Appendix D1

Report: Mine Waste Rock and Tailings Management Plan

MEADOWBANK GOLD MINE

UPDATED MINE WASTE ROCK AND TAILINGS MANAGEMENT REPORT & PLAN - 2016

MARCH 2016

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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 Licence No. 2AM-MEA1525 issued on July 23, 2015. This report presents an updated 2016 version of the Mine Waste Rock and Tailings Management Plan.

The Mine consists of several gold-bearing deposits: Vault, Portage and Goose Island. A series of dikes are required to isolate the mining activities from neighbouring lakes. The dikes were and will be constructed using quarried materials or using materials produced during mining.

Waste rock from the Portage and Goose Island Pits is currently being stored in the Portage Rock Storage Facility (PRSF), and in the Portage pit as infill. Pit infill is only 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 Rock Storage Facility was constructed to minimize the disturbed area and will be capped with a 4m layer of non-acid-generating rock to constrain the active layer within relatively inert materials. In fact this 4m capping has been completed around the perimeter of the PRSF and is considered 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 RSF indicate that freezing is occurring.

Mining commenced in the Vault Pit in 2014. Waste Rock from the Vault pit mining operations is stored in the Vault Waste Rock Storage Facility (VRSF). Mining is also planned, once approved by regulatory agencies, in Vault Phaser and BB Phaser pits beginning in Q4 2017. Waste rock from the Vault, Phaser and BBPhaser Pits will be stored in the existing Vault Rock Storage Facility (VRSF). Geochemical predictions indicate that a capping layer will not be required over this area as the majority of waste rock is considered NPAG. To date, through the ARD testing program it has been determined that approximately 87% of the waste rock generated is NPAG. As a precaution PAG waste rock is placed in the middle of the VRSF. This material will be covered with at least 4m of

NPAG to minimize any generation of ARD. An adaptive management plan includes monitoring of water quality during operations to confirm modelling predictions and to allow adjustments to the closure plan as required. The waste rock is expected to eventually freeze.

The Tailings Storage Facility (TSF) is delineated by a series of dikes built (and to be built) around and across the basin of the dewatered northwest arm of Second Portage Lake. The TSF is divided into the North and South Cells. From 2010 to 2015 tailings were placed in the North Cell. The North Cell of the TSF is delineated by the Stormwater Dike (separates North and South Cells), Saddle Dams 1 and 2 and perimeter rockfill road structures. Tailings deposition commenced in the South Cell in 2014 and will continue until 2018 when mine operations are scheduled to cease (North Cell deposition was completed in 2015). The South Cell is delineated by the Central Dike and Saddle Dams 3, 4 and 5. 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 trials to begin in the North Cell (2014-2016) while tailings deposition continues in the South Cell.

AEM is considering a Tailings Optimization Plan that may affect the future configuration of the South Cell. Should this Plan move forward AEM will advise regulatory bodies in advance and obtain any permits and licenses as required.

Tailings are placed sub-aerially as slurry and water from the pond is reclaimed during operation. The current tailings deposition strategy is to build beaches against the faces of the perimeter dikes to push the pond away, and ultimately produce a tailings surface that directs drainage towards the western abutment of the Stormwater Dike. 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. Capping commenced in the northeast area of the North Cell TSF in 2015. Further capping of the North Cell is planned during the winter of 2016.

A Thermal Monitoring Plan (TMP) was developed to observe the freezeback of the TSF and RSFs in order to comply with the Nunavut Water Board (NWB) water license 2AM-MEA1525. The License requires a TMP to monitor temperatures of the TSF and RSFs during and after, mining operations.

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. This activity is designed to enhance the potential for re-vegetation to occur and wildlife habitat re-establishment.

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DOCUMENT CONTROL

Version	Date (YM)	Section	Page	Revision
1	2009/10	All	All	Original Plan
2	2013/04	All	All	Comprehensive Updated to Original Plan
3	2014/03	All	All	Comprehensive Updated 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 Updated to Original Plan

Approved by:

Engineering Department

Environmental Department

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SECTION 1 • INTRODUCTION

During operations and according to the 2015 Life of Mine calculation, the mine will generate a total of approximately 180.6 Mt of mine waste rock & till and 28.2 Mt of tailings (placed in TSF with in situ density) from the following deposits:

- Portage
- Goose (mining ceased in early 2015); and
- Vault (which includes Phaser and potential BBphaser pits once approved).

Tailings are stored within the Tailings Storage Facilities (TSF – North and South Cells). The TSF includes dikes/dams built; and to be built, and is located within the basin of the former north-west arm of Second Portage Lake (2PL) which has been dewatered to allow mining in the Portage Pit. The TSF was separated by the Stormwater Dike to form a North and South Cell. From 2010 until November 2014, and again in June – September 2015, tailings were deposited into the North Cell. The South Cell (former Portage Attenuation Pond) is now operating and receiving tailings. A series of Saddle Dams (1 and 2) were constructed around the North Cell TSF to ensure that the tailings are impounded onsite. From November 2014 to June 2015, and November 2015 – 2018 tailings will be deposited in the South Cell. South Cell containment is accomplished by the construction of the Central Dike which is now completed to elevation 137m. Construction will continue in 2016 to elevation 143m. Final elevation of this dike is currently planned to be approximately 143m. The footprint area designated for tailings storage has decreased from the original plan when it was anticipated that Central Dike would be completed to an elevation of 150m. Saddle Dams 3, 4 and 5 were partially constructed in 2015 to complete the South Cell TSF delineation boundary and will be raised to elevation 143m in 2016. The mine is now scheduled to cease production at the end 2018.

At the present time, tailings are placed sub aerially as slurry in the South Cell and water from the pond is reclaimed by the mill. The tailings deposition strategy is to build beaches against the face of the Central Dike such that the water/drainage is directed towards the west end of the cell. Thermal modelling indicates that the tailings will freeze in the long term, and that the talik that currently exists below 2PL Arm will freeze before any seepage from the TSF reaches the groundwater below the permafrost. Thermistor monitoring results to date indicate that this is occurring in the North Cell, therefore the potential for groundwater contamination to occur as a result of seepage from the TSF is considered low. To date, AEM's groundwater monitoring program has detected low levels of Total Cyanide (.093 mg/l in 2015), less than the effluent limit stated in the Type A Water License, in a new well installed in 2014 which is downstream from the South Cell TSF (MW 14-01- see Groundwater Monitoring Report 2015). Another well, MW-08-02, which is located further downstream, indicated no levels of Cyanide in 2015. These wells were sampled twice in 2015. Monitoring will continue in 2016.

Tailings are potentially acid generating (PAG); therefore a minimum 2-m thick cover of non-potentially acid generating (NAG) rock-fill will be placed over the tailings to physically isolate the tailings and to confine the active layer within relatively inert materials. Cover trials have been initiated in the North Cell (in 2014) to determine the required cover thickness to physically isolate the tailings and to confine the active layer. Some capping over the North Cell was completed in 2015. Further capping is planned in the winter of 2016. 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.

Waste rock from the Portage and Goose (mining ceased in early 2015) open pits is stored in two areas. The first being an area to the north of 2PL Arm and to the west of the Vault Haul Road, designated as the Portage Rock Storage Facility (Portage RSF). The second storage location is within the mined out portion of Portage Pit – pits B, C and D - which will ultimately be flooded. This deposition forms part of AEM's fisheries habitat compensation approved by the Fisheries and Oceans Canada (DFO). Waste rock from the Vault Pit, Phaser Pit and BBphaser will be stored in an area to the west of the Vault pit, designated as the Vault Rock Storage Facility (Vault RSF). There is also a possibility of storing waste from Phaser and BBPhaser within Phaser Pit in an in pit dumping location (see Figure 2-1).

The Portage RSF has been progressively capped around the perimeter with a 4m layer of NAG rock to constrain the active layer within relatively inert materials. The final capping (top portion) will be completed upon mine closure to the same specification. All capping will be graded to promote runoff from the facility. The PAG waste rock is expected to freeze resulting in low rates of acid rock drainage (ARD) generation in the long term. To date, thermistor readings taken from within the Portage RSF indicate freezeback is occurring as predicted. Additional monitoring instruments were installed in 2015 within the RSF to verify the performance of capping and assess the thermal behavior of the RSF.

The Vault RSF will be graded at closure to encourage runoff and to provide a final shape consistent with the surrounding topography. The water seepage from the Vault RSF area is expected to be of suitable quality to allow discharge to the environment without treatment (Golder, 2007c), and capping of this facility is therefore not proposed. It has been determined to date through testing in accordance with the Meadowbank ARD Plan, that approximately 87% of the waste rock generated at Vault is NPAG material. PAG rock is placed in the middle of the Vault RSF to ensure that it is capped with NPAG material. Freezeback is expected to occur in the long term similar to the Portage RSF. An adaptive management plan will include monitoring of water quality during operations and closure to confirm modelling predictions, and to allow adjustments to the closure plan as required. A plan for the management of contact and diverted water is presented in this document.

Generally contact water from the Portage RSF will be directed toward the North and South Cell TSF, and non-contact water will be diverted by a ditching system to prevent contact with mine related activities. Contact water from the Vault RSF is directed to the Vault Pit and subsequently pumped to the Vault Attenuation Pond.

SECTION 2 • BACKGROUND INFORMATION

2.1 MINING OPERATION DESCRIPTION

The Meadowbank Gold Mine consists of several gold-bearing deposits within reasonably close proximity to one another. The three main deposits are: Vault, Portage (South, Center and North Portage deposits), and Goose Island.

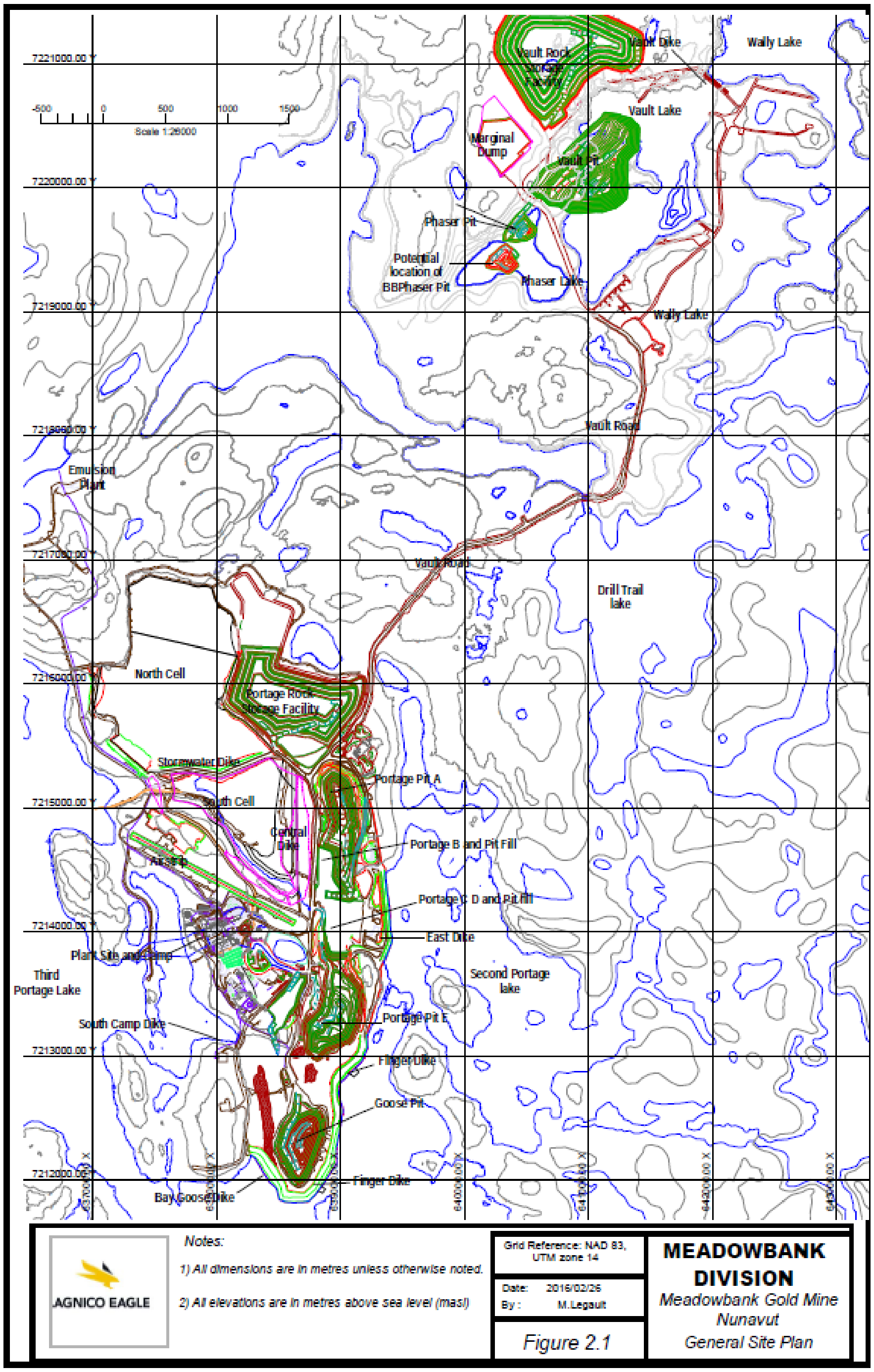
The South Portage deposit is located on a peninsula, and extends northward under Second Portage Lake (2PL) and southward under Third Portage Lake (3PL). The North Portage deposit is located on the northern shore of 2PL. The South, Center and North Portage deposits will be mined from a single pit, termed the Portage Pit, which will extend approximately 2 km in a north-south direction. The Goose deposit lies approximately 1 km to the south of the Portage deposit, and beneath 3PL. Mining was completed in the Goose Pit in early 2015. The Vault deposit is located adjacent to Vault Lake, approximately 6 km north of the Portage deposits. Phaser and BBPhaser pits are located within the footprint of Phaser Lake. A series of dewatering dikes (East, West Channel, Bay-Goose, South Camp and Vault) were required to isolate the mining activities from the lakes. Additional dikes (Central Dike, Stormwater Dike and Saddle Dams) were required to manage tailings within the dewatered 2PL Arm. East Dike, West Channel, Bay-Goose, South Camp and Stormwater Dikes, Saddle Dam 1 and Saddle Dam 2 were all constructed between 2008 and 2013. Saddle Dams 3, 4, 5 and Central Dike to elevation 137m were completed in 2015. These structures will be raised to elevation 143m in 2016. The dikes and dams were and will be constructed primarily using materials produced on site.

Mining is a truck-and-shovel open pit operation. The current mining plan indicates that approximately 10.3 Mt of ore will be mined over a nominal remaining mine life of approximately 2.75 years, ending in September 2018.

2.1.1 Site Conditions

The site layout is illustrated in Figure 2-1.

Figure 2-1: General Site Plan


Vault Rock Storage Facility
Vault Dike
Wally Lake
Vault Lake
Marginal Dump
Vault Pit
Phaser Pit
Potential location of BBPhaser Pit
Phaser Lake
Wally Lake
Vault Road
Emulsion Plant
Vault Road
Drill Trail lake
North Cell
Portage Rock Storage Facility
Stormwater Dike
Portage Pit A
South Cell
Central Dike
Portage B and Pit Fill
Airstrip
Portage C D and Pit Fill
East Dike
Plant Site and Camp
Third Portage Lake
Second Portage lake
South Camp Dike
Portage Pit E
Finger Dike
Goose Pit
Finger Dike
Bay Goose Dike
Scale 1:25000
Notes:
1) All dimensions are in metres unless otherwise noted.
2) All elevations are in metres above sea level (masl)
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Grid Reference: NAD 83, UTM zone 14
Date: 2016/02/26
By: M.Legault
MEADOWBANK DIVISION
Meadowbank Gold Mine
Nunavut
General Site Plan
Figure 2.1

2.1.2 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.

The 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.

2.1.3 Faults

As indicated on Figure 2-5, two main faults are inferred in the Portage deposit area. The Second Portage fault trends to the northwest and is expected underneath the Central Dike and TSF, roughly parallel to the orientation of the Second Portage Lake. Analysis conducted during the design of the Central Dike showed little seepage potential. To date Central Dike has been completed to elevation 137m and no seepage has been evident in Portage pit. However if seepage, that affects operation or has a potential environmental affect, occurs in the future, mitigation plans such as grouting could be carried out beneath the Central Dike.

In November 2014 seepage from the Central Dike was discovered and reported. The seepage is contained directly downstream of the Central Dike and a pumping system was installed in 2015. The water is pumped back into the South Cell. Initial sample analysis results indicate water quality similar to the South Cell reclaim pond – i.e. low levels of Cyanide, Copper, sulphates, all indicative of reclaim water. The issue was brought to the attention of the Meadowbank Dike Review Board (MDRB) and a mitigation plan has been developed. Part of the mitigation will include developing a sufficient tailings beach to act as a barrier to seepage. Monitoring will continue in 2016 in accordance with the Water License, MDRB recommendations and the Engineering Department. More information is contained in the 2015 Water Management Report and Plan (included in the 2015 Annual Report).

2.1.4 Permafrost

The Meadowbank Gold Mine is located in the area of continuous permafrost, as shown on Figure 2-2.

Lake ice thicknesses of between 1.5 m and 2.5 m have been encountered during geotechnical investigations in mid to late spring as well as a result of sampling campaigns undertaken by the Environment Department. 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 ranges based on depth of overburden, vegetation and organics, proximity to lakes, and aspect is about 1 to 1.5 m.

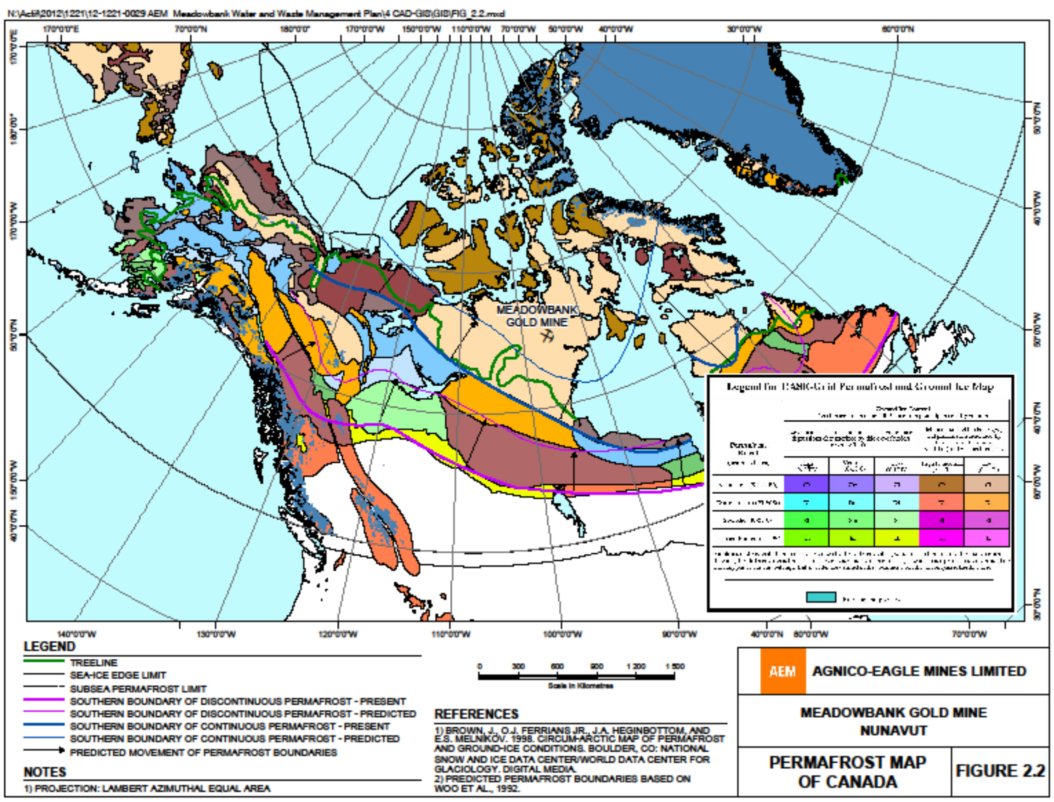
Based on ground conductivity surveys and compilation of regional data, the ground ice content is expected to be low. Locally on land, ice lenses and ice wedges are present, as indicated by ground conductivity, and by permafrost features such as frost mounds. These areas of local ground ice are generally associated with low-lying areas of poor drainage.

A thermal monitoring plan, which meets the requirement of the Water Licence, is presented in Section 8 of this document.

2.1.4.1 Second Portage Lake Talik

Thermistors have been installed in numerous boreholes (see Figure 2-3 for locations); the inferred thermal regime beneath the 2PL Arm, based on measurements from these instruments, is shown in Figure 2-4. A talik exists below 2PL Arm, and is expected to extend to the base of the permafrost (Figure 2-6).

Figure 2-2: Permafrost Map of Canada



2.1.4.2 Vault Lake Talik

Due to the size of Vault Lake, the underlying talik is expected to be closed or confined within the permafrost. This means it does not extend to the deep groundwater flow regime, because the size and depth of the lake is not sufficient for an open talik to develop. Much of the lake is less than 2 m in depth; consequently it freezes to the bottom during winter.

2.1.4.3 Impact of Global Warming on Site Conditions

A report titled "Implications of Global Warming and the Precautionary Principle in Northern Mine Design and Closure" (BGC, 2003) was prepared for Indian and Northern Affairs Canada, and provides guidance relevant to mine design in Nunavut.

This report suggests that globally the average temperature may increase by about 2°C by 2100 due to global warming. However, the report also states that the increase may be double the global average for sites located at 50°N, and may be 3.5 times greater for sites located at 80°N. In a more recent study, the Intergovernmental Panel on Climate Change (IPCC, 2007) projected the maximum average air temperature to increase by 6.4°C by 2100 for a site located at 65°N latitude.

Table 2.2 presents a summary of reported climate change predictions used on a number of northern projects that have been reported in the engineering and scientific literature.

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

Based on Table 2.2, a climate warming trend of 6.4°C over 100 years is considered to be a conservative upper estimate of the climate change rate for the mine area and is consistent with predicted and recommended climate change trends for projects in the north.

By the middle of the 21st century, the effect of temperature change is predicted to reduce near-surface permafrost by 12% to 15% once equilibrium conditions become established under the new temperatures. The predicted increase in active layer thickness of 15% to 30% will reach equilibrium relatively faster (NRC, 2004).

Studies indicate that the boundaries of discontinuous and continuous permafrost are expected to move northward due to global warming (Woo et al., 1992) (Figure 2-2). Predictions based on a warming of 4°C to 5°C over the next 50 years (NRC, 2004) (approximately double the rate predicted above) suggests that the Meadowbank site would remain within the zone of continuous permafrost, but the active layer thickness would be expected to increase, and the total thickness of permafrost may slowly reduce in time.

