Tailings Storage Facility (TSF) Design Report and Drawings
6515-583-163-REP-001

30-Day Notice to Nunavut Water Board
In Accordance with Water License 2AM-MEL1631 (Part D, item 1)

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TABLE OF CONTENTS

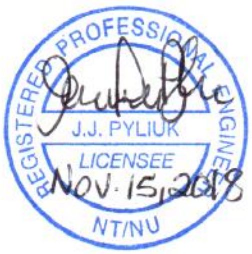
LIST OF TABLES

LIST OF APPENDICES

DOCUMENT CONTROL

Version	Date	Section	Page	Revision
1	November 15, 2018			Design Report

Prepared by:



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1 INTRODUCTION

Agnico Eagle Mines Limited (Agnico Eagle) is developing the Meliadine Project (the Project), a gold mine located approximately 25 km north of Rankin Inlet and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. Situated on the western shore of Hudson Bay, the Project site is located on a peninsula between the east, south, and west basins of Meliadine Lake (63°1'23.8'' N, 92°13'6.42"W).

The current mine plan focuses on the development of the Tiriganiaq gold deposit which will be mined using both conventional open-pit and underground mining operations. Existing or proposed mining facilities to support this development include a plant site and accommodations, overburden stockpile, tailings storage facility (TSF) and a water management system comprised of collection ponds, diversion channels, dikes and retention berms. A Type "A" Water License (No. 2AM-MEL-1631) was awarded to Agnico Eagle for the development of this Project in 2016.

Tailings generated from mill production at the Project will be dewatered by pressure filtration to a solids content of approximately 85% by weight. The filtered tailings will have the consistency of damp, sandy silt and will be transported by haul truck to either the paste plant for use underground as backfill or for placement and storage in the TSF in a process conventionally referred to as "dry stacking". Production of filtered tailings is expected to commence in Q1 of 2019 as part of the commissioning process for the mill.

In accordance with Part D of the Type "A" Water License, this report summarizes the design basis and design criteria for the TSF. Also provided are construction and operational procedures, thermal instrumentation and monitoring requirements and issued for construction (IFC) drawings.

2 GENERAL SITE CONDITIONS

2.1 CLIMATE

The Project site lies within the Southern Arctic Climatic Region, where daylight reaches a minimum of four hours per day in winter and a maximum of 20 hours per day in summer. The nearest weather station is Rankin Inlet A (Station 2303401), located approximately 25 km south of the Project site.

The climate is extreme, experiencing long cold winters and short cool summers. The monthly mean air temperature is typically above 0°C for the months of June to September, and is below 0°C between October and May. July is typically the warmest month with a mean temperature of 12°C and January the coldest with a mean temperature of -31°C. The mean annual temperature for the period of record from 1981 to 2009 was -10.4°C.

Mean annual precipitation at the Project site is estimated to be 411.7 mm, after accounting for rainfall and snowfall undercatch (based on the hydrological year from October 1 to September 30). Approximately 51% of the precipitation occurs as rainfall, while 49% occurs as snow.

The region is known for high winds, blowing from the north and north-northwest direction more than 30% of the time. The mean values for wind speed show that the north-northwest, together with north and northwest winds, have the highest speeds and tend to be the strongest. Mean monthly wind speeds are typically between 19 km/hour and 27 km/hour. Calm winds occur at a frequency of only 2.8%.

The climate in the Project region is projected to be warmer for the 2020s, 2050s, and 2080s time horizons when compared to the observed historic values (Agnico Eagle and Golder 2014).

Precipitation shows an increase compared to historical values, but the majority of projections are not significantly different from the annual recorded precipitation value

2.2 PERMAFROST

The Project site is located within the Southern Arctic terrestrial eco-zone in an area of continuous permafrost. Continuous permafrost to depths of between 360 m to 495 m is expected based on ground temperature data from thermistors installed throughout the Project site and as measured in underground development. The measured ground temperature data indicates that the active layer is 1.0 m to 3.0 m in areas of shallow soils and areas away from the influence of lakes. The typical permafrost ground temperatures at the depths of zero annual amplitude (typically at a depth of below 15 m) are in the range of -5.0°C to -7.5°C in the areas away from lakes and streams. The geothermal gradient ranges from 0.012°C/m to 0.02°C/m (Golder 2012a).

