Appendix 17

Meadowbank Mine Waste Rock and Tailings Management Plan

MEADOWBANK GOLD MINE

WASTE ROCK AND TAILINGS MANAGEMENT REPORT & PLAN – 2018

MARCH 2019

EXECUTIVE SUMMARY

Agnico Eagle Mines Ltd. Meadowbank Division (AEM) is operating the Meadowbank Gold Mine (the Mine), located on Inuit-owned surface lands in the Kivalliq region approximately 70 km north of the Hamlet of Baker Lake, Nunavut. The Mine is subject to the terms and conditions of both the Project Certificate issued in accordance with the Nunavut Land Claims Agreement Article 12.5.12 on December 30, 2006, and the Nunavut Water Board Water License No. 2AM-MEA1526 issued on July 23, 2015. This report presents an updated version of the Mine Waste Rock and Tailings Management Plan for Meadowbank mine.

The Meadowbank Mine consists of several gold-bearing deposits: Vault, Portage and Goose Island. Prior to beginning of mining a series of dikes were built to isolate the mining activities from neighbouring lakes.

Waste rock from the Portage and Goose Island Pits is stored in the Portage Rock Storage Facility (Portage RSF), and in the Portage Pit as infill. Pit infill is carried out in areas where mining is completed, and, as such, contributes to the overall fish habitat compensation approved by Fisheries and Oceans Canada (DFO). The Portage RSF was constructed in a way to minimize the disturbed area and is capped with a 4m layer of non-acid-generating rock to constrain the active layer within relatively inert materials as part of progressive reclamation. This control strategy is designed to minimize the onset of oxidation and the subsequent generation of acid rock drainage through freeze control of the waste rock as a result of permafrost encapsulation and capping with an insulating convective layer of NAG rock. The waste rock below the capping layer is expected to freeze, resulting in low rates of acid rock drainage (ARD) in the long term. Thermistors currently installed in the Portage RSF indicate that freezing is occurring.

Mining commenced at the Vault Pit mining operation in 2014. Waste rock from the Vault Pit, Phaser Pit and BBPhaser Pit mining operation is stored in the Vault Waste Rock Storage Facility (Vault RSF). Geochemical predictions indicate that a capping layer will not be required at the Vault RSF as the majority of waste rock produced is NAG. To date, through the ARD testing program, it has been determined that approximately 85.5 % of the waste rock generated is NAG. As a precaution, PAG waste rock is placed in the middle of the Vault RSF and this material will be covered with at least 4m of NAG to minimize any generation of ARD to promote freeze back.

The Tailings Storage Facility (TSF) is located with the Portage Pit Area and is comprised of the South Cell and the North Cell. These cells are delimited by tailings retaining dikes that are progressively built as capacity is required. The division of the TSF into cells allows tailings management in comparatively smaller areas with shorter beach lengths that reduce the amount of water that is trapped and permanently stored as ice. Operation in cells also allows progressive closure and cover.

Tailings are deposited sub-aerially and sub-aqueously as a slurry using the end of pipe technique. Tailings deposition is alternated between North Cell and South Cell, depending on the tailings

deposition plan. In 2018 tailings deposition occurred in the North Cell from August to October and in the South Cell for the remainder of the year.

As the Cells are filling with tailings, additional engineered structures are required. In 2018:

- North Cell Internal Structure (NCIS) was partially constructed to variable El (152-154 m) to increase the North Cell tailings capacity and promote closure landforms;
- Central Dike was raised to El. 145m to increase the South Cell tailings capacity;
- South Cell Permeable berm was constructed to maintain reclaim capability;

As per the latest tailings deposition plan, additional tailings containment structures raises are planned to be progressively built in the TSF to obtain the required capacity to achieve tailings deposition until 2021. AEM is currently in amendment process of its license for in-pit tailings disposal, which would change the tailings management strategy presented in this plan.

Following mine operations, a minimum 2-m thick cover of NAG rockfill will be placed over the tailings as an insulating convective layer to confine the active layer within relatively inert materials. The final thickness of the rockfill cover layer will be confirmed in the final design based on thermal monitoring to be completed during operations. The control strategy to minimize water infiltration into the TSF and the migration of constituents out of the facility includes freeze control of the tailings through permafrost encapsulation. Progressive capping is ongoing in the North Cell since 2015.

Thermal monitoring is ongoing to observe the freezeback of the TSF and RSFs. Additional instruments will be installed at closure.

All infrastructures needed for mine operations, closure and reclamation, including mine waste management areas, will be re-contoured and/or surface treated during closure, according to site specific conditions, to minimize windblown dust and erosion from surface runoff.

Recommendations obtained during the 2017 Meadowbank Annual Report Review have been included in the 2018 Waste Management Plan.

DOCUMENT CONTROL

Version	Date (YM)	Section	Page	Revision
1	2009/10	All	All	Original Plan
2	2013/04	All	All	Comprehensive update to Original Plan
3	2014/03	All	All	Comprehensive update to Original Plan
4	2015/03	Section 1, 2, 3, 4, 5, 6		Updated with the actual Life of Mine (LOM) for operations ending in Q3 2017
		Section 7		Updated according to the tailings deposition plan and water balance for the actual Life of Mine (LOM) for operations ending in Q3 2017
		Section 8		Updated according to additional instruments installed and future monitoring plan
		Section 9		Updated according to additional monitoring plan for final closure design
5	2016/03	All	All	Comprehensive update to Original Plan
6	2017/03	All	All	Comprehensive update to Original Plan
7	2018/03	All	All	Comprehensive update to Original Plan
8	2019/03	All	All	Comprehensive update to Original Plan.

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1 INTRODUCTION

Agnico Eagle Mines Ltd. Meadowbank Division (AEM) is operating the Meadowbank Gold Mine (the Mine), located on Inuit-owned surface lands in the Kivalliq region approximately 70 km north of the Hamlet of Baker Lake, Nunavut. The Mine is subject to the terms and conditions of both the Project Certificate issued in accordance with the Nunavut Land Claims Agreement Article 12.5.12 on December 30, 2006, and the Nunavut Water Board Water License No. 2AM-MEA1526 issued on July 23, 2015.

This report presents an updated version of the Waste Management Plan 2017. The management, monitoring and closure strategies for both waste rock storage facility and tailings storage facility is presented in this document.

This update includes change in the life of mine (LOM), mining sequence, waste placement sequence, tailings deposition parameters, tailings management strategy and an updated discussion on thermal monitoring results.

1.1 RECOMMENDATION FROM 2017 WASTE MANAGEMENT PLAN

Recommendations obtained during the 2017 Meadowbank Annual Report Review have been included in the 2018 Waste Management Plan:

- CIRNAC recommended that AEM provides a comparison of the volume of waste rock generated annually to FEIS prediction. This is addressed in Section 3.1.
- CIRNAC recommends that AEM review the status of current climate change literature to ensure that the design used in the FEIS is still appropriate. This is addressed in Section 2.1.3.1.
- CIRNAC recommends that instrumentation be added to confirm Vault WRSF freezeback predictions. This is addressed in Section 8.1.2.
- ECCC would like further discussion on tailings cover thickness and why the cover thickness is different that for the WRSF. This is addressed in Section 7.
- ECCC request that the Bay-Goose Fault be discussed further. This is addressed in Section 2.1.2.
- ECCC requests that AEM clarify whether the ‘coarse material’ placed within the RSF cover would be sufficiently compacted for the purpose of limiting the amount of air and water that interacts with the waste rock underneath. This is addressed in Section 7.2.
- ECCC recommends that the proponent clarify where the ultramafic rockfill (soapstone) used for the tailings cover will be sourced from and the effect of using it in the cover. This is addressed in Section 7.1 and Section 9.1.

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2 BACKGROUND INFORMATION

2.1 SITE CONDITION

The location of the Meadowbank mine site is shown in Figure 2.1.

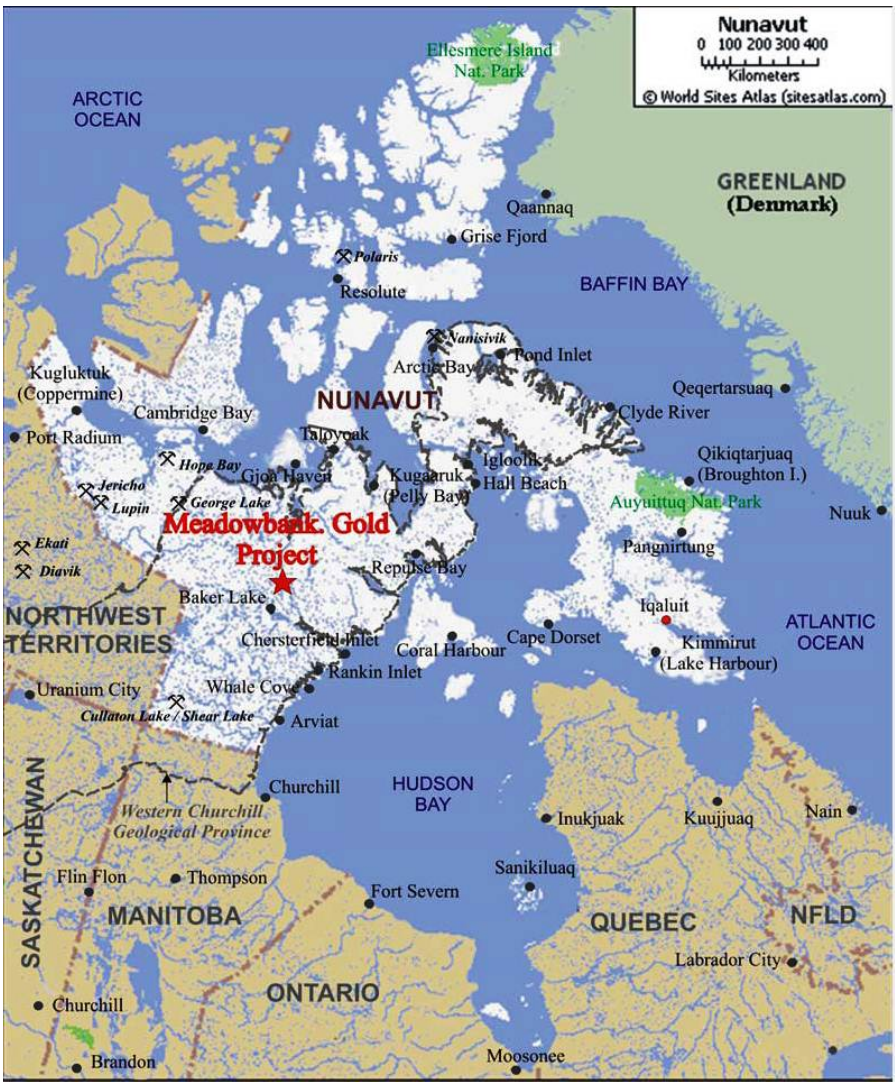

Figure 2-1 : Meadowbank Mine Location

2.1.1 Climate

The Meadowbank region is located within a low Arctic Eco climate described as one of the coldest and driest regions of Canada. Arctic winter conditions occur from October through May, with temperatures ranging from +5°C to -40°C. Summer temperatures range from -5°C to +25°C with isolated rainfall increasing through September (Table 2-1).

Table 2-1: Estimated Average Monthly Climate Data – Meadowbank Site

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: 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.

The long-term mean annual air temperature for Meadowbank is estimated to be approximately 11.1°C. Air temperatures at the Meadowbank area are, on average, about 0.6°C cooler than Baker Lake air temperatures, and extreme temperatures tend to be larger in magnitude. This climatic difference is thought to be the effect of a moderating maritime influence at Baker Lake.

The prevailing winds at Meadowbank for both the winter and summer months are from the northwest. A maximum daily wind gust of 93 km/h was recorded on September 1, 2009. Light to moderate snowfall is accompanied by variable winds up to 70 km/h, creating large, deep drifts and occasional whiteout conditions. Skies tend to be more overcast in winter than in summer.

Table 2-1 presents monthly rainfall, snowfall and total precipitation values for the mine site. August is the wettest month, with a total precipitation of 43.4 mm, and February is the driest month, with a total precipitation of 6.1 mm. During an average year the total precipitation is 249.6 mm, split between 147.5 mm of rainfall and 102.1 mm of snowfall precipitation.

2.1.2 Faults

Two main faults are inferred in the Portage deposit area and included in the groundwater model (Golder, 2011) used to estimate groundwater inflows and brackish water upwelling to the pits during mine life. These are the Bay Zone Fault and the Second Portage Fault shown in Figure 2.2 by clear blue lines,

The Second Portage fault trends to the northwest under Central Dike and the Tailings Storage Facilities (TSF), roughly parallel to the orientation of Second Portage Lake. This fault has been identified a potential pathway for Central Dike Seepage.

The Bay Zone Fault trend from South to North and cross Third Portage Lake, Goose Pit and Portage Pit. This fault is a potential pathway for water infiltration from Third Portage lake into Goose pit.

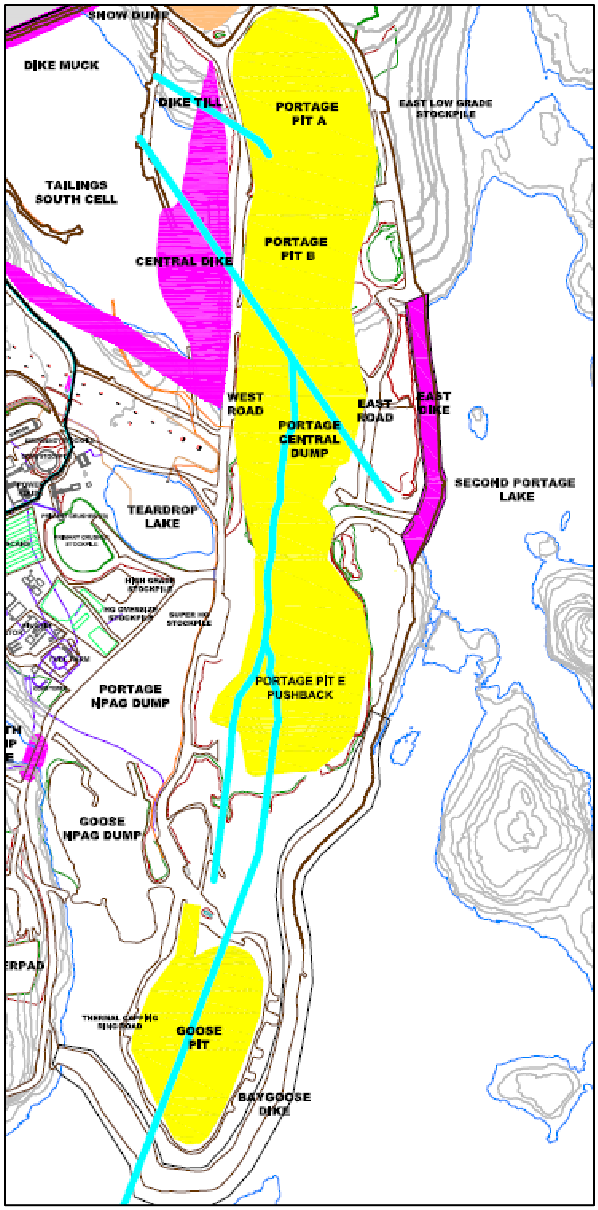

Figure 2-2 : Portage Pit Area Fault location

2.1.3 Permafrost

The Meadowbank Gold Mine is located in an area of continuous permafrost. Lake ice thicknesses between 1.5 m and 2.5 m have been encountered in mid to late spring during geotechnical investigations and sampling campaigns. Taliks (areas of permanently unfrozen ground) are expected where water depth is greater than about 2 to 2.5 m. Based on thermal studies and measurements of ground temperatures (Golder, 2003), the depth of permafrost at site is estimated to be in the order of 450 to 550 m, depending on proximity to lakes. The depth of the active layer is about 1 to 1.5 m and vary based stratigraphy, presence of overburden and vegetation and proximity to lakes.

Based on ground conductivity surveys and compilation of regional data, the ground ice content is expected to be low. 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.

2.1.3.1 Impact of Climate Change on Site Conditions

Table 2-2 presents a summary of climate change predictions used on a number of northern projects that have been reported in the engineering and scientific literature. Further study incorporating climate change reference will be done using the climate change predictions from the IPCC (Intergovernmental Panel on Climate Change) RCPs (Representative Concentration Pathways) RCP6.

Table 2-2: Summary of Reported Climate Change Rates Used in Northern Projects Engineering Studies

Reference	Increase in MAAT by Year 2100 (°C)	Notes
Hayley (2004)	4.7	Used in design studies for the Inuvik Regional Health Center. Reported as increase of 0.47°C per decade.
Hayley and Cathro (1996)	5.0	Used for Raglan Dam analyses.
Diavik	3.2	Used for the Processed Kimberlite Containment Facility Design
Burn (2003)	6.0	For use in the Western Arctic for pipeline design projects. Reported as increase of 1.75°C over a 29 year period
Intergovernmental Panel on Climate Change (AR5)	See Figure 2.3	RCP 6.0 to be used as base case

As part of the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5), the IPCC adopted new Representative Concentration Pathways (RCPs) to replace the previous emission scenarios of the Special Report on Emission Scenarios (SRES) (IPCC 2013). The four adopted RCPs differ from the SRES in that they represent greenhouse gas concentration trajectories, not emissions trajectories. The four scenarios (RCP2.6, RCP4.5, RCP6.0 and RCP8.5) are named after the radiative target forcing level for 2100, which are based on the forcing of greenhouse gases and other agents and are relative to pre-industrial levels.

The climate change database for Meadowbank and Amaruq project was developed following the recommendations outlined on the Canadian Climate Data and Scenarios (CCDS) website, which is wholly supported by ECCC (CCDS, 2018). The website recommends the use of statistical downscaling to "downscale" a GCM's predictions to a specific location based on historical observations. Statistical downscaling is a two-step process consisting of i) development of statistical relationships between local climate variables (e.g., surface air temperature and precipitation) and large-scale predictors (e.g., pressure fields), and ii) application of such relationships to the output of GCM experiments to simulate local climate characteristics in the future. The Pacific Climate Impact Consortium (PCIC) at the University of Victoria provides statistically downscaled daily temperature and precipitation under the RCP2.6, RCP4.5 and RCP8.5 scenarios for all of Canada at a resolution of approximately 10 km (PCIC, 2018). The second-generation Canadian Earth System Model (CanESM2), developed by the Canadian Centre for Climate Modelling and Analysis (CCCma), was used as the predictor GCM to downscale and make climate change databases representative of site condition.

Statistical downscaling is limited by the availability of large-scale predictors. Current CCCma CanESM2 model runs are limited temporally to 2100. In order to predict beyond 2100, the radiative forcing trend was applied to the temperature. RCP4.5 and RCP6.0 are expected to stabilize shortly after 2100, while RCP8.5 is expected to continue along the same trend until after 2200.

Temperatures are anticipated to rise at about the same rate (approximately 0.06°C/year) for RCP4.5 and RCP6.0 until approximately 2070, after which RCP4.5 estimates a reduction in the temperature increase rate. Under RCP8.5, temperatures are expected to increase at a higher rate (approximately 0.12°C/year) for the duration of the modelled period. All three scenarios predict an increase in precipitation with time of approximately 0.5 mm/year (75 mm total increase over 150 years) for RCP4.5, 0.6 mm/year (90 mm total increase over 150 years) for RCP6.0 and 0.7 mm/year (100 mm total increase over 150 years) for RCP8.5.

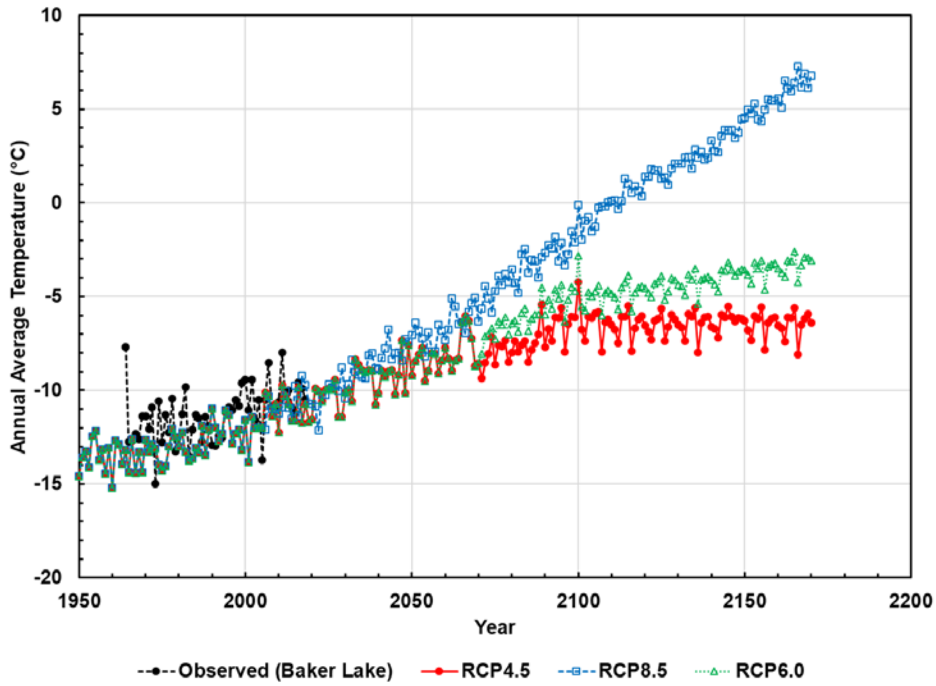

Figure 2-3 : Annual average temperature estimated for the RCP4.5, RCP6.0 and RCP8.5 climate change scenarios. Observed temperature at Baker Lake is also shown.

2.2 MINING OPERATION DESCRIPTION

Mining is a truck-and-shovel open pit operation. The current Meadowbank mining plan indicates that approximately 0.6 Mt of ore will be mined over a nominal remaining mine life of approximately 0.75 years, ending in September 2019.

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 BBPhaser), Portage (South, Center and North Portage deposits), and Goose.

2.2.1 Portage Pit Area

The Portage area located between the Third Portage Lake (3PL) and Second Portage Lake (2PL) contains most of the infrastructure of the Meadowbank mine site including but not limited to the Portage Rock Storage Facility (RSF), North and South Tailings Storage Facilities (NC & SC TSF), the mill, the camp and the Stormwater Management Pond.

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. Subsequent renaming of the pits led to the nomenclature for each pit (A, B, C, D and E).) Portage Pit is isolated from the Second Portage Lake by the East Dike built in 2008-2009 and the Bay-Goose Dike (Pit E) built from 2009 to 2011.

Mining in Pits A, B, C, and D (representing the North and Central Portage area is completed and these areas are currently subject to pit infilling operations with waste rock material (which will form part of fish habitat compensation). In 2018, an expansion was done in pit E to extend mining and mill feed to bridge the gap between the end of mining activities in Meadowbank, and the start of mining activities at the Amaruq project. As a result, mining activities in the Portage area in 2018 were only ongoing in Pit E.

Figure 2-4 shows the Portage Pit Area and surrounding infrastructures.