Figure 2-3: Thermistors and Section Location Plan

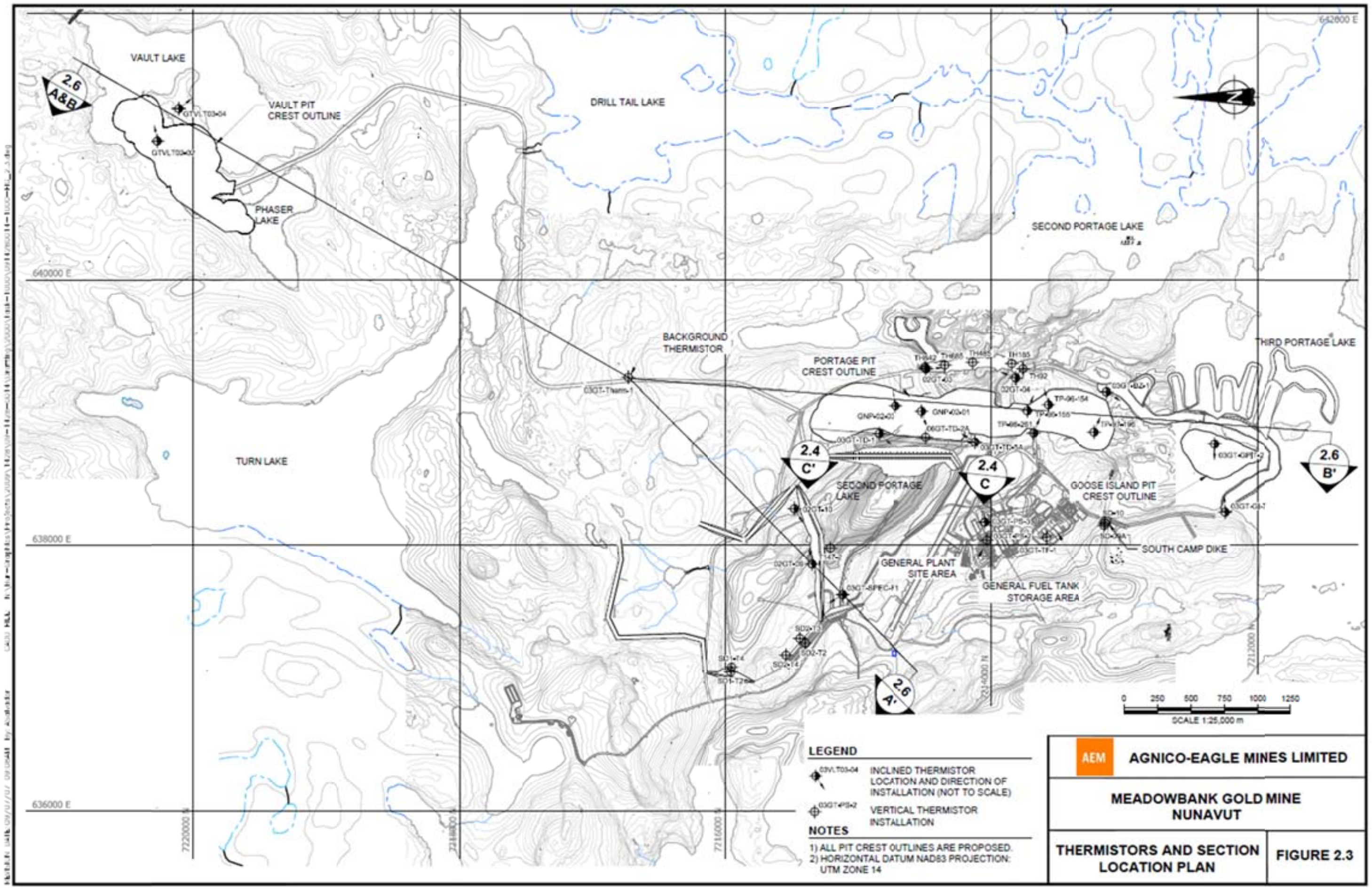


Figure 2-4: Baseline Thermal Condition below Second Portage Arm

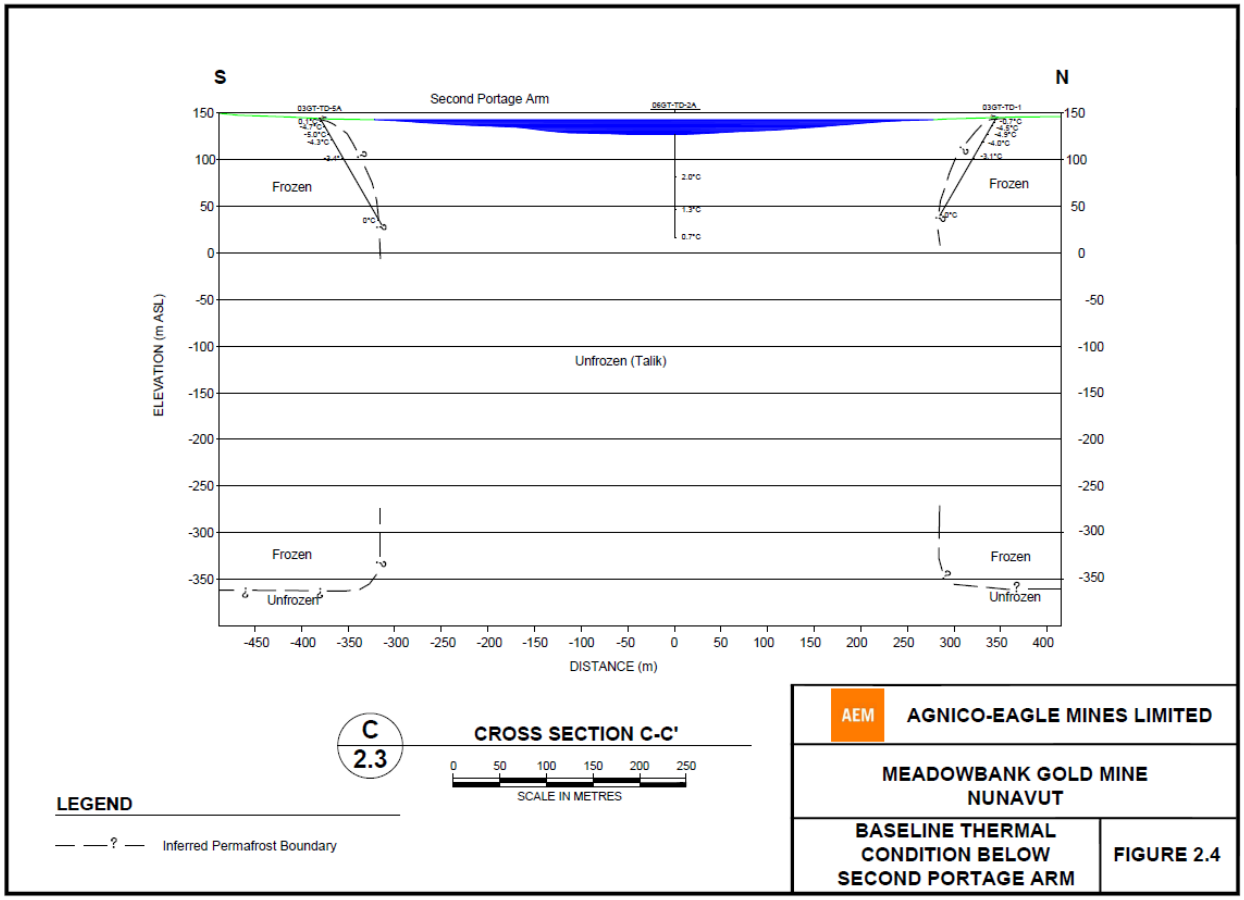


Figure 2-5: Inferred Locations of Faults

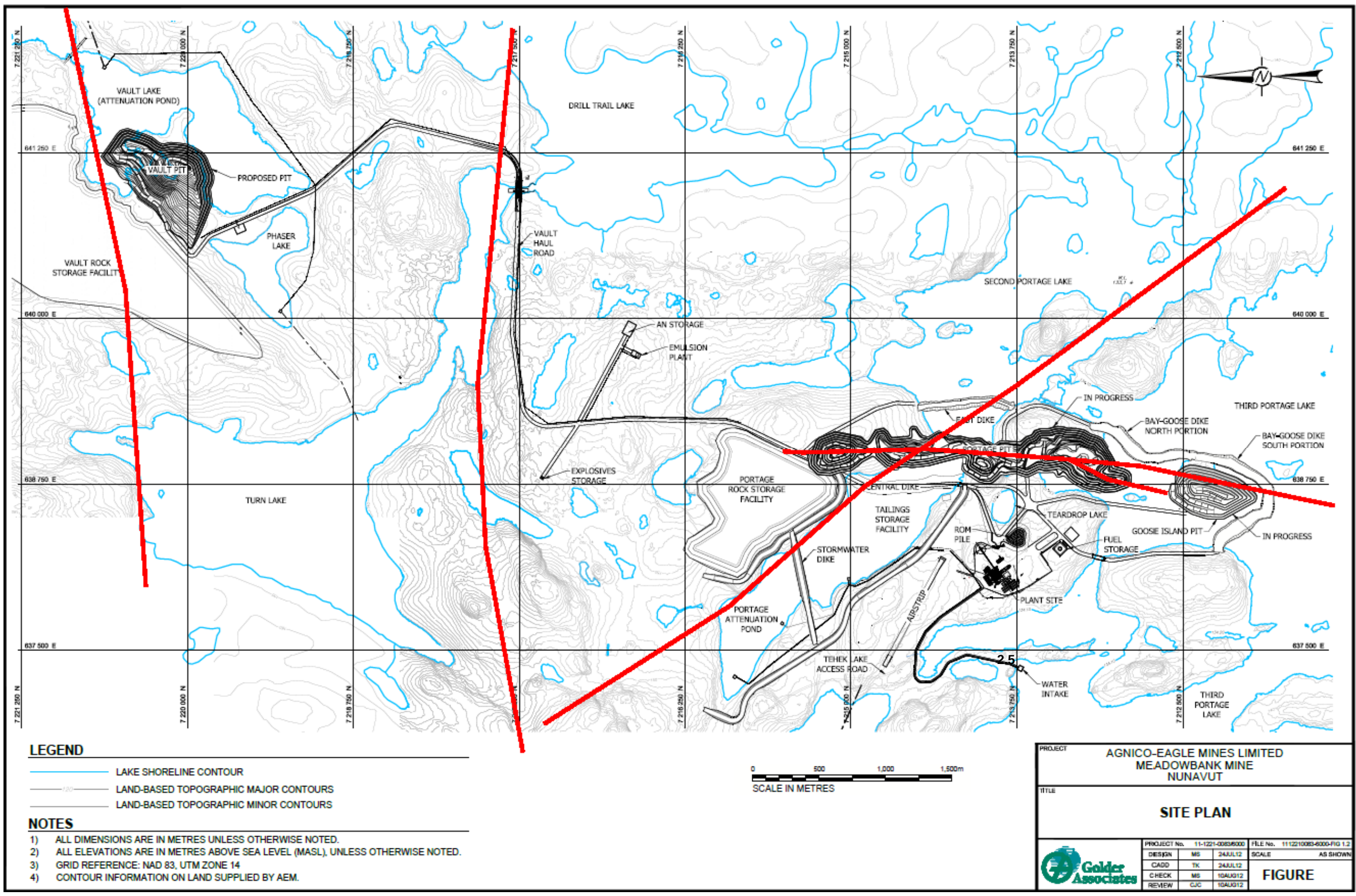
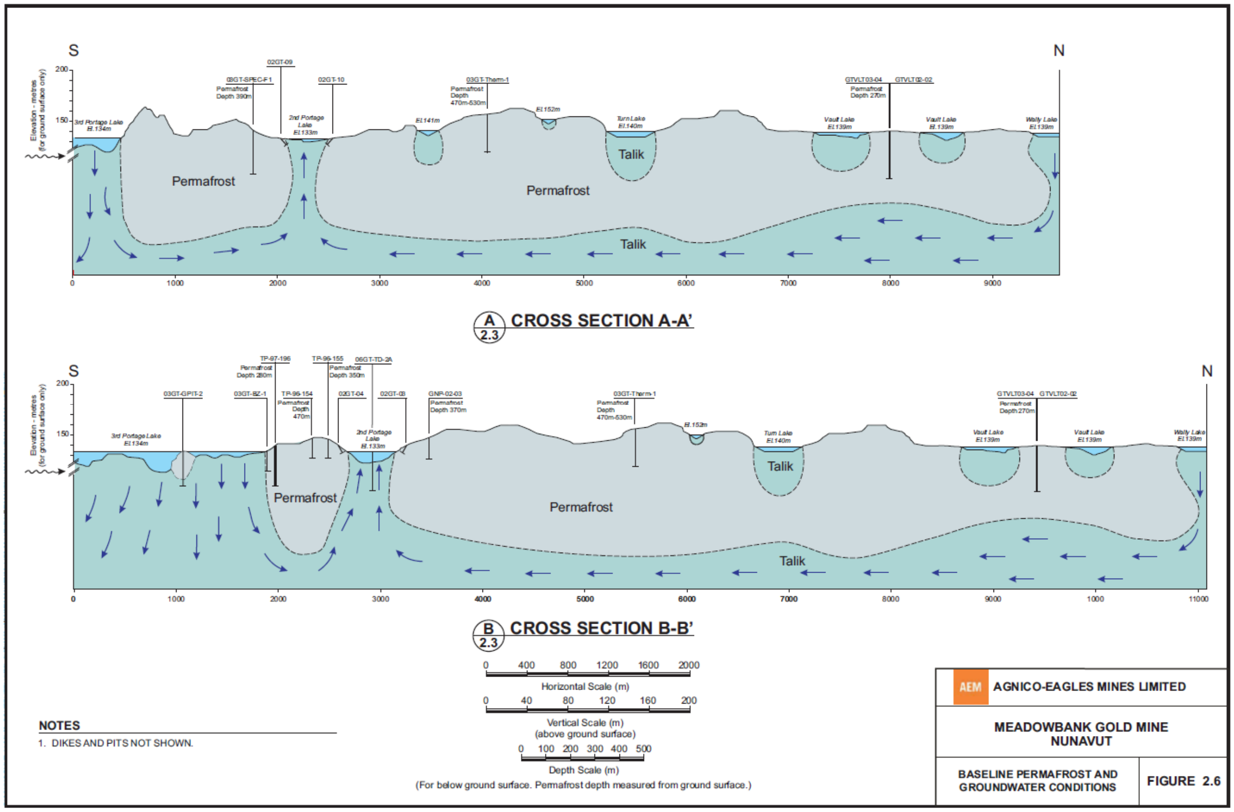


Figure 2-6: Baseline Permafrost and Groundwater Conditions



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SECTION 3 • MINE DEVELOPMENT PLAN

3.1 MINE WASTE PRODUCTION SEQUENCE

The current mine plan (2016 to 2018) indicates that an approximate further 10.3 Mt of ore will be processed over a nominal mine life of 2.75 years, including ore from pits and stockpiles. During this time, approximately 48.1 Mt of mine waste rock will be produced. At the end of the mine life, an approximate total of 28.2 Mt of tailings will be placed in the TSF, based on in situ tailings density.

The 2009, 2010, 2011, 2012, 2013, 2014 and 2015 material balances are presented in Table 3.1, Table 3.2, Table 3.3, Table 3.4 , Table 3.5, Table 3.6 and Table 3.7 respectively, with predicted remaining material balance presented in Table 3.8 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 3.9, Table 3.10 and Table 3.11, show the material destination distribution for Portage Pit and Goose Pit, as well as material taken from NAG stockpiles.

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 construction, capping activities and closure/reclamation projects. The general mine development sequence is described in Section 3.2.

Table 3.1: 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 3.2: 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*

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Table 3.3: 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 3.4: 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 3.5: 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 3.6: 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 Vault Pit, Portage Pit & Goose Pit*

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Table 3.7: 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 Vault Pit, Portage Pit & Goose Pit*

Table 3.8: Projected Meadowbank Mined Tonnages (2016– 2018)

		2016	2017	2018	
Portage Pit	Total Waste Rock (t)	4,574,895	2,935,523	169,392	**7,679,809**
	NAG (~ %)	63%	46%	48%	**56%**
	PAG (~ %)	37%	54%	52%	**44%**
	Till (t)	57,960	-	-	**57,960**
	Ore (t)	459,280	934,257	98,622	**1,492,160**
Vault, and Phaser Pit	Total Waste Rock (t)	24,903,767	12,515,387	2,405,234	**39,824,388**
	NAG (~ %)	100%	100%	100%	**100%**
	PAG (~ %)	<1%	<1%	<1%	<1%
	Till (t)	-	621,950	-	**621,950**
	Ore (t)	3,597,403	2,830,533	1,151,183	**7,579,120**

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

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Table 3.9: Portage PAG, Destinations & Tonnages (2016 – 2018)

	2016	2017	2018	
Portage Rock Storage	0	1,475,656	121,973	**1,597,629**
Facility (PAG Dump)	0%	58%	72%	**29%**
Portage Pit Fill	2,452,893	866,578	0	**3,319,471**
	91%	34%	0%	**61%**
Central Dike	0	0	0	**0**
	0%	0%	0%	**0%**
Stockpile Marginal material	246,995	223,295	47,589	**517,879**
	9%	9%	28%	**10%**
All Portage PAG	2,699,888	2,565,529	169,562	**5,434,979**
Destination	100%	100%	100%	**100%**

Note: PAG material from Vault is not shown as all said material will be sent to the Vault RSF. To prevent acid mine drainage potential, the relatively small expected volume of PAG material will be capped with NAG waste rock as dumping proceeds.

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Table 3.10: Portage NAG, Destinations & Tonnages (2016– 2018)

	2016	2017	2018	
Portage Rock Storage Facility (NAG Dump)	6,311	0	0	**6,311**
	<1%	0%	0%	**<1%**
Central Dike	0	0	0	**0**
	0%	0%	0%	**0%**
Capping TSF (North Cell)	225,401	0	0	**225,401**
	11%	0%	0%	**8%**
Saddle Dams	0	0	0	**0**
	0%	0%	0%	**0%**
Goose NAG Dump	886,693	0	0	**886,693**
	42%	100%	100%	**32%**
Portage NAG stockpile	466,179	244,286	47,419	**757,884**
	22%	39%	100%	**27%**
Other destinations	535,505	376,093	-	**911,598**
	25%	61%	0%	**33%**
All Portage NAG Destinations	**2,120,089**	**620,379**	**47,419**	**2,787,887**
	76%	**22%**	**2%**	**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. NAG material from Vault is not shown as all said material will be sent to the Vault RSF.

Table 3.11: NAG Stockpile for mine closure requirement, Destinations & Tonnages (2016 – 2019)

	2016	2017	2018	2019	
Capping Portage Rock Storage Facility (PAG Dump) with NAG	0	0	1,157,318	0	**1,157,318**
	0%	0%	12%	0%	**6%**
Capping TSF (North Cell)	225,401	1,253,814	3,893,819	2,973,625	**8,346,659**
	11%	67%	39%	56%	**43%**
Capping TSF (South Cell)	0	0	2,880,737	2,364,450	**5,245,187**
	0%	0%	29%	44%	**27%**
Central Dike	0	0	0	0	**0**
	0%	0%	0%	0%	**0%**
Saddle Dams	0	0	0	0	**0**
	0%	0%	0%	0%	**0%**
Primary Crusher NAG capping	0	0	465,234	0	**465,234**
	0%	0%	5%	0%	**2%**
Goose Rock Garden/Finger Dikes (fish habitat compensation)	0	0	256,945	0	**256,945**
	0%	0%	3%	0%	**1%**
Stormwater Dike Capping	0	0	350,064	0	**350,064**
	0%	0%	3%	0%	**2%**
Capping Marginal Dump	0	0	642,600	0	**642,600**

	0%	0%	6%	0%	**3%**
NAG stockpiles	1,888,323	620,379	376,093	0	**2,884,795**
	89%	33%	4%	0%	**15%**
All Portage & Goose NAG to be stockpiled	2,113,724	1,874,193	10,022,810	5,338,075	19,348,802
	100%	100%	100%	100%	100%

Note: Central dike and Saddle dams will be built from existing stockpiles created in 2015 rather than through mine production as was planned last year,

3.2 MINE DEVELOPMENT SEQUENCE 2016 - 2018

The general sequence of mine development over the operating life is listed in Table 3.6 and illustrated in Figure 3-1, Figure 3-2, Figure 3-3, Figure 3-4, Figure 3-5 and Figure 3-6. A conceptual sequence of pit development over the life of mine is illustrated in Figure 3-7.

Table 3.6: Mine Development Sequence

Fig. No.	Year	Items
3.3, 3.4, 3.5	2016-2018	- Complete construction of Central Dike, to elevation 143masl. - Complete construction for Saddle Dams 3, 4 and 5, to elevation 143 masl. - Continue TSF deposition at the South Cell from November 2015 to 2018, until mill closure. - South Cell Reclaim Pond pumped to Process Plant for use as make-up water during operations. - Anticipated completion of phase 1 and phase 2 of North Cell TSF capping during in 2016-2019. - Initiate final closure plans including capping of crusher pad and reclamation of temporary NAG stockpiles. - Goose in flows, freshet, possible Bay-Goose dike seepage in flow used for Goose re-flooding started after the mining operation in 2015. Possibly initiate reflooding in 2016 via siphons as per 2015 Water Management Plan and Report. - Advance and complete mining of North and South Portage, and Vault pits. -Anticipated mining of Phaser and BBphaser pits in 2017 provided that permitting is approved. - Commence flooding of Portage and Vault Pits in 2018. - Runoff from Vault RSF is directed to Vault Attenuation Pond. - Monitor water quality within Vault Attenuation Pond, decanting excess to Wally Lake through Vault WTP (if required).To date the WTP has not been required as Vault Attenuation Pond meets MMER and Water License discharge criteria. - Runoff from Portage Rock Storage Facility and Landfill directed to South Cell Reclaim Pond. Seepage collected at ST-16 (PRSF) is pumped to North Cell TSF, transfer to South Cell. - Plant site and airstrip runoff to be directed to Stormwater Management Pond before discharge of excess to TSF. - Reclaim Pond water treated, if necessary, transferred to Portage Pit to assist with re-flooding late in 2017 (see 2015 Water Management Plan and Report). - Monitor water quality within flooded pits, treating in situ or in reclaim pond, if required, - Vault Pit waters directed to Vault Attenuation Pond. - Commence construction of finger dikes for fish habitat (preliminary placement of waste rock on ice at specified locations in Third Portage Lake).

9.1	Closure	- Completion of TSF capping - Completion of capping of Portage RSF - Construction of fish habitat structures (Finger Dikes/Goose Rock Garden/re-grading of pit fill surface). - Breach dewatering dikes once pit lake water quality meets CCME criteria for the Protection of Aquatic Life – anticipate 2029.