2.3 GROUNDWATER

In areas of continuous permafrost, there are generally two groundwater flow regimes: a shallow groundwater flow regime located in the active layer near the ground surface, and a deep groundwater flow regime located beneath permafrost. From late spring to early autumn, when temperatures are above 0˚C, the active layer thaws. Within the active layer, the water table is expected to be a subdued replica of topography, and is expected to parallel the topographic surface. The Project area groundwater in the active layer flows to local depressions and ponds that drain to larger lakes.

The permafrost in the rock in the Project area would be virtually impermeable to groundwater flow. The shallow groundwater flow regime, therefore, has little to no hydraulic connection with the deep groundwater regime. A numerical hydrogeological model for the deep groundwater flow regime was developed (Golder 2013a). The results of the hydrogeological model have indicated that the rock at the Project site below the base of the permafrost or in taliks is generally of low hydraulic conductivity, on the order of 3×10^{-9} m/s (Golder 2013b).

To a lesser degree, groundwater beneath the permafrost is influenced by density differences due to the upward diffusion of deep-seated brines (density-driven flow). In the Canadian Shield, concentrations of Total Dissolved Solids (TDS) in groundwater increase with depth, primarily in response to upward diffusion of deep-seated brines. Salinity can induce a freezing point depression, creating a cryopeg in permafrost where water can be unfrozen even though the temperature is below 0°C. At the Project site, the freezing point depression was calculated to be equivalent to -3.3°C (Golder 2012a). The portion of the permafrost, where groundwater may be partially or wholly unfrozen due to the freezing point depression, has been estimated to be at a depth of 350 m to 375 m (Golder 2012a).

2.4 SEISMIC ZONE

The Project is situated in an area of low seismic risk. The peak ground acceleration (PGA) for the area was estimated from the 2015 National Building Code of Canada seismic hazard website (http://earthquakesscanada.nrcan.gc.ca). The estimated PGA is 0.022 g for a 5% in 50-year probability of exceedance (0.001 per annum or 1 in 1,000 year return) and 0.037 g for a 2% in 50-year probability of exceedance (0.000404 per annum or 1 in 2,475 year return) for the area.

3 DESIGN BASIS

3.1 2018 MINE WASTE MANAGEMENT PLAN

As part of the documentation series produced for the Type “A” Water License application, Agnico Eagle presented a Mine Waste Management Plan (MWMP) for the Project in March of 2018. This plan described the feasibility-level design basis and general operational procedures for the TSF.

Key points for the design and construction of the TSF from the 2018 MWMP included the following:

- A total of 12.1 Mt of tailings will be produced over a mine life of approximately eight (8) years. About 9.7 Mt of tailings (80% of the total) will be placed in the TSF as dry stack tailings, with the remaining 2.4 Mt (20% of the total) to be used as underground cemented paste backfill for the primary and longitudinal stopes.
- Process commissioning and tailings placement is to begin in Q2 of Year -1 (2019), with full ore processing capacity expected at the end of Q3 (Year -1).

3.1.1 Refinements Since 2018 Mine Waste Management Plan

Refinements to the expected production schedule and predicted quantities have been made since the release of the March 2018 MWMP. Specifically, full ore processing capacity is now anticipated in early Q2 of Year -1 (2019), or about six (6) months ahead of the previous schedule. Accordingly, commissioning and early tailings placement have also advanced, with initial commissioning activities now slated to begin at the very end of Q4 of Year -2 (2018).

The current projections of expected tailings quantities have increased, with the total amount over the eight (8) year life-of-mine now anticipated to be approximately 14.9 Mt. A greater proportion of tailings are now slated for use as underground backfill (27% or 4.0 Mt), while a lesser proportion (73% or 10.9 Mt) will be stored in the TSF.

Table 1 summarizes the production schedule, quantities and distribution of the tailings by year.