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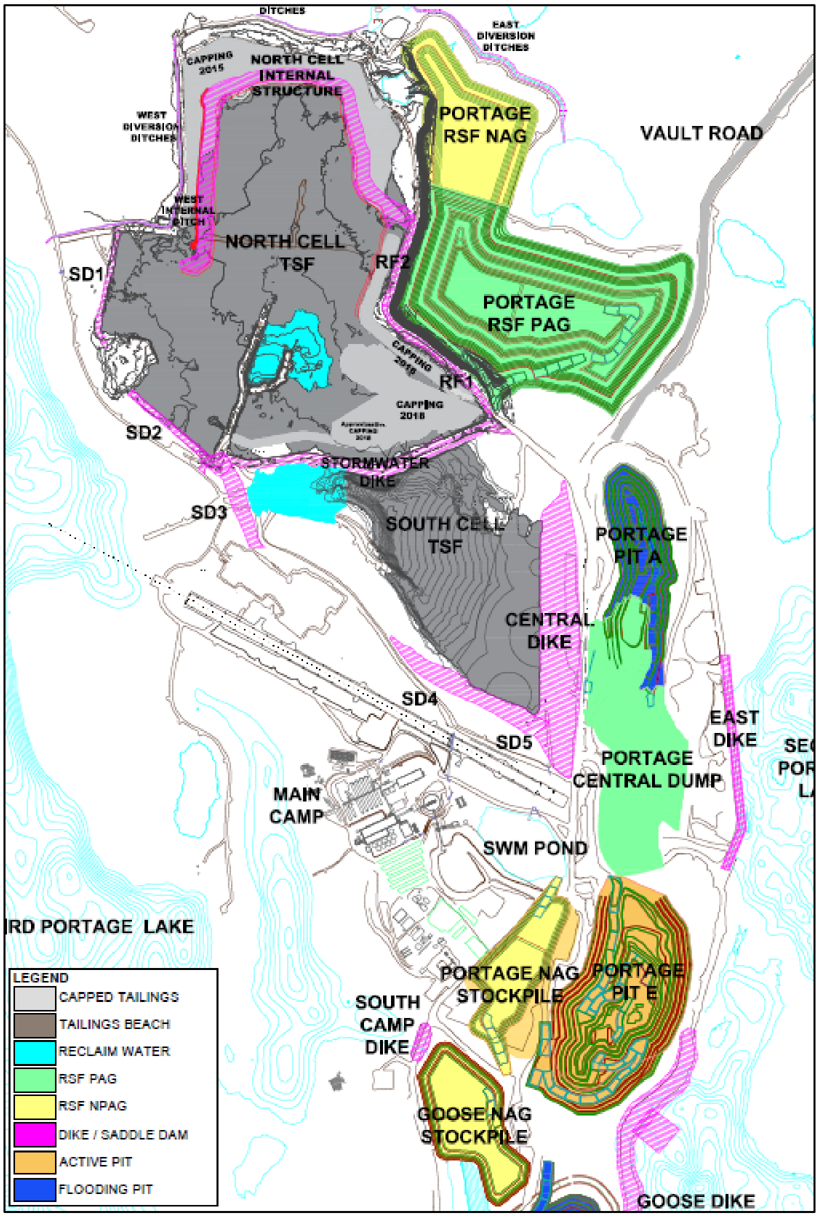

Figure 2-4 : Portage Pit and Tailings Storage Facility Infrastructures

2.2.2 Goose Pit Area

The Goose deposit lies approximately 1 km to the south of the Portage deposit, and beneath 3PL. The pit is isolated from the Second Portage Lake and the Third Portage Lake by the Bay-Goose Dike and the South Camp Dike constructed in 2009-2010. Mining in Goose pit began in 2012 and was completed in April 2015. The Northern part of the pit was historically used as for pit infilling. The Goose Pit area and surrounding infrastructure are illustrated in Figure 2-5.

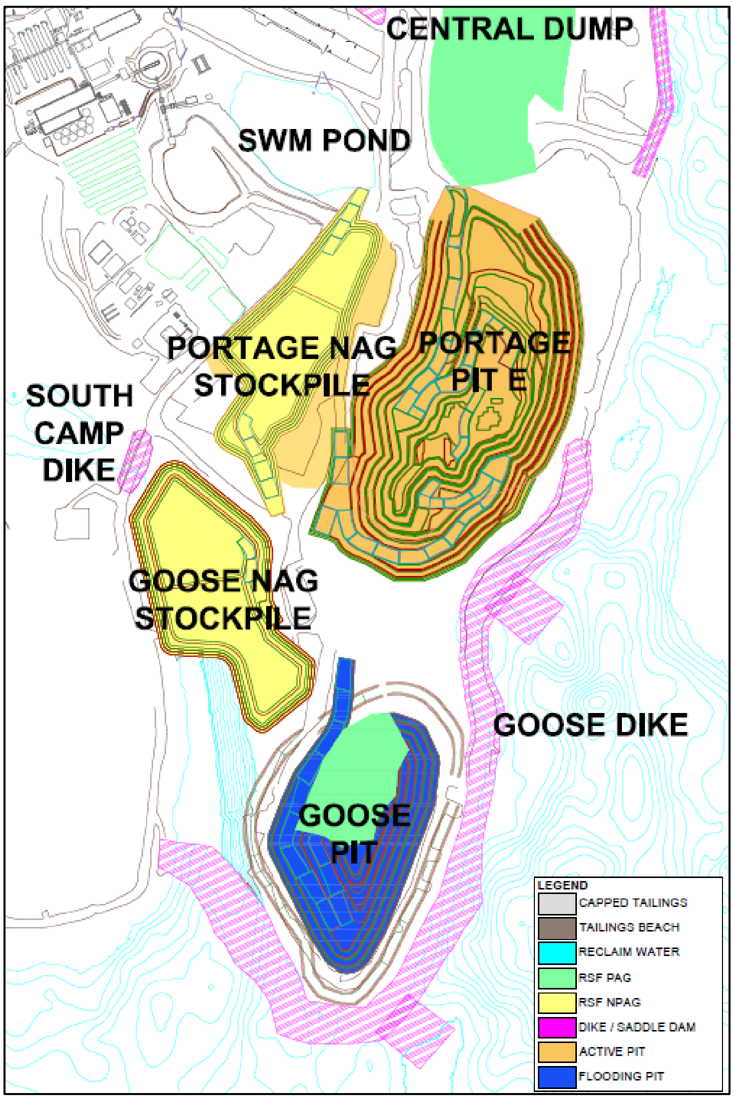

Figure 2-5 : Goose Pit Area Map

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2.2.3 Vault Pit Area

The infrastructure of the Vault Pit area includes the Vault RSF, ore and marginal pads, Vault dike, Vault pit, Phaser Pit, BB Phaser Pit, Vault attenuation pond and emergency shelter. Figure 2-6 illustrates the Vault Pit area and surrounding infrastructure.

The Vault deposit is located adjacent to Vault Lake, approximately 6 km north of the Portage deposits. The deposit is isolated from the Wally Lake by the Vault Dike built in 2013.

The Vault pit began pre-mining operations in 2013 with active mining starting in 2014 and is expected to be completed in the first quarter of 2019. The dewatering of Phaser Lake occurred during summer 2016 in preparation for mining activity in Phaser and BB Phaser Pit. Phaser Pit mining activities were completed in October 2018. BB Phaser mining began in early 2018 and is scheduled to be completed in July 2019.

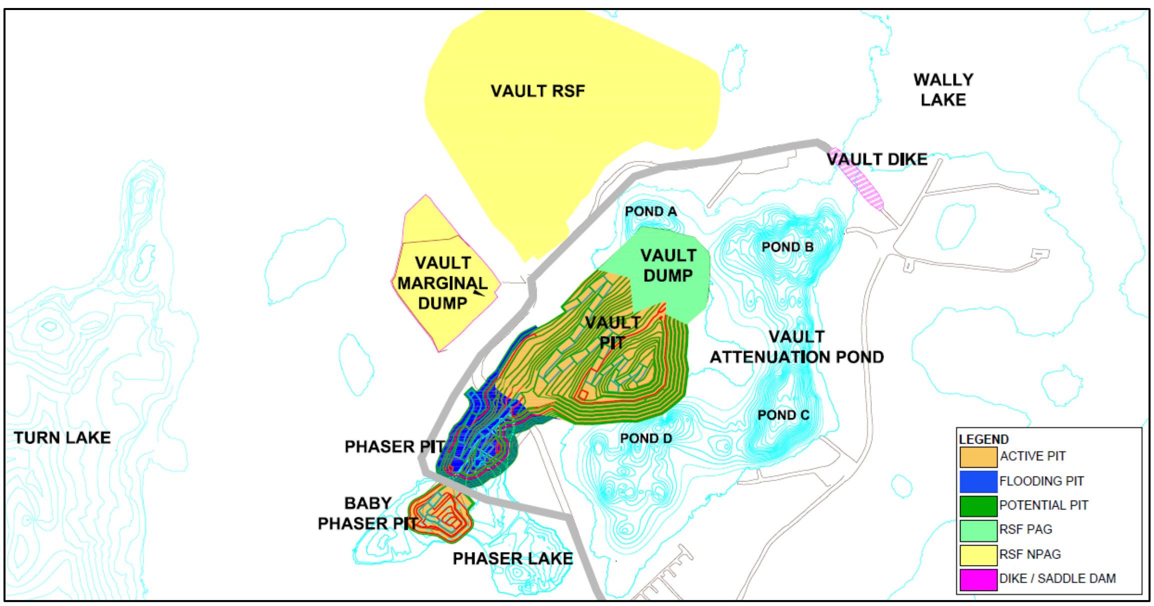

Figure 2-6 : Vault Pit Area Map

2.3 TAILINGS STORAGE FACILITY DESCRIPTION

The Tailings Storage Facility (TSF) is located with the Portage Pit Area and is comprised of the South Cell and the North Cell. These cells are delimited by tailings retaining dikes that are progressively built as capacity is required. The configuration of the TSF is presented on Figure 2-4. A summary of the TSF infrastructure is presented in Table 2-3.

Stormwater Dike, constructed in 2009-2010, is an internal dike (El. 150m) that divides the TSF in the North and South Cell.

The peripheral structures of the North Cell are SD1, SD2, RF1 and RF2 built to El 150 m from 2009 to 2010. In 2018, an internal structure was built in the Northern part of the North Cell over the existing tailings (variable El. From 152 to 154 m) to increase the tailings storage capacity.

The peripheral structures of the South Cell are SD3, SD4, SD5 and Central Dike built to El. 145 m from 2012 to 2018.

A permeable berm was built in the South Cell in 2017, to prevent tailings from reaching the reclaim pump area. A future structure is planned in 2019.

The diversion ditches (East and West), located around the perimeter of the North Cell TSF and the Portage RSF, are designed to collect the non-contact water runoff from the surrounding watershed.

Table 2-3 : TSF Infrastructure Description

TSF cell	Structure	Construction date	Purpose
North Cell	Saddle Dam 1	Built to el. 141m - 2009 Raised to el. 150m - 2010	Peripheral Dike Tailings Retention
	Saddle Dam 2	Built to el. 150m - 2011	Peripheral Dike Tailings Retention
	Rockfill road structure 1 (RF1)	Built to el. 150m – 2009 Till Plug Constructed in 2013	Access Road Tailings Retention
	Rockfill road structure 2 (RF2)	Built to el. 150m - 2009	Access Road Tailings Retention
	Stormwater Dike	Built to el. 140m - 2009 Raised to el. 148m – 2010 Raised to el. 150m - 2013	Divider Dike Tailings Retention
	North Cell Internal Structure	Built to el. variable 152-154m - 2018	Internal Structure Tailings Retention
	North Cell Capping	2015 to 2018	Progressive closure
South Cell	Saddle Dam 3	Built to el. 140m - 2015 Raised to el. 143m - 2016 Raised to el. 145m – 2017-2018	Peripheral Dike Tailings Retention
	Saddle Dam 4	Built to el. 140m - 2015 Raised to el. 143m - 2016 Raised to el. 145m - 2017	Peripheral Dike Tailings Retention
	Saddle Dam 5	Built to el. 143m - 2016 Raised to el. 145m - 2017	Peripheral Dike Tailings Retention
	Central Dike	Built to el. 110m - 2012 Raised to el. 115m - 2013 Raised to el. 132m - 2014 Raised to el. 143m - 2016 Raised to el. 145m - 2017-2018	Peripheral Dike Tailings Retention
	Permeable Berm 1	Built to el. 137.25 - 2017	Water management

3 MINE DEVELOPMENT PLAN

3.1 MINE WASTE PRODUCTION SEQUENCE

The current mine plan (2019) indicates that an approximate further 0.6 Mt of ore will be processed over a nominal remaining mine life of 0.75 years, including ore from pits and stockpiles. During this time, approximately 1.99 Mt of mine waste rock will be produced. By the end of the mine life, an approximate total of 34.6 Mt of tailings will be placed in the TSF.

The material balances from 2009 to 2019 is presented in Appendix A. This balance indicates the distribution of the following categories of materials by rock type:

- Mine rock for construction;
- Mine rock for dike construction;
- Mine rock for capping; and
- Mine rock to RSFs and Portage Pit fill.

Table 3-1 to ***Table 3-3*** show the material destination distribution for Portage and Vault Pits, as well as material taken from NAG stockpiles. **Table 3-4** compare the amount of waste mined to the FEIS prediction. It is to be noted that the difference in PAG and NPAG mined compared to the FEIS does not impact the management strategy and the closure concept.

NAG classified waste rock produced by pre-stripping and generic mining activities will be used for construction of the remaining mine infrastructure and dikes at the site, as has been the practice to date. Based on current material balance calculations, sufficient quantities of suitable rock fill and till borrow materials will be available for capping activities and closure/reclamation projects.

Table 3-1: Meadowbank PAG Destinations & Tonnages (2019)

	2019
Portage Rock Storage Facility (PAG Dump)	192,766
	17%
Portage Pit Fill	742,186
	65%
Central Dike	0
	0%
Stockpile Marginal Material	201,577
	18%
Vault Rock Storage Facility (PAG)	0
	0%
All PAG Destinations	**1,136,529**
	100%

Note: To prevent acid mine drainage potential, the relatively small expected volume of PAG material from Vault and Phaser Pits will be capped with NAG waste rock as dumping proceeds. However, Vault marginal and sub-marginal materials have been included in the "Stockpile Marginal Material" category.

Table 3-2: Meadowbank NAG Destinations & Tonnages (2019)

	2019
Portage Rock Storage Facility (NAG Dump)	0
	0%
Central Dike	0
	0%
Capping TSF (North Cell) ***Includes 219,821 m3 for North Cell Internal Structure**	522,191
	51%
Saddle Dams	0
	0%
Goose NAG Dump	0
	0%
Portage NAG Stockpile	0
	0%
Other destinations	497,903
	49%
Vault Rock Storage Facility (NAG)	0
	0%
All NAG Destinations	**1,020,094**
	100%

Note: The NAG rehandling stockpiles: The Goose NAG dump, the Central dump NAG stockpiles, and the Portage NAG stockpile will also be used for NAG rehandling at closure.

Table 3-3: NAG Stockpile for mine closure requirements, Destinations & Tonnages (2019)

	2019
Capping Portage Rock Storage Facility (PAG Dump) with NAG	0
	0%
Capping TSF (North Cell)	255,976
	100%
Capping TSF (South Cell)	0
	0%
Central Dike	0
	0%
Saddle Dams	0
	0%
Primary Crusher NAG capping	0
	0%
Goose Rock Garden/Finger Dikes (fish habitat compensation)	0
	0%
Stormwater Dike Capping	0
	0%
Capping Marginal Dump	0
	0%
NAG Stockpiles	0
	0%
All Portage NAG to be Stockpiled	**255,976**
	100%

Table 3-4 : Waste rock mined compared to FEIS prediction

	Portage/Goose			Vault		
	Non-PAG	Uncertain	PAG[1]	Non-PAG	Uncertain	PAG[1]
FEIS Estimated Quantity (10^6 tonnes)	64.3	8.9	28.8	51.0	7.5	9.5
Mined Quantity (10^6 tonnes)	53.9	0	90.5	53.9	0.0	23.7

[1] PAG quantity includes ORE for Mined Quantity

3.2 MINE DEVELOPMENT SEQUENCE (2019)

The general sequence of mine development over the operating life is listed in Table 3-5 and illustrated in Figure 3-1 to Figure 3-3. A conceptual sequence of pit development over the life of mine is illustrated in Figure 3-4

Table 3-5: Mine Development Sequence

Year	Items
2019	- Finish mining of BB Phaser Pit - Finish mining of Portage Pit E - Continue progressive capping of North Cell TSF - Continue progressive reclamation of Portage RSF - Portage Pit infiling

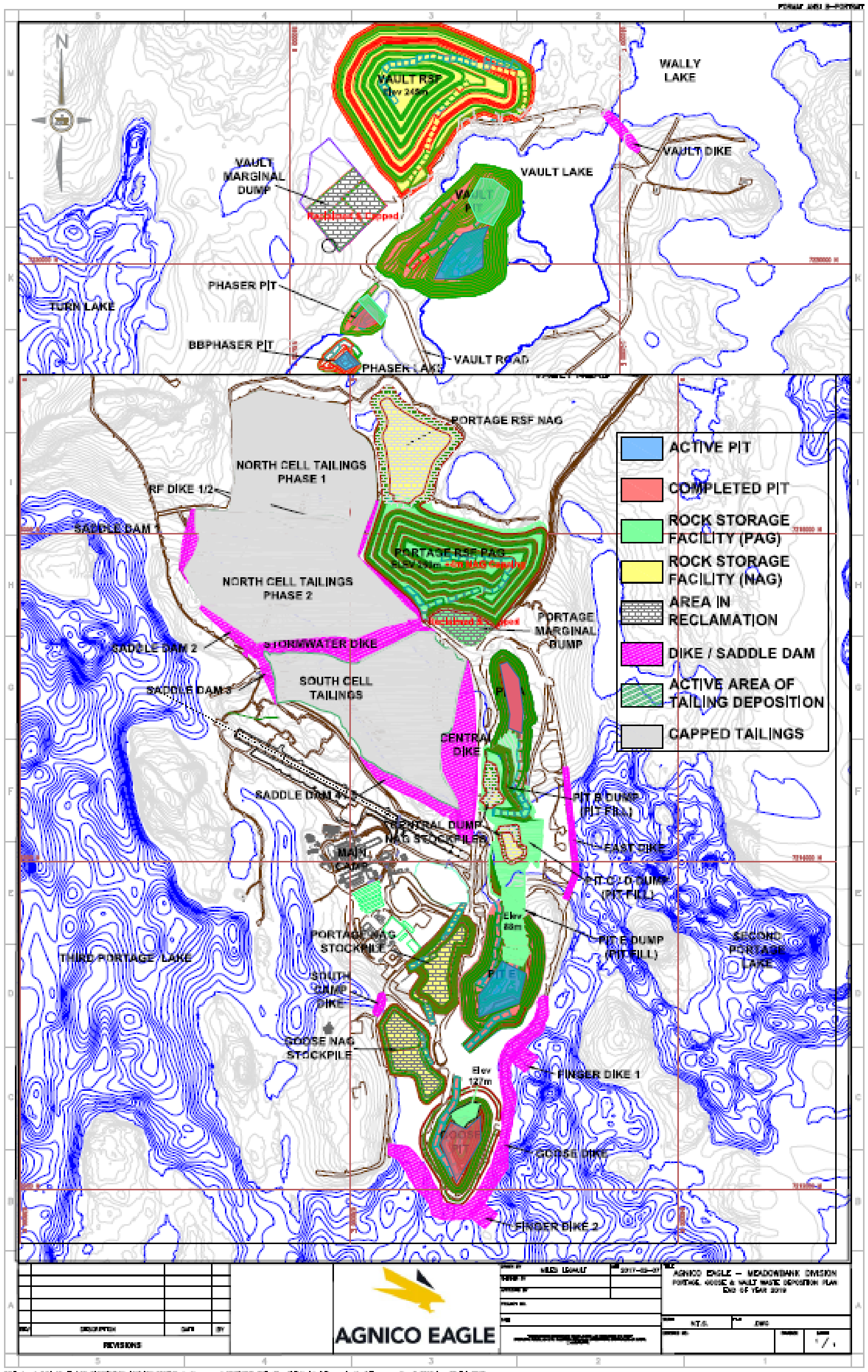

Figure 3-1: Current Status (EOY 2018) for Portage Pit, Vault Pit & Dumps

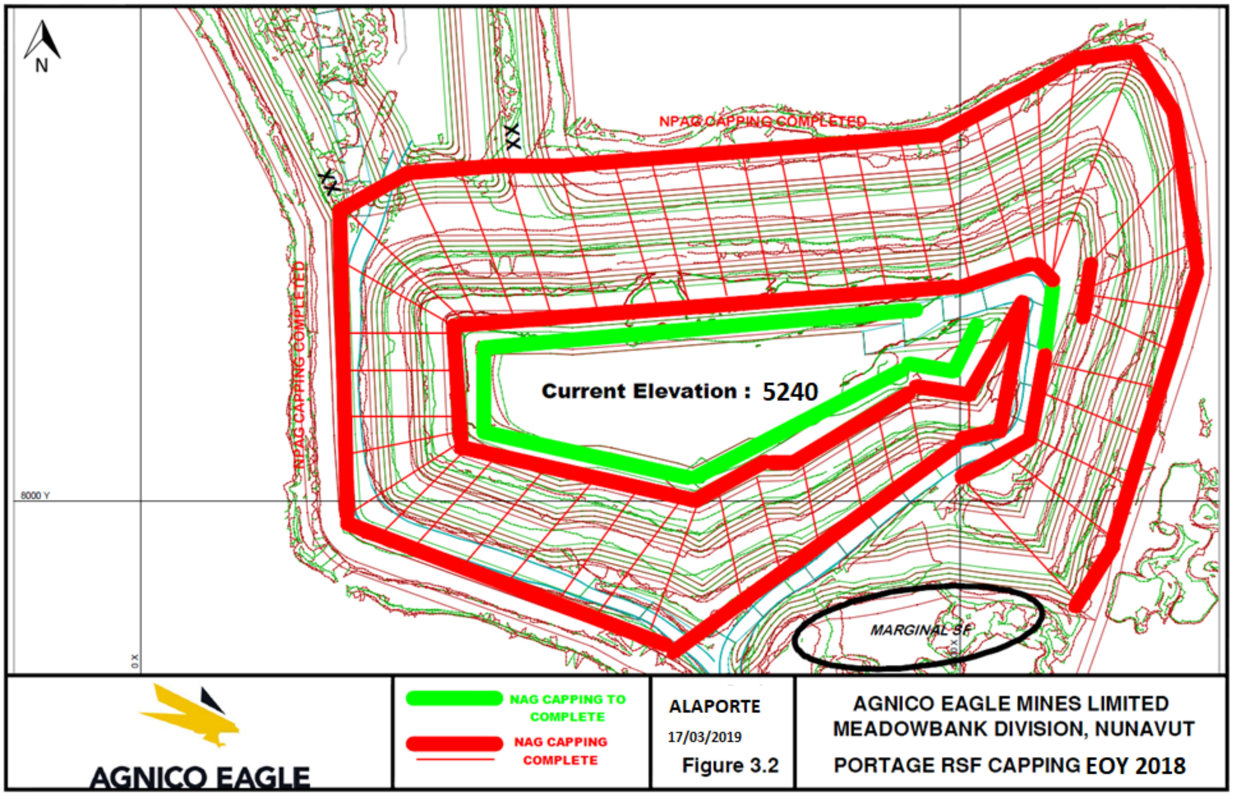

Figure 3-2: Current Status (EOY 2018) Capping Portage Rock Storage Facility with NAG