Figure 3-1: Current Status (End of 2015) _ Portage, Goose and Vault Pits & Dumps Status.

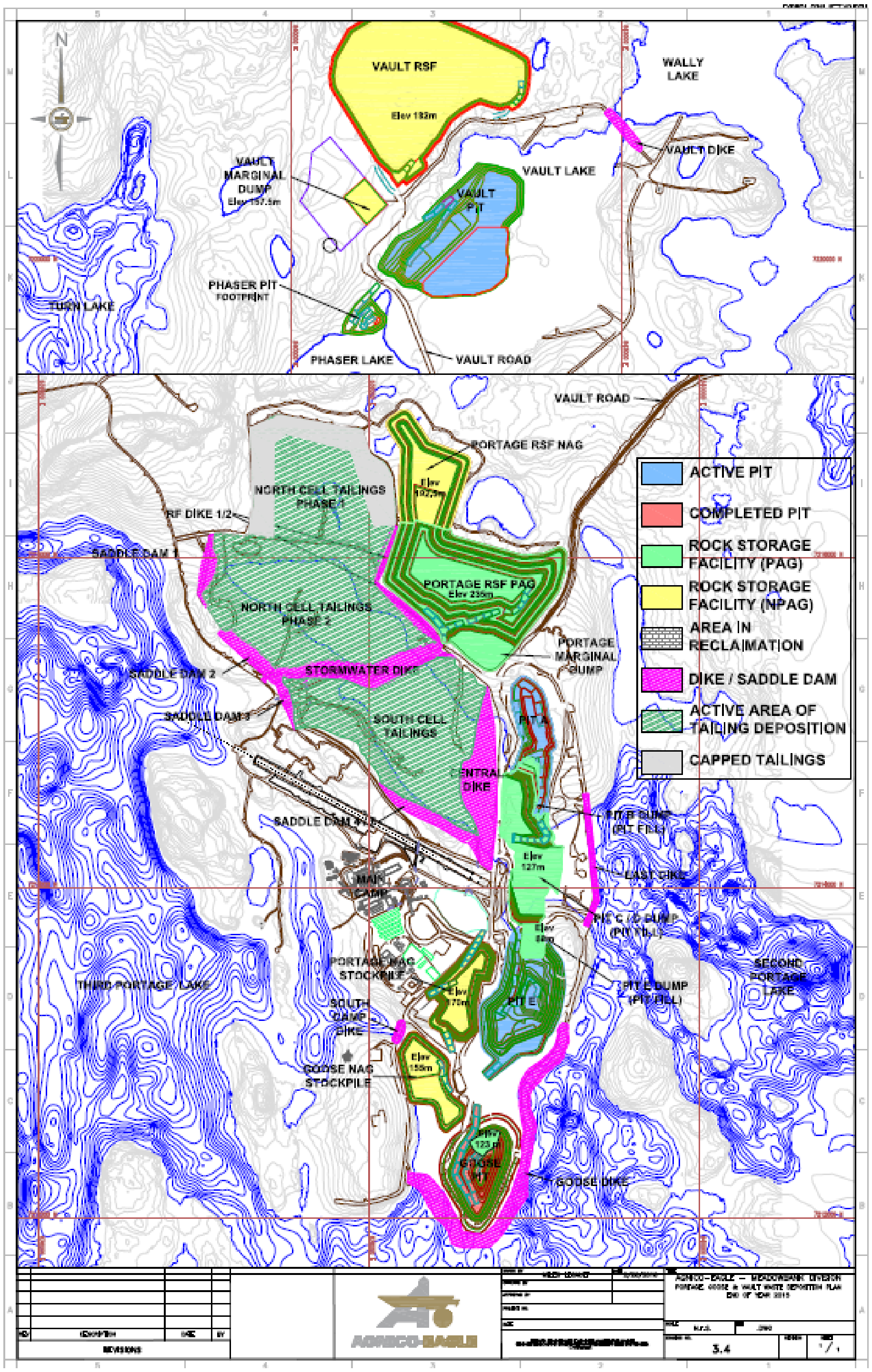

Figure 3-2: Current Status (January 2016) Capping Rock Storage Facility with NAG

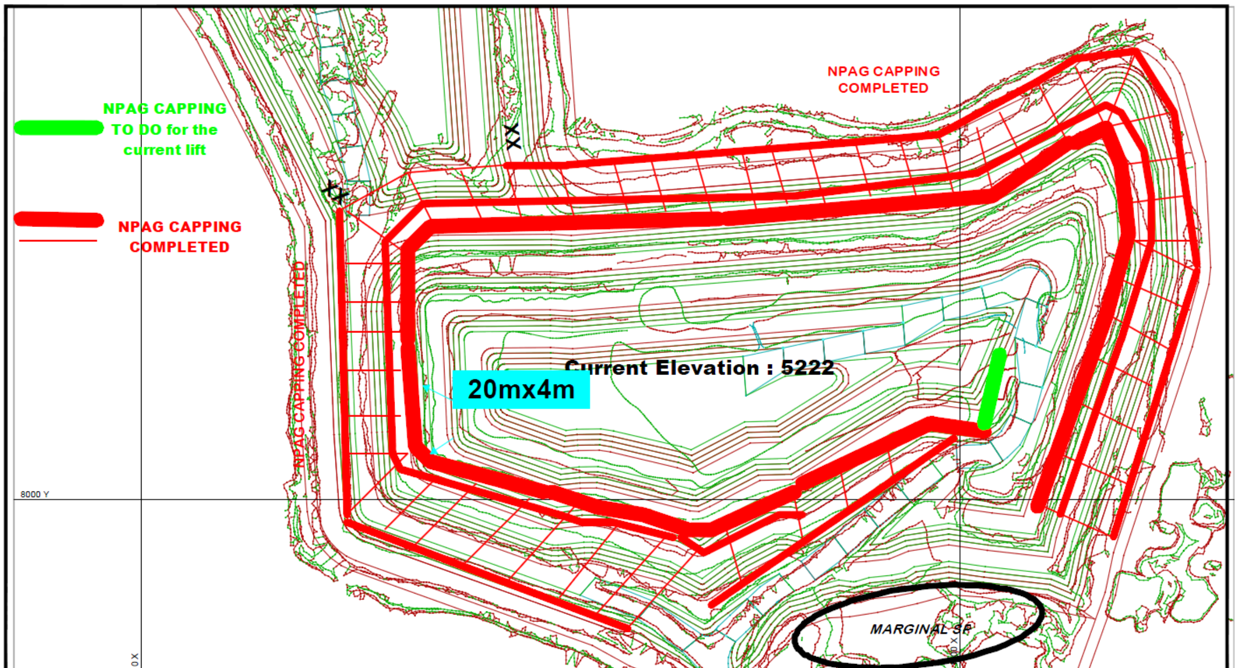

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Figure 3-3: Development Sequence Year 1 (2016)

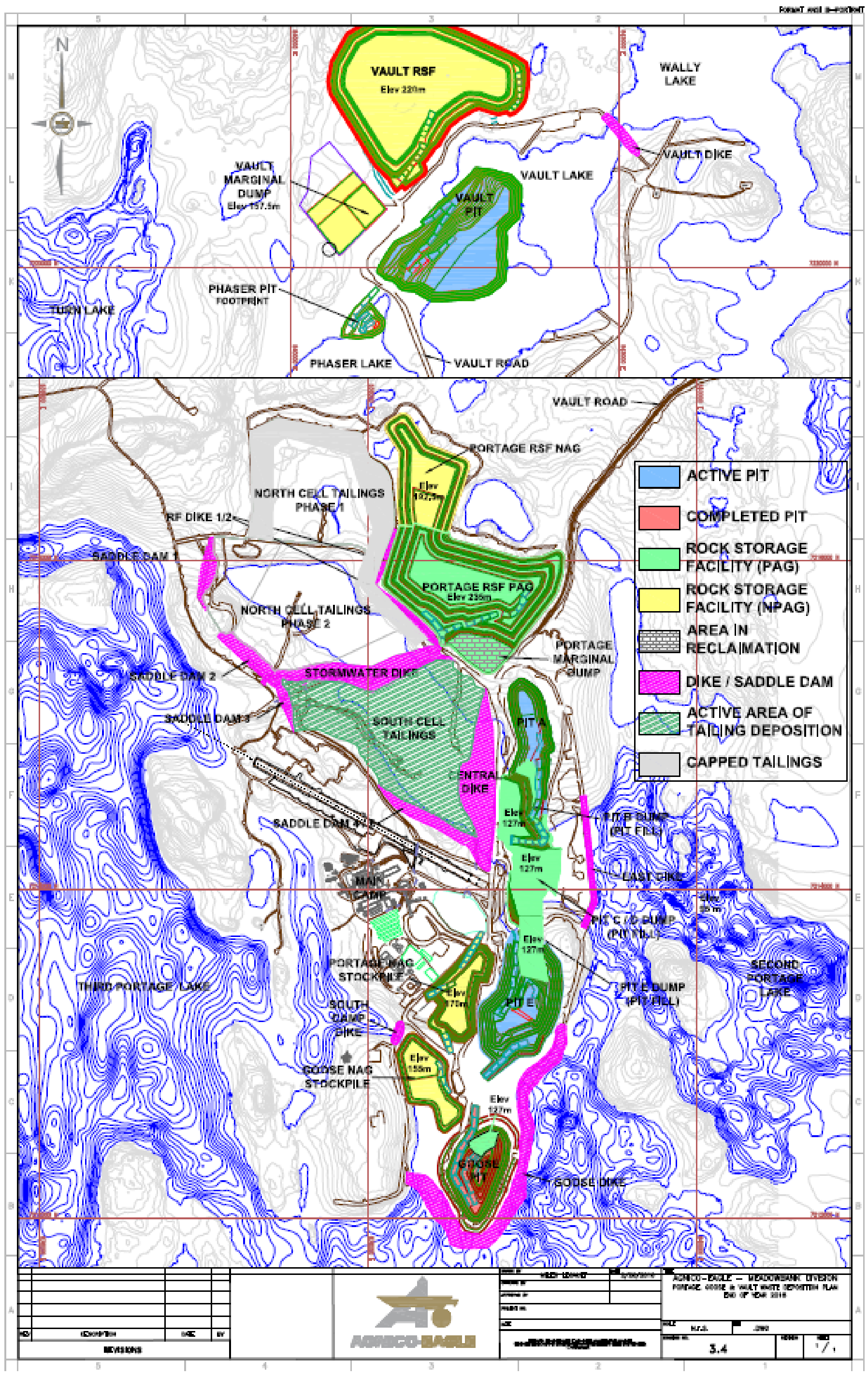


Figure 3-4: Development Sequence Year 2 (2017)

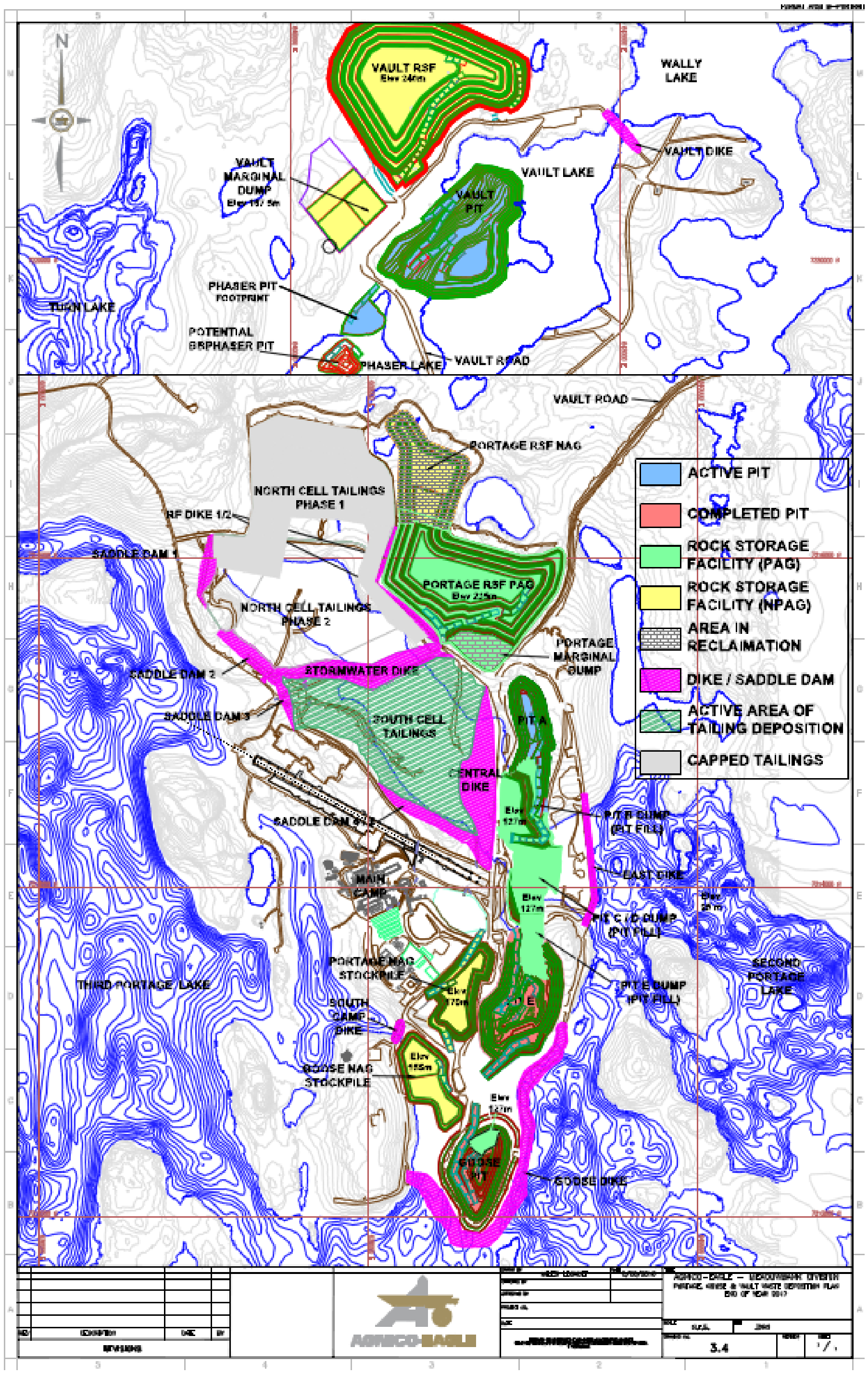


Figure 3-5: Development Sequence Year 3 (2018)

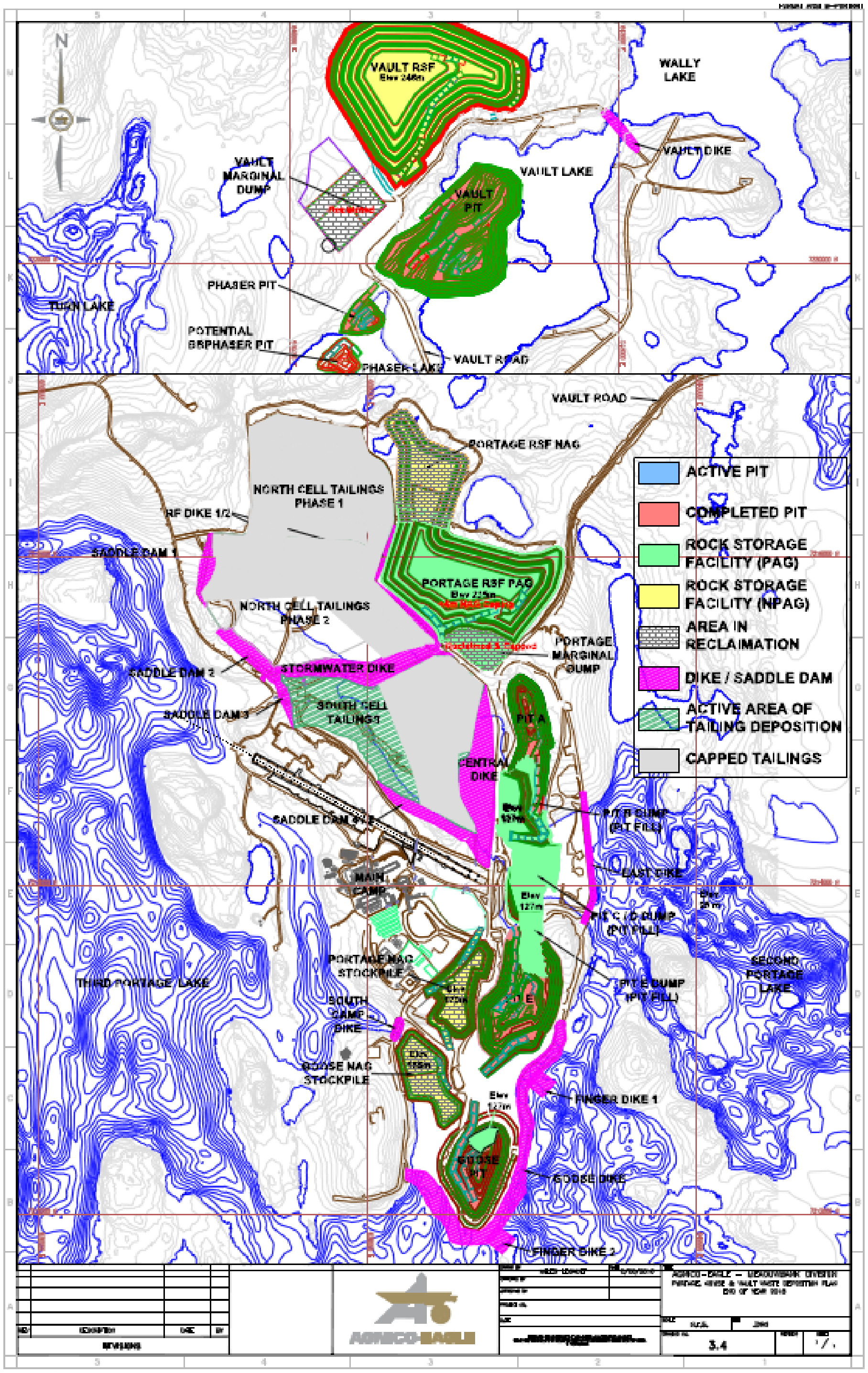


Figure 3-6: Development Sequence Year 4 (2019)

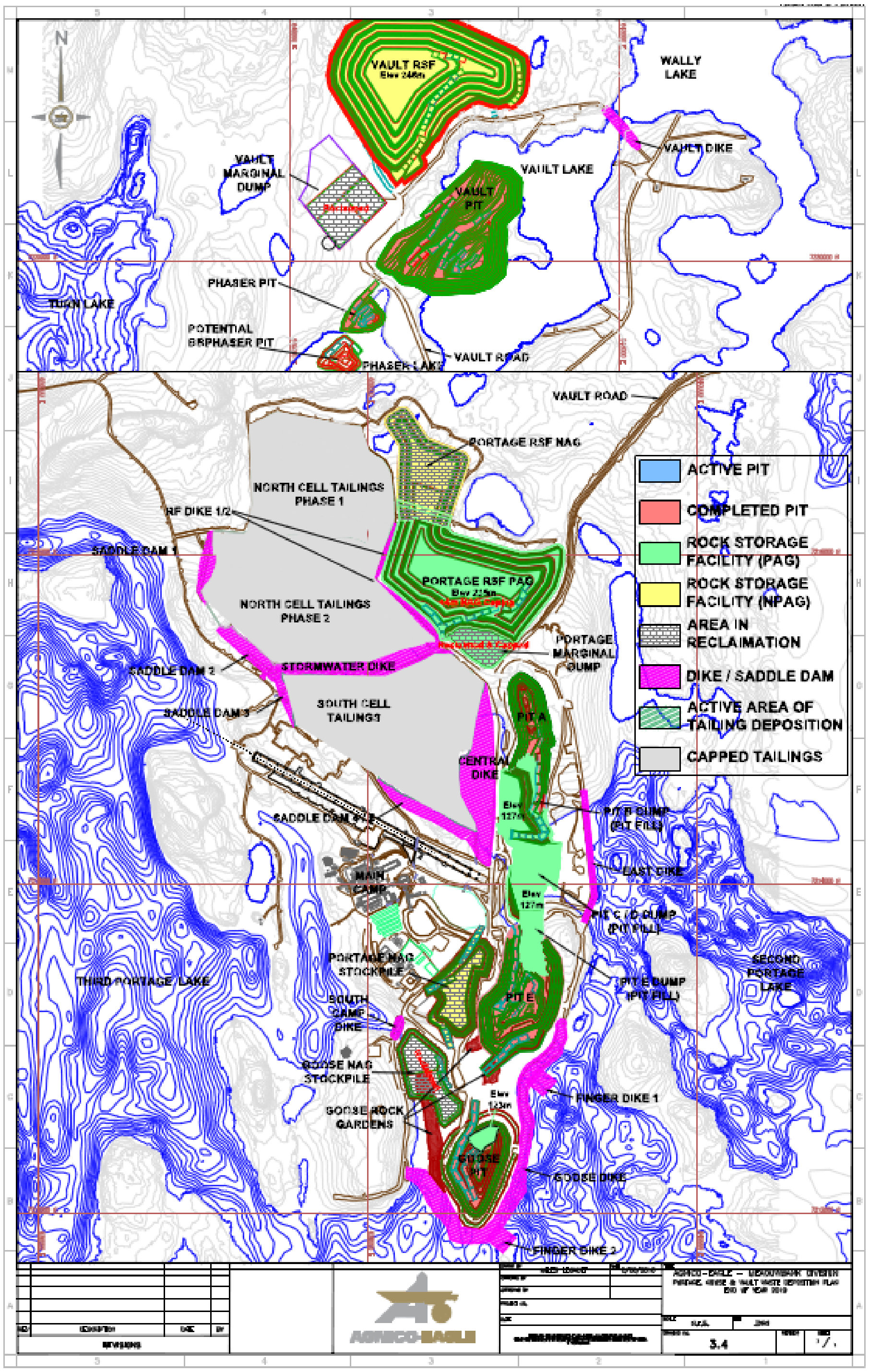
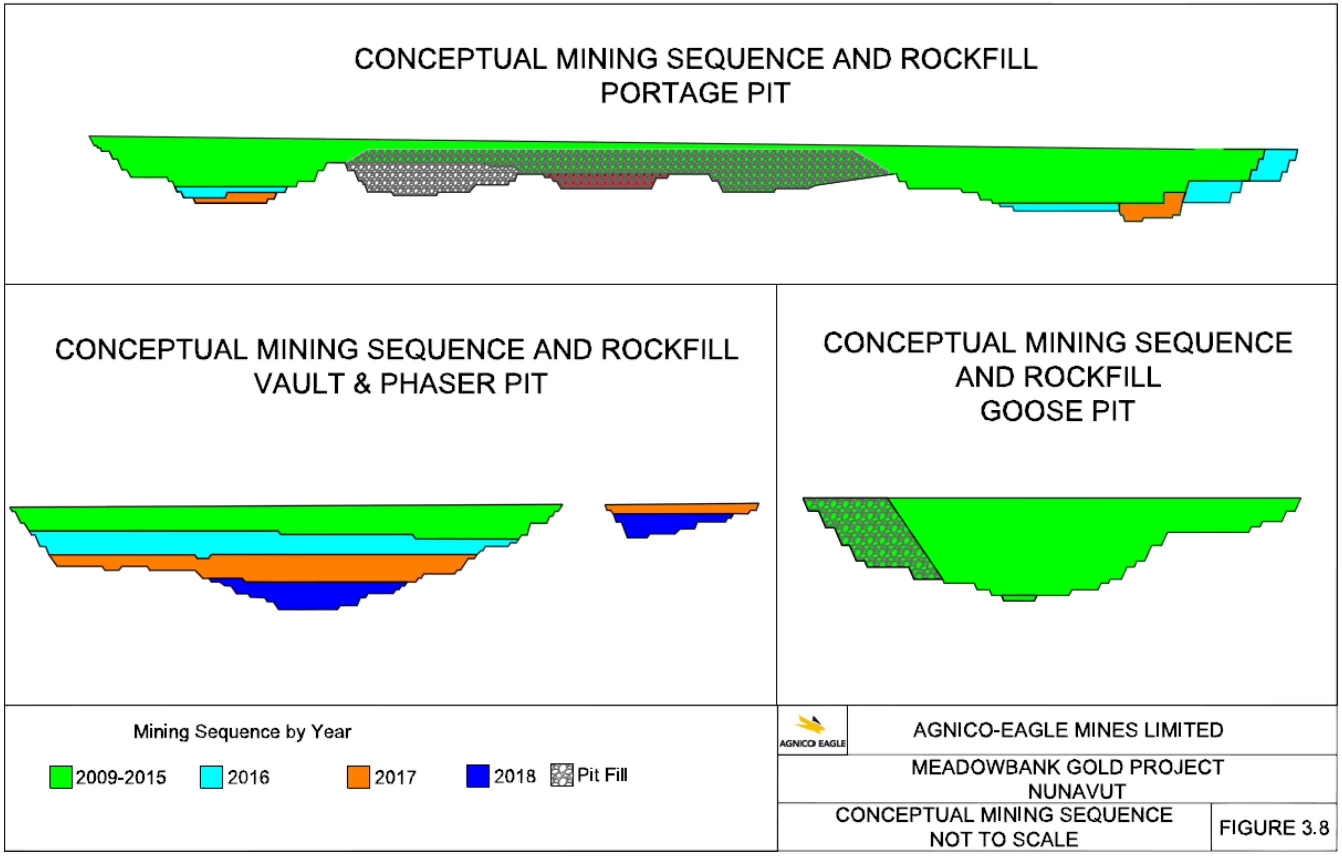


Figure 3-7: Conceptual Mining Sequence (Life of Mine)



SECTION 4 • CONTROL STRATEGIES FOR ACID ROCK DRAINAGE IN COLD REGIONS

The generation of metal leachate in acidic drainage is a concern for mining projects. In evaluating the potential control strategies for the disposal of the mine waste at the Meadowbank Gold Mine, consideration was given to control strategies that are effective in cold regions. A discussion of the alternative control strategies considered for the Meadowbank Gold Mine is summarized below.