Table 1: Schedule, Quantities and Distribution of Tailings by Year

Year	Mine Year	Tailing Solids from Mill (t)	Tailing Solids to be Used as Underground Backfill (t)	Tailing Solids to be Placed in Dry Stack TSF (t)
2019	Yr-1*	962,543	380,517	582,026
2020	Yr 1	1,328,999	443,962	885,037
2021	Yr 2	1,368,750	316,143	1,052,607
2022	Yr 3	1,368,750	371,743	997,007
2023	Yr 4	2,007,500	518,249	1,489,251
2024	Yr 5	2,196,000	485,926	1,710,074
2025	Yr 6	2,190,000	500,187	1,689,813
2026	Yr 7	2,190,000	521,941	1,668,059
2027	Yr 8	1,320,570	474,318	846,252
Total		**14,933,113**	**4,012,986**	**10,920,127**

** Includes approximately 60,000 t of tailings produced during commissioning from end Q4 (2018) to Q1 (2019)*

3.2 TAILINGS PROPERTIES AND CHARACTERISTICS

3.2.1 Geotechnical Properties

Laboratory testing to establish the physical and geotechnical properties to guide design of the TSF was conducted by Tetra Tech (EBA, 2013 and Tetra Tech EBA, 2014a). The test program included physical index testing, gradation analysis, moisture-density relationship (Standard Proctor) testing, consolidation, direct shear, hydraulic conductivity and soil water characteristics. The key findings from the test results are summarized as follows:

- The tailings will comprise approximately 17% sand, 81% silt and 2% clay-sized particles. The material is of low plasticity and low compressibility;
- The maximum dry density is 1,800 kg/m^3 at an optimum moisture content of 14.9% (Standard Proctor);
- The coefficient of consolidation (c_v) of the tailings ranges from 24.6 to 29.8 m^2/year under pressures ranging from 10 to 1,600 kPa;
- The tailings have a soil water characteristic curve with an air entry value of 20 kPa and a residual suction of 900 kPa;
- For tailings samples with a dry density of 1,700 kg/m^3, the inferred angle of friction is 33.5º and the apparent cohesion is 9.9 kPa. The saturated hydraulic conductivity for these samples is 2.91 x 10^{-07} m/sec;

3.2.2 Geochemical Characteristics

A series of waste geochemical characterization programs were carried out between 1998 and 2011, with the principle findings presented in Golder 2014. Testing the acid rock drainage and metal leaching potential included mineralogical and chemical composition testing, acid base accounting (ABA), shake flask extraction (SFE), humidity cell tests (HCTs), large column tests and field cell tests. Results of the geochemical characterization indicate that both the tailings from the Tiriganiaq deposit and the waste rock is considered non-potentially acid generating (NPAG) and have low potential for metal leaching (ML).

Salinity content stimulation indicate levels of 8,000 ppm of chlorides can be expected in the steady state process water, assuming a 3% moisture content of the ore (Soutex, 2016).

3.3 LOCATION AND SURFACE CONDITIONS

The TSF will be located on the high ground to the west of the Process Plant and east of Lake B7. Drawing 6515-583-163-001 in Appendix A shows the proposed footprint of the TSF in relation to other site infrastructure, including the TSF water management facilities and haulage roads. Haulage distance from the mill to the TSF ranges from 400 m to 800 m, while a minimum distance of approximately 200 m from the edge of the dry stack pile to Lake B7 is respected.

With the exception of the southeast corner of the proposed facility, which encompasses the top of the northern tip of the Tiriganiaq esker, the ground surface of the proposed footprint is generally relatively flat. Straddling two watersheds, the majority of the TSF falls within Watershed B and gently slopes (less than 2%) to the southwest towards Lake B7. A portion of the eastern side of the footprint lies within Watershed B and slopes towards the CP1 area. Vegetation in the area consists of moss/peat cover. No major waterbodies are within the footprint, although a few shallow localized depressions hold small volumes of water on a seasonal basis. Polygonal or linear topographic expressions typically associated with the presence of vertical ice wedges are not readily apparent.

3.4 SUBSURFACE GEOTECHNICAL CONDITIONS

Numerous site investigation programs have been conducted at Meliadine since 1998, with a total of seven (7) boreholes having been drilled within the proposed TSF footprint. The location of these boreholes is shown on Drawing 6515-583-163-002 and the key geotechnical information summarized in Table 2.

In general, the subsurface of the TSF consists of a thin layer of organic material overlying ice-rich silty sand, gravelly silt and sand, with traces of clay and shells with cobbles. Excess ice was observed in most of the boreholes. The depth to bedrock ranges from 1.3 m on the eastern side of the TSF to 7.3 m at the southeastern side.