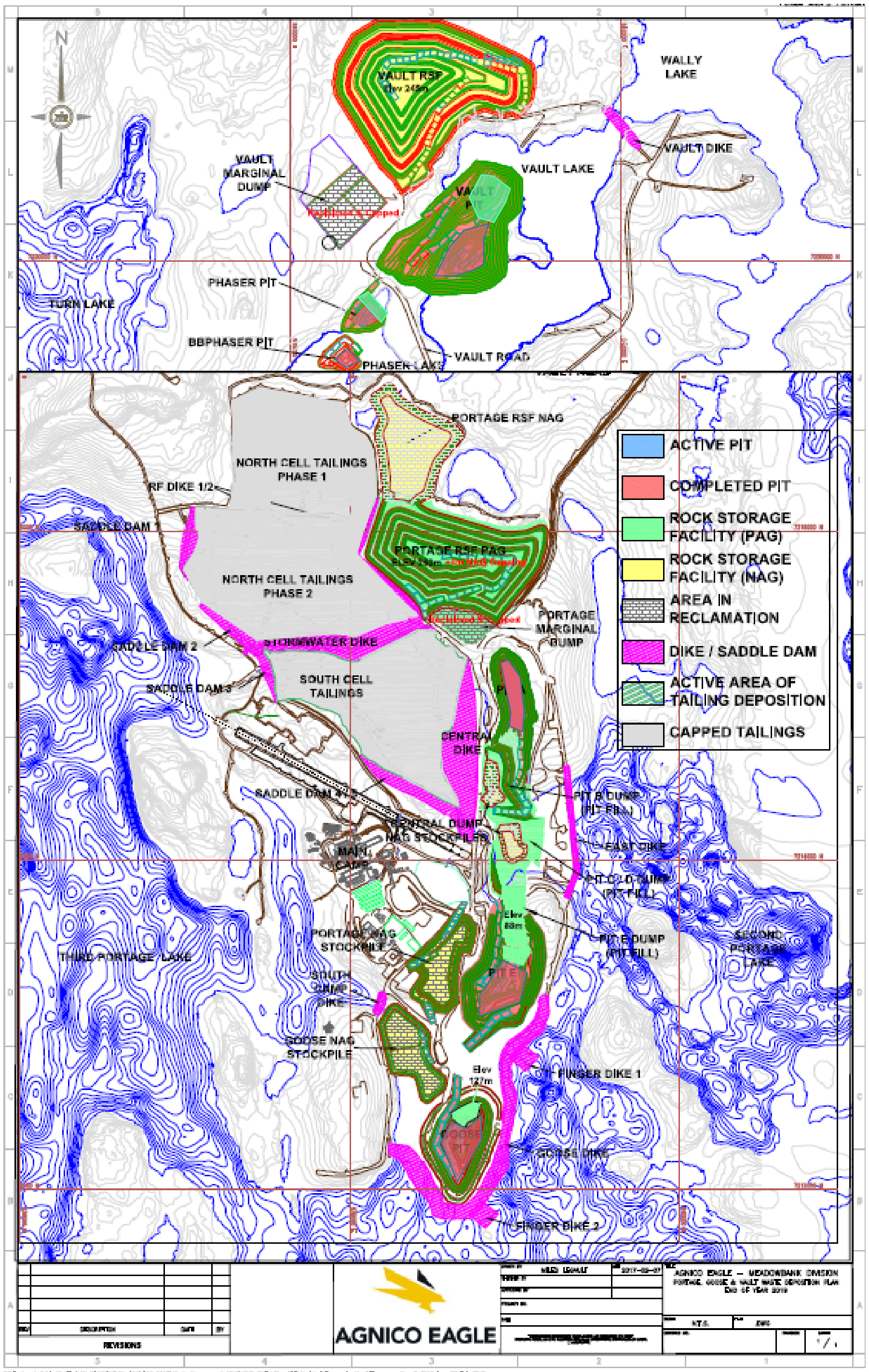

Figure 3-3: Development Sequence 2019 to end of LOM

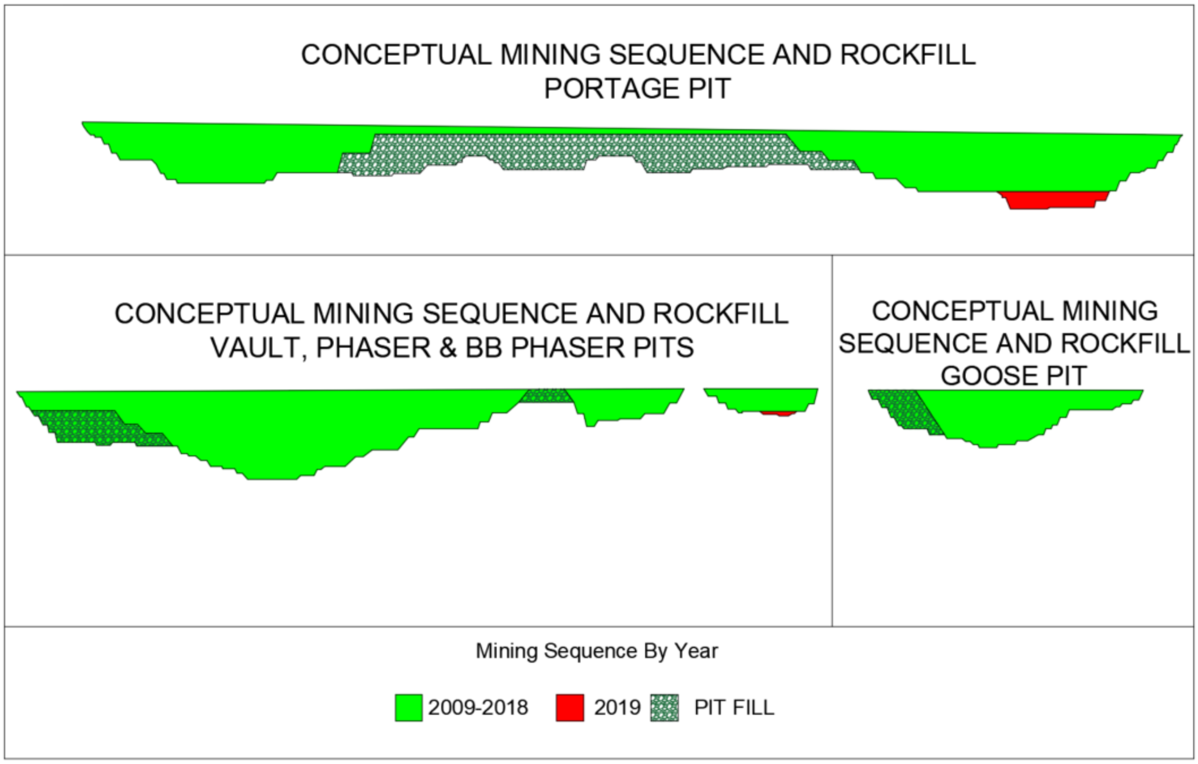

Figure 3-4: Conceptual mining sequence by year

4 OVERBURDEN MANAGEMENT

4.1 LAKEBED SEDIMENTS

The lakebed sediment consists of soft, fine-grained sedimentary deposits that can be found at the bottom of lakes.

The thickness of lake bottom sediments at Meadowbank is variable and can range from a few centimeters up to 10 meters and more as suggested by geophysical surveys and information obtained from various drilling programs and construction activities.

Lakebed sediments were excavated and managed during the construction of Stormwater Dike, Central Dike and of the dewatering dikes as well as and during pre-stripping of the Pits.

The strategy to manage lakebed sediment removed during construction or pre-stripping was to place it in either the Portage or Vault RSF.

4.2 TILL

The remainder of the overburden materials consists of till materials (mix of silt, sand, gravel, cobbles and boulder) with alluvial deposits of silt and sand intermixed. The till material is generally described as a silty sand/gravel. It contains cobble and boulder-sized particles with an average of 30 to 40% silt particles. The average till thicknesses throughout the Mine area varies based on location and may range from zero to upwards of 18 m.

The management strategy for till was to stockpile a part of it to be used for construction of the tailings management infrastructure as required. The remaining quantity of till was placed within the RSFs and mixed with waste rock.

In 2018, a total of 401,194 tonnes of lakebed sediment and till material were managed from the Vault zone (BBPhaser pit) by placement in the Vault RSF and were mixed with waste rock.

5 WASTE ROCK MANAGEMENT

The strategy to manage waste rock from the open pit mines, not used for site development purposes, is to store it within a Waste Rock Storage Facilities (RSFs).

Due to the distance between the Portage mining area and the Vault mining area, two separate waste 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 Goose Pits), while waste rock from the Vault, Phaser and (potential) BBPhaser Pits will be stored in a separate storage facility adjacent to the Vault Pit (Vault RSF). Waste rock is also stored within mined out area of pit (pit-infilling).

5.1 WASTE ROCK PROPERTIES

The estimated quantities to be stored in each of the RSFs and other destinations as well as their geochemical classification (NAG or PAG) are summarized in Table 5-1.

Table 5-1*: Quantities of Waste Rock by Destination*

Destinations (RSF and others)	Rock Type	Quantity*
Portage RSF	Waste Rock (about 19% of NAG)	73.5 Mt**
Portage Pit Filling	Waste Rock (about 100% of PAG)	14.7 Mt
Construction	Waste Rock (NAG)	25.0 Mt
Tailings Capping	Waste Rock (100% of NAG)	16.8 Mt
Rock Garden	Waste Rock (about 100% of PAG)	0.3 Mt
Goose NAG Dump	Waste Rock (100% of NAG)	4.5 Mt
Vault RSF	Waste Rock (about 95% of NAG and 5% PAG)	56.3 Mt
Vault Pit Filling	Waste Rock (about 95% of NAG and 5% PAG)	3.1 Mt
Phaser Pit Filling	Waste Rock (about 95% of NAG and 5% PAG)	0.6 Mt

*The quantities have been adjusted as the loose density assumption changed from 2.15 to 2.04.

** The maximum quantity of PAG is realized at the end of mine life. The maximum quantity of NAG is realized at the end of 2018 (before the start of reclamation). The figure reported here reflects the maximum quantity at any one time which is reached at the end of 2016. Quantities also include NAG capping.

5.2 WASTE ROCK MANAGEMENT STRATEGY

Waste rocks are managed within the RSF as well as within the mined out area of Portage, Goose and Phaser Pits. The waste rock is qualified with testing as non acid generating (NAG) or Potentially acid generating (PAG). The management strategy for NAG and PAG material is different.

Placement of waste rock within the Portage RSF commenced closest to the Portage Pit and has progressed westward over the entire footprint, then upward to further benches during the development of the mine. In 2012, an extension of the Portage WRSF was done to store NAG material within a temporary area (Figure 5-1).

Placement of waste rock within the Vault RSF has commenced closest to the Vault Pit and proceeded in a northward direction, rising upward as pit development progresses.

PAG rockfill is managed within the Portage RSF, Vault RSF, Portage Pit infill and Vault and Phaser Pit infill. The PAG rockfill within the Portage RSF is placed outside of the capping area (which consist of a thickness of 4 m at surface). At the Vault RSF the majority of the rockfill is NAG with the PAG placed within the middle area.

NAG rockfill is managed as construction material, capping material for the TSF, Goose Pit infill, Vault infill, Phaser infill and within the Portage and Vault RSF. At the Portage RSF the NAG is stored within a temporary NAG stockpile area and is also used as capping for the PAG material. At the Vault RSF the NAG material consists the majority of the RSF.

5.3 WASTE ROCK STORAGE FACILITY CHARACTERISTIC

Table 5-2 summarizes the overall (final) physical dimensions and aspects of the Portage and Vault RSFs.

Table 5-2: 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

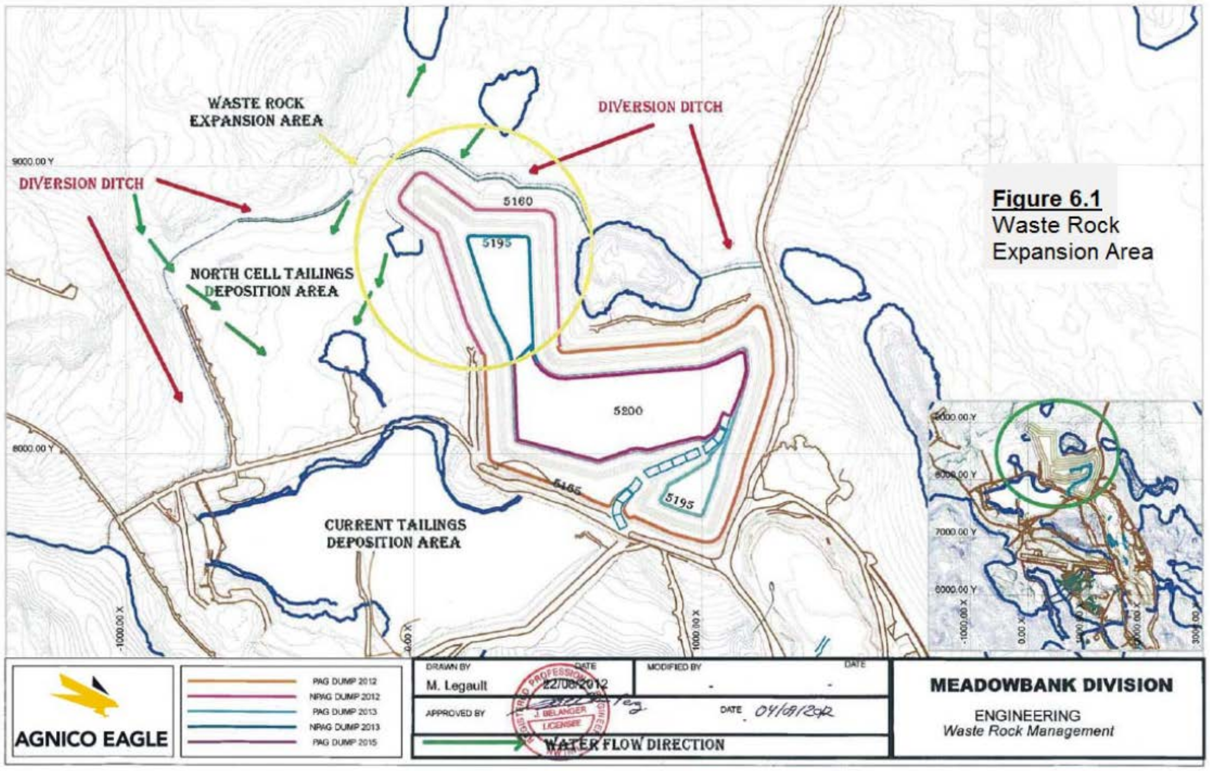

Figure 5-1: Waste Rock Expansion Area (temporary NAG storage area)

6 TAILINGS MANAGEMENT

Tailings are the material by-product of the gold recovery process produced by the process plant. Tailings are pumped as a slurry from the process plant to the Tailings Storage Facility.

The tailings storage facility (TSF) is the permanent storage facility for tailings produced during the operation of the mine. It is located north of the Process Plant Site within the dewatered portion of the northwestern arm of Second Portage Lake.

Tailings containment is achieved by the construction of a series of dikes. The structures of the TSF will be raised as additional tailings capacity is required. The maximum allowed El. of the North Cell and South Cell peripheral structures is El. 150 masl, while the maximum allowed El. of the North Cell Internal Structure is El. 154 m. Refer to Section 2.3 for description of the tailings containment infrastructures and their current elevation.

6.1 TAILINGS MANAGEMENT STRATEGY

Tailings deposition is done using end of pipe deposition with one active point at a time. The deposition point location and duration is determined from the tailings deposition plan. Changing between deposition points on a given line consist of stopping the flow of tailings in the line, redirecting it through the pig launcher bypass, flushing the line, relocating the deposition point pipe and then switching tailings from the by-pass to the newly installed deposition line.

The TSF was designed in two cells, (North and South) in order to allow tailings management in smaller areas with shorter beach lengths, reducing the amount of water that is trapped and permanently stored as ice, which would result in losing TSF capacity. Operation in cells also allows progressive closure, cover trials, and cover construction.

Due to the arid climate and permafrost environment, tailings are disposed of in a manner promoting freezeback. Given the length of time that water at the site is ice covered, sub aqueous disposal is preferred. It is anticipated that the tailings will eventually become encapsulated by permafrost; thus limiting oxygen diffusion and water infiltration into the tailings, seepage from the tailings, and the generation of acid mine drainage.

Tailings management is closely linked with water management. Refer to the 2018 water management plan for information on how water is managed within the TSF.

The tailings deposition plan is aligned with the tailings management strategy and considers the following aspect:

- The deposition sequence inform the dike construction activity and ensure enough capacity to store the life of mine tailings while maintaining adequate freeboard (2.0m for water and 0.5m for tailings)
- The deposition sequence maintains a reclaim pond with sufficient depth for efficient operation of the reclaim pumping system while minimizing pond volume as TSF operation best practices.
- The deposition sequence maintains beaches on the upstream faces of perimeter dikes
- The deposition sequence promote sub-aqueous deposition in winter to limit ice entrapment
- The deposition sequence promotes freezing of the tailings during the operating period and;
- The deposition sequence maximizes certain areas of the TSF earlier in order to promote rockfill capping during operation.

6.2 TAILINGS DEPOSITION – 2018

Table 6-1 presents the history of tailings deposition in the TSF. Deposition was done according to the deposition plan, which considers various factors such as construction sequence, remaining capacity and limiting ice entrapment during winter deposition.

Table 6-2 presents the amount of tailings deposited in 2018 and their properties measured at the mill.

In 2018, the tailings deposition strategy in the South Cell was to push the pond of water against SD3 and Stormwater Dike, while maintaining tailings beach against the other peripheral structure (SD4, SD5, Central Dike). The objective was to keep the pond as far as possible from these structures with a minimum beach length target of 20 m.

In 2018, the deposition strategy in the North Cell was to deposit tailings from the North Cell Internal Structure to secure sufficient capacity until further construction campaigns, while optimizing tailing landform for closure purposes. Due to the length of the beaches in the North Cell, and the objective to limit aerial deposition in the winter, deposition only occurred in the summer months.

Table 6-1: Deposition location (realized)

Date	Deposition location	Tailings deposited (dried tons)
February 2010 to November 2014	North Cell	16.0M tons
November 2014 to July 2015	South Cell	2.7M tons
July 2015 to October 2015	North Cell	1.0M tons
October 2015 to August 2018	South Cell	10.8M tons
August 2018 to October 2018	North Cell	0.5M tons
October 2018 to December 2018	South Cell	0.7M tons

Table 6-2*: 2018 Processed Tailings Volume and Associated Properties*

	Total Tailings Slurry (tonnes)	Density of Tailings (% solid)	Density of Slurry (tonnes / m^3)	Tailings Placed in TSF (m^3)
January	500,787	59.0%	1.612	310,708
February	522,314	55.2%	1.566	333,600
March	428,691	57.5%	1.596	268,679
April	441,143	57.7%	1.591	277,343
May	516,754	58.4%	1.615	320,050
June	501,379	57.3%	1.593	314,670
July	616,890	56.3%	1.592	387,433
August	602,007	50.4%	1.495	402,744
September	466,772	51.0%	1.507	309,715
October	410,910	58.3%	1.620	253,595
November	366,738	58.7%	1.645	222,967
December	414,542	59.2%	1.653	250,774
TOTAL	**5,788,926**	56.4%		**3,652,278**

6.2.1 Parameter Analysis - 2018

The June 2018 bathymetry of the South Cell was used to do a parameter analysis by comparing the results to the previous bathymetries realized since 2014. Results of this analysis are presented in *Table 6-3*.

Based on the 2018 bathymetric analysis, 25% of the water from the slurry is entrapped within the capillary void spaces of the tailing, and up to 40% is entrapped within the TSF as ice depending on the time of the year.

The tailings dry density (TDD) and the tailings beach slope in the South Cell during 2018 are lower than previous years. For example, yearly average TDD was 1.26 t/m^3 in 2018 compared to 1.30 in 2017, and tailings beach slope was estimated to 2.36% sub-aqueous in 2018 compared to 2.94% in 2017. This difference can be explained by a closer discharge to the pond which leads to lower ice entrapment.

For North Cell, the key parameters used was from the last bathymetry done in 2014 which gave a TDD of 1.28 t/m^3 and an ice entrapment of 90% in the winter months and 30% in the summer months.

The analysis of the water balance in 2018 leads to a revised ice-entrapment of 61% instead of the 38% measured in 2017 for the South Cell.

Table 6-3: Yearly tailings deposition parameter evolution - South Cell and North Cell

	Tailings Dry Density (t/m^3)	Sub-aerial beaches (%)	Sub-Aqueous beaches (%)	Ice entrapment (%)
2014 (North Cell and South Cell)	1.28	0.45	4.00	60%
2015 (South Cell)	1.45	1.10	3.60	36%
2016 (South Cell)	1.48	0.88	3.03	39%
2017 (South Cell)	1.30	0.73	2.95	38%
2018 (South Cell)	1.26	0.58	2.36	61%
2018 (North Cell)	1.28	0.45	2.36	61%

Note: Yearly averages are presented

6.3 TAILINGS DEPOSITION PLAN – 2019-2021

An updated version of the tailings deposition from 2019 until the end of mine life is presented in Appendix B. This updated tailings deposition plan considers modification to the LOM and tailings deposition parameters. The water management strategy related to this deposition plan is presented in the water management plan. This plan does not consider the in-pit amendment process, which would require an update to the tailings deposition strategy and plan.

As mill processing rates and tailings characteristics may fluctuate over the life of the mine, the design of the TSF and tailings deposition plan will continue to evolve based on changes in design parameters including mill process rates, tailings beach slopes, ice entrapment, and tailings in-situ densities. These parameters are re-evaluated every time the deposition plan is updated. Table 6-4 present the input parameters that were used to update the tailings deposition plan. The key input parameters that impact the performance of the tailings deposition are the following:

- Tonnage profile;
- Tailings beach slope;
- In-situ dry density;
- Water content entrapment.

Table 6-5 presents a summary of the deposition strategy and required dike raises for deposition from 2019 to 2021 based on the output of the deposition modelling.

The deposition plan demonstrates the TSF will have reached its maximum capacity for its permitted elevation at the end of the LOM.

The tailings deposition strategy in the South Cell is to maintain the reclaim pond against the SD3 and Stormwater Dike structures, while maintaining tailings beach against the other peripheral structure (SD4, SD5, Central Dike). The tailings deposition strategy in the North Cell is to continue building the North Cell Internal Structure to continue tailings deposition while maintaining a pond of water in the middle of the Cell. The water is then transferred to the South Cell for reclaim. The deposition will be ongoing in the North Cell, until completion of required South Cell structure raise. Table 6-6 presents a summary of the deposition schedule and infrastructure requirement.

Table 6-4: Input parameters for tailings deposition plan – 2019-2021 Deposition plan

Period	Dried tonnage (tons)	Ice Thickness (m)	Ice entrapment (%)	SC TDD (t/m^3)	NC TDD (t/m^3)	SC Sub aerial beach (%)	NC Sub aerial beach (%)	NC & SC Sub aqueous beach (%)
19-Jan	235,249	1.1	65%	1.05	1.08	0.58%	0.45%	2.36%
19-Feb	223,040	1.3	65%	1.05	1.08			
19-Mar	183,000	1.6	65%	1.05	1.08			
19-Apr	239,360	1.7	65%	1.05	1.08			
19-May	210,120	0	40%	1.305	1.32			
19-Jun	239,360	0	25%	1.56	1.56			
19-Jul	287,342	0	25%	1.56	1.56			
19-Aug	281,816	0	25%	1.56	1.56			
19-Sep	242,346	0	25%	1.56	1.56			
19-Oct	287,342	0.2	40%	1.305	1.32			
19-Nov	277,869	0.5	65%	1.05	1.08			
19-Dec	287,342	0.8	65%	1.05	1.08			
2020 Q1[1]	798,477	1.6	65%	1.32	1.32			
2020 Q2	843,078	0	43%	1.32	1.32			
2020 Q3	799,662	0	25%	1.32	1.32			
2020 Q4	852,552	0.8	57%	1.32	1.32			
2021 Q1	810,000	1.6	65%	1.32	1.32			
2021 Q2	819,000	0	43%	1.32	1.32			
2021 Q3	828,000	0	25%	1.32	1.32			
2021 Q4	828,000	0.8	57%	1.32	1.32			

[1] From 2020 Q1, deposition is modelled on a Quarterly frequency.

Table 6-5: Deposition plan and infrastructure construction – summary

Date	Operational Cell	Dry tons deposited	Infrastructure construction
January to April 2019	South Cell	0.9M tons	• February 2019: South Cell permeable berm to secure reclaim pond
May 2019 to June 2020	North Cell	2.7M tons	• April 2019: 1st NC permeable berm to secure NC pond • August 2019: NC permeable berm to secure NC pond • August 2019: NC reclaim road raise to 154m • July to October 2019: Progressive NCIS raise to 154m in the west extents • September 2019: 2nd NC permeable berm to direct water ponding • Q1 2020: 3rd NC permeable berm to direct water ponding • Q 2020: Center access for additional deposition point deposition
July 2020 to January 2021	South Cell	4.9 M tons	• Q3 2020: Saddle Dam 3, 4 and 5, and Central Dike raise to 150m masl • Q4 2021: Center access for additional deposition point deposition

6.4 MONITORING OF TAILINGS SEEPAGE

Following dewatering of 2PL Arm and during investigations and construction of the TSF perimeter dikes, several investigative procedures were used to identify the location and hydraulic properties of faults that are inferred to be present beneath the North Arm of 2PL including mapping of exposed bedrock, and packer testing in boreholes.

The results of the investigations were used to locate monitoring wells and thermistors that are and will be installed within the dikes, and between the Central Dike and crest of the Portage Pit. Thermal data is monitored to evaluate seepage from the TSF and freezeback of the TSF, and of the Central Dike, Saddle Dam and Rockfill perimeter containment foundations.

- If monitoring indicates flow rates and water qualities of concern, then mitigation measures would be undertaken. Collection of any seep water will be required for pumping it back to the TSF. The potential mitigation action would be dependent on observed flow rates and water quality data;
- If, during monitoring, the freezeback of the dike and tailings deposit is found to be occurring at a rate less than predicted, then enhancement by artificial freezing methods (i.e. thermosyphons) may be considered.

Refer to the 2018 Water Management Plan and Report for details on the Central Dike seepage and to the Tailings Storage Facilities OMS Plan for seepage monitoring and mitigation actions, both included in the 2018 Annual Report.

7 CONTROL STRATEGIES FOR ACID ROCK DRAINAGE – COVER DESIGN

Some rock lithologies from the Meadowbank mining activity are potentially acid generating (PAG) which can raise the concern of generating acid drainage. This section describes the control strategy used at Meadowbank to limit acid rock drainage from the tailings and waste rock.

During selection of the acid rock drainage control strategies for the disposal of the mine waste at the Meadowbank Gold Mine, consideration was given to control strategies that are effective in Arctic regions.

Common control strategies for the prevention or reduction of acid mine drainage in cold regions are:

1. Control of acid generating reactions;
2. Control of migration of contaminants; and
3. Collection and treatment.

In assessing the overall control strategies for the Meadowbank Gold Mine, emphasis has been placed on methods that satisfy (1) and (2), which then has an impact on (3) by potentially reducing the requirements for these activities. Table 7-1 presents various acid mine drainage control strategies for Arctic condition that can be found in the literature.

Table 7-1: Acid Mine Drainage Control Strategies of the Arctic

Strategy	Tailings	Waste Rock
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.	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	May not be a reliable strategy for saturated tailings.	Requires control of convective airflow 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	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.	Very difficult to dispose of waste rock beneath winter ice.
Collection and Treatment	Costly to maintain at remote locations Long term maintenance cost.	
Segregation and Blending	Tailings are normally geochemically homogeneous.	May be very effective. Research and development on-going.