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) in the above list, which then has an impact on (3) by potentially reducing the requirements for these activities. Table 4.1 presents various acid mine drainage control strategies.

The Meadowbank Gold Mine is located within the zone of continuous permafrost, and has a mean annual air temperature of about -11.1°C. Based on thermal data collected from the site since 1996, the mine area is underlain by permafrost to depths between 450 and 550 m. In developing the Mine Waste Management Plan, freeze control and climate control strategies have been adopted.

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 amenable to freeze control strategies, and hence should be taken advantage of. In addition to immobilization of pore fluids, permafrost can reduce the hydraulic conductivity of materials by several orders of magnitude. Consequently, freeze control strategies are effective methods for reducing the migration of contaminants through materials.

According to Dawson and Morin (1996), freeze control strategies can only be effective if sufficient quantities of non-potential acid generating (NAG) waste rock are available for use as a cover and insulation protection. 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.

Table 4.1: 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 air flow through waste rock, infiltration control with modest measures and temperature controls. Better understanding of waste rock air, water, and heat transport for reliable design.
Engineered Cover	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)

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 and metal leachate. Climate control strategies are best applied to materials placed at a low moisture content to reduce the need for additional controls on seepage and infiltration. This strategy is considered to be effective for waste rock, but not tailings. Therefore, the arid climate at the Meadowbank Gold Mine is also suited for climate control strategies for use with the RSFs.

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. NAG capping trial pads were constructed in 2014 in the North Cell TSF

North Cell to determine the effectiveness of different cover thicknesses and designs over tailings. Additional instruments were installed in 2015 within the RSF.

SECTION 5 • OVERBURDEN MATERIALS

5.1 LAKE BOTTOM SEDIMENT

The lakebed consisted of soft, fine-grained sedimentary deposits, referred to as lake bottom sediment that are underlain by till or other soil materials, and then bedrock. The thickness of lake bottom sediment was variable and ranged from a few centimetres up to 10 metres or more, as suggested by geophysical surveys and information obtained from various drilling programs and construction activities.

The sediments present underneath the footprint of the Stormwater Dike and the coffer dam (constructed within the upstream limit of the Central Dike footprint) were removed prior to the construction. The sediment at the bottom of the core of the dewatering dikes were removed during the excavation of their main and center trenches. A portion of the sediment present in the footprint of Portage Pits was removed as part of pre-stripping activities.

The remaining sediment present in the footprint of Portage Pit and the sediments of Goose Pit were removed as part of pre-stripping activities. The sediments present underneath the footprint of Central Dike were removed prior to construction; good quality material can be used for construction stages.

The sediment removed for the Dewatering Dikes, TSF Dikes, Goose Pit, the Portage Pits were sent to Portage RSF or within designated areas in the mine footprint. As for sediment that will be removed from the remaining Central Dike and Saddles Dam’s footprint; an estimated range of potential volumes has been provided in Table 5.1. These estimates are based on investigation results. These sediments will be disposed of within the TSF but outside the footprint of the Central Dike or other areas to be determined.

Table 5.1: Estimate of Lake Bottom Sediment Volumes

Construction Year	Estimated Volumes Excavated (m^3)
2011	107,771
2012	207,500
2013	31,500
2014	104,698
2015	82,777
Total Excavated	534,246
Remaining volume (including Central Dike and Saddle Dams 3-4-5) (m^3) to be excavated in 2016	38,570
Total including material excavated and remaining (m^3)	572,816

5.2 TILL

The remainder of the overburden materials on site consist of well graded till or till-like materials with alluvial deposits of silt and sand intermixed. The till and till-like materials is generally described as a silty sand/gravel. It contains cobble and boulder-sized particles with an average of 30 to 40% silt and clay sized particles. Some of the till or till-like material has been and will continue to be used in the construction of TSF perimeter dikes/dams; with the balance placed in the RSFs . Till placed in the RSFs will be mixed with the waste rock. The average till thicknesses throughout the Mine area varies based on location and may be from zero to upwards of 18 m.

SECTION 6 • MINE WASTE ROCK

Waste rock from the open pit mines, not used for site development purposes, has been and will be trucked to one of the two Waste Rock Storage Facilities (RSFs) until the end of mine operations. From 2016 to 2018 however, the majority (approximately 59%) of the PAG waste rock generated from the Portage and pits (mining ceased in Goose Pit in early 2015) will be placed within the mined out areas of Portage Pit. This PAG material will become submerged as the pit is flooded (subaqueous disposal) and is considered as fish habitat compensation in accordance with AEM's DFO authorization. Any material not able to be placed within the Portage pit as pit fill will be trucked to the Portage RSF.

Due to the distance between the Portage mining area and the Vault mining area, two separate waste rock storage facilities were required. Waste rock from the Portage and Goose pits is stored in a storage facility located near to these pits (Portage RSF or Mined out areas of Portage and Goose pits), while waste rock from the Vault, Phaser and potentially BBPhaser pits (once approved) will be stored in a separate storage facility adjacent to the Vault Pit (Vault RSF).

6.1 WASTE ROCK PROPERTIES

The quantities of waste rock excavated between 2009 and 2015 are summarized in Table 3.1, Table 3.2, Table 3.3, Table 3.4, Table 3.5 and Table 3.6. The quantities of waste rock to be excavated in the open pits from 2016 to 2018 are summarized in Table 3.7. The estimated quantities to be stored in each of the RSFs and other destinations are summarized in Table 6.1.

Table 6.1: Quantities* of Waste Rock by destination

Destination (RSF & Other destination)	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)	60.0 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 2015 (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.

6.2 WASTE ROCK FACILITY MANAGEMENT

As stated, waste rock will be deposited at the applicable RSF as well as within the Portage pit and in the Goose Pit. The waste types that report to the RSFs show variable ARD potentials, some of which require control measures. Based on the results of thermal modelling, it is expected that the material within the RSFs will freeze within two years of placement (BGC, 2004). As stated previously the perimeter of the Portage RSF has been capped with 4m of NPAG and the top will be covered in the same manner at closure.

Waste rock deposition plans for the Portage and Vault RSF's are shown on Figure 3-1, Figure 3-3, Figure 3-4, and Figure 3-5. 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. Placement of waste rock within the Vault RSF has commenced closest to the Vault Pit and will generally proceed in a northward direction, rising upward as pit development progresses.

As noted previously a further ARD control measure, the Portage RSF will be capped with a minimum of 4-m thick cover of NAG rock. This capping is continually ongoing around the perimeter as parts of the RSF reach their limits. The final top capping will be completed at closure. The depth of cover was selected based on thermistor data and thermal modelling which indicates the depth of thaw (active layer depth) to be on the order of 1.5 m. The cover material would be coarse to 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 average annual precipitation infiltration into the pile is expected to be low. Additional instrumentation was installed within the RSF in 2015 and further study analysis will be performed to assess the performance of the RSF NAG capping and to understand the thermal behavior of the RSF. It is possible that additional capping will be required to accomplish effective encapsulation and thus the prevention of the potential thawing of ARD material.

Most of the waste rock (app 87%) from the Vault deposit is NAG and water quality modeling concluded that the Vault RSF is not expected to require capping. As a precautionary measure, any PAG material encountered at Vault is and will be placed in the middle and be capped with NAG waste rock as dumping proceeds.

As for the potential Phaser and BBphaser pits, the total volume of waste rock is projected to be of 6.3 MT which would all be contained within the VRSF as it is currently designed. The waste rock from these small pits is similar to Vault pit waste rock – primarily NAG.

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6.3 WASTE ROCK STORAGE DIMENSIONS

Table 6.2 summarizes the physical dimensions and aspects of the Portage and Vault RSFs.

Table 6.2: Details of Proposed Rock Storage Facilities

Descriptors	Portage Rock Storage Facility	Vault Rock Storage Facility
Approximate storage volume	39.3 Mm^3	29.1 Mm^3
Approximate crest elevation	225 m	200 m
Approximate height	75 m	55 m
Maximum elevation of adjacent topography	192 m	190 m
Approximate footprint area	80.8 ha	61.0 ha

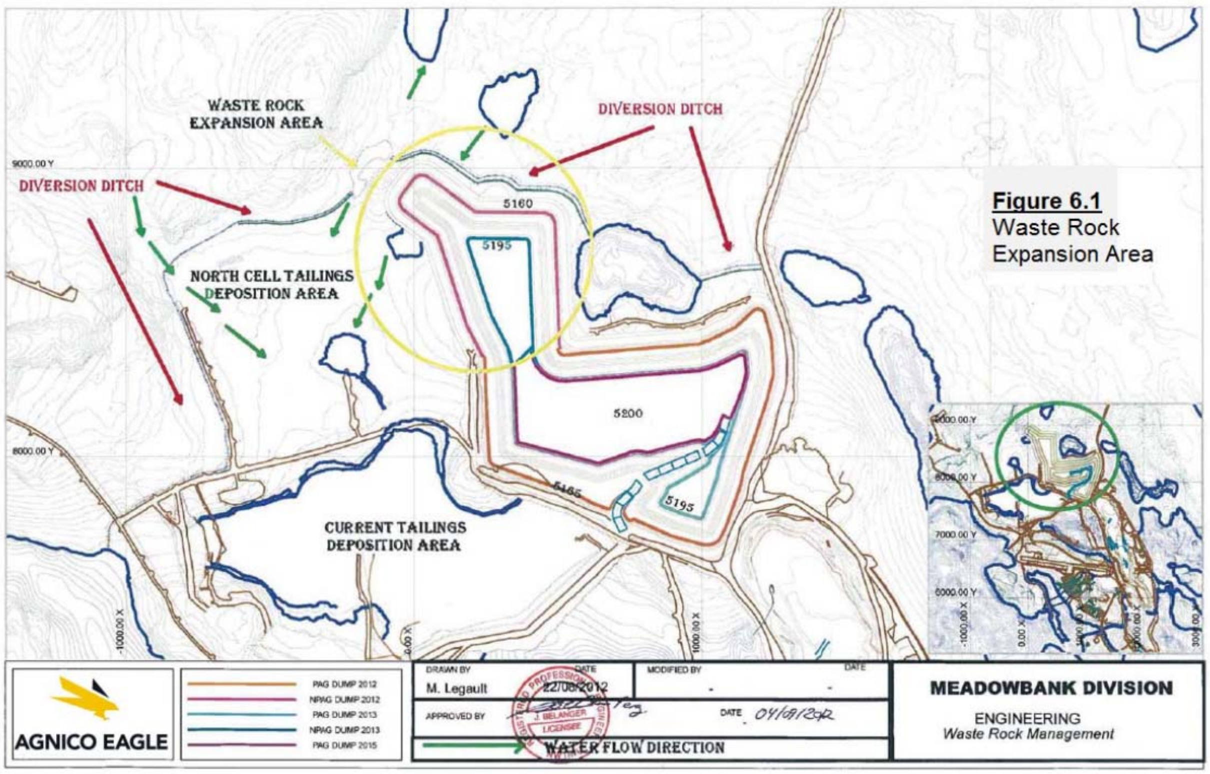
6.4 PORTAGE ROCK STORAGE FACILITY EXPANDED AREA

In 2012, AEM decided to revise the Portage rock storage facility (RSF) footprint which resulted in a temporary expansion from the original area of the Waste Storage Facility from 63 ha to 80.8 ha (Figure 6-1). The expansion was necessary due to the absence of sufficient area within the RSF for the storage of NAG material. The deposition of waste rock within the RSF must be completed according to strict engineering stability principles. NAG could not be stored in the storage area design previous to 2012 as the upward progress of deposition; combined with the volume of NAG generated on a day-to-day basis would have resulted in a large volume of NAG to be covered with PAG material as and when it was produced. Reclamation of NAG for construction/capping projects then becomes difficult. The NAG material is valuable as it is used for onsite construction materials and will be need at closure for capping purposes.

The current RSF design volume is similar to the original 2009 design; the deposition pattern has however changed to allow for the separate, temporary NAG material storage area discussed above. The expansion is still within the original mine footprint and all runoff is directed to the TSF or the South Cell. The diversion ditch system further prevents any watershed freshet from reaching the RSF mitigating any potential contamination. In 2015, 2 collection ponds were constructed; WEP 1 and WEP 2 to collect any contact water runoff from the NAG extension. It will be directed back to the North Cell TSF (See details in 2015 Water Management Plan and Report)

This design change was considered a minor revision and the 2012 Waste Rock Management Plan references this. Reclamation activities during closure will return the area affected by the temporary NAG expansion to as near original conditions as possible.

Figure 6-1: Waste Rock Expansion Area



SECTION 7 • TAILINGS MANAGEMENT

Tailings are the processed material by-product of the gold recovery process. Tailings are processed through a cyanide destruction circuit, then pumped to the Tailings Distribution Box, and then deposited in the Tailings Storage Facilities – North and South Cells (TSF).

The TSF is divided by the Stormwater dike into the North and South Cells. The North Cell is currently delimited by the Saddle Dams 1 and 2 as well as two rockfill road structures (RF1 and RF2). All those structures of the North Cell are presently at final El.150m. Final tailings deposition occurred in 2015 to maximum elevation 149.5masl. The pond will be maintained at a maximum of El.148m (to allow a 2 meter freeboard of water) until capping will be completed. The North Cell reclaim pond ceased function in November 2014 when deposition was switched to the South Cell (the South Cell became the reclaim pond). Since that time, a pumping station located on the North Cell reclaim road has been used to transfer excess water from the North to the South cells.

The South Cell is currently delineated by the Central Dike which has partially been completed to El.137m. The Central Dike embankment was completed to El.115m in 2012 and, to El.120m in 2013, to El. 132m in 2014, to El. 137m in 2015 and will be completed to El. 143m in 2016. A liner (LLDPE) was installed on the upstream surface to El.137m. This dike will be raised to a currently planned final elevation of El.143m in the summer 2016.

Tailings deposition began in February 2010, in the North Cell, and was switched to the South Cell (former Portage Attenuation pond) on November 22nd 2014 and continued to July 1st, 2015. During that time, the first phase of North capping occurred. Deposition switched back in the North Cell during the summer 2015 to finalize the beach profile for closure. Deposition was switched back to the South Cell on October 28th, 2015. Currently the reclaim pond is located in the South Cell and this water is recycled to the mill as process water.

7.1 TAILINGS PROPERTIES

Properties of the tailings relevant to the design of the TSF are presented in Table 7.1.

Table 7.1: Relevant Data for Tailings Storage Facility

Property	Value
Mine design life	2.75 yrs
Mill production (solids)	Approx. 11,300 tpd
Total rock processed (including In pit Reserves)	27.6 Mt
Goose pit (In pit Reserves)	0 Mt
Vault and Phaser pit (In pit Reserves)	7.6 Mt
Vault Pit (Ore mined)	1.9 Mt
Portage and Goose pits (Ore mined)	15.3 Mt
Portage pit (In pit Reserves)	1.5 Mt
Average specific gravity for ore	3.1 t/m^3
Assumed void ratio	1.4
Assumed in situ density (yearly average)	1.40 t/m^3
Volume of tailings in TSF	17.97 Mm^3

Processed tailings slurry volumes, pumped from the Mill to the TSF, and associated properties for 2015 are presented in Table 7.2.

Table 7.2: 2015 Processed Tailings Volume and Associated Properties

	Total Tailings Slurry (tonnes)	Density of Tailings (% solid)	Density of Slurry (tonnes / m^3)	Slurry pumped to TSF (m^3)
January	666,211	55%	1.59	419,980
February	545,822	56%	1.61	339,800
March	578,206	56%	1.61	359,494
April	525,560	57%	1.63	321,506

May	634,049	57%	1.62	391,002
June	611,979	59%	1.66	368,731
July	635,369	56%	1.61	395,681
August	631,604	57%	1.63	386,537
September	476,006	59%	1.66	286,170
October	615,401	58%	1.64	374,939
November	608,552	59%	1.66	365,695
December	557,279	56%	1.62	344,574
TOTAL				**4,354,107**

7.2 TAILINGS MANAGEMENT STRATEGIES

Due to the arid climate and permafrost environment, tailings are disposed of in a manner that encourages total freezing as a control strategy. Given the length of time that water at the site is ice covered, sub aqueous disposal is preferred. The objective is to allow the tailings to be frozen in layers in order to maximize the total frozen thickness. 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.

The TSF was designed in two cells 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. Operation in cells also allows progressive closure and cover trials that has commenced in the North Cell (2015) while tailings deposition continues in the South Cell.

Tailings deposition started in the North Cell (2010) and was done from the perimeter dikes and rockfill structures. The primary objective was to build tailings beaches to keep the pond away from the dikes and rockfill structures; especially prior to the freezing period to protect the liner against ice build-up, and to prevent or limit any seepage out of the TSF. This deposition strategy also facilitated the reclaim pond management that ensured an adequate supply for re-use in the mill.

Once deposition switched to the South Cell in November 2014, Stormwater Dike became an internal dike; dividing the North Cell from the South Cell. Any exfiltration from the Stormwater Dike (not evident to date) is expected to flow to the South Cell.

The tailings deposition plan in the South Cell has resulted in the development of a tailings beach starting on the upstream slope of the Central Dike and progressively advancing northwest, away from the Central Dike and Portage pit. This will force potential seepage pathway away from Central Dike and its foundation materials reducing possible seepage-flux to the environment.

Once hydraulic gradients are reduced, the migration of seep water into the talik beneath the North Arm of Second Portage Lake can only occur by diffusion. Diffusive transport is calculated to require more than $1x10^6$ years for 1% of the initial constituent concentration to reach the deep regional groundwater system. The rate of advance of the freezing front into the talik beneath the 2PL is therefore expected to exceed the rate of advance of diffusive transport, eventually encapsulating any constituents. Thermistors within the North Cell indicate the tailings are freezing as predicted.

During operations, the cells (North or South) into which tailings are be deposited will initially (early operation) be a local groundwater discharge area as the water level in the tailings will be below Second Portage Lake. As the Portage Pit is excavated however, it may become a regional hydraulic sink in the area. Any seepage into the talik beneath the tailings area could be directed towards the Portage Pit where it will be captured during the open pit operations and redirected back to the TSF. Groundwater monitoring is conducted to confirm or determine if the tailings management strategy is working.

Seepage through the Central Dike has been first observed at the downstream toe of the dike in 2014. AEM is managing the seep by pumping the seepage back to the South Cell. The mitigation plan has been reviewed and approved by the Meadowbank Dike Review Board (MDRB). AEM will continue to build the beach in this area in 2016. The seepage flow has diminished as a result. Chain of events and an action plan for future years is presented in the 2015 Water management Plan and Report, available with the Meadowbank Annual Report 2015.

7.3 TAILINGS RECLAMATION

On November 2015, O'Kane Consultants Inc (OKC) submitted the AEM Meadowbank TSF Closure Design Report which presents the detailed design and construction plan for reclamation of the North Cell Tailings Storage Facility (TSF) at the Meadowbank Mine. The design work for the South Cell cover will be undertaken in 2016. 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. Conceptual cover system designs previously modelled (Golder 2008) and presented in 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%.

To achieve the goals and criteria for the reclaimed TSF, the final design prepared by O'Kane will consist of a landform that promotes water shedding from all surfaces covered by an engineered cover system. The final design for the engineered cover system is a layer of compacted NAG waste rock (soapstone) of a minimal 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. The nominal cover thickness over most of the landform is well over the minimum, up to 8.0 m in the thicker portions. This thickness variation is required to obtain the designed landform. Cover material is used to build up the landform because the tailings material displays a low angle of deposition and its frozen state makes it difficult to re-handle economically. Under the 2.0 m minimal cover, the tailings material remains frozen for all but the warmest years of 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 final landform consists of two watersheds with several catchments in each watershed creating positive drainage off all surfaces of the TSF. Design objectives were 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. The main purpose is to prevent water infiltration and allow underlying tailings to freeze. 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. The drainage channels convey surface runoff water from the former TSF footprint through two surface runoff outlets located in the South and North-West portions of the TSF North Cell. 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 2015 Water Management Plan included in the 2016 Annual Report.