Table 2: Summary of Geotechnical Information from Overburden Soils in TSF Area

Borehole No.	Organic Layer Thickness (m)	Overburden Soil Description	Ice Conditions	Bedrock Depth (m)
GT07-11	0.20	Sand, ice-rich fine-grained materials, till (not logged in detail)	~2.25 m (from 0.75 to 2.0 m) ice-rich fine-grained material with up to 75% ice	~5.5
GT09-15	0.30	Low recovery – gravel, silty sand	NA - Thawed during drilling	3.5
GT11-10	0.75	Silty peat, ice and silt, gravelly sandy silt	1.75 m ice and silt from 0.75 m to 2.5 m	6.3
GT12-18	--	Gravelly silty sand, sandy silt, silty sand	Vs from 1 to 2 m	7.3
GT12-19	--	Gravelly silty sand, sandy silt, silty sand	Vs to Vc, Vr from 2 to 2.7 m	3.1
GT13-07	0.10	Boulders, sand and silt	NA – thawed during drilling	1.3
GT14-13	0.10	Silty gravelly sand, sand and silt	Up to 10% Vx, Vc, 5% from 1.8 m to 3.2 m	3.2

3.5 ADDITIONAL KEY DESIGN CONSIDERATIONS

In addition to the expected tailings production schedule, quantities and characteristics, a number of other factors were reflected in the detailed design of the TSF. Additional key considerations include:

- **Site climate conditions**: The geographic location of the site was maximized to promote the tailings freezing process, freeze-back of the underlying foundation soils and encourage permafrost development in the facility;
- **Environmental obligations**: Avoidance of impacts on fish-bearing habitat by maintaining a suitable buffer distance from protected natural lakes, minimizing the overall footprint and limiting surface dust generation;
- **Water management**: Facilitate the collection and management of contact water from the TSF during operations to avoid potentially negative impacts on the outside environment and where feasible, divert clean, natural run-off to avoid contact with the tailings and minimize water flow through the TSF area;
- **Geotechnical issues**: Including favorable geotechnical foundation conditions, controlling surface erosion and maintain the short and long term stability of the facility;
- **Constructability/Operational concerns**: Minimize haulage wherever feasible, reduce pre-production construction and optimize local construction availability;

- **Closure**: Reduce closure costs by facilitating early progressive closure of the facility during mine operations when cover materials are readily available and establish a proper closure cover system to limit the potential for long-term seepage through the tailings.

4 DESIGN OF TAILINGS STORAGE FACILITY

4.1 DESIGN CONCEPT AND PARAMETERS

To address the numerous considerations presented in the design basis for the TSF, filtered tailings will be managed using a two-cell placement system and incorporating a progressive closure cover as placement advances. Table 3 presents the key parameters adopted for the detailed TSF design.

Table 3: Key Design Parameters for the TSF

Design Parameter	Value
Filtered tailings solid content to TSF	85% w/w (weight percentage)
Moisture content of filtered tailings to TSF	17.6% (by mass)
Minimum target dry density of compacted tailings	1,650 kg/m^3
Average height of filtered tailings over original ground surface	33 m
Side slope for lower placed tailings (below elevation 80.2 m)	4H:1V
Side slope for upper placed tailings (above elevation 80.2 m)	3H:1V
Slope of final tailings surface at crest	4%
Final top tailings surface area (Cell 1)	46,359 m^2
Final bottom tailings surface area (Cell 1)	179,741 m^2
Final top tailings surface area (Cell 2)	84,655 m^2
Final bottom tailings surface area (Cell 2)	149,632 m^2

4.1.1 Refinements Since 2018 Mine Waste Management Plan

The 2018 MWMP presented a three-cell management system that had originally been proposed during the 2014 feasibility level scoping assessment. However, a two-cell system has been progressed during detailed design, which offers the following technical advantages over the previously discussed three-cell system:

- **Construction access**. To accommodate the additional 1.2 Mt of tailings expected to be placed in the TSF, both the overall footprint and the average height of the facility have increased slightly from the 2018 MWMP. In order to maintain an acceptable 10% grade on the access ramps to the upper levels of the facility with a three cell system would have required either switch-backs or wrap around ramps, both of which would have further decreased available space and introduced potential safety concerns.
- **Freeze-back**. The two-cell system provides a thinner annual tailings placement which thereby enhances the freeze-back potential of both the underlying ground surface and the placed tailings.