Reference: (MEND 1.61.2, 1996)

The acid rock drainage control strategies retained at Meadowbank is freeze control and climate control strategies. These strategies involve placing a sufficiently thick cover of non-potential acid generating (NAG) waste rock over the PAG material to provide and insulation protection so that the PAG material stay frozen while the active layer is maintained within the NAG material. Based on the production forecast schedule for the Meadowbank Gold Mine, there will be sufficient NAG rock available to provide cover over the Portage RSF and TSF and the Vault RSF. The TSF and RSF cover thickness design will be different as the thermal phenomena within each facility will be different. For example, the tailings are much finer than the waste rock which will impact the convective airflow model due to lower air conductivity and higher water content.

Freeze control strategies rely on the immobilization of pore fluids to control acid mine drainage reactions, and the potential migration of contaminated pore water outside of the storage facility. The climate conditions at the Meadowbank Gold Mine site are suitable to freeze control strategies. In addition to immobilization of pore fluids, permafrost can reduce the hydraulic conductivity of materials by several orders of magnitude.

Climate control strategies rely on cold temperatures to reduce the rate at which oxidation occurs. The low net precipitation in permafrost regions limits infiltration of water into waste rock and tailings disposal areas. Consequently, the climate of the Meadowbank Gold Mine area will act as a natural control to reduce the production of acid mine drainage. Climate control strategies are best applied to materials placed at a low moisture content such as waste rock to reduce the need for additional controls on seepage and infiltration.

Research activities have been undertaken since 2014 in collaboration with the Research Institute Mines and Environment (RIME) to optimize the control strategies to be used in Meadowbank Gold Mine for the RSF's and the TSF's.

Thermistors are installed in the Portage RSF and TSF North Cell to monitor thermal behavior as an adaptive management technique.

7.1 TSF COVER DESIGN

Capping trial and test pads have been constructed on the TSF North Cell in 2014 and 2015, in collaboration with the Research Institute on Mines and the Environment (RIME) to gather data that will help determine the most appropriate design for the site conditions. The design of the cover for the North Cell and South Cell has been initiated in 2015 and 2016. The design is still in progress and the final design will be presented in the Final Closure and Reclamation Plan.

Design criteria specific to the cover system design include:

- The tailings material placed within the North Cell should be entirely frozen after a period of 10 years following completion of the capping (frozen defined as tailings temperature <0°C).
- The freezing front should continue at depth into the lakebed sediments and the bedrock underlying the North Cell, thus eliminating the talik currently in place. The time required for this phenomenon to take place will be determined from modelling and is to be corroborated by monitoring of ground temperatures following closure.
- The tailings are to remain frozen for a period of over 150 years following closure, taking into account the agreed-upon climate change scenario. This will be based on modelling and monitoring of ground temperatures following closure of the facility.
- Ground temperature monitoring should be conducted for a minimum of ten years following closure of the TSF and data compared to the modelled scenario. Model parameters are to be adjusted based on monitoring data and future ground temperature predictions refined.
- For 90% of the TSF surface area, the active layer shall remain within the constructed NAG cover system and the underlying tailings material shall remain frozen for a warm year event with a return period of 1 in 100 years, accounting for the climate change scenario.

- In areas where the active layer extends into the tailings material, the thawed layer should be limited to the upper 30 cm of the tailings mass and saturation of the tailings should remain above 85% to limit oxidation of the tailings.
- As an additional method to reduce tailings reactivity, the degree of saturation within the tailings mass should remain above 85%. This will reduce the tailings reactivity should part of the upper region of the tailings mass thaw during a warm year event.

Conceptual cover system designs previously modelled (Golder, 2008) and presented in the interim closure plan (Golder, 2014) rely on aggradation of the tailings material into the surrounding permafrost to limit the production of Acid Mine Drainage (AMD) and the movement of contaminants through surface and groundwater. The construction of a cover system consisting of non-acid generating granular material (NAG) over the tailings material ensures that the active layer (material going through freeze-thaw cycles, overlying permafrost) remains within the benign material. The objectives of the cover system are to maintain the tailings material below 0°C under most conditions and to maintain saturation above 85%.

The design for the engineered cover system is a layer of compacted NAG waste rock (ultramafic) with a minimum thickness of 2.0 m. The design was developed as a result of soil-plant-atmospheric (S-P-A) modelling, as well as thermal and seepage modelling. Visual observation in the field show that the ultramafic material is heterogeonous with coarser and finer zone so it will be possible that some part of the capping is more insulative than others. As the capping is done in winter over frozen tailings using such a material will have advantage as it will allow to better preserve the freezing condition of the tailings while limiting water infiltration in the cover.

Thermal modelling show that the tailings material, beneath the minimum 2.0 m thick cover will remain frozen for all year (excluding the warmest years) from the 100-year database, accounting for climate change. The unfrozen tailings are segregated in the upper 0.5 m of the TSF and remain above 85% saturation, thus reducing the risk of oxidation until the material freezes back into the permafrost over time.

The TSF closure design will also include a landform that promotes water shedding from all surfaces covered. TSF landform material will be achieved by backfilling using the same material as the cover. With this strategy, the current closure landform plan indicates that the cover thickness over most of the landform will generally be significatively thicker than 2 m reaching up to 8.0 m in certain portions due to the tailings topography.

Additional thermal monitoring and analysis will be required to verify the performance of the cover system against the design intent and inform on the final cover design. Final cover details for the TSF will be subject to modification depending on the results obtained from the site trials as well as from data provided from the Thermal Monitoring Program.

Results of the modelling and the cover design will be provided in the Final Closure and Reclamation plan for Meadowbank site.

7.2 RSF COVER DESIGN

For the Portage waste rock storage, the current plan considers a cover of NAG rock placed over the PAG material present in the waste rock piles. The majority of the Portage RSF is covered with NAG material during operations. For Vault, the waste rock is mainly NAG, and the PAG waste rock is encapsulated in the center of the pile during operations.

Based on the results of the initial thermal modelling, it is expected that the material within the RSFs will freeze within two years of placement. The use of coarse rockfill material within the waste dump will allow the development of convective cooling during winter, and insulation through trapped air within voids during summer. Given the high evaporation rate and low annual average precipitation at the site, the water infiltration into the pile is expected to be low.

The RSF cover design from the FEIS consists of a 4 m thick layer of non-acid generating (NAG) rockfill to contain the active layer within the NAG cover. The depth of cover was selected based on thermal modelling and instrumentation to assess the probable thickness of the active layer at closure including climate change. The NAG cover will not be compacted during construction, but this is taken into account in the thermal model and in the thickness of the cover.

Additional thermal monitoring and analysis will be required to verify the performance of the cover system against the design intent and inform on the final cover design. Final cover details for the RSF will be subject to modification depending on the results obtained the Thermal Monitoring Program.

8 THERMAL MONITORING PLAN

To observe the freezeback of the Tailing Storage Facility (TSF) and the Rockfill Storage Facilities (RSF's), a series of subsurface thermistors have been installed at strategic locations.

The purposes of the TSF thermistors are to monitor the talik temperatures underneath the TSF as freezing progresses and to monitor the freezing of the tailings. The purpose of the thermistors in the RSF is to monitor the RSF temperature as freezing progresses. See Figure 8-1 and Figure 8-2 for the locations of the thermistors installed. Appendix C list all thermistor installed for thermal monitoring of the RSF and TSF.

The thermistors are monitored regularly and this will continue throughout the operational period as well as during closure and post closure. The results collected are to be used to evaluate the predicted thermal response of the facilities with the actual thermal response. This will allow adjustments to the tailings deposition plan, the Waste Rock deposition and the final Closure Plan.

8.1 INSTRUMENT SPECIFICATIONS

Each thermistor installed as part of the thermal monitoring plan must comply with the general specifications presented in Table 7-2 .

Table 7-1: Thermistor Specifications

Items	Specifications
Accuracy	1 degree Celsius
Thermistor temperature range	-40 to 40 degree Celsius
Method of cable termination	Amphenol connector and DAS direct connection
Cable termination enclosures	Weatherproof Animal resistant
Readout and data logger	Manual and DAS

8.2 THERMAL MONITORING PLAN OF TSF

The monitoring program for the TSF will provide the data required to validate the predictions of freezeback within the tailings and support the cover design. The objectives of the TSF North and South Cell cover systems and landforms are to ensure long-term landform stability, encourage TSF freeze-back into the surrounding permafrost, and maintain either subzero temperature or a high degree of saturation (>85%) in the tailings at all times. If it is determined by monitoring during operations that the tailings are freezing at lower rates than predicted, then mitigation procedures would be implemented.

An instrumentation plan for TSF is planned to be developed to define the required instrumentation at closure once capping of the TSF is completed. The purpose of the performance monitoring system is to ensure that the cover perform as per its design intent.

The instrument installed in the North Cell TSF were done in location where tailings deposition was not planned to resume at the time. No instruments are currently installed within the tailings of the South Cell.

These installations will continue to take place as the TSF is filled with tailings. Initially, some of the installations may be 'sacrificial' or temporary; in other words, installations may be used to collect data over a short period and then may be destroyed or inaccessible as deposition progresses. The rationale behind installing such thermistors is to monitor the thermal conditions within and beneath the TSF from a very early stage in the life of the facility. As the TSF reaches final elevation, thermistors will be installed from the final tailings surface, and directly into the underlying bedrock.–These will likely be on the order of 50 m to 75 m in length (potentially deeper) with nodes placed at intervals to monitor temperatures within the tailings and within the bedrock.

8.2.1.1 Thermal Performance of TSF

At this time the thermistors indicate that freezeback is occurring within the North Cell TSF thermistors installed in the tailings. An active layer can be observed as most instruments are installed entirely within the tailings.

There is currently not enough thermistor installed within capping material to be able to conclude on the effectiveness of TSF cover. When more instruments will have been installed in the TSF capping, a study will be undertaken to compare the thermal performance of the cover to the predicted performance.

8.3 THERMAL MONITORING PLAN OF RSF

Thermistors are installed within the Portage RSF. No instruments are installed within the Vault RSF.

Additional thermistors are planned to be installed within the Portage and Vault RSF at closure. An instrumentation plan will be developed to define the required instrumentation at closure.

8.3.1.1 Thermal Performance of RSF

At this time the thermistors indicate that freezeback is occurring within the Portage RSF structures. The instruments show that the active layer is variable in thickness based on the thermistors location.

A mandate is currently ongoing for the Amaruq WRSF to calibrate the thermal model and develop an instrumentation plan to assess the cover performance. Once this mandate is over a similar approach will be used at Vault and Portage RSF to obtain information to assess the performance of the Portage cover. This mandate is expected to be initiated in 2019.

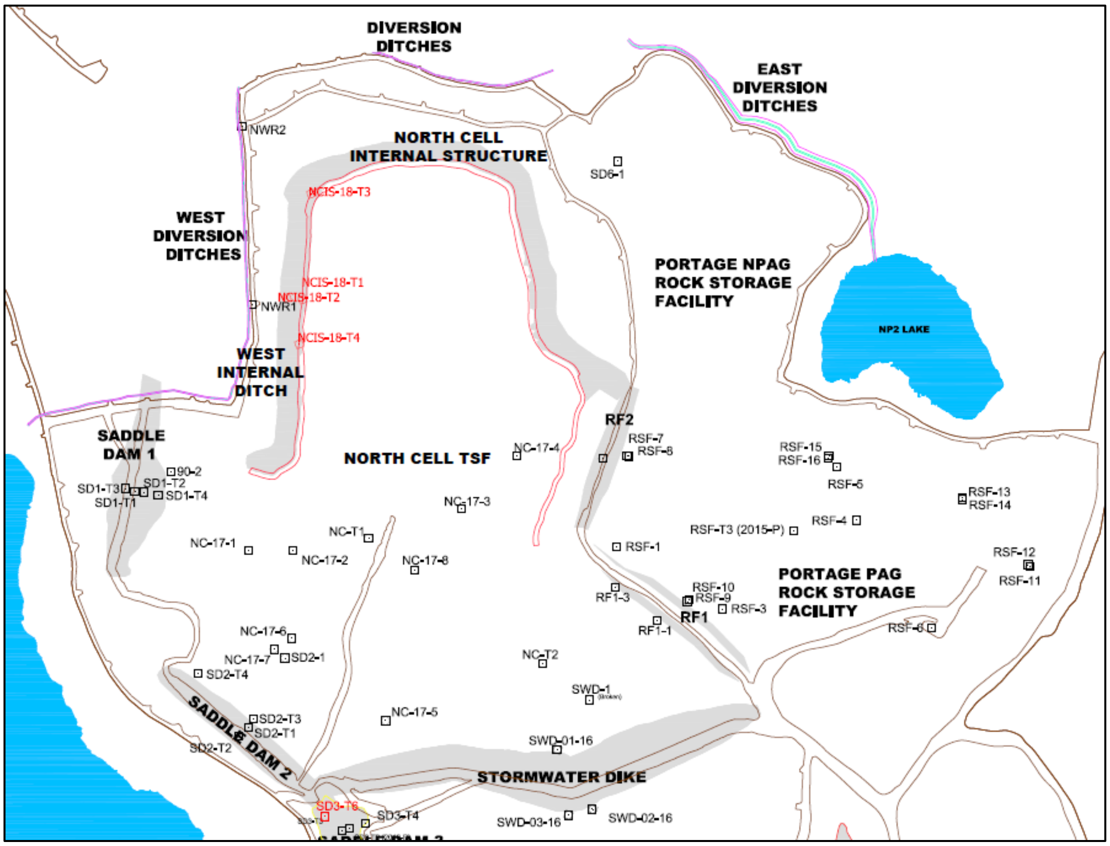

Figure 8-1: Thermistor Location in Portage RSF and TSF North Cell (red: installed in 2018, black: existing)

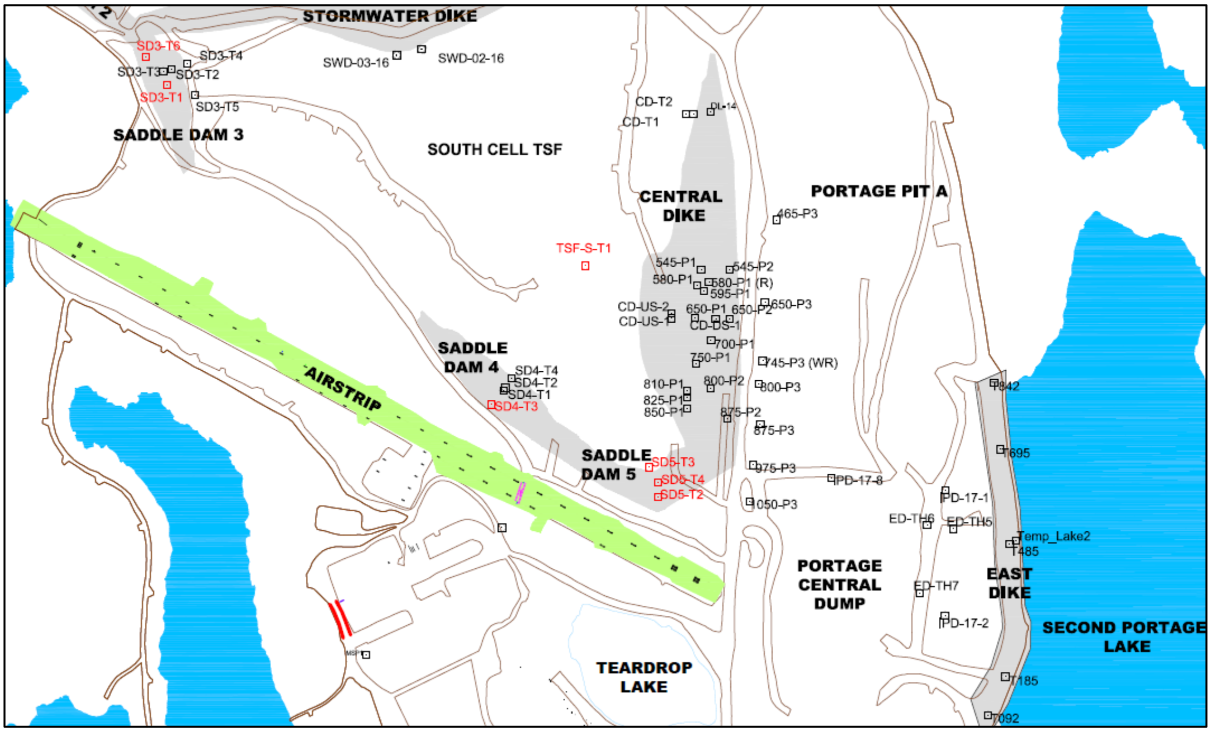

Figure 8-2: Thermistor Location in TSF South Cell (red: installed in 2018, black: existing)

9 MONITORING AND CLOSURE

Mine closure and reclamation will utilize accepted management practices and appropriate mine closure techniques that comply with accepted protocols and standards. Closure will be based on project design and operation to minimize the area of surface disturbance, stabilize disturbed land surfaces and permafrost against erosion, and return the land to post-mining uses for traditional pursuits (MMC, 2007a). An updated Interim Closure and Reclamation Plan was prepared by Golder in January, 2014. The document was included as part of AEM's 2013 Annual Report.

All infrastructure associated with waste management facilities will be re-contoured and/or surface treated according to site specific conditions to minimize windblown dust and erosion from surface runoff, avoid acid rock drainage and to enhance the re-establishment of natural vegetation and wildlife habitat. A Final Reclamation and Closure Plan will be issued in accordance with the Water License.

The post-closure general concept for the Meadowbank site is illustrated in Figure 9-1. Mine waste rock storages for Portage and Vault and the North Cell TSF will be progressively closed during mine operations.

9.1 TSF RECLAMATION

The ultimate goals for reclamation of the TSF are to mitigate long-term environmental effects to the aquatic receiving environment and to establish a landform similar to that of the natural surrounding area.

To achieve the goals and criteria for the reclaimed TSF, the final design will consist of a landform that promotes water shedding from all surfaces covered by an engineered cover system. During the post-closure period, the tailings are predicted to freeze with time, resulting in permafrost encapsulation.

The final landform will consist of two watersheds in the North Cell, each one having its own outlet, and one landform for the South Cell. Around half of the North Cell area discharges through a first outlet in a sump and ditch at the North leading to 3PL. The second outlet discharges via a spillway to the lower South Cell cover. From this point, this water is mixed with the South Cell watershed going through a sump and ditch system in such a way that water is drained from both covers, in line with closure requirements. Design objectives are to minimize cover material volumes and tailings excavation by taking advantage of the tailings surface and balancing the required excavation and cover system material volumes. Several scenarios were prepared on both the North Cell and South Cell to minimize rockfill volumes and the most optimal ones were chosen.

Facility minimum slope angle for the cover surface is 1%. Water is moved off the cover using a surface water management system consisting of grading the plateau areas towards engineered surface runoff drainage channels. The runoff drains have a minimum slope of 0.5%.

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 run off water will be directed to the South Cell or to the Portage Pit until it meets criteria for direct discharge to Third Portage Lake. This is discussed in the 2018 Water Management Plan.

At closure water will be removed from the South Cell and North Cell of the TSF. Once the North Cell and South Cell TSF reclaim ponds will be dewatered, the migration of seep water into the talik beneath the North Arm of Second Portage Lake can only occur by diffusion. The rate of advance of the freezing front into the talik beneath the 2PL is expected to exceed the rate of advance of diffusive transport.

North Cell progressive capping occurred from winter of 2015 to 2018 using mainly ultramafic rockfill from the Portage Pit operation. Capping will be completed once the operation of the North and South Cell is completed. During the operation, AEM is evaluating on a regular basis favorable locations for progressive capping.

9.2 RSF CLOSURE

For the Waste Rock Storage Facility, the current closure plan considers the placement of a 4m cover of NAG rock placed over the PAG material. This capping is continually ongoing around the perimeter as parts of the RSF reach their limits. To date, approximately 80% of the Portage RSF has been covered. The final capping will be completed at closure. Based on the results of the planned thermal monitoring and additional thermal modeling it is possible that additional capping will be required to achieve performance of the cover meeting design intent. Details of the Portage RSF closure will be presented in the Final Closure and Reclamation Plan.

For Vault, the waste rock stored is mainly NAG, and the PAG waste rock is encapsulated in the center of the pile during operations resulting in a thickness of NAG superior to 4 m acting as a cover.

The surfaces of the Portage and Vault RSFs will be contoured where required to direct drainage respectively to the TSF (see) and towards Vault Pit (see). Note that Section A in is conceptual and does not represent the design work of the TSF North Cell completed. The runoff water from the Vault and Portage RSFs will be monitored at closure.

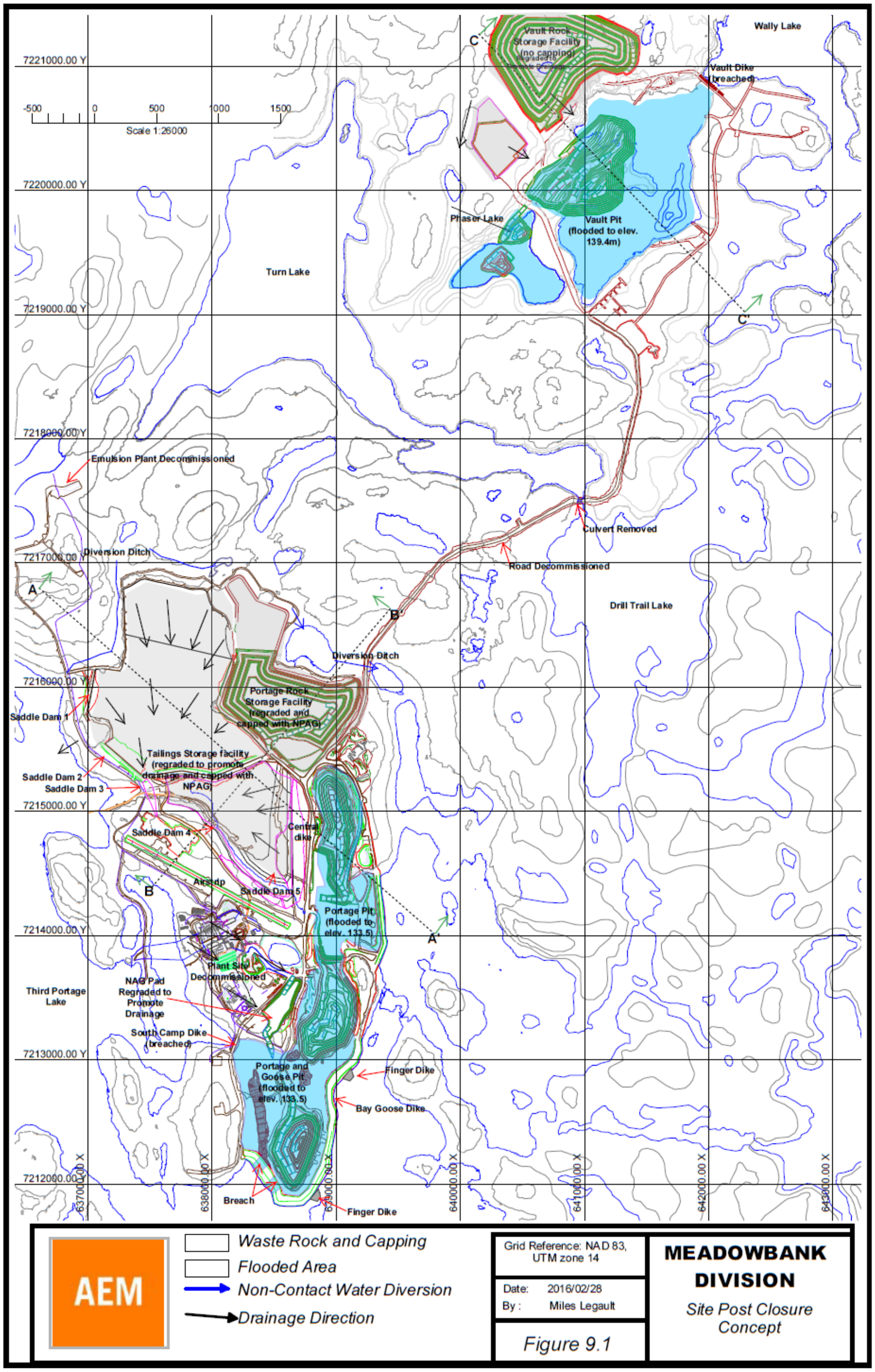

Figure 9-1: Site Post Closure Concept

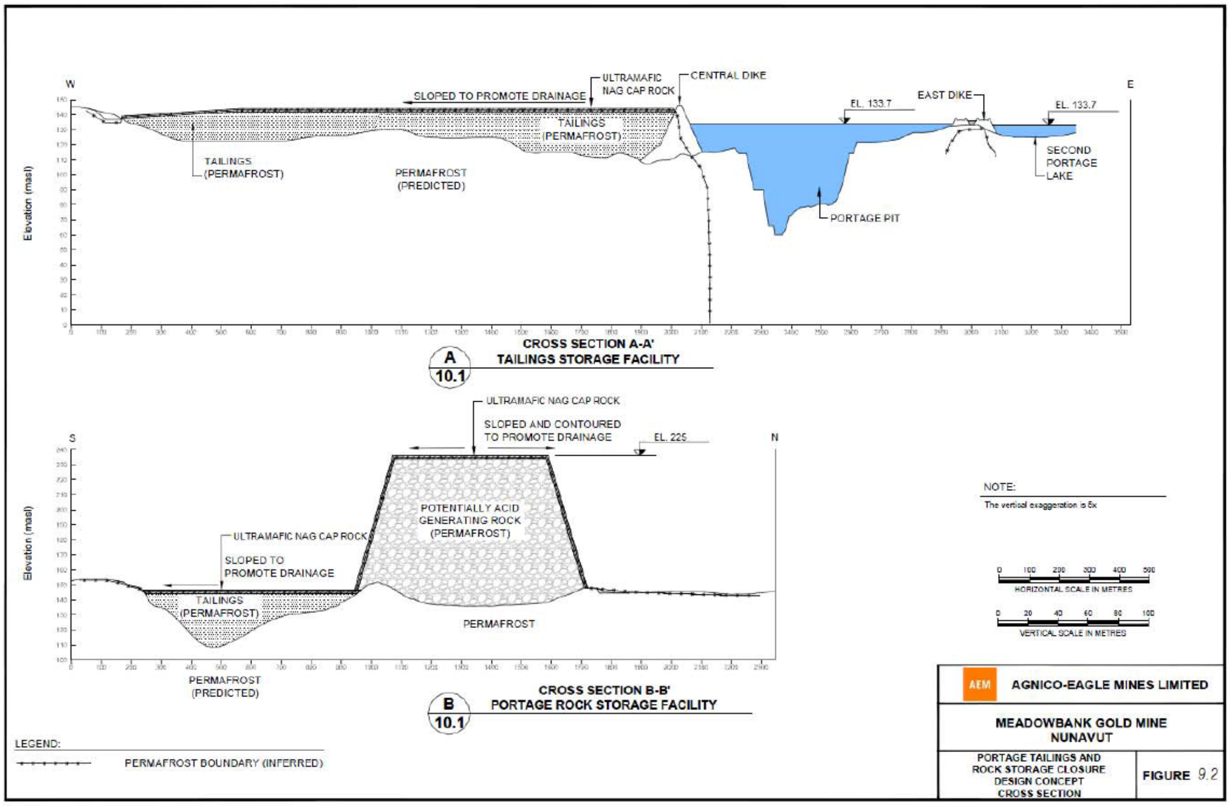

Figure 9-2: Portage Tailings and Rock Storage Closure Design Concept Cross Section