The proposed reclamation plan, which will be finalized in the Final Closure plan submitted in accordance with current Water License requirements (i.e. one year before closure), for the North Cell TSF is designed to be essentially maintenance free over the long term; however, AEM is committed to monitor, repair, and maintain the final reclaimed landform as required. The South Cell TSF capping detailed design and construction plan will also be completed one year prior to closure of the Meadowbank site.

During the post-closure period, the tailings are predicted to freeze with time, resulting in permafrost encapsulation. It is possible that a very low seepage flux of tailings pore water could flow to the flooded Portage Pit (at closure before any breach of the dikes) until the tailings are frozen. Groundwater monitoring to date downstream indicates minimal, if, any impacts that are associated with the TSF's (see 2015 Groundwater Report attached to the 2015 Annual Report). The pit lake will be isolated from the adjacent 3PL until monitoring indicates the pit lake water quality achieves acceptable levels to allow removal of sections of the Bay-Goose Dike and South Camp Dike.

7.4 TAILINGS FREEZEBACK AND SEEPAGE

The primary purpose of placing a cover system on the North Cell TSF is to mitigate long-term environmental effects due to runoff, seepage, erosion, or direct contact with the waste. From the determined closure objectives, design criteria for the closure of the North Cell of the TSF were developed. Modeling of tailings freezeback and contaminant transport was carried out by O'Kane Consultant in 2015 to estimate the performance of the permafrost encapsulation cover system design. Design criteria specific to the cover system design include:

Tailings Material Temperature

- The tailings material placed within the North Cell should be entirely frozen after a period of 10 years following closure (frozen defined as tailings temperature <0°C).
- The freezing front should continue at depth into the lake bed 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.

Tailings Material Saturation

- 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.

Dust Contamination

- Following closure of the facility and completion of the cover construction, dust emissions from the TSF will be in accordance with applicable standards.

The main objectives of numerical modelling are to estimate the seepage within the deposit and heat transfer within the system. One-dimensional (1D) soil-plant-atmosphere (SPA) modelling was completed primarily to determine surface temperatures for use in the thermal/seepage model.

Modeling of tailings freezeback and contaminant transport was carried out by O'Kane Consultant in 2015 to estimate the performance of the permafrost encapsulation cover system design. Numerical models were carried out in both one and two-dimensions. The 2D numerical model utilized a cross section profile of the entire North and South TSF, as well as the eventual pit lake, in order to accurately estimate the subsurface thermal and flow regimes. To develop reasonable lower boundary conditions for the 2D models, deep 1D models were completed first.

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). The two middle class scenarios: RCP4.5 and RCP6 scenarios were chosen as the most appropriate climate change scenarios for the site. The first of the two proposed scenarios, RCP4.5, is comparable to many scenarios that include some form of climate policy but allows for increases in emissions. The second proposed scenario, RCP6 is a stabilization scenario where total radiative forcing stabilizes after 2100 at 6 W/m2. This scenario would still require implementation of a range of technologies and strategies to reduce GHG emissions.

The first stage of modeling was completed using a 1D thermal model to predict temperature of the subsurface zone (tailings interface with cover) through the timeline modelled of 150 years. 2m and 4m cover systems were considered in this numerical modelling work. As uncertainty exists in the assessment of what the temperature values mean with regards to the phase of pore water; any temperature between 0°C and -2°C was considered as a potentially unfrozen zone. However, the agreed cover design objectives were such that the cover system is considered to meet performance objectives if the degree of saturation of the tailings material remains above 85% when the tailings temperature is above the freezing point. The 2m cover indicates minor thawing will occur for the upper portion of the tailings mass. The cover system will still effectively minimize oxygen ingress due to the high saturation of the tailings. Tailings interface under a 4 m cover system indicates temperatures at the interface are usually below -2°C, and always below 0°C, for the entire 150-year simulation period, even under the climate conditions of the RCP6 scenario. Note that the final landform surface presented shows a cover thickness above 4 m for 50% of the TSF surface area, increasing the confidence in the capacity of the designed cover system to limit oxidation and contaminant release.

The second stage was to develop 2D seepage and temperature models which include the North and South Cells with a realistic cross-section profile. It was assumed that a NAG cover would be placed on the South Cell. The inclusion of the South Cell TSF to the 2D model also allowed the incorporation of the Portage pit lake, providing a substantial source of energy to the system. The pit lake represents a continuous source of energy not accounted for in the 1D model. This energy source maintains a temperature condition above the freezing point in the subsurface, allowing water to continue seeping through the talik at this location, delivering energy to further points in the profile. This heat will radiate outwards until equilibrium is met.

Although the 2D modelling results for the coupled seepage – temperature models differs from the 1D model for the temperature profiles at depth, temperatures at the tailings – cover interface are similar for both approaches. The tailings – cover system interface results showed increased occurrences of temperatures rising above -2°C for the RCP6 and 2 m cover when compared to the model run under the RCP4.5 database with a 4 m cover. However, the conclusion from the 2D modelling approach remains the same as from the 1D approach, that the 2 m cover system is appropriate in meeting the performance criteria for the cover design.

The convective airflow model using modified geometry was run for a period of 150 years using the RCP4.5 climate database. Assuming the same initial temperature conditions as modelled in the thermal/seepage modelling, the airflow rates through the cover system and resultant temperatures within the buried tailings were calculated. Due to the presence of a layer of crushed soapstone resulting from construction at the surface, airflow rates through the cover system were minimal. Based on the results of this idealized model, it is predicted that airflow rates through the cover system on a large scale in the field will not be substantial enough to affect cover performance. This conclusion was drawn from the fact that the numerical modelling carried out herein used a geometry that was ideal for convective airflow to occur, and even under these conditions, there was no observable result on internal TSF temperatures.

Additional modelling work will be completed as part of the TSF final cover design. Results of the modelling and the cover design will be provided in the Final Closure and Reclamation plan for Meadowbank site.

7.4.1 Monitoring of Tailings Freezeback

During the development and mining of the deposits, an adaptive management plan has been implemented with respect to monitoring of the TSF. The Thermal Monitoring Plan (TMP) is presented in detail in Section 8 of this document.

The monitoring program for the TSF will provide the data required to validate the predictions of freezeback within the tailings. If it is determined by monitoring during operations that the tailings are freezing at lower rates than predicted, then mitigation procedures would be implemented. AEM has implemented Thermal Monitoring Program. Results to date indicate that the Tailings in the North Cell are freezing as predicted.

During the operational phase, a number of test pad stratigraphies have been developed to assess various cover designs, and to determine the most appropriate design for the actual site conditions. Such an approach has been used previously at northern mines such as Nanisivik. Four tests pads have been constructed on the TSF North Cell since 2014, in collaboration with the with the Research Institute Mines and Environment (RIME).

Once capping on the tailings with NAG will be completed, a specific monitoring program will be implementing. The objectives of the TSF North Cell cover system and landform are to ensure long-term landform stability, encourage TSF freeze-back into the surrounding permafrost, and maintain either subzero temperature or high degree of saturation (>85%) in the tailings at all times. The purpose of the performance monitoring system is to ensure that these objectives are met. The objectives of the TSF North Cell cover system performance monitoring program will be:

- To monitor the temperature profile through both the tailings and the cover system to verify that the tailings beneath the cover system remain below freezing for most of the year and to verify that the tailings and talik are freezing into the surrounding permafrost;
- To monitor the water content of the tailings below the cover system and understand the basic water content response at the base of the cover; and
- To monitor settlement, consolidation, sediment loss and progression of erosion features on the landform.

As indicated before, the tailings will also be covered with a minimum 2-m thickness of NAG rockfill, which will provide an alternative and preventive strategy for the management of the TSF in the event that permafrost develops more slowly than predicted.

7.4.2 Monitoring of Tailings Seepage

Following dewatering of 2PL Arm and during investigations and construction of the TSF perimeter dikes several investigative procedures are 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 are 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. In addition visual inspections are performed regularly and a yearly geotechnical inspection is undertaken by a third party contractor.

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

Refer to the 2015 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 2015 Annual Report.

7.4.3 Requirements for Sumps and Seepage Pump Back

Seepage collection systems are planned downstream of the TSF dikes, saddle dams and rockfill structures as a contingency against seepage. Seepage collection systems consist of trenches and sumps located immediately downstream of the TSF dikes (and Waste Rock Storage facilities). Seepage reporting to the sumps is to be pumped back over the dike into the TSF. Seepage pump back rates will be monitored and recorded as a measure of dike or rockfill performance. The seepage collection system has been constructed where required during operations. Additional structures could be constructed in operations or at closure if required as contingency against seepage.

In 2013 seepage was detected in a sump location on the North side of the Portage RSF (PAG). It was later determined that the source was the North Cell TSF reclaim water that had ponded against the rockfill structure adjacent to the Portage RSF. This water migrated under the Portage RSF and discharged to the sump location. Corrective measures (installation of a till plug, increased pumping, the installation of 4 additional thermistors to assist in monitoring freezeback in the RSF, installation of filter material and geotextile installation along the rockfill structures RF1 and RF2) were undertaken to prevent migration of contaminants to Lake NP-2 (2013, 2014). A report, including recommendations, was prepared by Golder (Jan, 2014). Also AEM prepared a Freshet Action Plan which includes monitoring and continued pumping of this seepage area. This Plan is updated yearly as part of the 2015 Water Management Plan and Report. AEM has implemented the Golder recommendations to control the seepage.

In November 2014 upon the start of the South Cell deposition and water reclaiming, an unpredicted rise in piezometers levels downstream of Central Dike was observed. This rise was recorded as having the same rate of rise as the South Cell reclaim pond thus indicating a possible seep beneath the Central Dike structure through the dense till foundation layer and fractured bedrock. Golder was advised and issued a revision of the seepage model of their design. Chain of events, investigations results and action plan is detailed in the 2015 Water Management Plan and Report. AEM will continue thorough monitoring of the situation and implement corrective measures if needed. This area is now included as a sampling location in accordance with the Water License. The seepage is contained on site and excess volumes are pumped back to the South Cell TSF.

7.5 TAILINGS DEPOSITION PLANNING

The main components of the TSF are illustrated in Figure 7.1 and the general operation of the TSF facilities will follow the sequence laid out in Table 3.6. The estimated storage capacity of the tailings storage facilities, Reclaim Pond, and total basin capacity are shown on Figure 7.2.

As mentioned above, the general operational management strategy for the TSF involved discharging tailings into the North Cell of the TSF to a maximum elevation of 149.5m. The North Cell is filled up to its final capacity as the final tailings deposition was completed in summer 2015. The reclaim system was put in place in the South Cell in October 2014. While the South Cell is in operation, the North Cell will be allowed to freeze, and progressive reclamation and NAG capping was initiated in winter 2015 and will continue in 2016. The tailings are capped with rockfill placed first in the northern sector of North Cell and working towards Stormwater Dike. The North portion on the North Cell was capped in 2015 and more will continue in 2016. After mining is completed and the operation of the South Tailings Cell is completed, capping of the South Cell will commence.

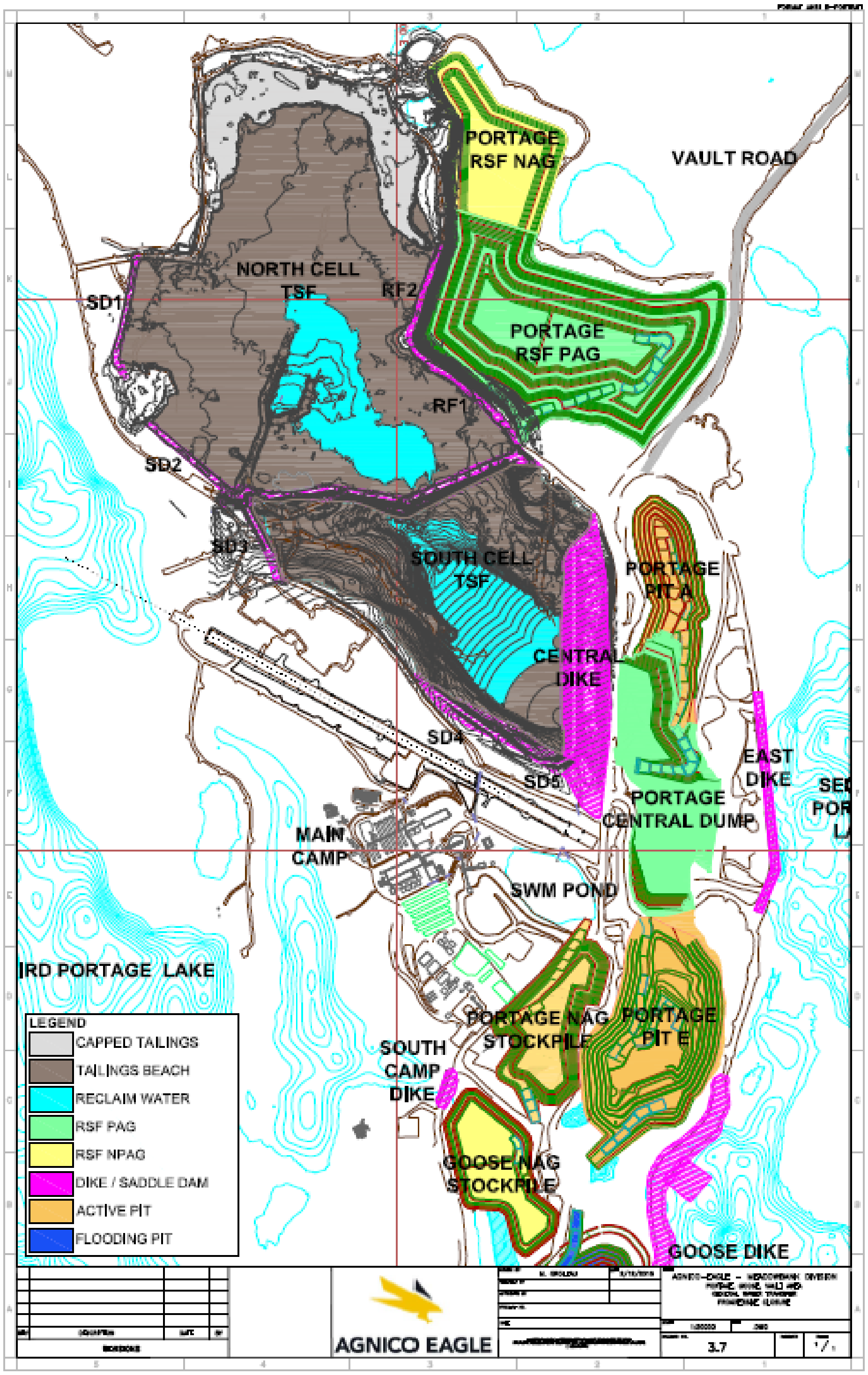
An updated operational detailed deposition plan is completed and available in Appendix 1 of this report.

Tailings deposition planning for the mine is based on the following general objectives and operating philosophy:

- Define a deposition sequence based on proposed dike alignments with sufficient capacity to store the life of mine tailings plus a contingency while maintaining the required setback from the Portage Pit;
- Define a deposition sequence that allows the cells to be partitioned (Stormwater Dike) to facilitate the lake dewatering sequence, construction of the Central Dike, and to allow a portion of the TSF to be operated as an attenuation pond for at least 3 years (until November 2014). This has been completed as the Central Dike is constructed to elevation 137m in 2016 and as the South Tailings Cell is in operation since November 2014;
- Define a deposition sequence that maintains a reclaim pond with sufficient depth for efficient operation of the reclaim barge;
- Define a deposition sequence that maintains beaches on the upstream faces of perimeter dikes, Stormwater Dike, Central dike, all associated Saddle Dams and peripheral rock fill structures;
- Define a deposition sequence to operate in cells to reduce beach length to more efficiently operate in cold conditions to minimize ice entrapment ;

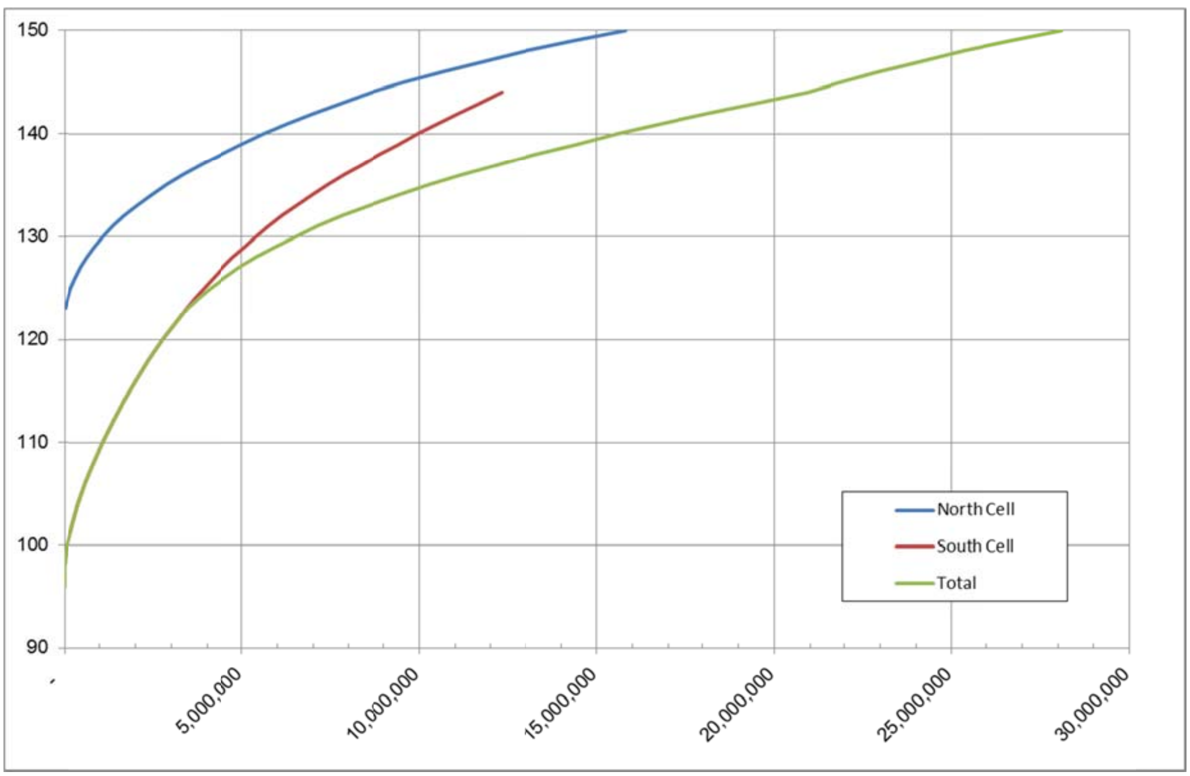
- Define the staged construction schedule for the dikes so that adequate freeboard is maintained within the impoundment and that the deposition sequence does not interfere with the dike's construction;
- Define a deposition sequence that creates a tailings surface that will require the minimum earthworks during closure and if possible will allow covering of some portion of the tailings surface during operations; and
- Define a deposition sequence that promotes freezing of the tailings during the operating period.

Figure 7-1: Tailing Storage Facility Main Components



As mentioned above, the general operational management strategy for the TSF involved discharging tailings into the North Cell of the TSF to a maximum elevation of 149.5m. The North Cell is filled up to its final capacity as the final tailings deposition was completed in summer 2015. The reclaim system was put in place in the South Cell in October 2014. While the South Cell is in operation, the North Cell will be allowed to freeze, and progressive reclamation and NAG capping was initiated in winter 2015 and will continue in 2016. The tailings are capped with rockfill placed first in the northern sector of North Cell and working towards Stormwater Dike. The North portion on the North Cell was capped in 2015 and more will continue in 2016. After mining is completed and the operation of the South Tailings Cell is completed, capping of the South Cell will commence.

Figure 7-2: Tailings Storage Facility Stage Storage Volume Curve



7.6 TAILINGS STORAGE FACILITY CAPACITY

As mill processing rates and tailings characteristics are liable to 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. As such, a preliminary deposition plan was done in 2009 to provide guidelines for operation of the facility and to schedule the construction of the TSF perimeter dikes. The preliminary deposition plan was initially updated each year to include data collected from the previous year's deposition within the TSF. Since 2013, AEM has assigned dedicated engineers, who regularly review/update the deposition plan incorporating any new and relevant information and changes to mine and operational planning.

The TSF was designed to have sufficient capacity to store the expected tailings volume over the life of mine (Golder, 2008b). In that same study, a sensitivity analysis was conducted to evaluate the impact of possible ice entrapment on the final elevation of the TSF. It has been observed that ice has been trapped in the tailings as a result of tailings transport water freezing before it reaches the Reclaim Pond. The results are summarized in Table 7.3. The original design included an assumption of a 20% tailings bulking factor due to ice entrapment. AEM has since determined that this assumption was less than information gathered on site through field observations, as explained below.

AEM performed a bathymetric analysis in July 2015 of the North Cell to further validate the key variables which influence the water balance as well as the deposition plan. Mainly, those key variables are the tailings dry density (influenced by ice entrapment) and the sub-aerial and sub-aqueous beach angles. Furthermore, a dynamic model was established with parameters influenced in accordance with the real time conditions (i.e. seasonal temperature variation) instead of working with year round estimated average and this allows AEM better reflect the actual site conditions.

The 2015 bathymetry was compared to the 2013 and 2014 bathymetries. The findings revealed that deposition in the South Cell during the winter 2015-2016 was much more efficient than expected. Average tailings dry density measured was up to 1.45t/m^3 instead of the average of 1.28t/m^3 observed in the North Cell during the last years. It could be explained by the deposition conditions that changed which results as only sub-aqueous deposition was performed. An average of 38% of the original slurry water in the tailings remains in the cell through a combination of 30% being trapped as pore water within the tailings along with an additional 8% being pure ice entrapment (ice lenses). This differs with the 60% determined in 2015. The better performance observed in 2015 could be related to the deposition strategy promoted which was based on performing sub-aquatic deposition during winter time in the South Cell in order to reduce the impact of cold temperature on tailings deposition. Beach angles measured in the South Cell were also steeper; 1.1% sub-aerial beach slope in the South Cell instead of the 0.45% in the North Cell, and 3.6% sub-aqueous slope in the South Cell instead of 2.36% in the North Cell.