The 2018 MWMP provides a dry density value of 1,710 kg/m^3 for the filtered tailings, which corresponds to 95% compaction when compared to the maximum dry density of 1,800 kg/m^3 (Standard Proctor, ASTM D698) and optimum moisture content of 14.9%. Since the filtered tailings are anticipated to leave the mill at a moisture content that is 2.7% wetter than the optimum, it is anticipated that the 1,710 kg/m^3 dry density will be difficult to achieve in field conditions, particularly during winter placement. For the purposes of detailed design therefore, the more conservative target dry density value of 1,650 kg/m^3 was adopted, which reflects 92% of the maximum dry density value.

4.2 STABILITY ANALYSIS

Limit equilibrium analyses were conducted to calculate the deterministic factor of safety (FoS) against slope failure under both static and pseudo-static (seismic) conditions during the 2014 feasibility study. Typical cross sections of the TSF were evaluated under short and long term construction and closure situations assuming various conditions. The minimum calculated FoS assuming unfrozen tailings and ground conditions under various loading scenarios from this analyses are provided in Table 4.

Table 4: Summary of Slope Stability Analysis Results

Loading Scenario	Calculated Minimum Factor of Safety (Tetra Tech, 2014)	Condition
Short-term static (Construction)	2.1	Unsaturated, unfrozen tailings overlying unfrozen ice-rich silt, water table on ground surface, excess pore water pressures generated
Long-term static (Closure)	1.9	Unsaturated, unfrozen tailings overlying thawing ice-rich silt, water table on ground surface, no excess pore water pressures
Long-term pseudo-static (Closure)	1.7	Same condition as above with addition of appropriate peak ground acceleration for seismic condition

Generally, the selection of a design FoS for an earth structure depends on the importance of the structure, potential failure consequences, and uncertainties involved in design loads and soil parameters. The 2014 stability analysis compared the calculated safety factors to guidelines for mine waste dumps as presented in PAE (1991). Updated guidelines for mine waste dump and stockpile design and suggested stability acceptable criteria based on overall consequence of failure and confidence level on site conditions, input parameters, and supporting data have been presented by Hawley and Cunning (2017). The consequence of failure for the TSF can be classified as "Low" for low risk of structure failure and "Moderate" for potential moderate environmental impacts (but manageable). The confidence level can therefore be classified as "Low" to "Moderate".

Based on the classifications and site conditions, the minimum FoS for the TSF stability design are adopted as presented in Table 5.

Table 5: Design Factors of Safety for TSF Stability

Conditions	Suggested Factor of Safety in PAE (1991)	Suggested Factor of Safety in Hawley and Cunning (2017)	Design Factor of Safety Adopted for TSF
Long-term, static loading for shallow slip surfaces	1.2	N/A	**1.2**
Short-term, during construction for overall stability (or deep-seated slip surfaces)	1.3 – 1.5	N/A	**1.3**
Long-term static loading for overall stability (or deep-seated slip surfaces)	1.5	1.4 – 1.5	**1.5**
Long–term seismic (pseudo-static) loading for overall stability (or deep-seated slip surfaces)	1.1 - 1.3	1.1 – 1.15	**1.1**

The results indicate that the calculated FoS for the TSF exceed industry and AEM requirements for all loading scenarios assuming unfrozen tailings and ground conditions. The stability analyses did not consider the freeze back that is expected to occur in the facility and the related accompanying increase in strength parameters. As the 2014 results are therefore considered conservative, and as the general geotechnical parameters of the TSF are unchanged since the initial stability assessment, there are no plans to update this analysis at this time.

4.3 THERMAL ANALYSIS

Thermal analysis was conducted to estimate the thermal conditions of the tailings and the foundation soils during mine operations and closure during the 2014 feasibility study, with a summary of these results reported in the following paragraphs. It is recognized that this analysis is reflective of the tailings placement plan and schedule of the 2018 MWMP and requires updating based on the quantities and schedule presented in this report. However, although overall filtered tailings quantities have increased, the adaptation of a two-cell management system is expected to increase freeze-back capabilities so that the 2014 thermal analysis is anticipated to be conservative.