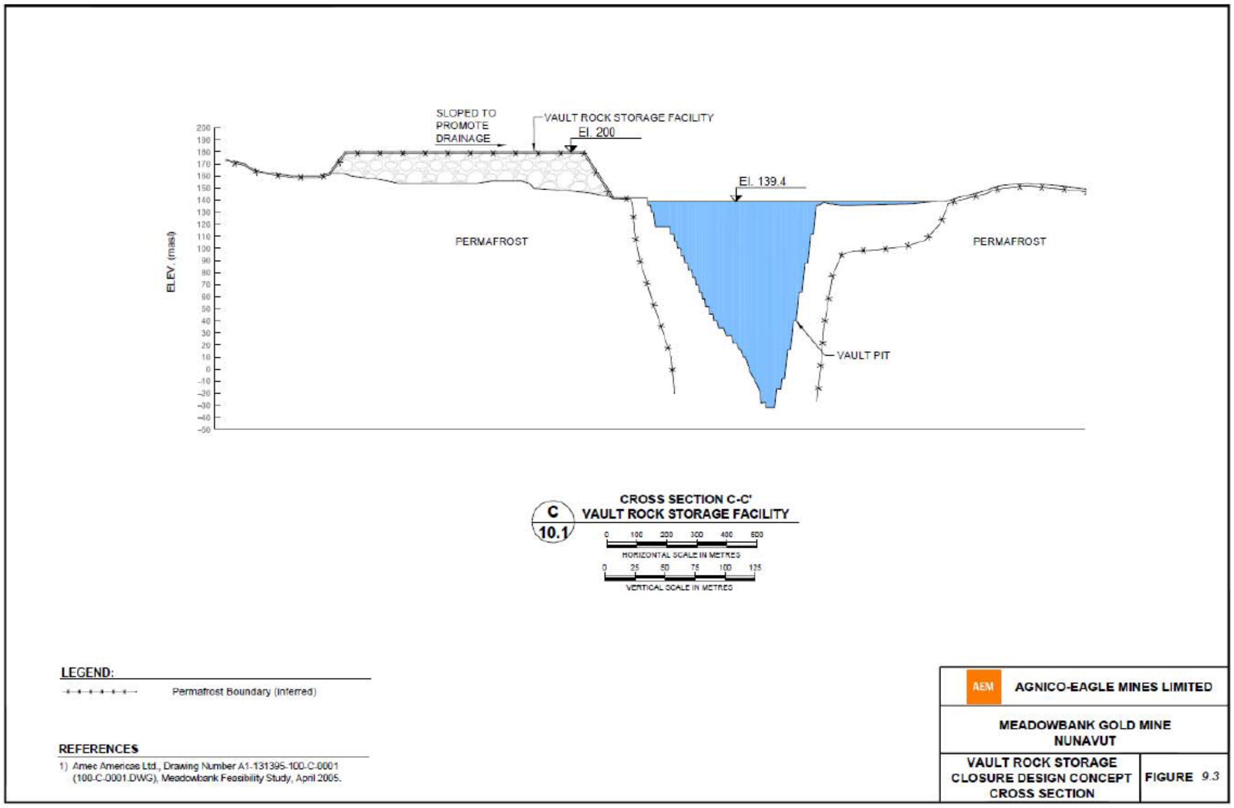

Figure 9-3: Vault Rock Storage Closure Design Concept Cross Section

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APPENDIX A

Meadowbank Mined Material Balance (2009-2019)

Table A: Meadowbank Mined Tonnages for 2009

	North Portage (Tonnes)			South Portage (Tonnes)			Total (Tonnes)
	Rock	Ore	Waste	Rock	Ore	Waste	-
January	160,294	-	-	-	-	-	-
February	103,323	-	-	-	-	-	-
March	256,972	-	280	-	-	-	-
April	388,725	12,733	1,306	-	-	-	-
May	516,829	-	-	-	-	-	-
June	531,933	729	-	-	-	-	-
July	584,364	5,910	6,820	-	-	-	-
August	741,518	-	-	-	-	-	-
September	528,191	9,618	4,445	-	-	-	-
October	640,295	42,452	250	19,778	-	2,548	-
November	378,005	33,247	3,167	601,807	94,848	4,061	-
December	322,641	6,307	-	341,547	339,991		-
TOTAL	****5,153,090**	*****110,996**	***16,268**	****963,132**	*****434,839**	***6,609**	**6,684,934**
*Total Waste Rock Transferred to Waste Dump							22,877
**Total Rock Used for Construction Purposes (road, dikes, etc.)							6,116,222
***Total Ore							545,834

Table B: Meadowbank Mined Tonnages for 2010

	Portage Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	97,446	223,842	190,281	156,162	173,736	-	-	-	744,021	-
February	43,979	281,368	46,654	123,727	359,649	-	32,298	1,295	844,991	47,745
March	75,333	503,299	107,635	-	197,125	23,540	-	-	831,599	163,399
April	116,940	258,416	63,100	171,451	428,814	-	-	6,196	927,977	176,857
May	136,444	258,481	10,019	148,576	672,724	-	-	50,073	1,139,873	177,610
June	152,606	534,039	24,748	126,155	401,748	-	-	12,632	1,099,322	215,389
July	236,768	471,106	176,169	127,379	237,095	-	-	-	1,011,749	193,422
August	225,467	493,626	506,385	168,085	115,930	-	-	-	1,284,026	215,559
September	272,675	503,624	606,044	161,673	214,866	5,621	-	-	1,491,828	227,502
October	232,888	235,924	595,322	56,337	461,627	53,522	-	-	1,402,832	198,394
November	247,401	3,813	104,087	8,991	963,805	-	-	-	1,080,596	218,260
December	323,641	-	299,167	8,991	1,118,767	-	-	-	1,426,925	214,400
TOTAL	**2,161,588**	**3,767,538**	**2,729,611**	**1,257,527**	**5,345,886**	**82,683**	**32,298**	**70,196**	**13,285,739**	**2,048,537**

1. Waste Rock disposed at the waste dump includes overburden stripped for exploitation of Portage Pit

Table C: Meadowbank Mined Tonnages for 2011

	Portage Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	231,025	-	113,259	37,096	1,109,543	-	-	2,544	1,262,442	193,748
February	133,165	-	25,308	51,280	766,807	-	-	404	843,798	213,313
March	86,161	-	21,288	33,271	662,028	-	-	1,044	717,631	221,615
April	235,303	-	77,596	85,064	1,497,859	-	-	11,504	1,672,024	223,041
May	207,399	-	64,171	137,980	1,448,630	-	-	49,069	1,699,851	186,811
June	326,108	8,744	291,067	176,248	1,592,345	-	-	26,615	2,095,019	257,401
July	340,966	54,927	99,513	74,750	1,869,449	-	-	19,140	2,117,779	284,295
August	326,808	122,696	4,674	117,745	1,484,613	-	-	2,384	1,732,111	275,766
September	412,783	333,829	27,199	148,545	1,724,305	-	-	22,884	2,256,762	306,020
October	389,418	22,085	136,862	53,614	1,791,385	-	-	162,725	2,166,671	306,756
November	321,180	12,725	29,518	83,943	1,972,577	-	-	110,214	2,208,976	214,868
December	334,768	164,399	55,516	52,137	1,913,103	-	-	53,454	2,238,609	294,088
TOTAL	**3,345,084**	**719,404**	**945,971**	**1,051,671**	**17,832,645**	**-**	**-**	**461,981**	**21,011,673**	**2,977,722**

1. Waste Rock disposed at the waste dump includes overburden stripped for exploitation of Portage Pit

Table D: Meadowbank Mined Tonnages for 2012

	Portage Pit, Goose Pit & Vault Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	312,546	-	25,347	853	1,707,100	-	-	568,896	2,302,196	275,186
February	320,370	-	57,299	-	1,859,479	-	-	276,030	2,192,808	307,134
March	311,938	-	4,574	33,835	1,760,145	-	-	374,271	2,172,825	304,740
April	318,550	-	29,748	171,964	2,187,929	-	-	183,366	2,573,007	285,702
May	253,947	37,372	200,732	103,650	2,000,982	-	-	231,500	2,574,236	320,542
June	276,731	78,343	281,403	64,460	1,866,369	-	-	226,695	2,517,270	294,829
July	354,765	9,991	342,978	134,006	1,791,752	-	-	268,051	2,546,777	337,110
August	271,444	260,083	261,459	214,516	1,327,154	-	-	720,701	2,783,914	352,831
September	364,410	674,872	515,804	7,309	1,446,572	-	-	273,284	2,917,841	313,014
October	119,100	-	488,259	-	2,163,147	-	-	590,936	3,242,342	358,860
November	133,041	6,880	281,560	7,439	2,081,931	-	-	337,974	2,715,783	356,646
December	176,287	105,724	142,448	-	2,178,832	-	-	577,195	3,004,199	314,317
TOTAL	**3,213,129**	**1,173,266**	**2,631,610**	**738,031**	**22,371,392**	**-**	**-**	**4,628,899**	**31,543,198**	**3,820,911**

1. Waste Rock disposed at the waste dump includes overburden stripped for exploitation of Portage Pit & Goose Pit

Table E: Meadowbank Mined Tonnages for 2013

	Portage Pit, Goose Pit & Vault Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	184,536	-	14,052	531	2,486,541	-	-	222	2,501,346	320,729
February	196,802	-	61,036	8,913	2,495,018	-	-	-	2,564,967	329,709
March	311,380	1,520	58,325	393	2,691,265	-	-	294	2,751,797	368,323
April	271,823	317,845	79,530	77,730	2,071,408	-	-	82,810	2,629,323	309,458
May	336,532	269,930	51,645	-	2,299,765	-	-	29,650	2,650,990	363,625
June	249,724	397,170	252,710	153,310	1,443,285	-	-	494,975	2,741,450	355,498
July	330,024	54,525	16,010	111,360	2,234,897	-	-	340,655	2,757,447	368,058
August	316,136	-	92,460	145,385	2,824,875	-	-	125	3,062,845	321,294
September	307,532	-	61,465	5,940	2,774,724	-	-	98,255	2,940,384	357,595
October	353,697	-	33,470	-	2,504,101	-	-	188,000	2,725,571	377,118
November	282,046	-	35,365	-	2,637,689	-	-	-	2,673,054	300,779
December	299,298	-	18,490	-	2,073,386	-	-	125	2,092,001	370,655
TOTAL	**3,439,530**	**1,040,990**	**774,558**	**503,562**	**28,536,954**	**0**	**0**	**1,235,111**	**32,091,175**	**4,142,841**

1. Waste Rock disposed at the waste dump includes overburden stripped for exploitation of Portage Pit & Goose Pit

Table F: Meadowbank Mined Tonnages for 2014

	Portage Pit, Goose Pit & Vault Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	223,588	-	-	-	1,731,954	-	-	28,475	2,187,943	364,275
February	291,542	-	-	-	1,032,536	-	-	5,554	1,876,728	314,877
March	400,472	-	246	-	1,768,995	-	-	7,891	2,681,239	303,462
April	314,088	49,640	-	98,086	1,792,686	-	-	21,683	2,598,780	355,557
May	239,028	40,939	-	40,939	1,435,491	-	-	332,704	2,673,027	339,395
June	337,659	123,348	-	123,348	1,852,273	-	-	348,606	2,573,438	356,065
July	347,514	470,324	-	470,365	1,052,263	-	-	810,414	2,650,362	361,983
August	333,746	284,388	-	284,389	1,117,766	-	-	728,531	2,602,482	341,168
September	307,532	-	-	-	1,473,602	-	-	397,963	2,431,958	354,171
October	360,860	451	-	-	1,534,790	-	-	33,932	2,214,199	308,014
November	324,971	-	-	-	1,565,615	-	-	57,065	2,265,457	349,780
December	350,972	-	-	-	1,441,827	-	-	5,447	1,960,172	369,259
TOTAL	**3,987,859**	**969,093**	**246**	**98,086**	**17,799,797**	**0**	**0**	**2,778,266**	**28,715,785**	**4,118,006**

1. Waste Rock disposed at the waste dump includes overburden stripped for exploitation of Portage Pit, Goose Pit, & Vault Pit

Table G: Meadowbank Mined Tonnages for 2015

	Portage Pit, Goose Pit & Vault Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	386,670	240	105,275	240	1,210,880	-	382,115	328,000	2,413,420	363,485
February	319,494	-	3,836	2,894	1,340,755	-	376,732	220,739	2,264,450	304,126
March	413,718	-	164,531	15,439	1,535,819	-	79,336	246,948	2,455,791	322,865
April	326,603	-	45,986	19,698	1,701,286	-	38,059	941,986	3,073,618	301,220
May	421,329	7,743	87,127	1,155	1,550,668	-	417,637	914,675	3,400,334	358,783
June	300,844	15,732	19,602	19,438	1,654,038	-	476,220	522,338	3,008,212	359,079
July	383,427	282,843	96,679	68,334	1,447,386	-	549,248	308,208	3,136,125	353,824
August	293,046	234,032	24,069	45,617	2,149,965	-	460,273	129,812	3,336,814	361,766
September	298,214	102,009	54,488	25,549	2,675,549	-	230,741	136,669	3,523,219	280,235
October	361,340	31,103	137,850	-	2,839,411	-	156,915	-	3,526,619	354,968
November	350,347	783	11,090	-	2,438,493	-	184,551	43,385	3,028,649	358,507
December	289,204	-	84,473	7,331	2,651,063	-	-	-	3,032,071	313,994
TOTAL	**4,144,236**	**674,485**	**835,006**	**205,695**	**23,195,313**	**-**	**3,351,827**	**3,792,760**	**36,199,322**	**4,032,852**

1. Waste Rock disposed at the waste dump includes overburden stripped for exploitation of Portage Pit, Goose Pit, & Vault Pit

Table H: Meadowbank Mined Tonnages for 2016

	Portage Pit & Vault Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	**Waste Rock**								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	292,365	17,453	155,335	45,232	2,353,611	0	43,056	21	2,614,708	346,009
February	234,713	108,151	476,263	23,721	1,814,074	0	50,523	27	2,472,760	300,954
March	244,497	51,826	67,814	116,657	2,345,902	0	18,217	112	2,600,527	298,552
April	260,323	31,133	98,223	43,404	2,491,605	0	45,545	130	2,710,040	330,863
May	327,610	128,385	21,503	3,734	2,522,759	0	57,936	36,009	2,770,327	351,932
June	311,403	68,802	94,678	19,090	2,640,740	0	86,615	122	2,910,047	310,702
July	398,530	49,347	520	38,145	2,571,022	0	107,503	28	2,766,566	356,517
August	410,800	14,305	273,580	170,705	2,120,975	0	103,675	129	2,683,369	325,639
September	377,414	79,939	23,053	169,733	2,099,627	0	95,243	27	2,467,621	279,249
October	364,792		117,665	335	1,994,464	0	6,456	17	2,118,937	339,157
November	438,954	6,741	8,294	16,164	1,834,572	0	17,275	1,036	1,884,082	326,841
December	370,247	17,092	346	17,786	1,544,266	0	23,590	165	1,603,246	348,687
TOTAL	**4,031,648**	**573,175**	**1,337,274**	**664,707**	**26,333,617**	**0**	**655,634**	**37,823**	**29,602,230**	**3,915,102**

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

Table I: Meadowbank Mined Tonnages for 2017

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

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

Table J: Meadowbank Mined Tonnages for 2018

	Portage Pit & Vault Pit (tonnes)									Ore Processed in Mill (tonnes)
	Ore	Waste Rock								
		Dikes	Roads	Crushers	Waste Dump[1]	Landfill	Stockpiles	Other	Total	
January	298,411	308	8,958	1,292	1,286,572	0	378	41,538	1,637,457	290,277
February	236,865	0	83,624	27,237	1,199,432	0	251	149,036	1,696,445	288,375
March	256,063	675	5,961	22,917	1,310,619	0	1,446	165,562	1,763,243	246,416
April	225,990	56,338	440	101,881	1,228,920	0	86,609	229,113	1,929,291	254,528
May	230,283	0	50,282	0	1,198,847	0	13,831	150,173	1,643,416	301,915
June	222,227	0	3,360	0	929,405	0	1,112	119,259	1,275,363	287,319
July	190,331	0	2,918	0	681,804	0	3,196	166,296	1,044,545	347,236
August	179,509	0	7,002	0	606,678	0	661	49,324	843,174	303,191
September	210,884	0	3,482	0	609,036	0	12,180	126,692	962,274	237,935
October	174,656	0	2,510	0	494,411	0	272	118,340	790,189	239,674
November	194,071	0	1,768	0	532,824	0	336	119,821	848,820	215,299
December	204,293	0	1,066	0	508,417	0	3,392	69,652	786,820	244,500
TOTAL	**2,623,583**	**57,321**	**171,371**	**153,327**	**10,586,965**	**0**	**123,664**	**1,504,806**	**15,221,037**	**3,256,665**

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

Table K: Projected Meadowbank Mined Tonnages (2019)

		2019
Portage Pit	**Total Waste Rock (t)**	**1,499,946**
	NAG (~ %)	38%
	PAG (~ %)	62%
	Till (t)	0
	Ore (t)	448,065
Vault Pit	**Total Waste Rock (t)**	**23,342**
	NAG (~ %)	100%
	PAG (~ %)	<1%
	Till (t)	0
	Ore (t)	42,571
BB Phaser Pit	**Total Waste Rock (t)**	**465,098**
	NAG (~ %)	100%
	PAG (~ %)	<1%
	Till (t)	0
	Ore (t)	106,488

Note: Difference between pit mill feed and total mill feed is due to stockpiled material to be processed.

APPENDIX B

TSF Integrated Deposition Plan

AGNICO EAGLE

MEADOWBANK

INTEGRATED TAILINGS DEPOSITION PLAN

FEBRUARY 2019

Introduction

- The objectives for the February 2019 Tailings Deposition Plan are as follows:
  - Develop 2019 deposition plan
  - Maximize tailings capacity with the current TSF infrastructure
  - Evaluate construction/work requirement for North Cell and South Cell deposition
- 2019 deposition plan done by Month
- 2020 & 2021 deposition plan done by Quarter
- The starting water balance used in the deposition plan is Water Balance – January 2019 EOM
- The starting surfaces are:
  - North Cell 2018 October EOM surface
  - South Cell 2019 January EOM surface:
  - Last bathymetry and scan: June 2018

Introduction

- The millfeed used in the deposition plan come from BUD2019_V1G

Month	Tonnage/month	Quarter	Tonnage/month
2019-02	223,040	2020-Q1	266,159
2019-03	183,000	2020-Q2	281,026
2019-04	239,360	2020-Q3	266,554
2019-05	210,120	2020-Q4	284,184
2019-06	239,360	2021-Q1	270,000
2019-07	287,342	2021-Q2	273,000
2019-08	281,816	2021-Q3	276,000
2019-09	242,346	2021-Q4	276,000
2019-10	287,342		
2019-11	277,869		
2019-12	287,342		
Total tonnage		9,3 Mt	
Total tonnage from July 2019		8,3 Mt	

- The design parameters considered in the deposition plan include mill process rates, tailings beach slopes, water entrapment, and tailings in-situ densities
- The following slides will present the parameters used in the deposition plan

June 2018 Updated Model Parameters

The South Cell parameters come from the parameter analysis following the June 2018 bathymetry, while the North Cell parameters are based on the 2014 bathymetry.

Beach Slope Angles			
	South Cell	**North Cell**	**By-pass**
Sub-Aerial	0.58%	0.45%	1.16%
Sub-Aqueous	2.36%	2.36%	2.36%
Reference	Bathymetry Parameter Analysis June 2018	2014 North Cell Bathymetry Analysis	Bathymetry Parameter Analysis June 2018

Year	Month	Ice Thickness (m)	Water Entrapment (%)	SC Tailings Density (t/m^3)	NC Tailings Density (t/m^3)
2019	January	1.1	65%	1.05	1.08
	February	1.3	65%	1.05	1.08
	March	1.6	65%	1.05	1.08
	April	1.7	65%	1.05	1.08
	May	0	40%	1.305	1.32
	June	0	25%	1.56	1.56
	July	0	25%	1.56	1.56
	August	0	25%	1.56	1.56
	September	0	25%	1.56	1.56
	October	0.2	40%	1.305	1.32
	November	0.5	65%	1.05	1.08
	December	0.8	65%	1.05	1.08
Annual Average		-	**47.5%**	**1.26**	**1.28**

June 2018 Updated Model Parameters

The South Cell parameters come from the parameter analysis following the June 2018 bathymetry, while the North Cell parameters are based on the 2014 bathymetry.

