal drink container or thermos.

The strategy for the management of solid waste at the Project is first to identify and segregate acceptable disposal items from non-acceptable items. Within the acceptable disposal items, the second step is to segregate those items that can be economically recycled from those that cannot. This separation is done at source by locating bins throughout the facilities for the collection of items suitable for recycling.

Organics or food waste generated at the Project are segregated in all buildings, collected, and stored in an enclosed space, and transported to the Meadowbank Mine incinerator building for final segregation and incineration. The Energy and Infrastructure Department are responsible for the collection, transport, and incinerator processing of waste.

The development of the landfill minimizes the area required for waste storage and re-handling of waste. Acceptable items that are disposed of in the landfill are those that are solid, non-salvageable, non-hazardous, non-putrescible, with a low leachate and low heat generation potential. Controlling the materials that can be placed in the landfill is a strategy aimed at reducing the concentration of constituents in potential leachate. The proposed landfill conforms to best management practices allowing for orderly landfill development, including covering of debris with waste rock, which reduce the potential for windblown debris.

All solid wastes that may contain medical waste from the Medical Clinic, food waste, food packaging waste, or other organic waste that could attract wildlife are incinerated. This includes all garbage from the accommodation complex, kitchen, lunchrooms, and offices. These are stored on site in closed bins and are sent to the Meadowbank incinerator as required. This waste is not allowed to remain unattended in trucks at any time.

Hazardous waste and materials that can be recycled are appropriately packaged (as per regulations under the *Transport of Dangerous Goods Act*) to be sent off-site to a licenced hazardous waste management facility or recycling facility, respectively. Management of hazardous materials is covered in detail in the Hazardous Materials Management Plan.

3.2 Acceptable Waste for Landfilling

The following materials are acceptable for disposal in the proposed landfill:

- plastic (except expanded polystyrene);
- steel, copper, aluminum, iron (most of this metal is recycled);
- wood;
- fiberglass insulation;
- fiberglass;
- roofing;
- cardboard;
- concrete;
- carpet;
- bricks;
- ceramics;
- rubber;
- empty caulking tubes;
- hardened caulk;
- clothing;
- glass;
- wire;
- small appliances (with batteries removed);
- gyproc;
- ash provided it has cooled to 60°C or less and follows procedures laid out in the Incinerator and Composter Waste Management Plan; and
- vehicles and machinery provided all liquids, grease, batteries, and electronics have been removed (see Section 3.3.2 for more details on ozone depleting substances).

3.2.1 Waste Asbestos²

Waste asbestos includes any type of material with greater than 1 % asbestos by weight (GN 2011a). Asbestos that has been immersed or fixed in a natural or artificial binder or included in a manufactured product is not considered waste asbestos; it is considered a hazardous waste and is disposed of accordingly. Waste asbestos can either be backhauled off-site for disposal in an approved facility or it can be landfilled. The following are guidelines for landfilling waste asbestos:

- immediate burial and cover with 0.5 metres (m) of cover material;
- bury where it will not be disturbed; and
- the location should be maintained on a map or diagram for future reference.

In addition to following the *Environmental Guideline for the General Management of Hazardous Waste* (GN 2010a), Agnico Eagle adhere to the Government of Nunavut's (GN) *Environmental Guideline for Waste Asbestos* (GN 2011a). Before landfilling waste asbestos, Agnico Eagle will review the steps in this guideline with the GN.

All Government of Nunavut environmental guidelines can be accessed online at <http://env.gov.nu.ca/programareas/environmentprotection/legislation>.

3.3 Unacceptable Waste for Landfilling

Materials that are not listed above in Section 3.2 are considered unacceptable for placement at the landfills, unless approved in writing by the Meadowbank Mine Environment Superintendent. The unacceptable materials include:

- organic matter including food, septic tank pumping's or sludge from wastewater treatment, dead animals;
- food containers and wrappings, unless cleaned;
- whole tires;
- hazardous waste including mercury, medical waste, batteries, solvents, glues, ethylene glycol antifreeze, adhesives (except empty caulking tubes);
- electronics;
- light bulbs or Fluorescent Lamp Tube;
- petroleum products, including materials contaminated with petroleum products; and
- expanded polystyrene.