The results from the 2014 thermal analysis indicated that given the assumed conservative initial tailings temperatures of 15°C to 25°C when placed:

- The original overburden ground below the tailings can freeze back and be maintained in a frozen condition afterwards, with the estimated temperature being around -4°C in the long term;
- The majority of the tailings placed would freeze after one winter and would remain frozen except for the final top thick layer placed during the late stages of cell development or the layer placed within the active layer;
- Almost all the tailings will become frozen within several winters after the final closure cover is placed;
- The predicted temperatures of the placed tailings range from -1°C to -4°C within 100 years of assumed climate change conditions after initial mine closure.

The thermal model will be verified and refined on a periodic basis throughout the life-span of the TSF, as ground/tailings temperature monitoring data and as-built information becomes available.

4.4 CREEP AND LONG TERM DEFORMATION

As noted in Section 3.4, the foundation soils underlying the TSF tend to be ice-rich, with excess or visible ice observed in most of the boreholes drilled throughout the footprint. As frozen soils and ice act as visco-elastic materials under loading and exhibit time dependant deformation (creep), analysis was conducted during the 2014 feasibility assessment to evaluate the potential for creep movements of the ice-rich material in the TSF foundation. The analysis was based on the conservative assumption of the presence of a continuous 1 m thick layer of ice-rich silt beneath the entire TSF footprint. Based on predicted long-term overburden temperatures of -4°C (from the thermal analysis), the results of the creep analysis are summarized as follows:

- Maximum horizontal displacements are expected to occur at the middle of the TSF side slopes, with 0.07 m of horizontal movement predicted ten years after closure and 0.55 m of movement after 100 years;
- Maximum vertical displacements occur at the crest of the TSF side slopes, with 0.02 m of movement predicted ten years after closure and 0.26 m after 100 years;

- The TSF and ice-rich permafrost foundation are expected to deform in secondary creep with a low strain rate of 3.4 x 10^{-7}/hour or less in the long term.

As mentioned, these results are based on conservative assumptions regarding the underlying foundation soils of the TSF and may be updated as required as the thermal model continues to be verified and refined.

4.5 PROGRESSIVE AND FINAL CLOSURE COVER

The TSF final closure cover was designed based on the thermal and stability analysis conducted at the feasibility stage of the project and has the design objectives of controlling erosion and dust generation from the stack, in addition to enhancing the freeze-back capabilities of the facility. To reduce final closure costs and minimize erosion, cover material on the side slopes will be placed progressively with the filtered tailings. The closure cover design may be updated when required pending performance monitoring of the TSF during mine operations.

Cover material placed on the side slopes will:

- Consist of 600 mm minus NPAG waste rock, of varying gradation;
- Be placed in controlled lifts of maximum 1.0 m in height prior to compaction with a 10-ton vibratory roller;
- Be placed in minimum thicknesses of 4.2 m over the lower toe of the final tailings side slopes and in minimum thicknesses of 3.7 m over the upper side slopes.

Final closure cover material will be placed when each cell reaches its operational capacity and sloped 4% to discourage ponding and surface infiltration. In addition to a top capping of 2.5 m thickness of 600 mm minus waste rock, the final cover will incorporate select overburden till placed and compacted over the top surface of the tailings. The till material is intended to reduce surface infiltration and enhance freeze-back potential and enhance thermal protection and will meet the following specifications:

- Inorganic, sandy silt or silty sand with a fines content of 20% to 60% and maximum particle size of 300 mm;
- Placed in an unfrozen condition and have a minimum thickness of 0.5 m.

Volumes of closure cover material distributed by year are provided in Table 6.

Table 6: Summary of Cover Material Quantities during Mine Operations

Year	Mine Year	Volume of Waste Rock Placed on Side Slopes (m3)	Volume of Waste Rock Placed on Final Top Surface (m3)	Total Volume of Waste Rock Placed as Closure Cover (m3)	Total Volume of Overburden Placed on Top Surface (m3)
2019	-1	39,760		39,760	
2020	1	97,036		97,036	
2021	2	89,103		89,103	
2022	3	110,124		110,124	
2023	4	139,379		139,379	
2024	5	117,037	123,942	240,979	22,940
2025	6	154,474		154,474	
2026	7	127,840		127,840	
2027	8	46,250		46,250	
2028	9	--	230,180	230,180	42,610
Total		**921,003**	**354,122**	**1,275,125**	**65,550**

5 CONSTRUCTION METHODS AND PROCEDURES

5.1 PRE-CONSTRUCTION

Limited pre-construction activities are required at the TSF prior to tailings placement. As the facility is generally located on high ground with a series of water management and diversion structures around it, a bottom drainage layer is not necessary and the design assumes that filtered tailings will be placed directly over original ground.