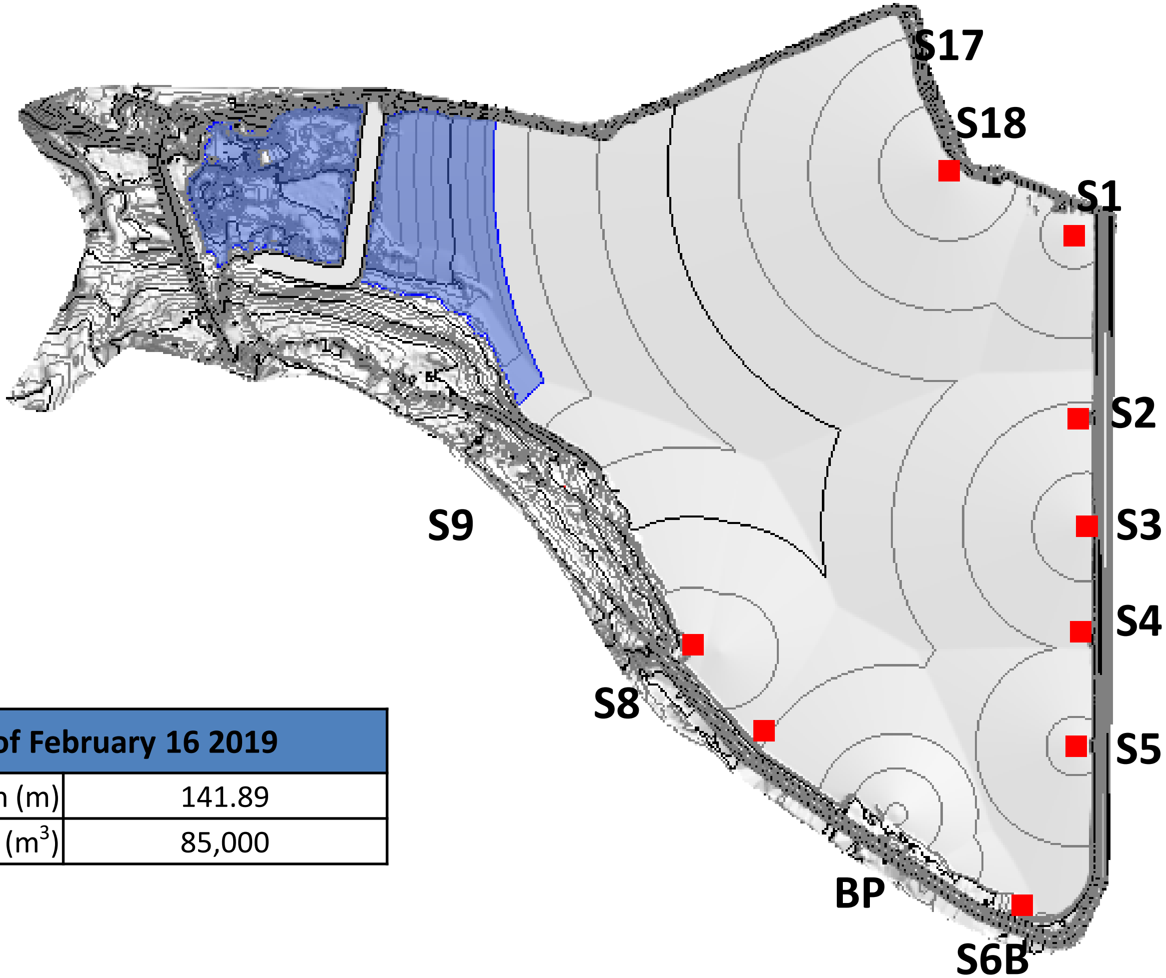
Year	Quarter	Ice Thickness (m)	Water Entrapment (%)[*1]	SC Tailings Density (t/m³)	NC Tailings Density (t/m³)
2020-2021	Q1	1.6	65%	1.32	1.32
	Q2	0	43%	1.32	1.32
	Q3	0	25%	1.32	1.32
	Q4	0.8	57%	1.32	1.32
Annual Average		-	**47.5%**	**1.32**	**1.32**

[*1] Average of the 3 months in the Quarter

2018 Updated Deposition Strategy

South Cell TSF

The figure below depicts the geometry of the South Cell modelled at the End of February based on the deposition plan presented hereafter. All structures (Central Dike, SD3, 4 & 5 and Stormwater Dike) are currently at elevation 145masl or above. A permeable berm in the Pond is required to be built in February



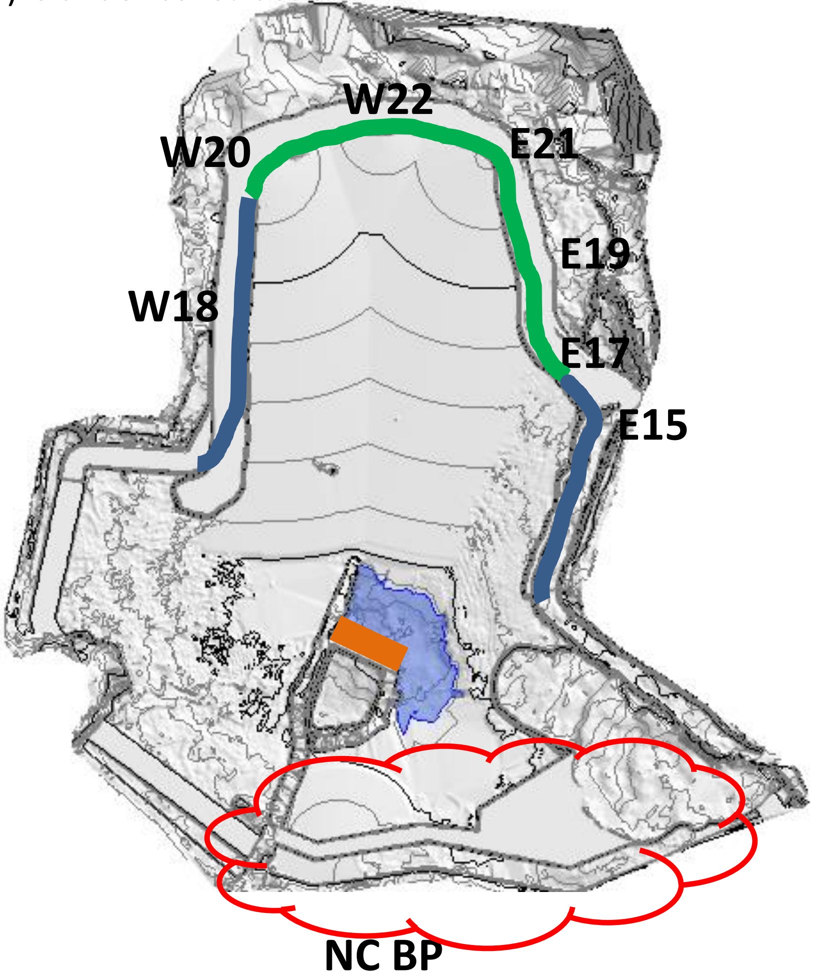
Conditions, as of February 16 2019	
Surveyed Water Elevation (m)	141.89
Total Free Water Volume (m^3)	85,000

2018 Updated Deposition Strategy

North Cell TSF

The figure below depicts the geometry of the North Cell modelled at the end of October. All structures (SD1, SD2, and Stormwater Dike) are currently at elevation 150masl or above. Internal structures have been completed to elevations 154, 152, in green and blue, respectively on the figure below. The area circled in red was capped and an permeable berm (in orange) is under construction.

Conditions, as of November 11 2018	
Surveyed Water Elevation (m)	146.875
Total Free Water Volume (m^3)	58,325

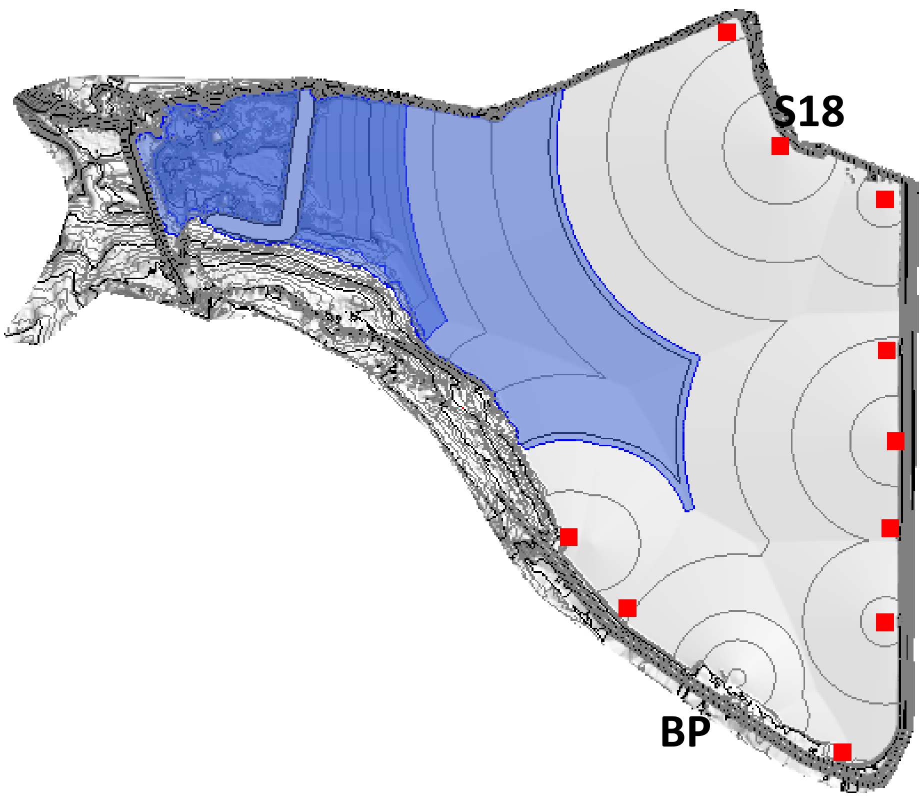


TSF Deposition Plan
February 2019 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
27.5	S18	219,929	144.494
0.5	BP	3,999	144,652

MODEL INPUT	
Pond Volume (m³)	126,427
Ice thickness (m)	1.3
Tonnes (t)	223,040

MODEL OUTPUT	
Total water volume (m³)	300,331
Free water volume (m³)	126,365
Ice volume (m³)	173,966
Pond elevation (m)	142.564
Free water elevation (m)	141.264
Pond bottom elevation (m)	137.2
Ice ratio (%)	58%
Water entrapment (%)	65%



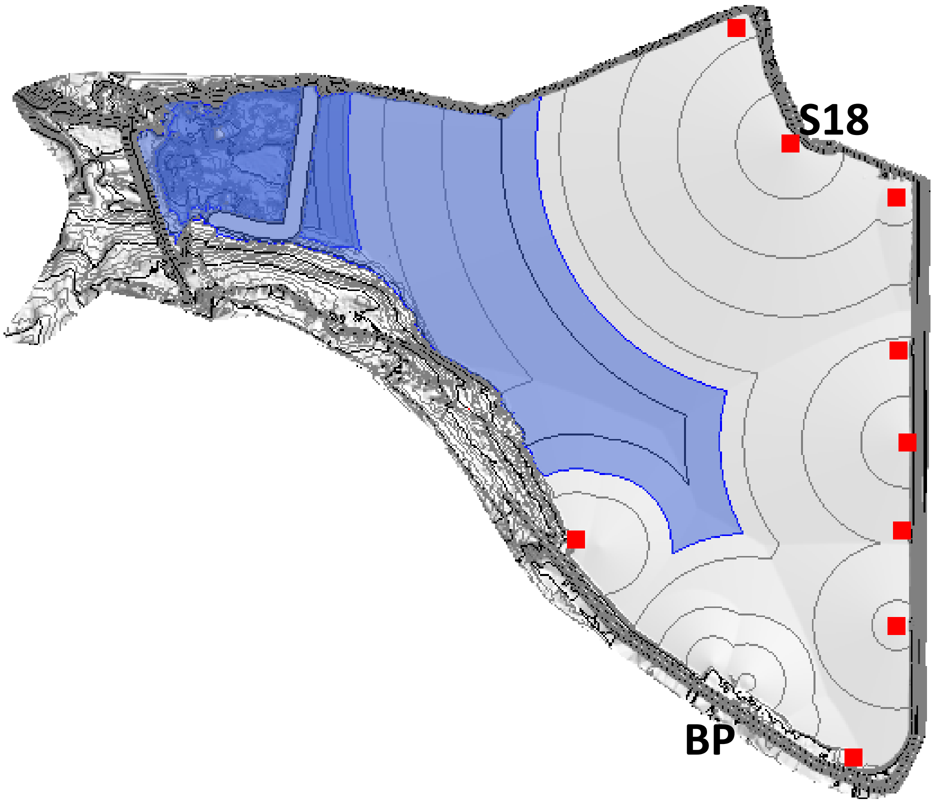
Comments: South Cell permeable berm to be completed

TSF Deposition Plan
March 2019 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
30.5	S18	180,287	144.964
0.5	BP	2,956	144,453

MODEL INPUT	
Pond Volume (m³)	80,714
Ice thickness (m)	1.60
Tonnes (t)	183,000

MODEL OUTPUT	
Total water volume (m³)	260,380
Free water volume (m³)	80,695
Ice volume (m³)	179,685
Pond elevation (m)	142.800
Free water elevation (m)	141.200
Pond bottom elevation (m)	137.2
Ice ratio (%)	69%
Water entrapment (%)	65%



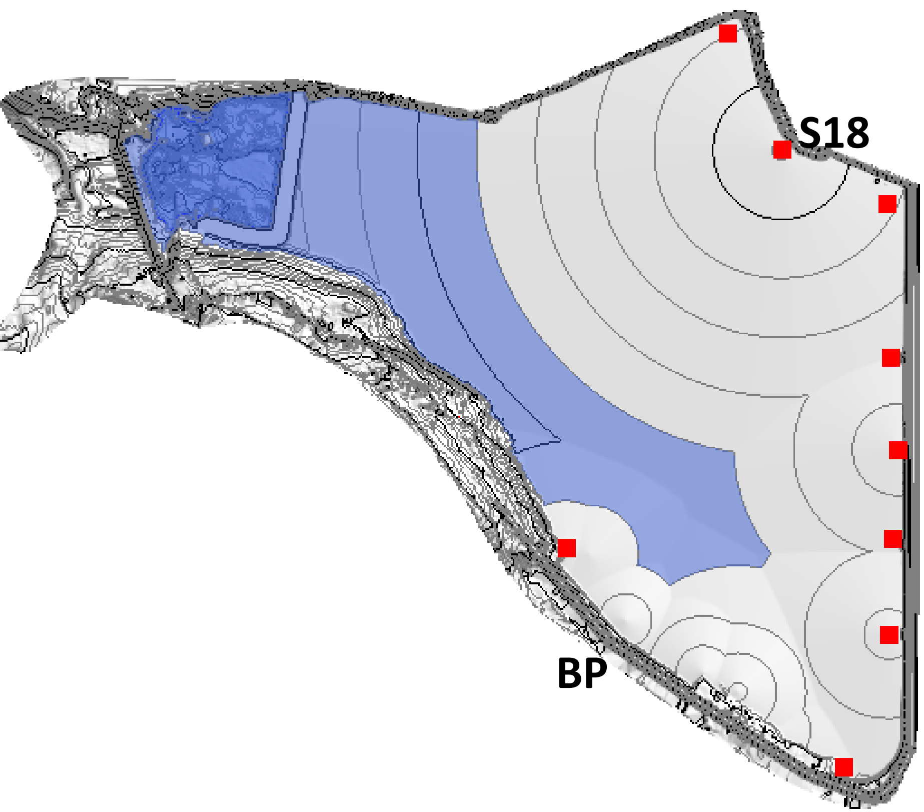
Comments:
1-By-Pass needs to be moved
2-Pond elevation is at 142.8m
3-Pond free water volume is less than 100,000m^3, however pond elevation near max.
4-Tailings elevation at S18 is higher than 144.5m however the natural ground topo. allows higher elevation.

TSF Deposition Plan
April 2019 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
29.5	S18	235,394	**145.580**
0.5	BP	3,990	143.950

MODEL INPUT	
Pond Volume (m^3)	75,688
Ice thickness (m)	1.70
Tonnes (t)	239,360

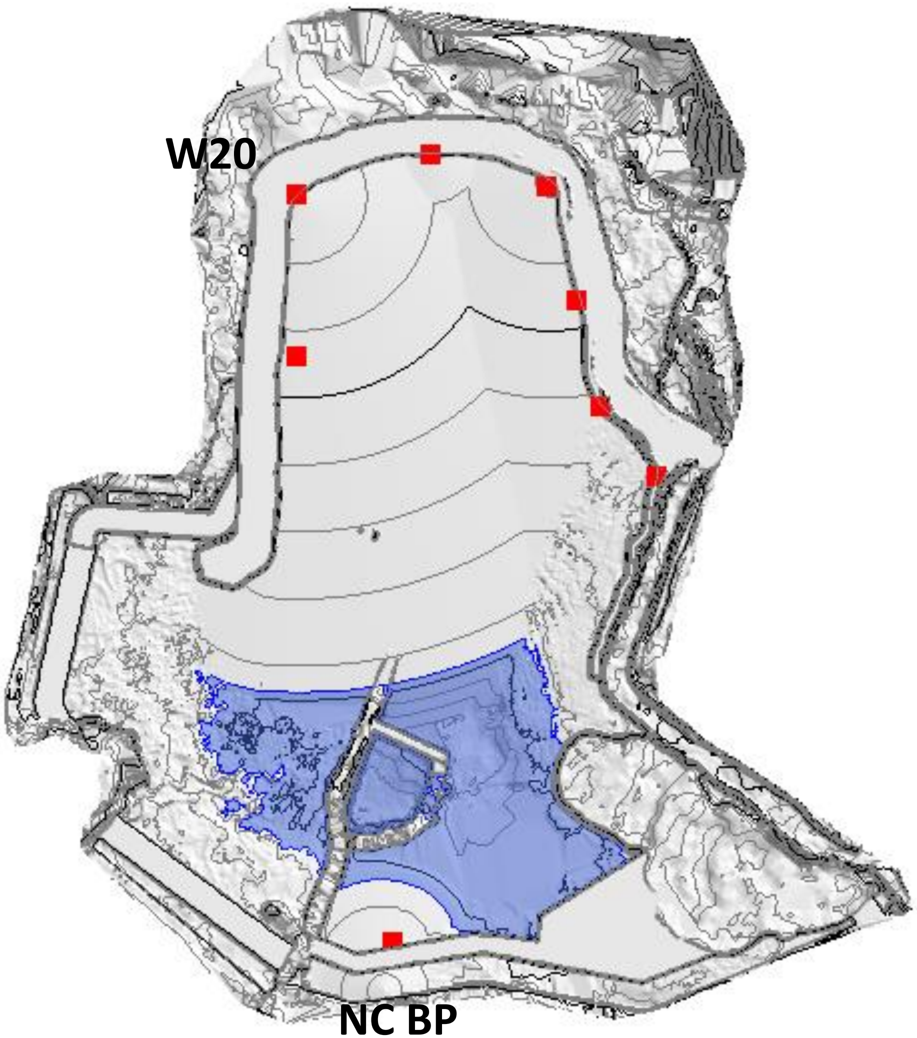
MODEL OUTPUT	
Total water volume (m^3)	219,882
Free water volume (m^3)	75,688
Ice volume (m^3)	144,194
Pond elevation (m)	143.000
Free water elevation (m)	141.3
Pond bottom elevation (m)	137.2
Ice ratio (%)	66%
Water entrapment (%)	65%



Comments:
1-By-Pass needs to be moved
2-Pond elevation is at 143m (max. elevation)
3-Pond free water volume is less than 100,000m^3, however pond elevation at max.
4-Tailings elevation at S18 is higher than 144.5m however the natural ground topo. allows higher elevation.

TSF Deposition Plan
May 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
30.5	W20	206,776	151.500
0.5	NCBP	3,390	149.327



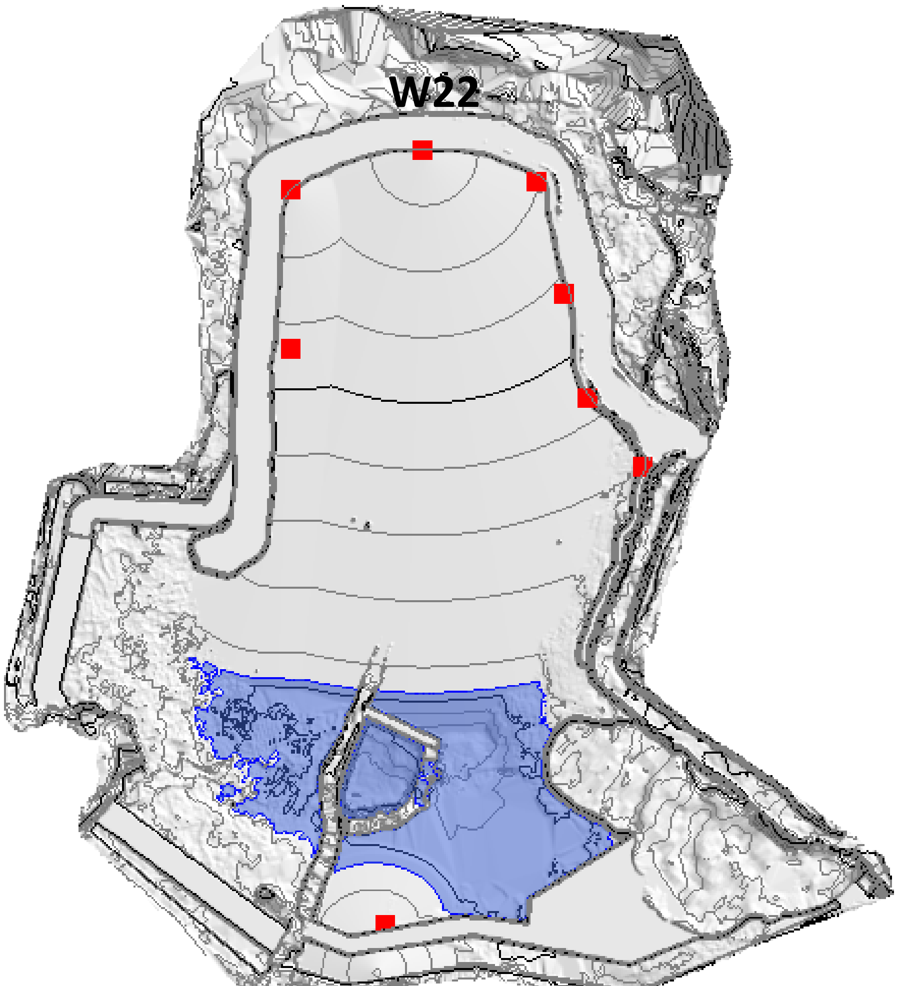
MODEL INPUT	
Pond elevation (m)	147.80
Ice thickness (m)	0
Tonnes (t)	210,120

MODEL OUTPUT	
Total water volume (m^3)	140,798
Free water volume (m^3)	140,798
Ice volume (m^3)	0
Pond elevation (m)	147.800
Free water elevation (m)	147.800
Pond bottom elevation (m)	143.5
Ice ratio (%)	0%
Water entrapment (%)	40%
Transfer to South Cell (m^3)	56,442

Comments:
1-Pond elevation is maintained at 147.8 m
2-North Cell permeable berm to be built prior discharging in North Cell

TSF Deposition Plan
June 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
29.5	W22	236,316	151.909
0.5	NCBP	4,005	149.577



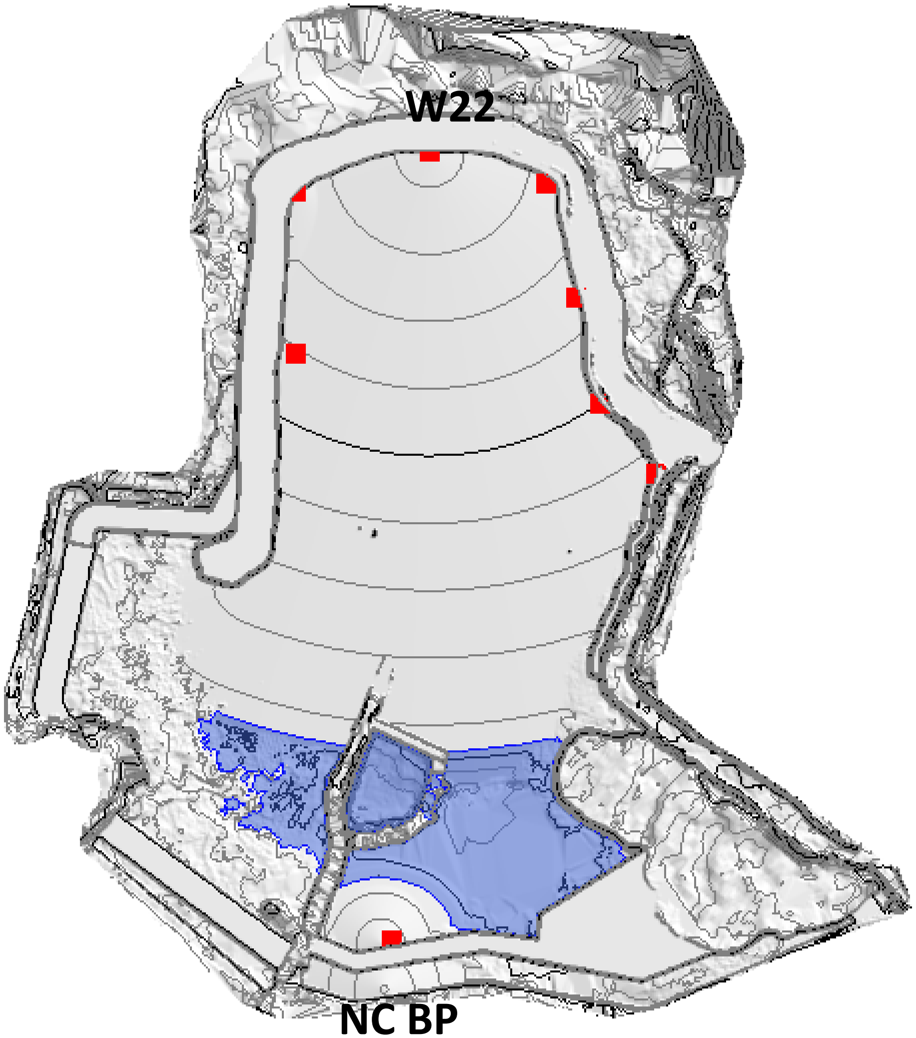
MODEL INPUT	
Pond elevation (m)	147.80
Ice thickness (m)	0
Tonnes (t)	239,360