Organic material is not accepted in the landfill, thus eliminating the attraction to carnivores and/or raptors. This is accomplished by requiring all personnel to dispose domestic waste in designated bins

² It is unlikely that asbestos waste will result from materials purchased for mine operations. Agnico Eagle will avoid using asbestos wherever possible.

and by sending all collected domestic waste (e.g., from kitchens and living quarters) to the site incinerator.

3.3.1 Fluorescent Lamp Tubes

Fluorescent tubes contain mercury phosphorus powder and traces of lead and cadmium, which are considered environmental contaminants under the Nunavut *Environmental Protection Act* (GN 2010b). The only disposal method for fluorescent tubes is through an approved hazardous waste recycling or disposal facility (GN 2003). Government of Nunavut guidelines on *Mercury-Containing Products and Waste Mercury* (GN 2010b) and *Environmental Guideline for the General Management of Hazardous Waste* (GN 2010a) are included in the Hazardous Materials Management Plan, respectively. These guidelines are followed and wastes having mercury will be sent to a certified waste management company for treatment, recycling, and/or disposal.

3.3.2 Ozone Depleting Substances

Ozone depleting substances include chlorofluorocarbons or halons. Common sources include refrigeration equipment, air conditioning equipment, motor vehicle air conditioners, and fire extinguishing equipment (GN 2011b). These materials are hazardous in nature; consequently, all disposal of ozone depleting substances will take place at an approved facility.

Any non-salvageable equipment containing ozone depleting substances will have the ozone depleting substances removed by a certified technician prior to disposal in the proposed landfill. The *Environmental Guideline for Ozone Depleting Substances* can be consulted as needed.

3.4 Total Volume of Waste

An estimate of waste volume is required to determine the appropriate size of the landfill. However, an exact waste volume is not a critical parameter in the design because of the flexibility of design to accommodate extensions (larger to accept more waste) or contractions (smaller to accept less waste) within the Whale Tail WRSF. Table 3.1 tabulates the estimated mass of waste destined for the landfill each year and cumulatively for the life of the Project.

As part of the larger waste management system, records are kept of quantity of waste landfilled, type and quantity of materials recycled. All this information will be submitted to regulators in an annual report.

Table 3.1 Waste in Landfill

Year	Waste Accumulated in Landfill (m ³)
2019	1,746
2020	6,241
Total	7,987

m³ = cubic meter

SECTION 4 • LANDFILL LOCATION AND CONSTRUCTION

The landfill is located within the Whale Tail WRSF. Berms will be constructed along the perimeter of the landfill (see drawing in Appendix A).

Both the floor and the berm of the landfill are constructed with rockfill and/or waste rock material sourced from the open pit. It was prepared by first placing a foundation (or base) of waste rock or and/or rockfill material directly on top of the natural ground to form a foundation. A service road, accessible only to mine staff and Agnico Eagle contractors, connected the landfill to other mine infrastructure. Berms surrounding the facility on two sides were built of waste rock and/or rockfill material. The design of the berms does not assume that they will be in a frozen state, or permanently impermeable to leakage. The berms serve to confine the area for waste disposal and act as a wind shield to reduce windblown debris. A typical section of the design of the landfill is presented in Appendix A. The location of the landfill will change for every 20m increase in elevation to allow access at all time of the landfill. Each landfill will respect the same specifications as the one in Appendix A. The landfill incorporation schematic is in Appendix B.

SECTION 5 • LANDFILL OPERATION

5.1 Operations Plan

The following is the operating plan for the landfill.

5.1.1 Materials Acceptable for Disposal

See Section 3.2.

5.1.2 Materials Not Acceptable for Disposal

See Section 3.3.

5.1.3 Site Development and Landfilling Method

The sub landfills will be filled progressively in an orderly manner. Specifically, waste will be placed at one end of the sub landfill at full height and then the active waste area progressively advances. Areas where the waste has been placed to full height and levelled, will be progressively covered by placement of a minimum 0.3 m thickness of waste rock fill on top of the waste.

5.1.4 Staffing and Equipment

The landfill does not require a full-time attendant during placement of material and maintenance of the landfill. Energy and Infrastructure department roll off trucks haul waste to the landfill and a dozer is used to spread and level the waste.

5.1.5 Leachate Management

The leachate from the landfill is expected to be very weak (dilute) or simply absent due to the controls on materials placed in the landfills. Therefore, specific landfill leachate management is not required.