Excess snow and/or ice will be removed from the ground surface before tailings placement and efforts will be made to avoid placement in areas of localized water accumulation.

A topographical survey of each cell will be completed prior to tailings placement.

5.2 OPERATIONAL CONSTRUCTION

After processing, filtered tailings will be deposited via conveyor from the mill to the Tailings Dewatering Building (TDB). The TDB has a maximum storage capacity of approximately 12,000 tonnes of filtered tailings (two to three days at maximum production) in the event that extreme weather conditions or equipment issues prevent haulage.

From the TDB, the tailings will be loaded with a CAT 988 loader into Volvo 40-ton haul trucks and hauled to either the TSF or to the Paste Plant where the filtered tailings will be mixed with cement and used underground as structural backfill for mining operations. The design capacity of the Paste Plant is approximately 3,000 tonnes per day (tpd), with operations expected to commence in Q2 2019.

The general construction sequence of the TSF during mill operations will be as follows:

- Conduct a topographical survey of the original ground surface and place stakes marking the limits of closure material, tailings and lift heights.
- Access from the haul road will be constructed with compacted waste rock cover material.
- Excess snow will be pushed out of the dumping area with the bulldozer during winter placement.
- Tailings will be spread after dumping into controlled lifts of maximum height 0.3 m with a CAT D6 bulldozer.
- Each lift of tailings will be compacted with a CAT CS356 10-ton vibratory drum roller to the target dry density before the next lift is placed.
- Each subsequent lift of tailings material will be “stepped in”, forming a staircase-like structure around the perimeter to establish the required design side slope.
- Waste rock will be placed and compacted around the side slopes as progressive cover material.

Further details regarding the overall deposition plan are provided in Section 6.0.

5.3 QUALITY CONTROL

A quality control plan will be developed and included as part of the Operation, Maintenance and Surveillance (OMS) plan for the TSF. This plan is expected to include on-going verification of design assumptions and parameters, including monitoring of ground/tailings temperatures, moisture content, placement temperatures of the filtered tailings, target dry density (compaction) and pore water salinity.

6 OVERALL TAILINGS DEPOSITION PLAN

The overall tailings deposition plan considers measures to both promote freeze-back of the tailings and the underlying original ground, as well as limit dust generation, control surface erosion and reduce final closure costs. The yearly schedule of deposition per cell, as well as average height of tailings placed in each cell is summarized in Table 7. Drawings 6515-583-163-002 to 6515-583-163-008 in Appendix A illustrate the yearly planned development of the TSF during mine operations and closure.

Table 7: Tailings Placement Schedule and Estimated Tailings Heights

Year	Mine Year	Tailing Solids to be Placed in Dry Stack TSF (t)		Estimated Average Height of Tailings Placed in Each Cell (m)		Planned Tailings Placement Period	
		Cell 1	Cell 2	Cell 1	Cell 2	Cell 1	Cell 2
2019	Yr-1	582,026		1.6		Jan to Dec	
2020	Yr 1	885,037		5.3		Jan to Dec	
2021	Yr 2	1,052,607		10.3		Jan to Dec	
2022	Yr 3	997,007		16.1		Jan to Dec	
2023	Yr 4	868,728	620,522	22.7	2.6	Jan to Jul	Aug to Dec
2024	Yr 5	717,635	992,439	33.0	6.9	Jan to May	Jun to Dec
2025	Yr 6		1,689,813		15.2		Jan to Dec
2026	Yr 7		1,668,059		24.7		Jan to Dec
2027	Yr 8		846,252		33.0		Jan to Aug
Total		**5,103,041**	**5,817,086**				

To promote freeze-back and permafrost development in the tailings and underlying ground surface, the following placement strategies will be adopted:

- Seasonality considerations. November to March is typically a period of sub-zero temperatures and snowfall, while April to October is a period of thawing/freezing conditions with rainfall. The initial lift of tailings over original ground will be placed during winter conditions whenever feasible.
- Restricted yearly tailings thickness. The maximum thickness of tailings placed during the initial year of each cell will be limited to 2.6 m, while the total yearly thickness placed in a cell for subsequent years will be no greater than 10.3 m.