MODEL OUTPUT	
Total water volume (m³)	121,863
Free water volume (m³)	121,863
Ice volume (m³)	0
Pond elevation (m)	147.800
Free water elevation (m)	147.800
Pond bottom elevation (m)	143.5
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m³)	410,086
Transfer from SC to Pit (m³)	307,240

Comments:
1-Pond elevation is maintained at 147.8 m
2-By-Pass needs to be moved at the end of June

TSF Deposition Plan
July 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
30.5	W22	283,095	152.256
0.5	NCBP	4,641	148.956



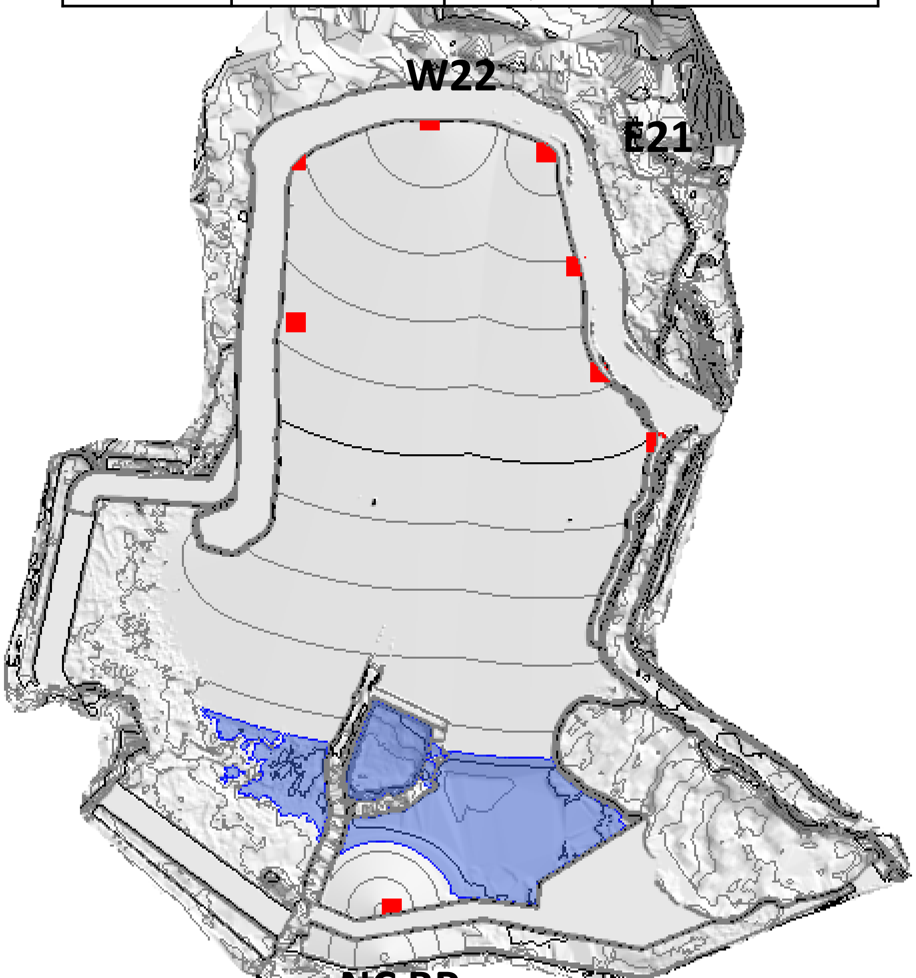
MODEL INPUT	
Pond elevation (m)	147.80
Ice thickness (m)	0
Tonnes (t)	287,342

MODEL OUTPUT	
Total water volume (m^3)	94,692
Free water volume (m^3)	94,692
Ice volume (m^3)	0
Pond elevation (m)	147.800
Free water elevation (m)	147.800
Pond bottom elevation (m)	143.5
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m^3)	248,189
Transfer from SC to Pit (m^3)	44,957

Comments:
1-Pond elevation is maintained at 147.8 m

TSF Deposition Plan
August 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
23.5	W22	213,712	152.490
7	E21	63,659	152.310
0.5	NCBP	4,547	149.133



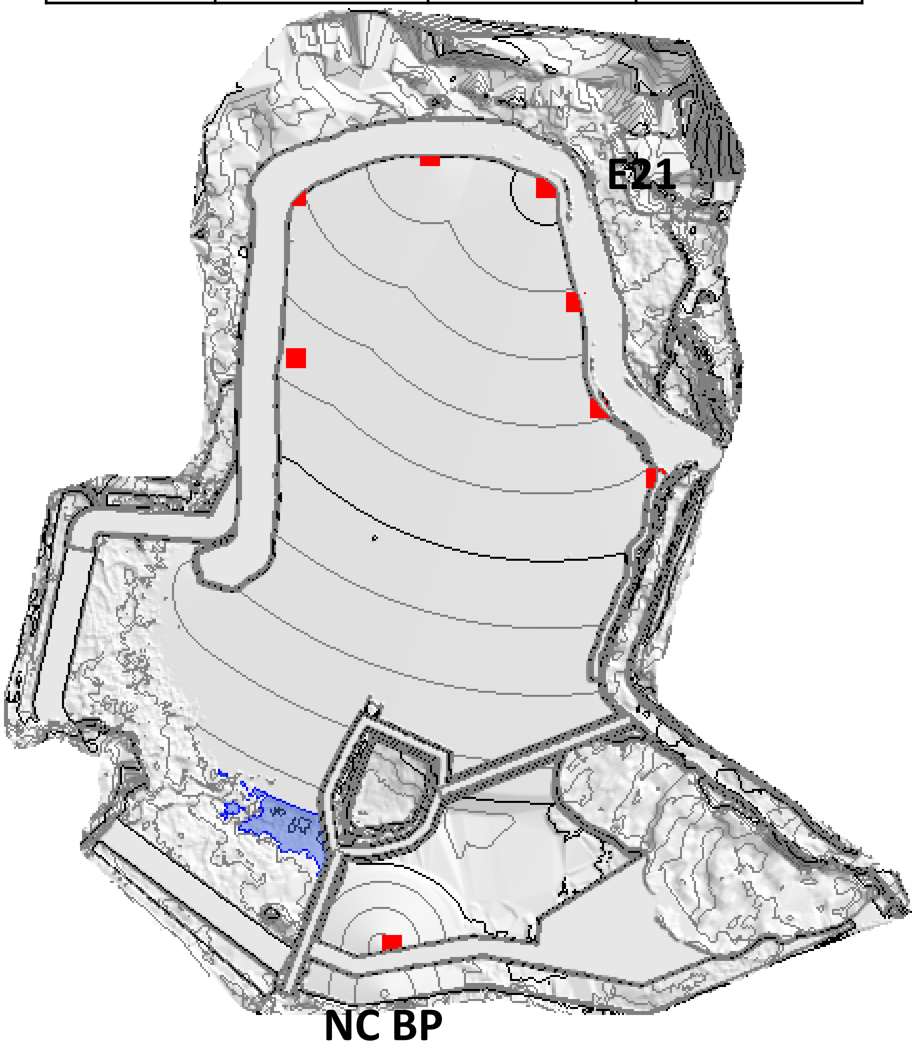
MODEL INPUT	
Pond elevation (m)	147.80
Ice thickness (m)	0
Tonnes (t)	281,816

MODEL OUTPUT	
Total water volume (m^3)	88,168
Free water volume (m^3)	88,168
Ice volume (m^3)	0
Pond elevation (m)	147.800
Free water elevation (m)	147.800
Pond bottom elevation (m)	143.5
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m^3)	237,207
Transfer from SC to Pit (m^3)	55,892

Comments:
1-Pond elevation is maintained at 147.8 m

TSF Deposition Plan
September 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
29.5	E21	237,619	152.765
0.5	NCBP	4,027	149.248



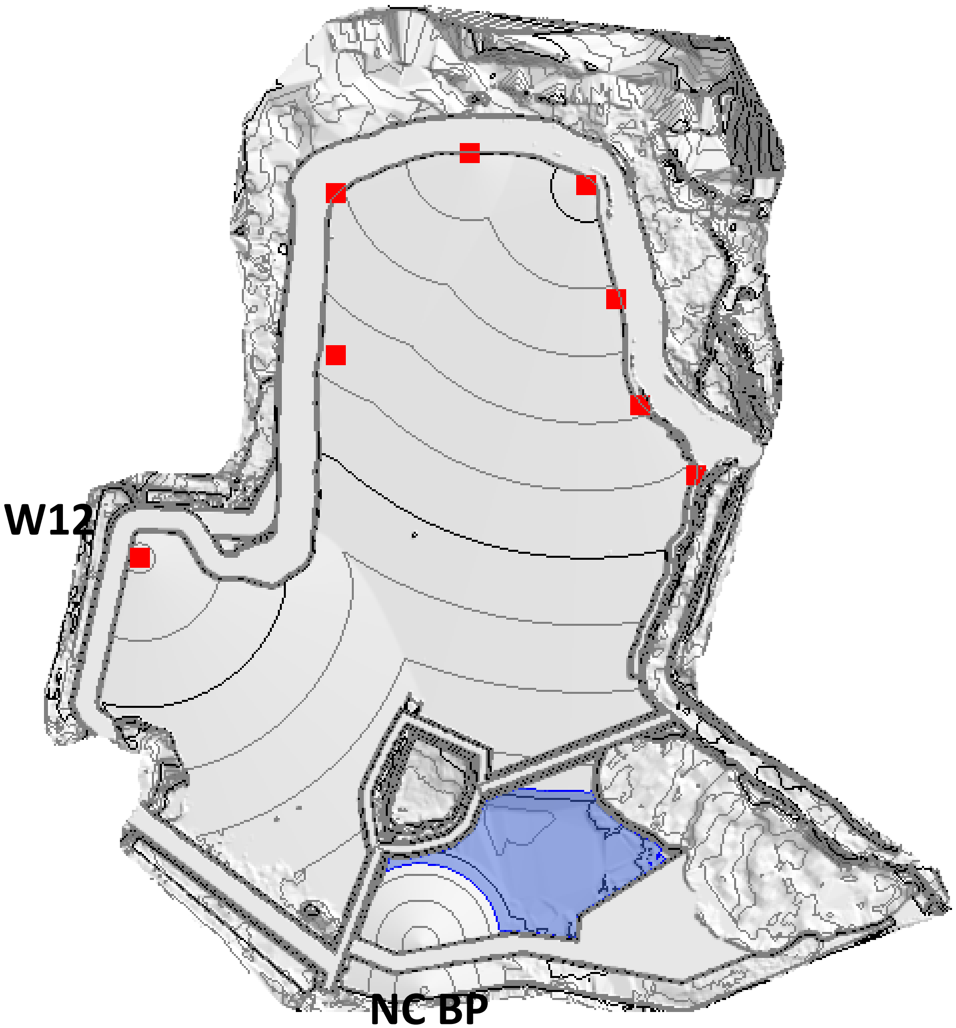
MODEL INPUT	
Pond elevation (m)	147.80
Ice thickness (m)	0
Tonnes (t)	242,346

MODEL OUTPUT	
Total water volume (m³)	84,836
Free water volume (m³)	84,836
Ice volume (m³)	0
Pond elevation (m)	147.800
Free water elevation (m)	147.800
Pond bottom elevation (m)	143.5
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m³)	213,825
Transfer from SC to Pit (m³)	46,244

Comments:
1-Pond elevation is maintained at 147.8 m
2-Permeable berm needs to be built and barge road needs to be raise for the beginning of September in order to prevent tailings covering capping, maintain a higher pond volume and prevent water ponding on the Stormwater dike. It allows to discharge more tailings on the upstream side.

TSF Deposition Plan
October 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
30.5	W12	282,869	151.111
0.5	NCBP	4,637	149.345



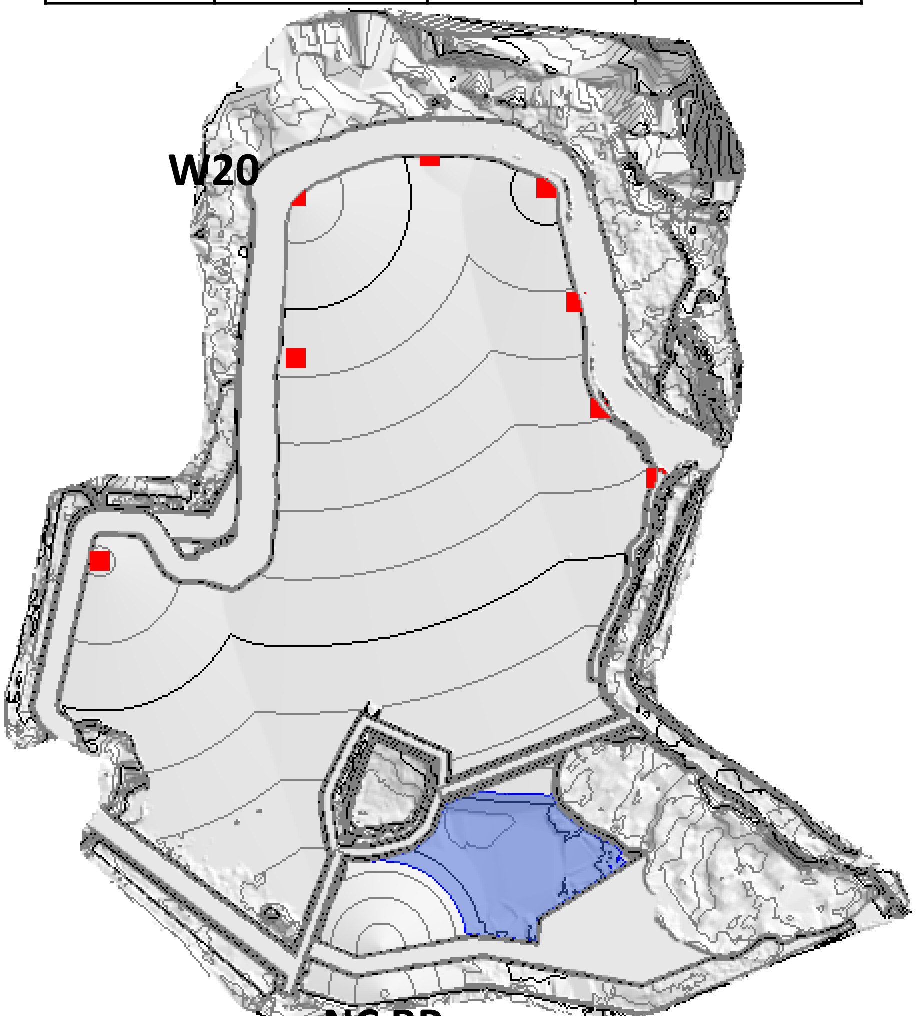
MODEL INPUT	
Pond elevation (m)	147.60
Ice thickness (m)	0.2
Tonnes (t)	287,342

MODEL OUTPUT	
Total water volume (m^3)	82,322
Free water volume (m^3)	68,156
Ice volume (m^3)	14,166
Pond elevation (m)	147.800
Free water elevation (m)	147.600
Pond bottom elevation (m)	143.5
Ice ratio (%)	17%
Water entrapment (%)	40%
Transfer from NC to SC (m^3)	144,956
Transfer from SC to Pit (m^3)	0

Comments:
1-Pond elevation is maintained at 147.8 m
2-NCIS needs to be built for beginning of October. Progressive construction can be evaluated.

TSF Deposition Plan
November 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
29.5	W20	275,152	153.341
0.5	NCBP	4,664	149.459



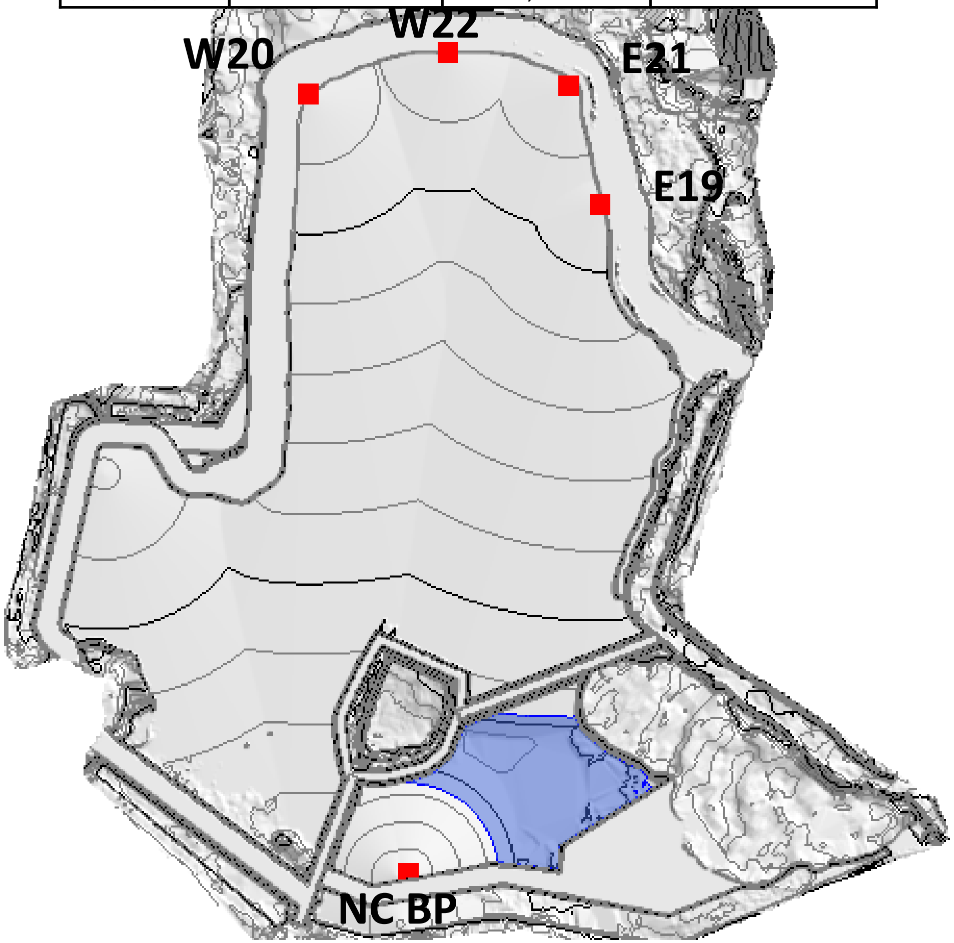
MODEL INPUT	
Pond elevation (m)	147.30
Ice thickness (m)	0.5
Tonnes (t)	277,869

MODEL OUTPUT	
Total water volume (m³)	80,725
Free water volume (m³)	49,994
Ice volume (m³)	30,731
Pond elevation (m)	147.800
Free water elevation (m)	147.300
Pond bottom elevation (m)	143.5
Ice ratio (%)	38%
Water entrapment (%)	65%
Transfer from NC to SC (m³)	81,712
Transfer from SC to Pit (m³)	0

Comments:
1-Pond elevation is maintained at 147.8 m

TSF Deposition Plan
December 2019 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
8	W20	74,153	**153.497**
6.5	W22	60,249	**153.495**
9.5	E21	88,056	**153.504**
6.5	E19	60,249	152.985
0.5	NCBP	4,635	149.459



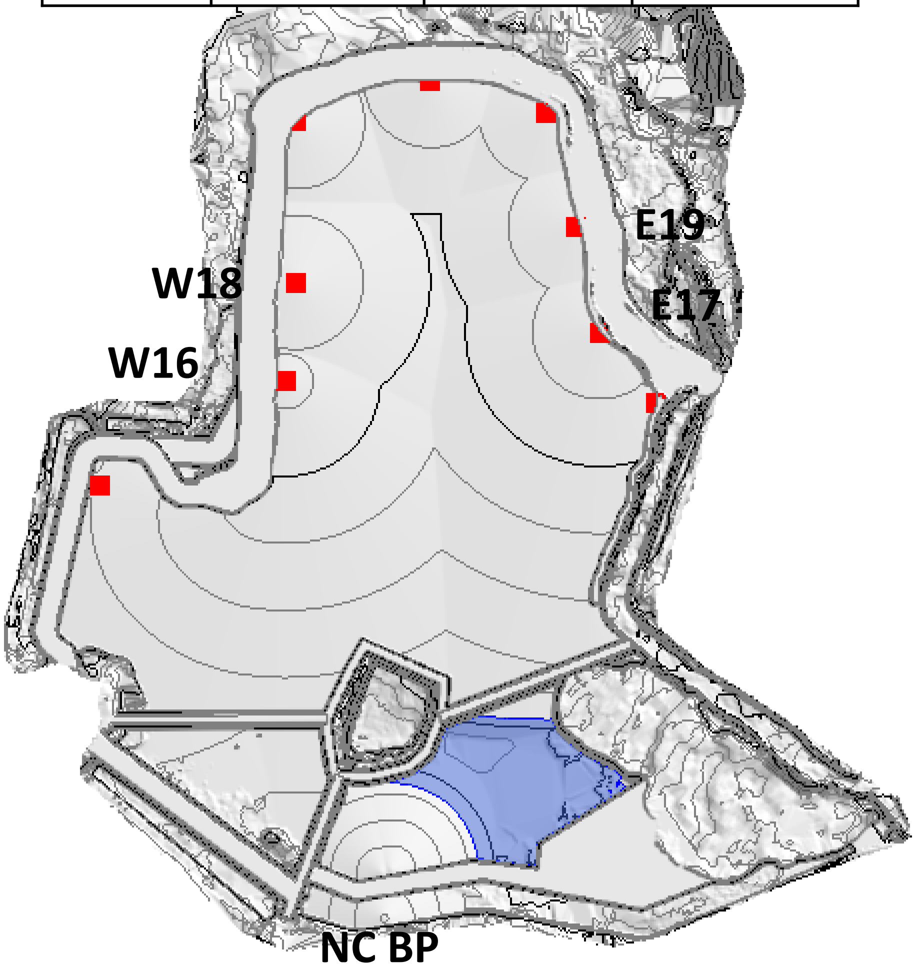
MODEL INPUT	
Pond elevation (m)	147.00
Ice thickness (m)	0.8
Tonnes (t)	287,342

MODEL OUTPUT	
Total water volume (m³)	78,886
Free water volume (m³)	41,148
Ice volume (m³)	37,738
Pond elevation (m)	147.800
Free water elevation (m)	147.000
Pond bottom elevation (m)	143.5
Ice ratio (%)	48%
Water entrapment (%)	65%
Transfer from NC to SC (m³)	84,877
Transfer from SC to Pit (m³)	0

Comments:
1-Pond elevation is maintained at 147.8 m
2-Discharge in North Cell during winter months

TSF Deposition Plan
Q1 2020 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
23	E19	201,813	153.500
38	W18	333,430	153.500
16.5	E17	144,779	153.500
13.5	W16	118,456	153.203



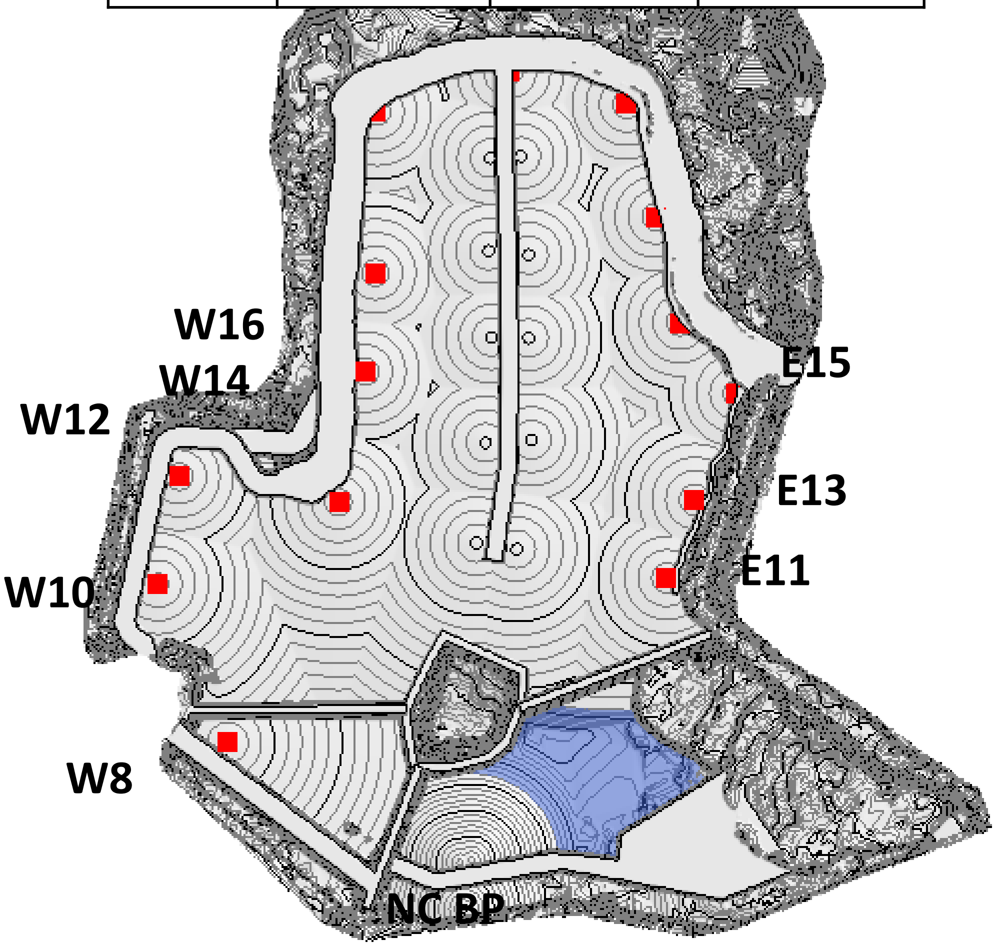
MODEL INPUT	
Pond elevation (m)	146.20
Ice thickness (m)	1.6
Tonnes (t)	798,478