Based on that new information, AEM reviewed the tailings deposition strategy and implement a new guideline in order to improve the efficiency of the tailings deposition and reduce the operational risk. During winter time, AEM observed slurry channeling over the frozen tailings beach instead of beaching in front of the discharge point. This phenomenon could compromise the reclaim water system operation as observed in 2013 when AEM needed to stop the reclaim barge. The new guideline consists to maintain a free water volume always a least two times bigger than the sub-aerial tailings volume into this deposition plan. Note that this strategy put more pressure on the Central Dike liner protection and the water treatment required at closure. With this new free water target, AEM expect that South Cell parameters of 2015 could be used to plan deposition for 2016-2017. North Cell parameters will be used for 2018 as they were considered representative of the tailings deposition occurring in a TSF pond at closure. A similar analysis will be conducted during the summer of 2016 in the both cells to confirm this assumption. Table 7.4 presents the parameters used for the South Cell tailings deposition plan.

Table 7.3: Average Height Increase of Tailings Surface Elevation for Various Amounts of Ice Entrapment based on Golder, 2008b

Proportion of Entrapped Ice (%)	**Average Height Increase of Final Tailings Surface Elevation* (m)**
0	-
10	1.4
20	2.5
30	3.7

*Based on initial ore reserves.

Table 7.4: South Cell tailings deposition modelling parameters

Month	Parameters					
	Ice Thickness (m)	Ice Ratio (%)	Tailings Dry Density (%)	Ice entrapment (%)	Sub aerial beach angle (%)	Sub aqueous beach angle (%)
16-Jan	1.1	19%	1.22	50%	1.10%	3.60%
16-Feb	1.3	24%	1.22	50%	1.10%	3.60%
16-Mar	1.6	31%	1.22	50%	1.10%	3.60%
16-Apr	1.7	34%	1.49	50%	1.10%	3.60%
16-May	0	0%	1.49	40%	1.10%	3.60%
16-Jun	0	0%	1.49	30%	1.10%	3.60%
16-Jul	0	0%	1.76	30%	1.10%	3.60%
16-Aug	0	0%	1.76	30%	1.10%	3.60%
16-Sep	0	0%	1.76	30%	1.10%	3.60%
16-Oct	0.2	4%	1.31	40%	1.10%	3.60%
16-Nov	0.5	10%	1.31	50%	1.10%	3.60%
16-Dec	0.8	17%	1.31	50%	1.10%	3.60%
17-Jan	1.1	28%	1.22	50%	1.10%	3.60%
17-Feb	1.3	32%	1.22	50%	1.10%	3.60%
17-Mar	1.6	46%	1.22	50%	1.10%	3.60%
17-Apr	1.7	55%	1.49	50%	1.10%	3.60%

17-May	0	0%	1.49	40%	1.10%	3.60%
17-Jun	0	0%	1.49	30%	1.10%	3.60%
17-Jul	0	0%	1.76	30%	1.10%	3.60%
17-Aug	0	0%	1.76	30%	1.10%	3.60%
17-Sep	0	0%	1.76	30%	1.10%	3.60%
17-Oct	0.2	4%	1.32	75%	0.45%	2.36%
17-Nov	0.5	7%	1.08	80%	0.45%	2.36%
17-Dec	0.8	13%	1.08	90%	0.45%	2.36%
18-Jan	1.1	18%	1.08	90%	0.45%	2.36%
18-Feb	1.3	23%	1.08	90%	0.45%	2.36%
18-Mar	1.6	28%	1.08	90%	0.45%	2.36%
18-Apr	1.7	32%	1.08	90%	0.45%	2.36%
18-May	0	0%	1.32	60%	0.45%	2.36%
18-Jun	0	0%	1.56	30%	0.45%	2.36%
18-Jul	0	0%	1.56	30%	0.45%	2.36%
18-Aug	0	0%	1.56	30%	0.45%	2.36%
18-Sep	0	0%	1.56	30%	0.45%	2.36%

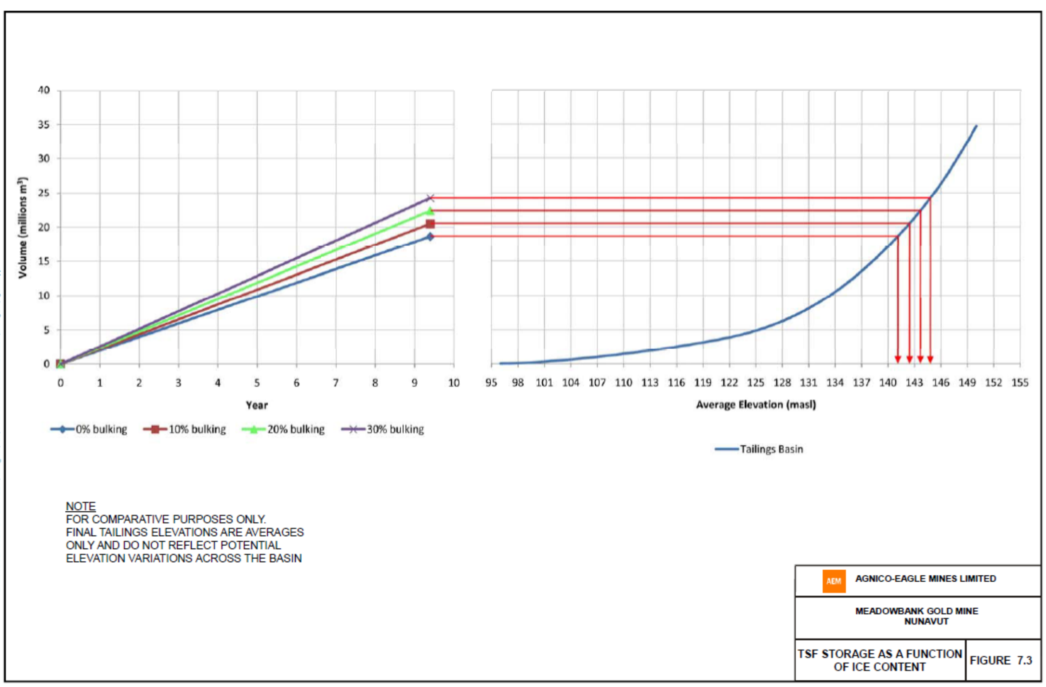
In addition to the contingency related to density, the design of the dikes allows for staging crest elevations without major re-design. The TSF dikes are raised by the downstream method, and the alignments of the dikes were selected to allow additional rising to occur above 150 masl, should additional ore bodies be identified.

The key variables that will influence the performance of the tailings facility are the following:

- Tailings beach slope;
- Reclaim pond volume;
- In-situ dry density;
- Seepage; and
- Ice content.

Regular monitoring of the TSF discharge operation, such as bathymetry and topography surveys, are to be conducted throughout the life of the TSF to adjust model parameters and deposition strategy. This ensures proper planning of the raisings/dikes construction, water availability in the TSF pond and water release strategy following freshet. It will also help in the evaluation of ice entrapment throughout the life of the TSF and verification of model parameters and deposition strategy within the updated deposition plan.

Figure 7-3: Tailings Storage as a Function of Ice Content



SECTION 8 • THERMAL MONITORING PLAN

To observe the freezeback of the Tailing Storage Facility (TSF) perimeter impoundment dikes and rockfill structures as well as the Rockfill Storage Facilities (RSF's), a series of subsurface thermistors have been installed at strategic, prescribed locations.

The thermistors have been installed in boreholes drilled around and in the perimeter of the RSF/TSF. The purposes of the thermistors in the TSF are to monitor the talik temperatures underneath the TSF as freezing progresses and to monitor the freezing of the tailings. The purpose of the TSF perimeter thermistors is to monitor the temperature of the perimeter structures which include the containment structures (i.e. saddle dams) to ensure they remain frozen. The purpose of the thermistors in the RSF is to monitor the RSF temperature as freezing progresses. See figure 8.1 for the specific locations of those thermistors.

The thermistors are monitored regularly and this will continue throughout the operational period as well as during closure and post closure. The results are 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 to attempt to influence the rate at which the TSF and RSF freeze.

At this time the thermistors indicate that freezeback is occurring within the North Cell TSF and in the Portage RSF structures. The thermistors installed on the perimeter structures of the TSF/RSF show that the foundation and the dikes remain frozen on yearly basis.

Additional thermistors are planned to be installed in tailings in 2016 and several were installed in the RSF in 2015. Thermistors installed in 2015 are RSF7 to RSF16 (10 thermistors total). Thermistors were also installed in the vicinity of Central Dike in 2015 to monitor the Central Dike seepage and the tailings freeze back. In 2015 AEM installed 5 new thermistors at Central Dike, and 10 thermistors at the RSF, as shown on Figure 8-1 for thermistor locations. Details on thermistors installed in 2015 and before are available in Table 8.2.

Installations of instrumentation in the tailings will continue to take place in the TSF's (North and South) as the cells are 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. Additional thermistors will be installed in the North Cell in 2016 as the tailings deposition is completed in this area.

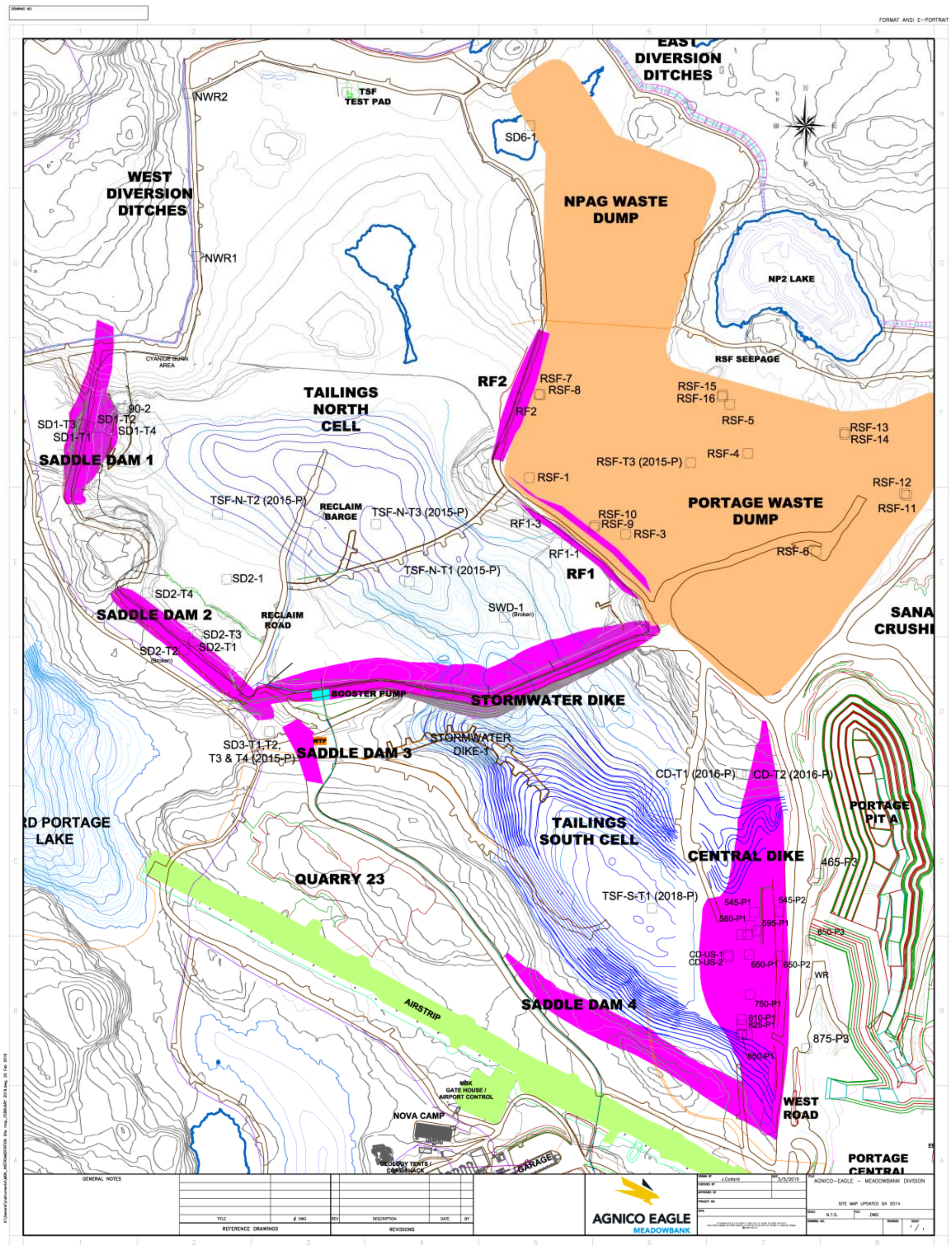
The locations of the thermistors are based on tailings deposition plans. For waste rock, the phasing and locations are based on the deposition plan described in Section 6 of this document. Future deposition plans will be taken into account prior to scheduling future installations, and if necessary thermistor specifications and locations should be modified as necessary.

A research project is ongoing at Meadowbank in collaboration with the RIME (Research Institute of Mine and Environment). Construction of test pad for cover trials in the TSF and installation of instruments for monitoring within the TSF and the RSF is part of the research project. The monitoring results are used for cover design, cover performance assessment for both the TSF's and RSF's and to ensure the expected criteria for closure will be met and maintained.

8.1 INSTRUMENT LOCATION

Installed and planned future locations of thermistors are presented on Figure 8-1.

Figure 8-1: Planned and Installed Thermistor Location



8.1.1 Operations

During the operational life of Meadowbank, monitoring of the TSF can be divided into two phases, 2010 to 2015 in the North Cell and 2015 to 2018 in the South Cell.

The Portage RSF will operate from 2009 to 2016. The Vault RSF will operate from 2014 to 2018.

The following describes the requirement for thermistors at each storage facilities.

8.1.1.1 TSF North Cell

- Several thermistors have already been installed as part of Saddle Dam 1 (SD1), Saddle Dam 2 (SD2) and Stormwater Dike (SWD) construction in 2009-2011. Data collected from these structures form part of the TMP.
- SD2-T1; Installed in 2012 down to the till plug, at the upstream toe of SD2.
- T121-1(RF1); Installed in 2012 along the perimeter of RF1 (upstream). This will provide a leading indicator of seepage through RF1 towards the Portage RSF. It will also monitor thermal regime of the upper 40 m into the overlying soils and bedrock.
- T73-6 (RF1-2); Installed in 2012 along the perimeter of RF1 (upstream). This will also provide a leading indicator of seepage through RF1 towards the Portage RSF.
- RF1-3: Installed in 2013 along the upstream slope of the RF1. The purpose of the thermistor is to monitor the temperature of the tailings sitting on the slope of the RF1.
- T122-1 (RF-2); Installed in 2012 along the perimeter of RF2 (upstream). This will provide a leading indicator of seepage through RF2 towards the Portage RSF. It will also monitor thermal regime of the upper 40 m into the overlying soils and bedrock.
- T90-2 (SD-1); Installed in 2012 in tailings near the Saddle Dam 1.
- TSF-NC-T1 & TSF-NC-T2; located within the North Cell, they would monitor the tailings temperature and freeze back in time. The will be installed within the tailings (30-40m of tailings) and through talik (30-40m of bedrock) in two different location. TSF-NC-T2 would replace the SWD-1 which was damage following installation in 2014 and the TSF-NC-T2 will be installed in the deepest spot of the cell where the tailings column is the highest.

- Proposed to be installed as part of the TSF North Cell in 2016 as part of the cover trials. These instruments will monitor the active cover layer, the tailings, below the lakebed into the talik.

- NWR-1 and NWR-2; Thermistors installed along the diversions ditch, at northwest of the North tailings cell, in 2014. The purpose of those thermistors is to monitor the temperature around the TSF and it will also provide a leading indicator of potential seepage.

- SD6-1; Installed in 2014 in a low point at the northeast of the north cell. This will provide a leading indicator of potential seepage towards the Portage RSF.

- TSF-NC-T3; Proposed to be installed as part of the TSF North Cell in 2015 as part of the cover trials. It will monitor the active cover layer, the tailings, and about 50 m below the lakebed into the Talik.

- Other thermistors will be installed inside and around the perimeter of the North Tailing cell in 2016 and further during operations.

8.1.1.2 TSF South Cell

- T147-1; this 57 m depth thermistor was installed in 2012 as part of the groundwater monitoring exploration wells. It replaced T147-2 which was installed in 2010.

- The Central Dike will be fully instrumented during its construction between 2014 and 2016. In 2013 AEM installed 9 thermistors at Central Dike: 750 P1, 650 P1, 580 P1, 545 P1, 650 P2, 545 P2, 875 P3, 650 P3, and 465 P3). CD-US-1 was installed in the upstream Central dike slope in 2014 to monitor the temperature of the tailings. New thermistors were installed on Central Dike in 2015: 595 P1, 810 P1, 825 P1 and 850 P1. In early 2016, CD-US-2 was installed; this thermistor acts as the continuation of CD-US-1 on the upstream slope of Central Dike.

- CD-T1 through CD-T6; these thermistors are proposed to be installed in 2017 or 2018. They will be installed within the tailings in front of Central Dike to monitor the temperature of the tailings and their freeze back.

- SD3-T1, T2, T3, T4; these thermistors are proposed as instrumentation for SD3. Construction is currently scheduled to be completed in 2016 and installation of all thermistors will be done in 2016 and 2017.

- SD5-T1, T2, T3, T4; these thermistors are proposed as instrumentation for SD5. Construction is currently scheduled to be completed in 2016 and installation of all thermistors will be done in 2017.

- SD4-T1, T2, T3, T4; these thermistors are proposed as instrumentation for SD4. Construction is currently to be completed in 2016 and installation of all thermistors will be done in 2016-2017.

- TSF-SC-T1; Location at the toe of Stormwater Dike, installation scheduled in 2016. This would monitor a cross-section of the South Cell, including the active layer through the overburden, about 5-10m depth of till, and 50 m into the talik.

8.1.1.3 Portage RSF

- RSF-1 and RSF 3 to 6; Installed in 2013 inside the perimeter of the RSF. The purpose of those thermistors is to monitor the freezeback of the RSF and validate the cover thickness.

- RSF 7 to 16 were installed in 2015 inside the perimeter of the RSF. The purpose of these thermistors is to monitor the freezeback of the RSF and validate the cover thickness.

- Additional instruments could be installed during operations as part of the as part of cover performance assessment.

8.1.1.4 Vault RSF

- For Vault, the waste rock storage is not expected to be covered, as the waste rock is mainly NAG, and the PAG waste rock is encapsulated in the center of the pile during operation. However, instrumentation will be installed to monitor the thermal behavior of pile.

- Instrumentation planned for the end of operation and closure. Specific locations are still to be determined.

8.1.2 Closure

Final detail design for the TSF cover will be subject to results obtained from the site trials previously discussed as well as from data provided from the Thermal Monitoring Program. The different thermistors installed will serve to monitor the performance of the covers on the Portage RSF, the TSF North Cell and the TSF South Cell and to ensure closure objectives are met. Monitoring of TSF and RSF freezeback during the closure and post-closure phase is a requirement of the Water Licence.

8.2 INSTRUMENT SPECIFICATIONS

Each thermistor to be installed as part of the TMP must comply with the general specifications presented in Table 8.1. Table 8.2 provides details concerning the installations.

Table 8.1: Thermistor Specifications

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

Table 8.2: Existing and Proposed Thermistor Installation Details

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)															
SD1-T2 (90-1)	7215956	637052	2009 (I)	Stage 1 Rockfill and foundation	Installed to 10m below bedrock, 2m spacing	Tailings	140 -110	30		16	0	2	4	6	8	10	12	…	2 m spacing to 30 m							
SD1-T4 (115-1)	7215949	637084	2009 (I)	Stage 1 U/S toe and foundation	Installed to 10m below bedrock, 2m spacing	Tailings	134- 119	15		16	0	1	2	3	4	5	6	…	1 m spacing to 16 m							
SD1-T1 (120-1)	7215978	637014	2010 (I)	Stage 1 & 2 U/S 3:1 slope	Installed to bedrock, at U/S toe of SD1	Tailings	149 -133	16		16	0	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
SD1-T3 (2m-1)	7215949	637084	2010 (I)	Stage 2 Rockfill and foundation	Installed to 10m below bedrock, 2m spacing	Tailings	148 -118	40		16	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
SD2-T2 (40M)	7215399	637267	2010 (I)	Stage 1 Rockfill and foundation	Installed to 10m below bedrock, 2m spacing. Broken.	Tailings	148-118	30		16	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32
SD2-T3 (1m)	7215439	637301	2010 (I)	Stage 2 Rockfill and	Installed to 10m below bedrock, 2m	Tailings	144-129	15		16	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)															
				foundation	spacing																					
SD2-T4 (73-4)	7215542	637175	2010 (I)	Stage 1 U/S toe and foundation	Installed to 10m below bedrock, 2m spacing	Tailings	144-121	23		16	0	1	2	3	4	5	6	7	9	11	13	15	17	19	21	23
T147-2	7215212	637979	2010 (I)	Monitor Talik beneath 2PL	Installed part of G/W monitoring Well investigation	Tailings	119.15	62		16	4	6	8	10	12	14	16	21	26	31	36	41	46	51	56	61
T147-1 (Stormwater Dike1)	7215204	637964	2012(I)	Monitor Talik beneath 2PL	To replace T147-2	Tailings	119.15	62		16	4	6	8	10	12	14	16	21	26	31	36	41	46	51	56	61
T121-1 (RF1-1)	7215643	638268	2012 (I)	Monitor potential seepage through RF1 and foundation to RSF.	Installed on RF1 crest	PAG Rock	150- 90	60		16	7	9	11	13	15	17	19	21	23	25	27	31	35	40	50	60
T73-6 (RF1-2)	7215621	638277	2012(I)	Monitor potential seepage through RF2 and	Installed on RF1 crest	PAG Rock	149.5-133	16.5		16	0	0	0	0	0	0	0	0.5	2.5	4.5	6.5	8.5	10.5	12.5	14.5	16.5

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)															
				foundation to RSF.																						
T122-1 (RF-2)	7216032	638096	2012 (I)	Monitor potential seepage through RF2 and foundation to RSF.	Installed on RF2 crest	PAG Rock	150- 90	60		16	12.4	13.4	14.4	15.4	16.4	17.4	18.4	19.4	21.4	24.4	29.4	34.4	39.4	44.45	49.4	59.4
T90-2 (SD1)	7216002	637113.5	2012 (I)	Monitor Talik beneath 2PL	Former TSF-N-T2 Bead#4 = broken	Tailings	143-131	12		16	0	0	0	0	1	2	3	4	5	6	7	8	9	10	11	12
SD2-T1	7215439	637300	2012 (I)	Stage 2 U/S 3:1 slope	Installed to till plug, at U/S toe of SD2	Tailings	148-145	30		16		0	2	4	6	8	10	12		2 m spacing to 30 m		Installed on slope and in till plug				
750 P1	7214539.4	638679.8	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	115-63	52		13	4	7	10	13	16	19	22	25	28	34	40	46	52			
650 P1	7214639.7	638677.8	2013 (I)	1) Water flow 2) Freeze		PAG-NAG Rock	115-63	52		13	4	7	10	13	16	19	22	25	28	34	40	46	52			