In the event there is leachate from the landfill during periods of heavy rainfall or spring freshet, the runoff will be collected in WRSF Pond and directed to the Whale Tail Attenuation Pond where it will be integrated as part of the water management plan and then, if necessary, treated before release to the receiving environment.

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

If greater volumes of leachate, or leachate with high ionic strength is found coming from the landfill, an investigation will immediately be undertaken to determine the cause. This could lead to changes

in the configuration and/or management of the landfill to further limit water encountering landfill materials and/or modify the water management strategy in this area. Because the landfill will be located in an area with underlying permafrost deep groundwater contamination from potential landfill leachate is not anticipated.

5.1.6 Protocol for Placement of Material

Waste are disposed of directly on the pad and compacted with heavy equipment against the berm or existing row. When the sub landfill is either full of compacted waste, the waste is covered with waste rock. A new sub landfill will be built, including rockfill berm to act as a wind shield.

Materials destined for burial in the demolition landfill will be dismantled as safely and efficiently as possible, stacked in a stockpile and will be cut by flame, hydraulic shears or saw, into manageable sizes for safe transport and placement in the landfill. The demolition debris will be placed in compacted layers and then buried. Once compacted, waste rock will be placed on the debris to infill voids. Once a continuous layer of waste rock has been covered the compacted debris a final cover of non-potentially acid generating (NPAG) waste rock will be placed over the entire landfill area.

5.1.6 Surface Water and Erosion Control

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

5.1.7 Inspections

The environmental department conduct periodic inspections to ensure compliance with the regulations, permits and operational plans.

5.2 Conceptual Closure Plan

The following is a conceptual plan for closing the landfill.

5.2.2 Estimate of Total Waste Volumes, Tonnage and Life of Landfill

Upon closure, it is estimated that the landfill will have the volumes as described in Section 3.4.

5.2.3 Final Cover Design

Subsequent detailed engineering analysis determined that transition layers would not be required to prevent seepage from the landfill and were therefore removed from the original design. The landfill will become encapsulated within the Whale Tail WRSF by surrounding and covering the facility with one layer of NPAG waste rock (same thickness than surrounding cover for Whale Tail WRSF), and should thereafter be stable and protected by the NPAG thermal cover. When finalizing the design for the cover, the need for thermistors will be evaluated. The cover surface will be left irregular to capture snow, windblown sediment, and plant seeds. Drainage water, if present will be naturally directed to the WRSF Pond, monitored, and discharged.

5.2.4 End use of Landfill after Closure

There is no planned end use of the landfill post-closure because it will be part of the Whale Tail WRSF.

5.2.5 Water Management

Contact water from the landfill at its closure will continue to be managed using best management practices in accordance with the Project's Interim Closure and Reclamation Plan.

SECTION 6 • TRAINING

All Agnico Eagle personnel and contractors working at the Whale Tail Pit Project are trained in waste management. This included in the site orientation upon arrival, which include the identification of waste bins and dumpsters for the different categories of waste, where these are located, and the signage associated with each. Stewardship of the environment emphasized in that it is everybody's responsibility to properly dispose of waste, including wastes that can be recycled. This extends to ensuring wildlife does not have access to food or food wastes.

The success of the waste management system at the mine site is dependent on the proper disposal of all waste by all employees and contractors. Waste management training beyond the initial orientation occur in each department. Environment department staff reinforce proper waste segregation and disposal at various departmental meetings.

The Project's Energy and Infrastructure Department have enhanced on-the-job waste management training as they collect and process all mine site waste. They are trained in identifying misdirected waste, what to do with it, and in recommending where further waste management training is required on-site.

All maintenance staff must successfully complete equipment training before they can operate machinery and vehicles related to waste management on-site. Additionally, crews handling waste are fully trained in safe work procedures. Training programs include Workplace Hazardous Materials Information System (WHMIS) and transportation of dangerous goods. Training completion and retraining documented and tracked by the Project's Human Resources Department.

SECTION 7 • PLAN REVIEW AND CONTINUAL IMPROVEMENT

This Plan will be reviewed, as required, in consultation with the Environment Coordinator to reflect changes in operations and/or technology. This Plan will be reviewed and updated every two years if required, to reflect changes in operations and/or technology. Improvements suggested through these reviews would be implemented in consultation with the regulators.

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APPENDIX A • LANDFILL INCORPORATION SCHEMATIC