MODEL OUTPUT	
Total water volume (m³)	78,886
Free water volume (m³)	28,333
Ice volume (m³)	50,553
Pond elevation (m)	147.800
Free water elevation (m)	146.200
Pond bottom elevation (m)	143.5
Ice ratio (%)	64%
Water entrapment (%)	65%
Transfer from NC to SC (m³)	243,840
Transfer from SC to Pit (m³)	0

Comments:
1-Pond elevation is maintained at 147.8 m
2-Permeable to prevent water ponding

TSF Deposition Plan
Q2 2020 – North Cell

Duration	Deposition Point	Tonnes	Elevation (m)
8.5	W8	78,921	150,850
11.5	W16	106,776	153.491
4	E15	37,139	153.491
25	W14	232,121	153.500
…	…	…	…



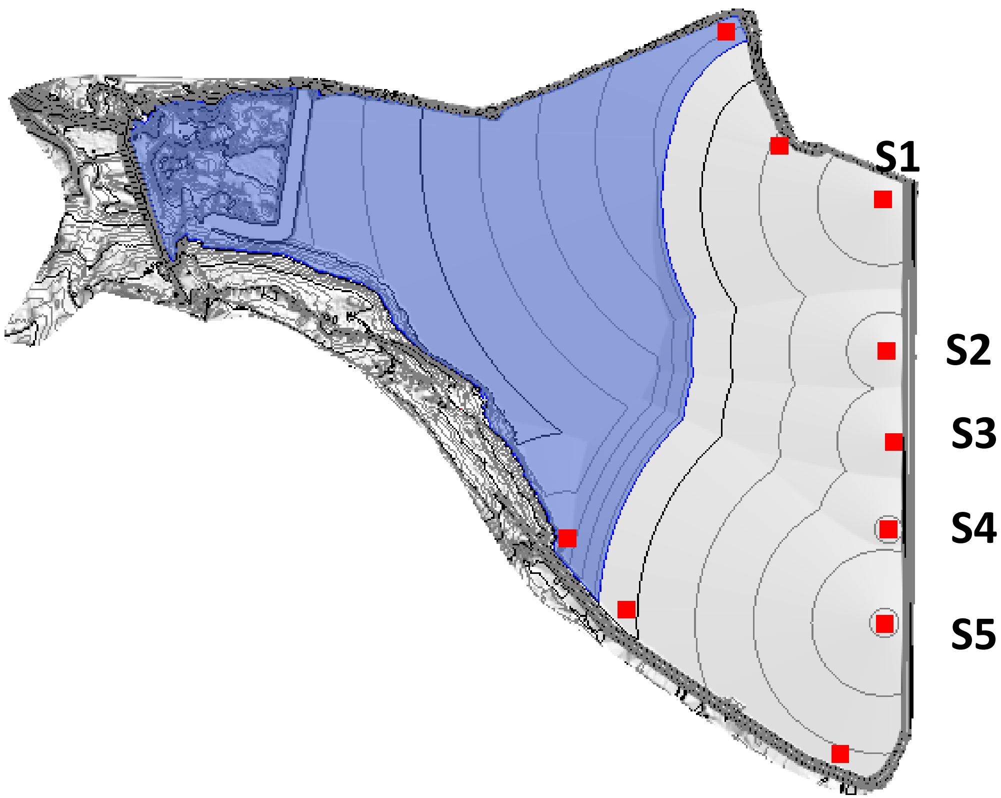
MODEL INPUT	
Pond elevation (m)	147.8
Ice thickness (m)	0
Tonnes (t)	843,079

MODEL OUTPUT	
Total water volume (m³)	78,886
Free water volume (m³)	78,886
Ice volume (m³)	0
Pond elevation (m)	147.800
Free water elevation (m)	147.800
Pond bottom elevation (m)	143.5
Ice ratio (%)	0%
Water entrapment (%)	43%
Transfer from NC to SC (m³)	743,369
Transfer from SC to Pit (m³)	0

Comments:
1-Pond elevation is maintained at 147.8 m
2- North Cell is at max. capacity

TSF Deposition Plan
Q3 2020 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
19	S1	165,752	146.566
18	S2	157,029	146.333
18	S3	157,029	146.483
18	S4	157,029	146.619
19	S5	165,752	147.125



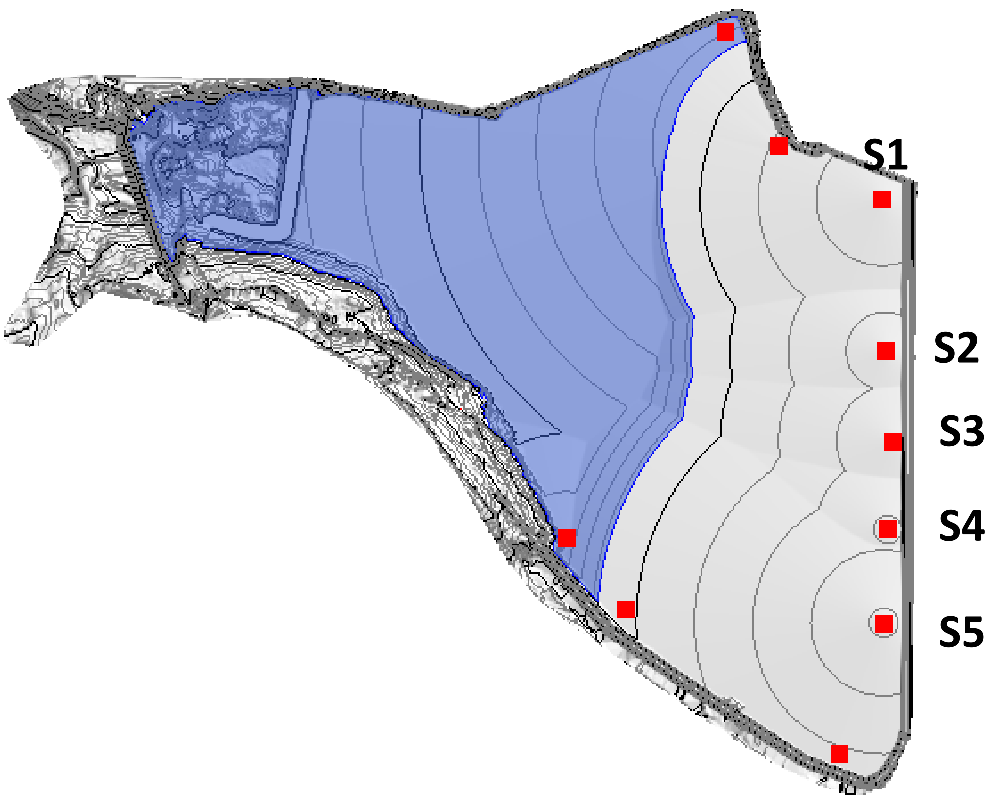
MODEL INPUT	
Pond volume(m^3)	630,071
Ice thickness (m)	0
Tonnes (t)	799.662

MODEL OUTPUT	
Total water volume (m^3)	628,643
Free water volume (m^3)	628,643
Ice volume (m^3)	0
Pond elevation (m)	144.667
Free water elevation (m)	144.667
Pond bottom elevation (m)	137.2
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m^3)	117,587
Transfer from SC to Pit (m^3)	0

Comments:
1-All structure at 150m

TSF Deposition Plan
Q4 2020 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
18	S1	167,831	146.982
19	S2	177,155	147.189
19	S3	177,155	147.704
18	S4	167,831	148.104
18	S5	167,831	148.617



MODEL INPUT	
Pond elevation (m)	144.67
Ice thickness (m)	0.8
Tonnes (t)	852,552

MODEL OUTPUT	
Total water volume (m³)	431,610
Free water volume (m³)	296,964
Ice volume (m³)	134,646
Pond elevation (m)	144.667
Free water elevation (m)	143.867
Pond bottom elevation (m)	137.2
Ice ratio (%)	31%
Water entrapment (%)	65%
Transfer from NC to SC (m³)	0
Transfer from SC to Pit (m³)	0

Comments:
1-All structure at 150m

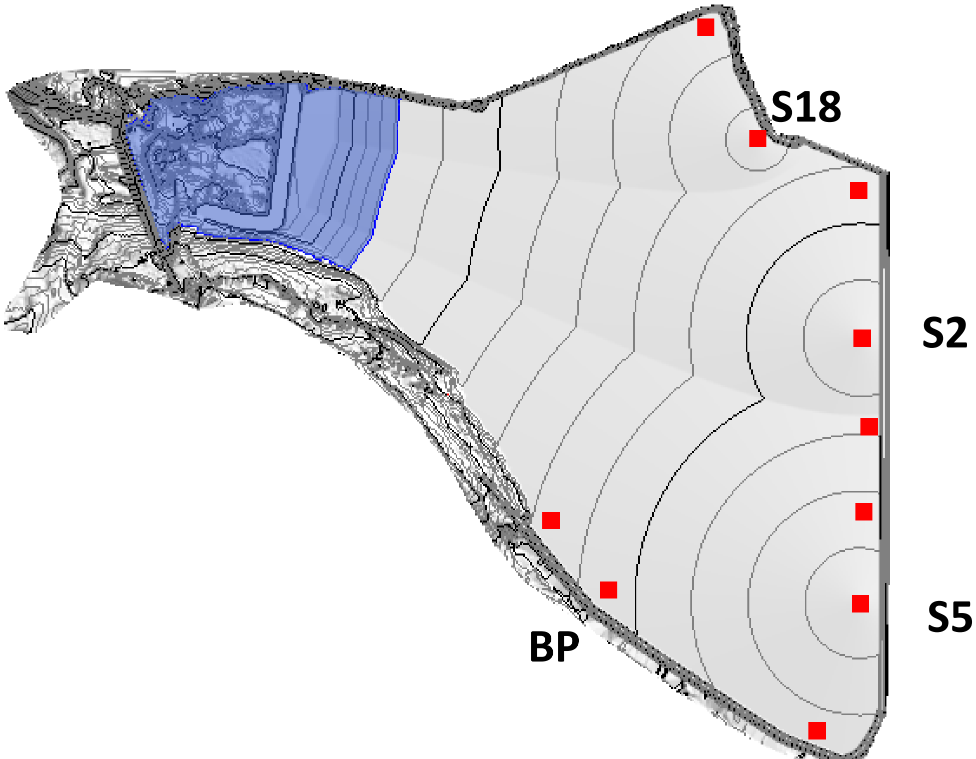
TSF Deposition Plan
Q1 2021 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
33	S18	294,404	147.279
30	S2	267,640	148.512
28	S5	249,797	149.486

MODEL INPUT	
Pond elevation (m)	144.50
Ice thickness (m)	1.6
Tonnes (t)	810,000

MODEL OUTPUT	
Total water volume (m^3)	473,176
Free water volume (m^3)	249,512
Ice volume (m^3)	223,664
Pond elevation (m)	145.708
Free water elevation (m)	144.108
Pond bottom elevation (m)	137.2
Ice ratio (%)	47%
Water entrapment (%)	65%
Transfer from NC to SC (m^3)	0
Transfer from SC to Pit (m^3)	0

Comments:
1-All structure at 150m



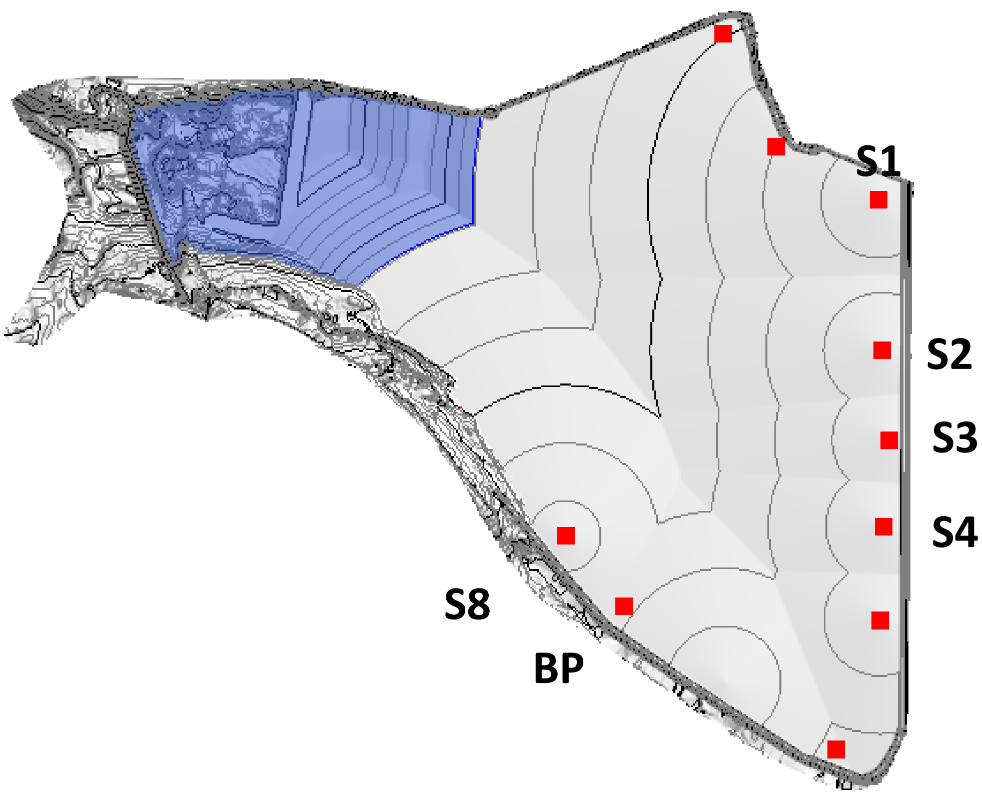
TSF Deposition Plan
Q2 2021 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
44.25	S1	398,871	149.500
12.5	S2	112,675	149.500
3	S3	27,042	149.494
1.75	S4	15,775	149.502
10.5	SC-BP	94,647	149.491
19	S8	171,267	148.806

MODEL INPUT	
Pond elevation (m)	145.98
Ice thickness (m)	0
Tonnes (t)	819,000

MODEL OUTPUT	
Total water volume (m³)	418,535
Free water volume (m³)	418,535
Ice volume (m³)	0
Pond elevation (m)	145.979
Free water elevation (m)	145.979
Pond bottom elevation (m)	137.2
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m³)	220,824
Transfer from SC to Pit (m³)	323,000

Comments:
1-All structure at 150m



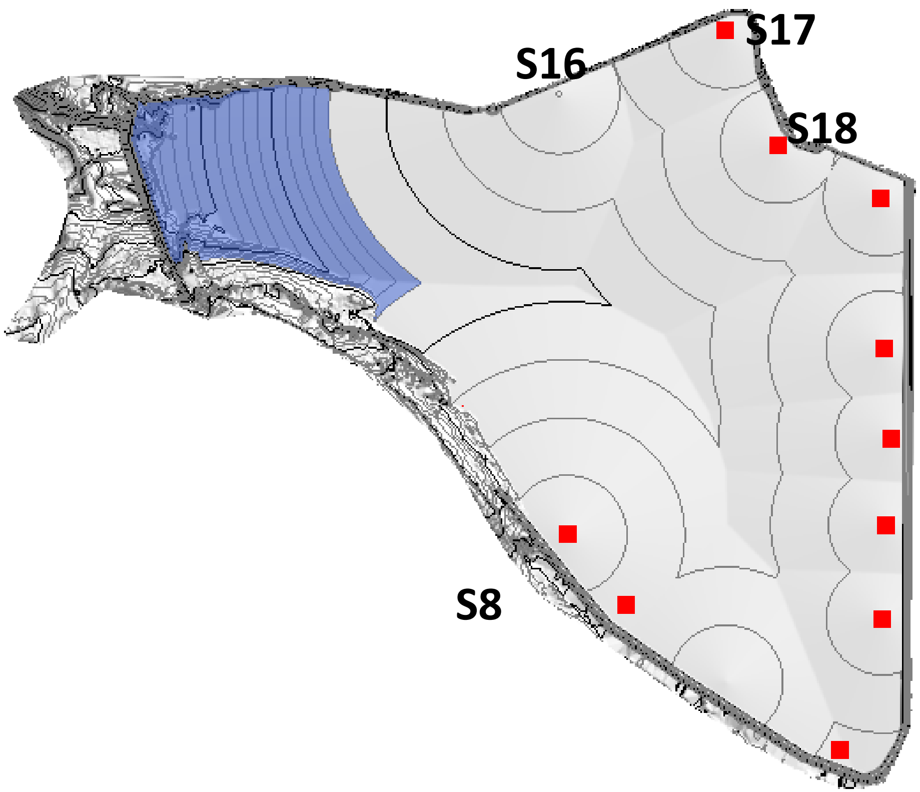
TSF Deposition Plan
Q3 2021 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
15	S8	135,194	**149.515**
18	S18	162,233	**149.500**
7.5	S17	67,597	**149.500**
51.5	S16	464,167	149.024

MODEL INPUT	
Pond elevation (m)	147.00
Ice thickness (m)	0
Tonnes (t)	828,000

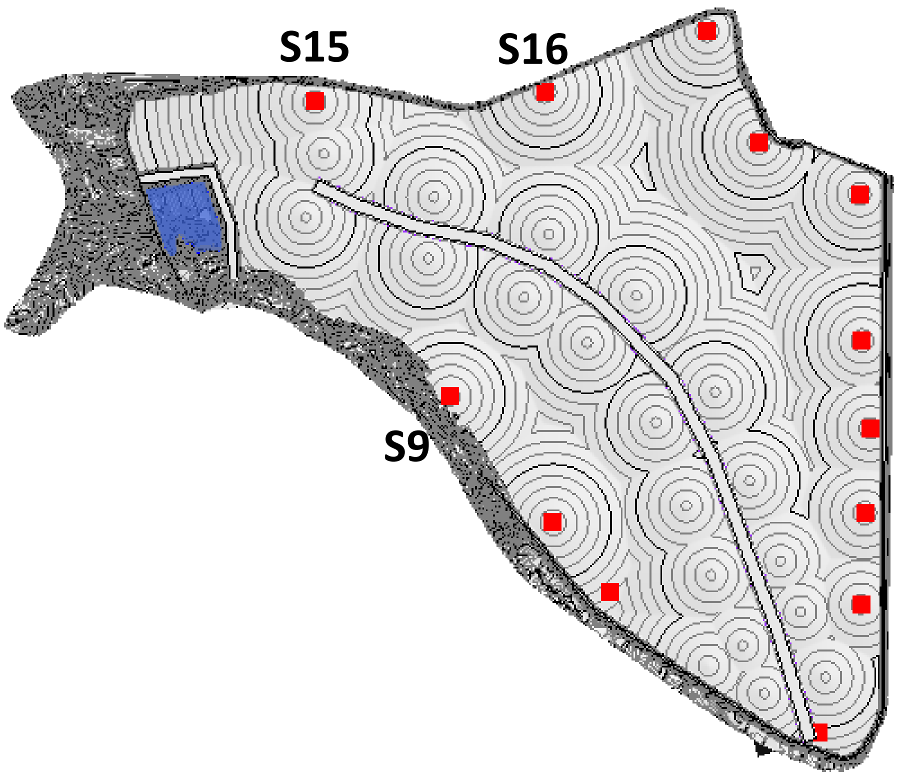
MODEL OUTPUT	
Total water volume (m^3)	211,373
Free water volume (m^3)	211,373
Ice volume (m^3)	0
Pond elevation (m)	147.000
Free water elevation (m)	147.000
Pond bottom elevation (m)	140.95
Ice ratio (%)	0%
Water entrapment (%)	25%
Transfer from NC to SC (m^3)	38,700
Transfer from SC to Pit (m^3)	316,224

Comments:
1-All structure at 150m



TSF Deposition Plan
Q4 2021 – South Cell

Duration	Deposition Point	Tonnes	Elevation (m)
28	S16	251,839	**149.500**
11	S9	98,937	**149.481**
18	S15	161,897	**149.500**
35	Final road	314,799	149.443



MODEL INPUT	
Pond elevation (m)	146.00
Ice thickness (m)	0
Tonnes (t)	828,000

MODEL OUTPUT	
Total water volume (m^3)	42,550
Free water volume (m^3)	33,002
Ice volume (m^3)	9,548
Pond elevation (m)	147.800
Free water elevation (m)	147.000
Pond bottom elevation (m)	140.95
Ice ratio (%)	22%
Water entrapment (%)	57%
Transfer from NC to SC (m^3)	0
Transfer from SC to Pit (m^3)	0

Comments:
1-All structure at 150m

APPENDIX C

RSF and TSF Thermal Monitoring – List of Instruments

Instrument ID	Northing; Easting	Installation date	Status	Data acquisition	Elevation interval in meter (Top - Bottom)	Nb of beads
RSF1	7215831; 638129	2013	Operational	Data logger	172.8-123.10	13
RSF-3(73-1 & RSF3)	7215689; 638370	2013	Operational	Data logger	173.99-128.5	16/29
RSF-4(248 & RSF4)	7215892; 638675	2013	Non-operational	Data logger	210.21-131	16/29
RSF-5(RSF2 & RSF5)	7216014; 638630	2013	Operational	Data logger	193.02-131	13/26
RSF-6(169 & RSF6)	7215647; 638845	2013	Operational	Data logger	197.79-127.8	16/29
RSF-7	7216039; 638153	2015	Operational	Data logger	172.5-168	10
RSF-8	7216038; 638156	2015	Operational	Data logger	172.9-163.9	10
RSF-9	7215707; 638290	2015	Operational	Data logger	170.6-166.1	10
RSF-10	7215711; 638293	2015	Operational	Data logger	171.1-162.1	10
RSF-11	7215787; 639071	2015	Operational	Data logger	192.3-187.8	10
RSF-12	7215791; 639066	2015	Operational	Data logger	192.9-183.9	10
RSF-13	7215943; 638916	2015	Operational	Data logger	190.8-186.3	10
RSF-14	7215939; 638917	2015	Operational	Data logger	190.9-181.9	10
RSF-15	7216038; 638612	2015	Operational	Data logger	191.4-186.9	10
RSF-16	7216033; 638610	2015	Operational	Data logger	191.6-182.6	10
NC-16-01	7215849; 637562	2015	Operational	Manual	147-85	13
NC-16-02	7215562; 637969	2015	Operational	Data logger	148-88	13
NCIS-01	7216395; 637412	2018	Operational	Data logger	151.8-143	16
NCIS-02	7216398; 637377	2018	Operational	Data logger	151.5-142	16
NCIS-03	7216636; 637432	2018	Operational	Data logger	154.1-143.5	16
NCIS-04	7216293; 637405	2018	Operational	Data logger	152-143	16
NC-17-01	7215784; 637292	2017	Operational	Data logger	148.1/107	16
NC-17-02	7215821; 637391	2017	Operational	Data logger	147.6/93.6	16
NC-17-03	7215913; 637776	2017	Operational	Data logger	147.6/93.6	16
NC-17-04	7216037; 637901	2017	Operational	Data logger	148.5/17.58	16
NC-17-05	7215434; 637602	2017	Operational	Data logger	148/106.9	16
NC-17-06	7215615; 637389	2017	Operational	Data logger	147.8/106.3	16
NC-17-07	7215596; 637349	2017	Operational	Data logger	147.9/107	16
NC-17-08	7215805; 637693	2017	Operational	Data logger	146.5/92.5	16
SD1-01	7215758; 637030	2010	Operational	Data logger	149.01/132.84	16
SD2-01	7215420; 637290	2012	Operational	Data logger	148.05/145.31	16
SD4-01	7214480; 638254	2017	Operational	Data logger	143.42/139.63	16
CD-US-0+650 (122.5 & 67.5	7214649; 638626	2014/2016	Operational	Data logger	143.0/111.06	16/32

Rock Storage Facility
North Cell tailings
South Cell tailings