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)												
				back rates																			
580 P1	7214711.5	638681.5	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	115-63	52		13	4	7	10	13	16	19	22	25	28	34	40	46	52
545 P1	7214745.4	638690.9	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	115-63	52		13	4	7	10	13	16	19	22	25	28	34	40	46	52
650 P2	7214636.9	638754.2	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	110-51	59		13	5	8	11	14	17	20	23	29	35	41	47	53	59
545 P2	7214746.6	638753.1	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	112.5-51	61.5		13	7.5	10.5	13.5	16.5	19.5	22.5	25.5	31.5	37.5	43.5	49.5	55.5	61.5
875 P3	7214404.8	638821.5	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	122-51	71		13	17	20	23	26	29	32	35	41	47	53	59	65	71

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)
650 P3	7214675.1	638831.6	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	109.5-51	58.5		13	4.5 7.5 10.5 13.5 16.5 19.5 22.5 28.5 34.5 40.5 46.5 52.5 58.5
465 P3	7214841.6	638852.3	2013 (I)	1) Water flow 2) Freeze back rates		PAG-NAG Rock	138-51	87		13	33 36 39 42 45 48 51 57 63 69 75 81 87
RF1-3 (RF1-3)	7215740	638126	2013 (I)	Monitor potential seepage through RF1 and foundation to RSF.	Installed on RF1 slope	PAG Rock	148.36-144.05	4.3		11	
RSF1	7215831	638129	2013 (I)	1) Potential Seepage from TSF through RF1 2) Freeze back of rockfill		PAG Rock	172.8-123.10	50		13	0 0.2 0.7 1.2 1.7 2.2 2.7 3.7 9.7 19.7 29.7 39.7 49.7
RSF-3 (73-1 &	7215689	638370	2013 (I)	1) Potential Seepage from TSF through RF1		PAG Rock	173.99-128.5	46		16/29	73-1: 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 9.5 11.5 13.5 15.5 17.5 19.5 21.5 23.5

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)
RSF3)				2) Freeze back of rockfill		PAG Rock				13/29	RSF3: 23.5 25.5 27.5 29.5 33.5 35.5 37.5 38.5 39.5 40.5 41.5 43.5 45.5
RSF-4 (248 & RSF4)	7215892	638675	2013 (I)	1) Potential Seepage from TSF through RF1 2) Freeze back of rockfill		PAG Rock	210.21-131	79		16/29	248: 2.5 3.5 4.5 5.5 6.5 7.5 8.5 10.5 12.5 15.5 20.5 25.5 30.5 35.5 40.5 50.5
						PAG Rock				13/29	RSF4: 60.5 62.5 64.5 66.5 68.5 70.5 72.5 73.5 74.5 75.5 76.5 77.5 79.5
RSF-5 (RSF2 & RSF5)	7216014	638630	2013 (I)	1) Potential Seepage from TSF through RF1 2) Freeze back of rockfill		PAG Rock	193.02-131	62		13/26	RSF2: 0.5 1 1.5 2 2.5 3 3.5 4.5 10.5 20.5 30.5 40.5 50.5
						PAG Rock				13/26	RSF5: 43.5 45.5 47.5 49.5 51.5 52.5 53.5 54.5 55.5 56.5 58.5 60.5 62.5
RSF-6 (169 & RSF6)	7215647	638845	2013 (I)	1) Potential Seepage from TSF through RF1 2) Freeze		PAG Rock	197.79-127.8	70		16/29	169 : 0.5 1.5 2.5 3.5 4.5 5.5 6.5 7.5 8.5 9.5 10.5 11.5 13.5 15.5 17.5 19.5

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)
				back of rockfill		PAG Rock				13/29	RSF6: 30 40 50 52 54 56 58 60 62 64 66 68 70
SWD-1	7215482	638006	2014 (I)	Monitor Talik beneath TSF	Broken	Tailings	147-117	30		13	0 1 2 3 4 6 8 10 14 18 22 26 30
SD2-1	7215577	637350	2014 (I)	Monitor Talik beneath TSF	Broken	Tailings	147-129	18		13	0 1 2 3 4 5 6 8 10 12 14 16 18
NWR1	7216384	637298	2014 (I)	Monitor Temperature around TSF	The beads #6 and 8 to 13 do not work.	Diversion ditches	151.5-157.5	7		13	0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 6 7
NWR2	7216710	637275	2014 (I)	Monitor Temperature around TSF	The beads #1 and 5 to13 do not work.	Diversion ditches	151-158	7		13	0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 6 7
SD6-1	7216710	638131	2014 (I)	Monitor Temperature around TSF (low point)	The beads #9, 10, 11, 12 and 13 do not work.	PAG-NAG Rock	150.5-157.5	7		13	0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 6 7
CD-US-1 (122.5)	7214639	638626	2014 (I)	Upstream slope (Tailing)	Installed on Central Dike slope	Tailings	126.4-111.1	15/52.5	70	16	0 3.5 7 10.5 14 17.5 21 24.5 28 31.5 35 38.5 42 45.5 49 52.5

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)									
RSF-7	7216039	638153	2015 (I)	Monitor Temperature of the RSF		PAG Rock	172.5-168	4.5		10	0.9	1.4	1.9	2.4	2.9	3.4	3.9	4.4	4.9	5.4
RSF-8	7216038	638156	2015 (I)	Monitor Temperature of the RSF		PAG Rock	172.9-163.9	9		10	0.9	1.9	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9
RSF-9	7215707	638290	2015 (I)	Monitor Temperature of the RSF		PAG Rock	170.6-166.1	4.5		10	0.7	1.2	1.7	2.2	2.7	3.2	3.7	4.2	4.7	5.2
RSF-10	7215711	638293	2015 (I)	Monitor Temperature of the RSF		PAG Rock	171.1-162.1	9		10	0.7	1.7	2.7	3.7	4.7	5.7	6.7	7.7	8.7	9.7
RSF-11	7215787	639071	2015 (I)	Monitor Temperature of the RSF		PAG Rock	192.3-187.8	4.5		10	0.8	1.3	1.8	2.3	2.8	3.3	3.8	4.3	4.8	5.3
RSF-12	7215791	639066	2015 (I)	Monitor Temperature of the RSF		PAG Rock	192.9-183.9	9		10	0.6	1.6	2.6	3.6	4.6	5.6	6.6	7.6	8.6	9.6
RSF-13	7215943	638916	2015 (I)	Monitor Temperature of the RSF		PAG Rock	190.8-186.3	4.5		10	0.9	1.4	1.9	2.4	2.9	3.4	3.9	4.4	4.9	5.4

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)															
RSF-14	7215939	638917	2015 (I)	Monitor Temperature of the RSF		PAG Rock	190.9-181.9	9		10	0.9	1.9	2.9	3.9	4.9	5.9	6.9	7.9	8.9	9.9						
RSF-15	7216038	638612	2015 (I)	Monitor Temperature of the RSF		PAG Rock	191.4-186.9	4.5		10	0.7	1.2	1.7	2.2	2.7	3.2	3.7	4.2	4.7	5.2						
RSF-16	7216033	638610	2015 (I)	Monitor Temperature of the RSF		PAG Rock	191.6-182.6	9		10	0.8	1.8	2.8	3.8	4.8	5.8	6.8	7.8	8.8	9.8						
595 P1	7214699	638697	2015 (I)	Monitor the Central Dike Seepage		RF/Till/Bedrock	114.5-69.5	45		16	0	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
810 P1	7214478	638659	2015 (I)	Monitor the Central Dike Seepage		RF/Till/Bedrock	135-75	60		16	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
825 P1	7214464	638660	2015 (I)	Monitor the Central Dike Seepage		RF/Till/Bedrock	131-71	60		16	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
850 P1	7214440	638660	2015 (I)	Monitor the Central Dike Seepage		RF/Bedrock	133-73	60		16	0	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)
CD-US-2 (67.5)	7214649	638626	2016 (I)	Upstream slope (Tailing)	Installed on Central Dike slope	Tailings	137-127	52.5	15	16	0 3.5 7 10.5 14 17.5 21 24.5 28 31.5 35 38.5 42 45.5 49 52.5
TSF-NC-T1	7215570	637830	2016 (P)	Monitor Talik beneath TSF		Tailings	147-117	30	300	13	0 1 2 3 4 6 8 10 14 18 22 26 30
TSF-NC-T2	7215740	637350	2016 (P)	Monitor Talik beneath TSF		Tailings	147-129	18	200	13	0 1 2 3 4 5 6 8 10 12 14 16 18
SD3-T1	7215196	637480	2016 (P)	Stage 1 & 2 U/S 3:1 slope	Install to bedrock, at U/S toe of SD3	Tailings	150-	~45		~9	0 5 10 20 25 30 35 …
SD3-T2	7215196	637480	2016 (P)	Stage 1 Rockfill and foundation	Installed to 10m below bedrock, 2m spacing	Tailings	145				0 2 4 6 8 10 12 …
SD3-T3	7215196	637480	2016 (P)	Stage 2 Rockfill and foundation	Installed to 10m below bedrock, 2m spacing		150				0 2 4 6 8 10 12 …
SD3-T4	7215196	637480	2016 (P)	Stage 1 U/S toe and foundation	Installed to 10m below bedrock, 2m spacing	Tailings	138				0 2 4 6 8 10 12 …

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)															
TSF-SC-T1	7214755	638435	2016 (P)	1) Monitor overburden 2) Monitor talik	Installed at the toe of SWD. Location to be determined, node locations to be reviewed upon cover design.	Tailings	125-35	90		16	0	1	1	2	2	2.5	3	5	10	20	35	50	55	60	75	90
RSF-T3	7215868	638532	2018 (P)	1) Potential Seepage from TSF through RF1 2) freeze back of rockfill 3) RSF Cover Trial		PAG Rock	240-120	120		16	0	1	2	3	4	6	75	85	95	98	101	104	107	110	113	120
TSF-NC-T3	7215715	637746	2018 (P)	1) Monitor freeze back of cover and tailings 2) Monitor talik	Install on tailings cover. Location tbd, node locations to be reviewed upon cover design.	Tailings	145-75	70		14	0	1	1	2	2	2.5	3	5	10	20	25	30	50	70		

Name	Northing	Easting	Year Installed (I) or Planned (P)	Purpose	Notes	Special Environmental Conditions	Top - Bot Elevation	Depth/ Length	Lead Length	Nodes	NODE DEPTHS (m)
CD-T1	7215089.51	638657.24	2018 (P)	U/S – Freeze back of tailings		Tailings	143-103			21	0 5 10 15 20 25 30 … 100
CD-T2	7215089.51	638673.51	2018 (P)	Rockfill and foundation		PAG-NAG Rock	143-79			32	0 2 4 6 8 10 12 … 62
CD-T3	7214689.51	638657.24	2018 (P)	U/S – Freeze back of tailings		Tailings	143-103			21	0 5 10 15 20 25 30 … 100
CD-T4	7214689.51	638673.51	2018 (P)	Rockfill and foundation		PAG-NAG Rock	143-86			32	0 2 4 6 8 10 12 … 62
CD-T5	7214439.51	638657.24	2018 (P)	U/S – Freeze back of tailings		Tailings	143-103			21	0 5 10 15 20 25 30 … 100
CD-T6	7214439.51	638673.51	2018 (P)	Rockfill and foundation		PAG-NAG Rock	143-81			32	0 2 4 6 8 10 12 … 62

SECTION 9 • MONITORING AND CLOSURE

Mine closure and reclamation will utilize currently 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.

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. For the Portage waste rock storage, the current plan considers a 4m cover of NAG rock placed over PAG waste rock piles. The majority of the Portage RSF is currently covered with NAG material. For Vault, the waste rock storage is not expected to be covered, as the waste rock is mainly NAG, and the PAG waste rock is encapsulated in the center of the pile during operation.

As explained in section 7.3 of the report, the design of the tailings cover for the North Cell was completed in 2015. A research project for the TSF cover has been in progress at Meadowbank since 2014, in collaboration with the Research Institute Mines and Environment (RIME). Additional trials tests and studies on the TSF NAG capping are in progress and in-situ trials have been in place since 2014 in the North Cell TSF to determine the effectiveness of different cover thicknesses and designs. These trials were considered in the design of the TSF North Cell cover prepared by O'Kane. Additional monitoring instruments are planned to be installed on the TSF cover and tailings in 2016 and further during operations. The results of the instruments and field trials will support the work on the TSF cover design. The design of the cover for the TSF South Cell will be undertaken in 2016.

For the rock storage facility in Portage, geotechnical instruments are in place to assess the PRSF freezeback and the performance of the NAG cover. Additional monitoring instruments were installed at the end of 2015, and additional instruments are also planned to be installed in the next years. Instruments will also be installed in the Vault waste rock storage. The surfaces of the Portage and Vault RSFs will be contoured where required to direct drainage respectively to the TSF (see Figure 9.2) and towards Vault Pit (See Figure 9.3). Note that Figure 9.2 Section A is conceptual and does not represent the design of the TSF North Cell cover completed in 2015. Monitoring of the runoff water from the Vault and Portage RSFs will be monitored at closure.

The Reclaim Pond will remain in place in the South Tailings Cell until mining and milling has been completed. Once milling has been completed, the South Cell reclaim water will be drained from the TSF and treated, if necessary, prior to discharge to the Portage pit or in situ in the Portage pit.

All infrastructure associated with these 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 one year prior to the end of mining operations in accordance with the Water License.

Figure 9-1: Site Post Closure Concept

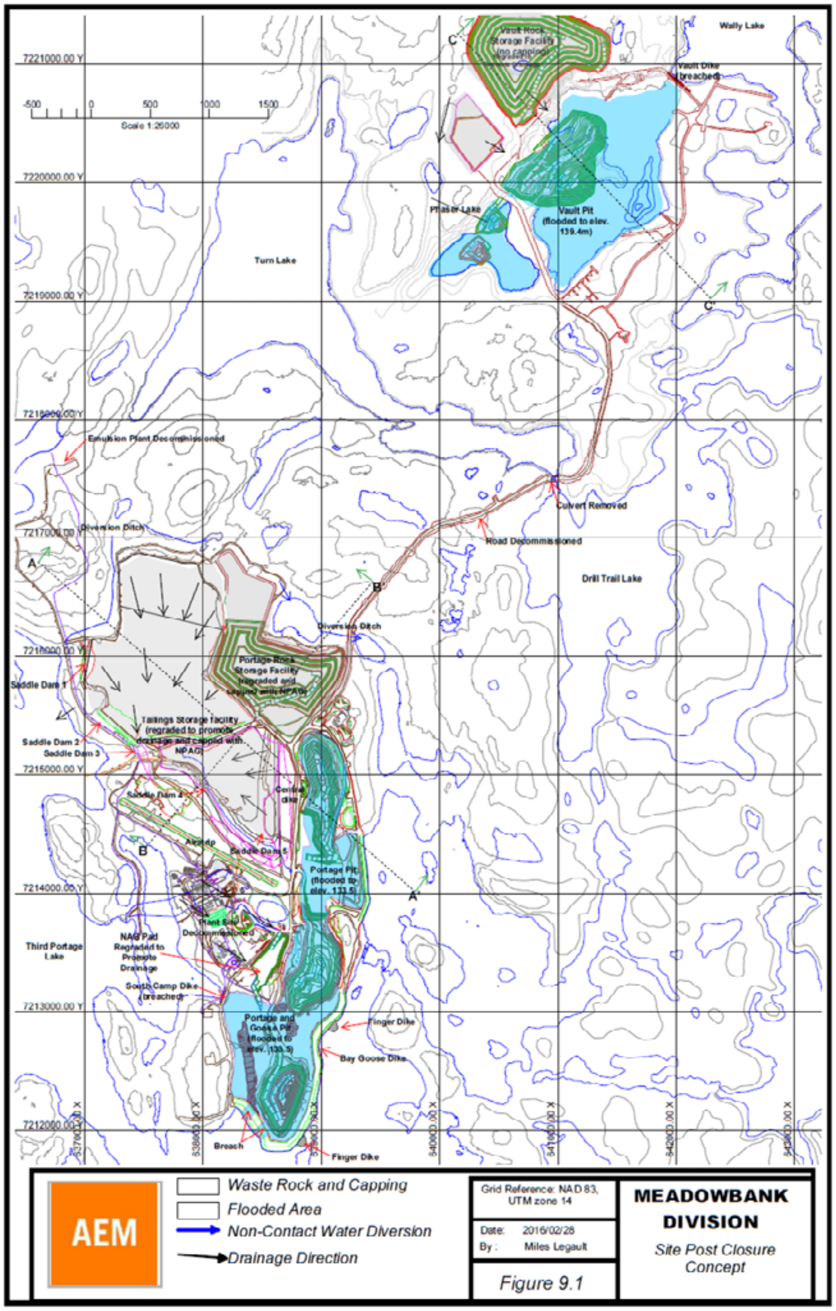
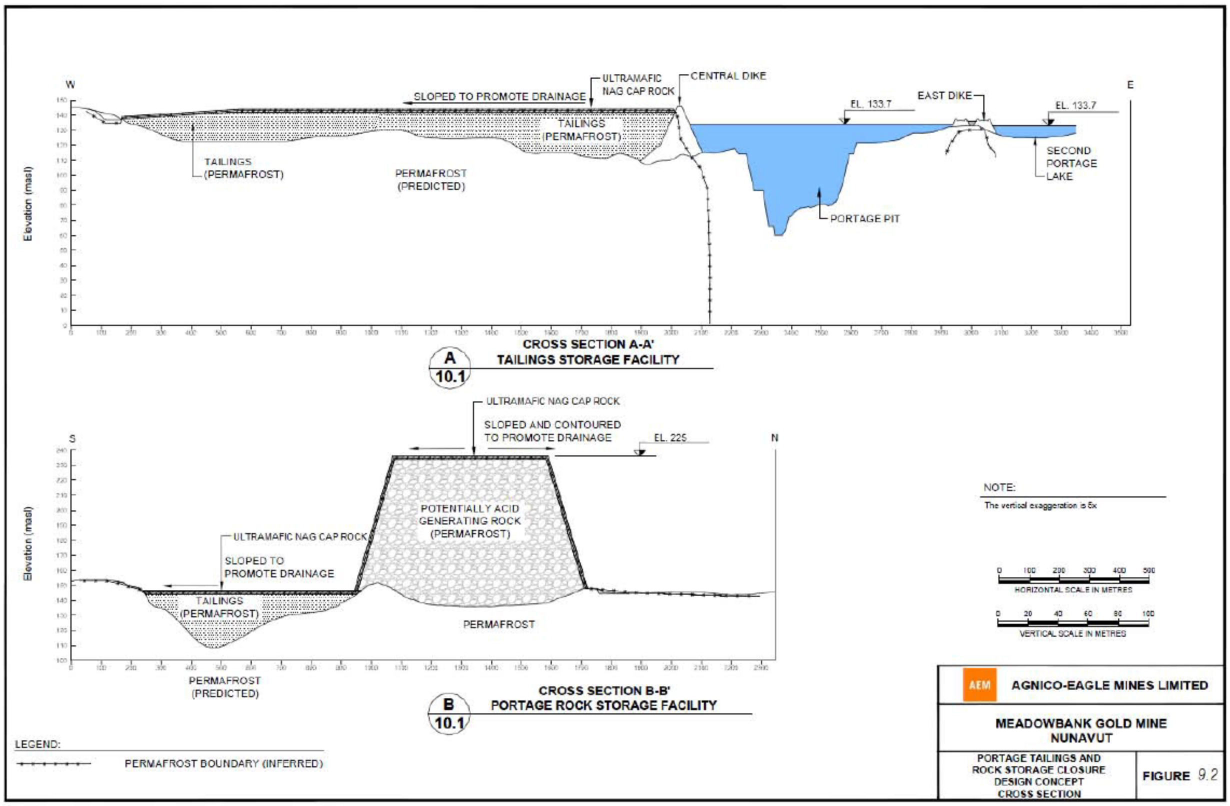
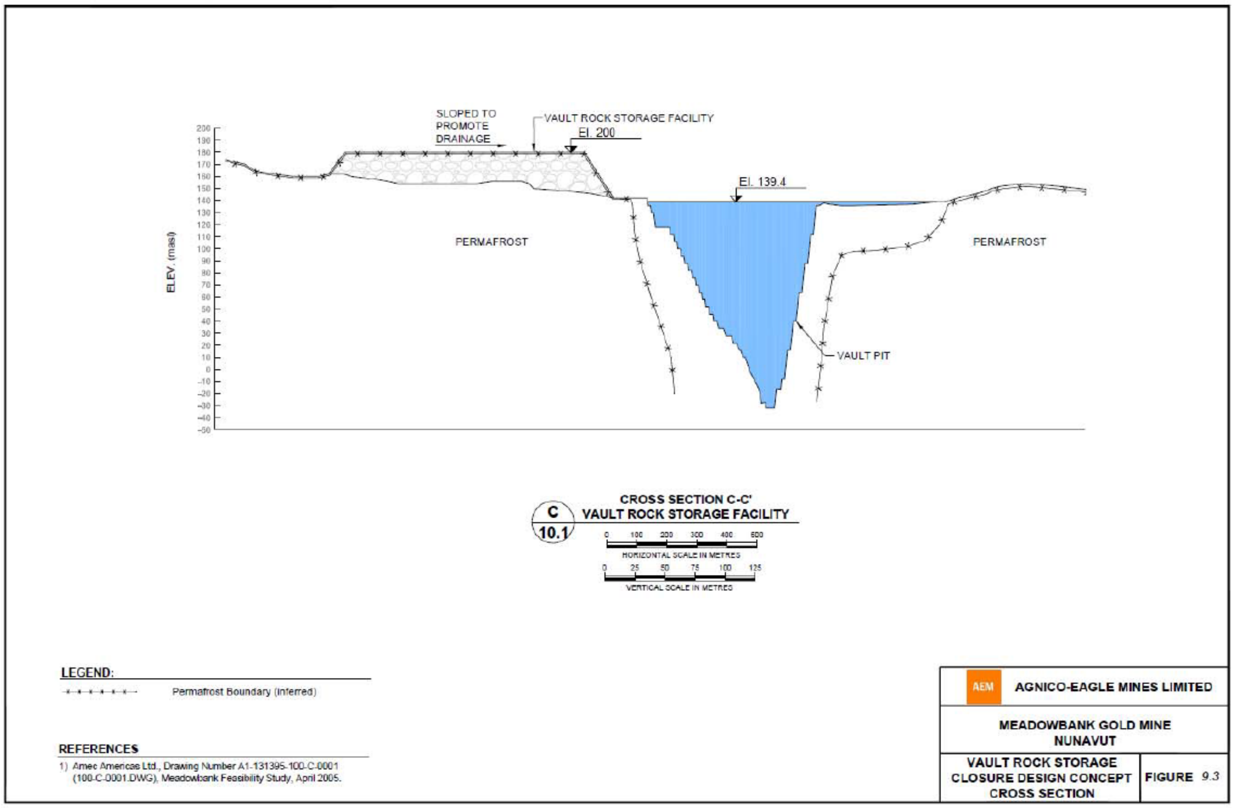


Figure 9-2: Portage Tailings and Rock Storage Closure Design Concept Cross Section



Note: Figure 9.2 Section A is conceptual and does not represent the design of the TSF North Cell cover completed in 2015

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



SECTION 10 • REFERENCES

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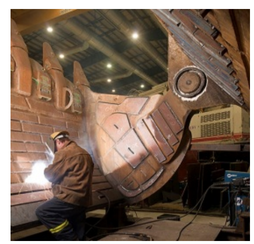
Supporting LOM files location: N:\20 - PLANNING\03 - Budget\2016 Budget\Official Version

Appendix 1. TSF Integrated Deposition Plan

MEADOWBANK

INTEGRATED TAILINGS DEPOSITION PLAN

JANUARY 2016



Introduction

This report presents the updated tailings deposition strategy until the end of the life of mine. This update is reconciliation with the 2014 integrated deposition plan and the observation and data collected during the last year.