As discussed in Section 5.2, the placed filtered tailings will be spread into thin lifts and compacted, with this placement method expected to reduce the potential for wind erosion and dust generation from the surface. However, dust generation is anticipated to be a challenge during tailings placement in active zones, particularly during the winter months due to freeze drying of the surface. Additional measures to limit dust and control surface erosion of the overall deposition plan will include:

- Placement of progressive closure cover over the final perimeter slopes as soon as possible;
- The final closure cover over the top tailings surface of Cell 1 will be placed when Cell 1 reaches capacity;
- Consideration of prevailing north-northeast wind direction by development of the southern portion of Cell 1 first and progression northward;

- During summer months, dust will be controlled by spraying water and/or other approved chemical dust suppressants if problematic. Winter months will utilize smaller working zones and sealing of the surface through compaction of zones that are finished.

The placement of thin lifts of rock material will be used to facilitate circulation of haul trucks to the deposition point during summer placement if required. These intermittent layers will be covered in tailings when surfaces become trafficable.

Alternate zones for deposition within the TSF, particularly during periods when weather conditions make placement more complex (i.e. heavy rainfall) or if the tailings are produced at less than optimum condition, will be identified.

7 WATER MANAGEMENT

The water management system of the TSF consists of berms, channels and collection ponds designed to collect any seepage and runoff from the filtered tailings, as well as divert water away from the storage facility itself. Design and drawings of the water management infrastructures related to the TSF have been approved by the Nunavut Water Board.

As indicated previously, two catchment systems are impacted by the TSF, with the management strategy for each watershed summarized as follows:

1. CP1 Catchment. Seepage and runoff from the placed filtered tailings within the CP1 catchment area will stream through Culverts 1, 18 and 19 to Channel 1 for deposit in CP1.
2. Lake B7 Catchment. Seepage and runoff will be collected in Pond CP3 either directly or via Channel 3. Water collected in CP3 will be pumped to H13 where it will flow through Channel 1 into CP1. Berm 2 serves to divert surface runoff away from the placed filtered tailings.

All water management infrastructure will remain in place until mine closure activities are complete and monitoring results demonstrate that the contact water quality from the TSF meets the discharge criteria. Further details on water management for the TSF are provided in the Water Management Plan (Agnico Eagle, 2018a).

8 MONITORING AND INSPECTION

Performance monitoring is an integral part of the operation of any structure in an arctic environment. Geotechnical instrumentation is required to monitor the behavior of the placed filtered tailings and the underlying foundation during operation of the TSF. The instrumentation is intended to provide the following information:

- Confirmation that the performance of the foundation soils and placed filtered tailings are consistent with the predictions made during the design studies, notably in terms of stability, deformation, seepage, and thermal analyses.

- Early warning of the development of potentially adverse trends such as seepage, deformation, and permafrost degradation.

The instrumentation plan therefore includes a minimum of eight (8) vertical ground temperature cables (GTCs) throughout the TSF area, installed to a minimum depth of 10 m below the original ground to verify the thermal conditions and assumptions. The proposed locations of the GTCs is presented on Drawing 6515-583-163-004. Additional vertical and horizontal ground temperature cables may be installed if required after review of monitoring data and operational performance. Thermistor readings will be measured once a month during the first year, and then on a quarterly basis during operation, with the measured readings analyzed and reported in the annual inspection report.

Visual inspection and monitoring can provide early warning of many conditions that can contribute to structure failures and incidents. Agnico Eagle will regularly undertake a visual inspection of the TSF, especially during spring and summer periods and note areas of seepage, unusual settlement or deformation, cracking or other signs of instability. Records of all inspections will be maintained.

An annual inspection, in accordance with Part I, items 14 and 15 of Water Licence-2AM-MEL1631 will be conducted by a qualified Geotechnical Engineer to document the performance of the facility. The reports will be submitted to the Nunavut Water Board as per the water license requirements.

Further details regarding the monitoring and inspection plan for the TSF can be located in the 2018 MWMP (Agnico Eagle, 2018b).

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Appendix A