Assumptions

- Using *Water Balance Dec 2015 – SNC WQA v3 with Budget2016_V00*
- Starting surfaces:
  - South Cell: December 2015 backtrack analysis
- Base on tonnage profile of the BUD2016_V00

Parameters

The model inputs are to one measured with the July 2015 South Cell bathymetry analysis combine with the one from the North Cell bathymetry analysis of 2014. The objective is to represent as much as possible the finale surface of the South Cell at closure.

From 2015 to 2017Q3

- Sub aerial tailings slope set at 1.1%;
- Sub aqueous tailings slope set at 3.6%;

From 2017Q4 to 2018

- Sub aerial tailings slope set at 0.45%;
- Sub aqueous tailings slope set at 2.36%;

Same sequencing was done for the tailings dry density & ice entrapment. These parameters are presented on next slide.

Model parameters

AEM observed an higher tailings dry density than expected in the South Cell during winter 2014-2015. Following the analysis of the parameter completed this fall, adjustment on the tailings dry density in time was done. This new model represents the evolution of this parameter in function of the tailings pond configuration.

Month	Ice Thickness (m)	South Cell Parameters 2015-2017Q3		South Cell Parameters 2017Q4-2018	
		Tailings Dry Density (t/m^3)	Ice entrapment (%)	Tailings Dry Density (t/m^3)	Ice entrapment (%)
January	1.1	1.22	50%	1.08	90%
February	1.3	1.22	50%	1.08	90%
March	1.5	1.22	50%	1.08	90%
Q1	**1.5**	**1.22**	**50%**	**1.08**	**90%**
April	1.7	1.49	50%	1.08	90%
May	0	1.49	40%	1.32	60%
June	0	1.49	30%	1.56	30%
Q2	**0**	**1.49**	**40%**	**1.32**	**60%**
July	0	1.76	30%	1.56	30%
August	0	1.76	30%	1.56	30%
September	0	1.76	30%	1.56	30%
Q3	**0**	**1.76**	**30%**	**1.56**	**30%**
October	0.2	1.31	40%	1.32	75%
November	0.5	1.31	50%	1.08	80%
December	0.8	1.31	50%	1.08	90%
Q4	**0.8**	**1.31**	**47%**	**1.16**	**82%**
Average	-	**1.45**	**42%**	**1.28**	**65%**

Deposition strategy

The steeper beach angle give new opportunity for the South Cell tailings deposition plan. In order to evaluated these ones, new elements was included in this model as:

- Diversion ditches water is pumped back into the South Cell until the end of 2017;
- Increase total water volume in the reclaim pond to mitigate effect of slurry channel during winter time.

Diverison ditches:

As the status of the diversion ditches discharge into the 3rd Portage Lake is unknown until next freshet and water quality analysis, the water volume pumped last year has been applied for the next two years. That planning give more flexibility for the reclaim pond management and reduce the total freshwater required. However more pumping time is needed if the ditches water need to be transfers in the TSF.

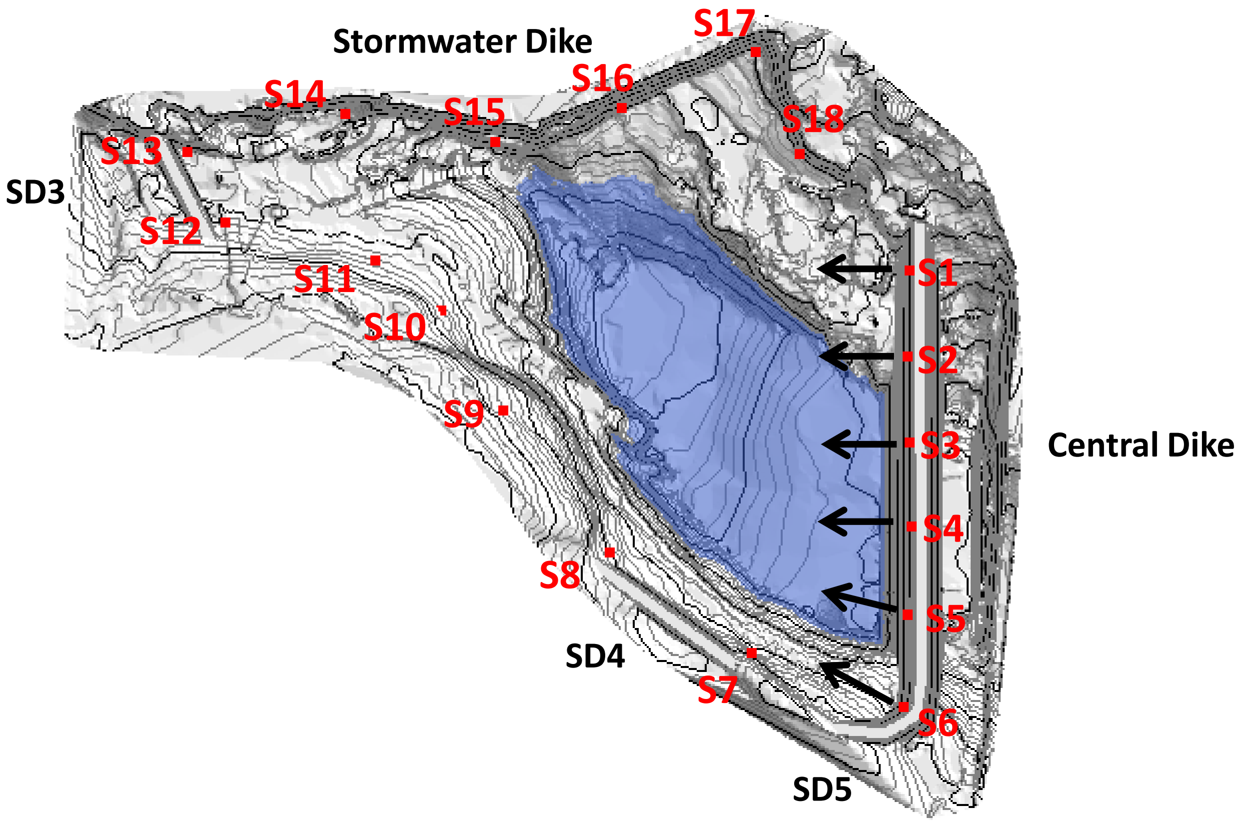
Slurry channel

During winter time, AEM observe slurry channeling over the frozen tailings beach instead of beaching in front of the discharge point. That phenomenon could compromise the reclaim water system operation as observed in 2013 when AEM need to stop the reclaim barge and run the mill on freshwater during more than 2 months. To mitigate that risk, the free water volume is always a least two time bigger than the tailings volume above water into this deposition plan. Note that this strategy put more pressure on the Central Dike liner protection and the water treatment required at closure.

Deposition strategy

South Cell TSF

The figure below on the right depicts the geometry of the South Cell before resuming the deposition in October 2015. All structures (Central Dike, SD3, 4 & 5 and Stormwater Dike) will be at elevation 143masl. Most of the deposition will occur from the Central Dike in order to reclaim water from the west end of the TSF.

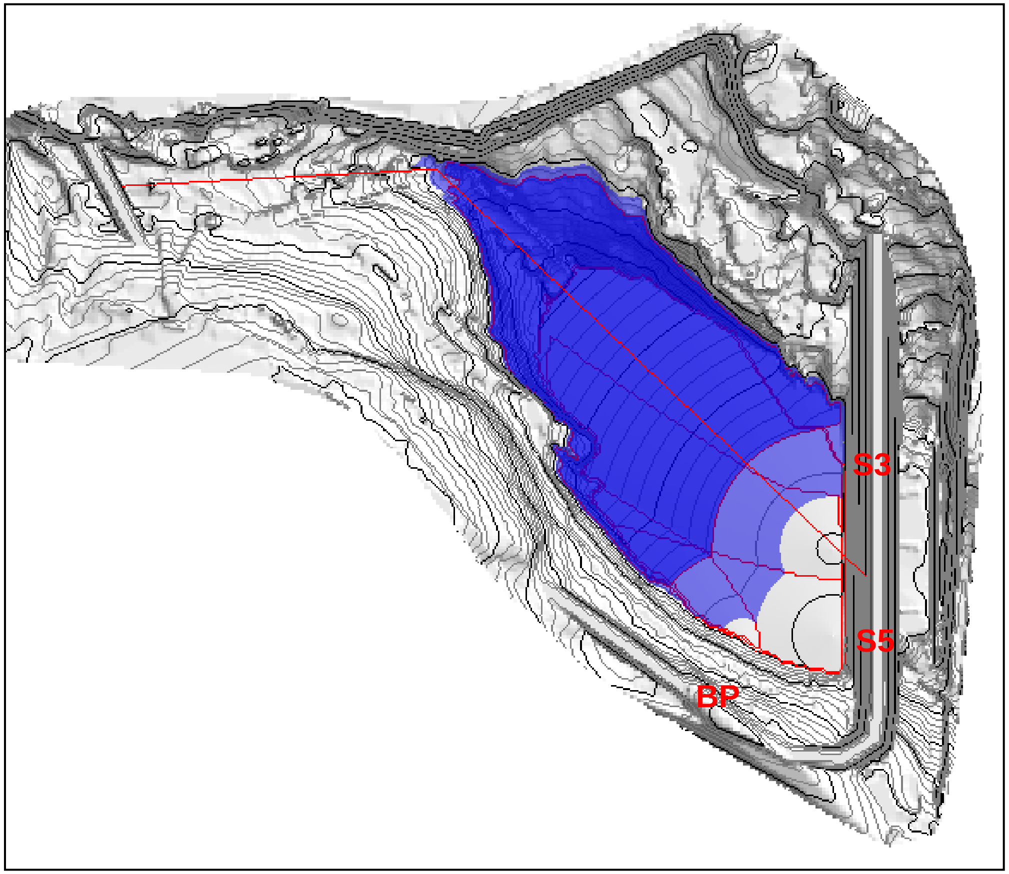


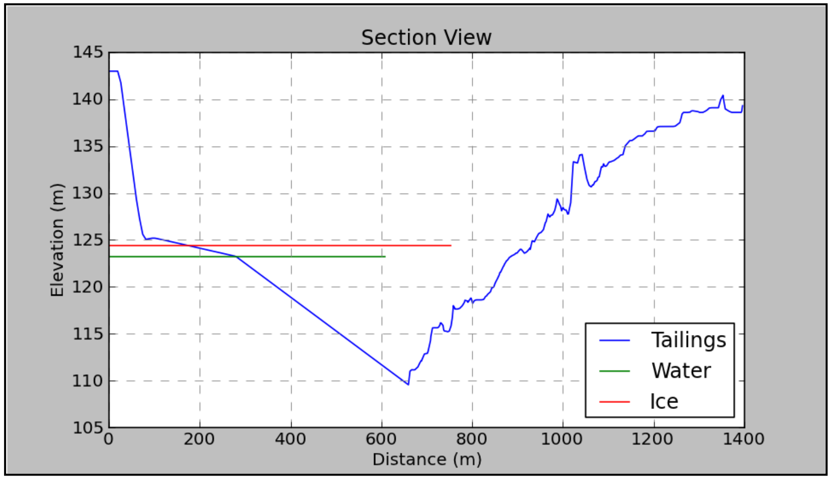
South Cell TSF deposition plan January 2016

Duration	Deposition Point	Tonnes	Elevation (m)
15	S3	172,316	125.666
15	S5	172,560	125.257
1	BP	11,483	124.768

MODEL INPUT	
Pond Volume (m3)	1,196,858
Ice thickness (m)	1.10
Tonnes (t)	356,345

MODEL OUTPUT	
Total water volume (m³)	1,196,858
Free water volume (m³)	969,895
Ice volume (m³)	226,963
Pond elevation (m)	124,389
Free water elevation (m)	123,256
Pond bottom elevation (m)	109,150
Ice ratio (%)	19%
Ice entrampment (%)	50%
Transfer (m³)	0



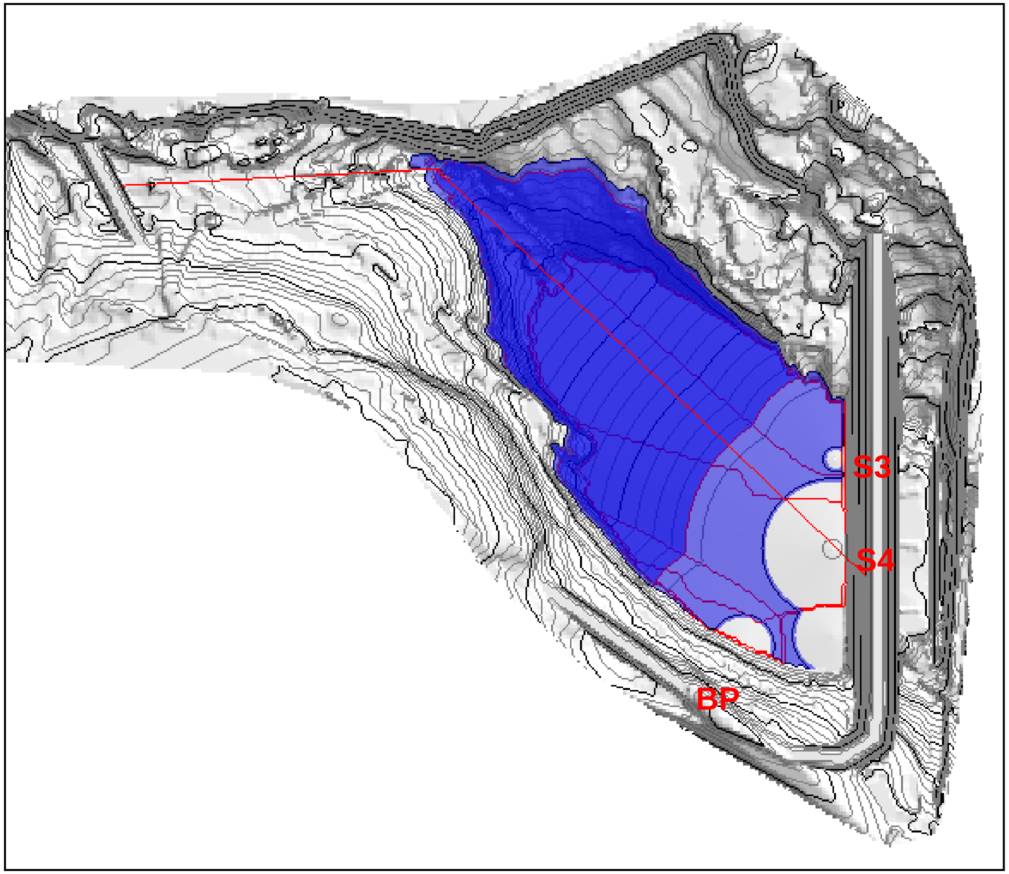


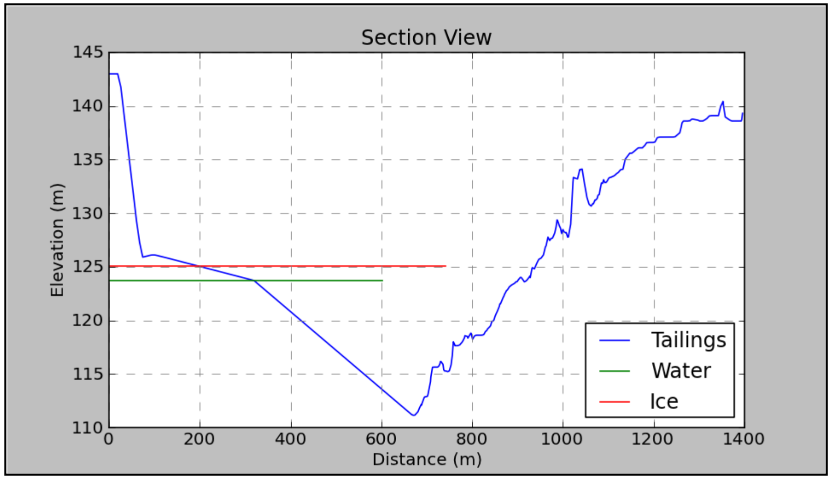
South Cell TSF deposition plan February 2016

Duration	Deposition Point	Tonnes	Elevation (m)
15	S3	172,003	125.209
13	S4	149,149	126.163
1	BP	11,456	125.525

MODEL INPUT	
Pond Volume (m3)	1,090,217
Ice thickness (m)	1.30
Tonnes (t)	332,688

MODEL OUTPUT	
Total water volume (m^3)	1,090,217
Free water volume (m^3)	832,525
Ice volume (m^3)	257,692
Pond elevation (m)	125.053
Free water elevation (m)	123.723
Pond bottom elevation (m)	110.230
Ice ratio (%)	24%
Ice entrampment (%)	50%
Transfer (m^3)	0



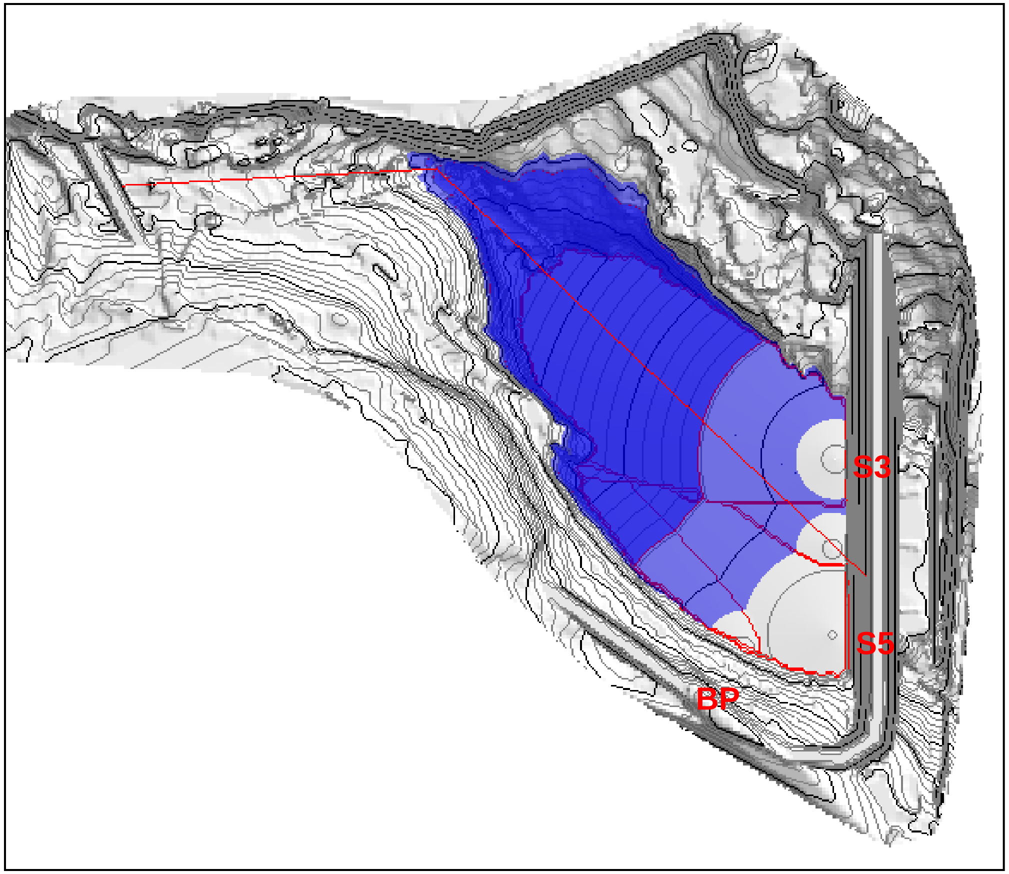


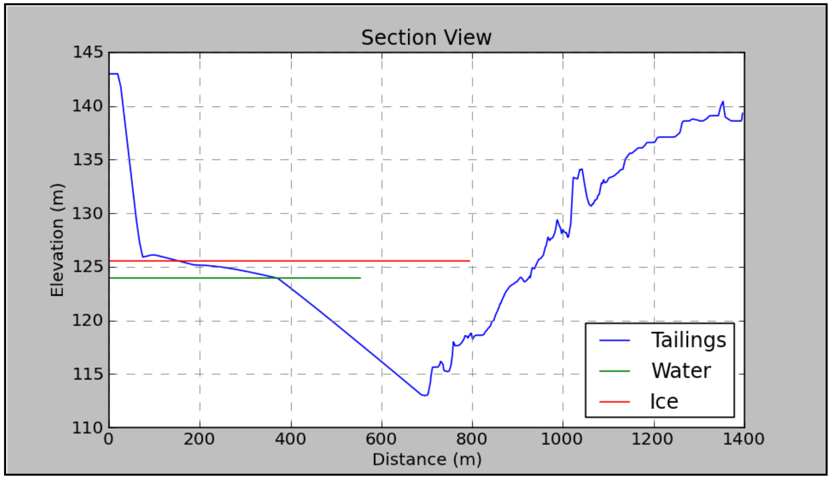
South Cell TSF deposition plan
March 2016

Duration	Deposition Point	Tonnes	Elevation (m)
25	S3	254,881	126.231
5	S5	50,954	127.069
1	BP	10,198	126.199

MODEL INPUT	
Pond Volume (m3)	663,053
Ice thickness (m)	1.60
Tonnes (t)	315,735

MODEL OUTPUT	
Total water volume (m³)	975,078
Free water volume (m³)	670,122
Ice volume (m³)	304,956
Pond elevation (m)	125.569
Free water elevation (m)	123.937
Pond bottom elevation (m)	112.247
Ice ratio (%)	31%
Ice entrapment (%)	50%
Transfer (m³)	0



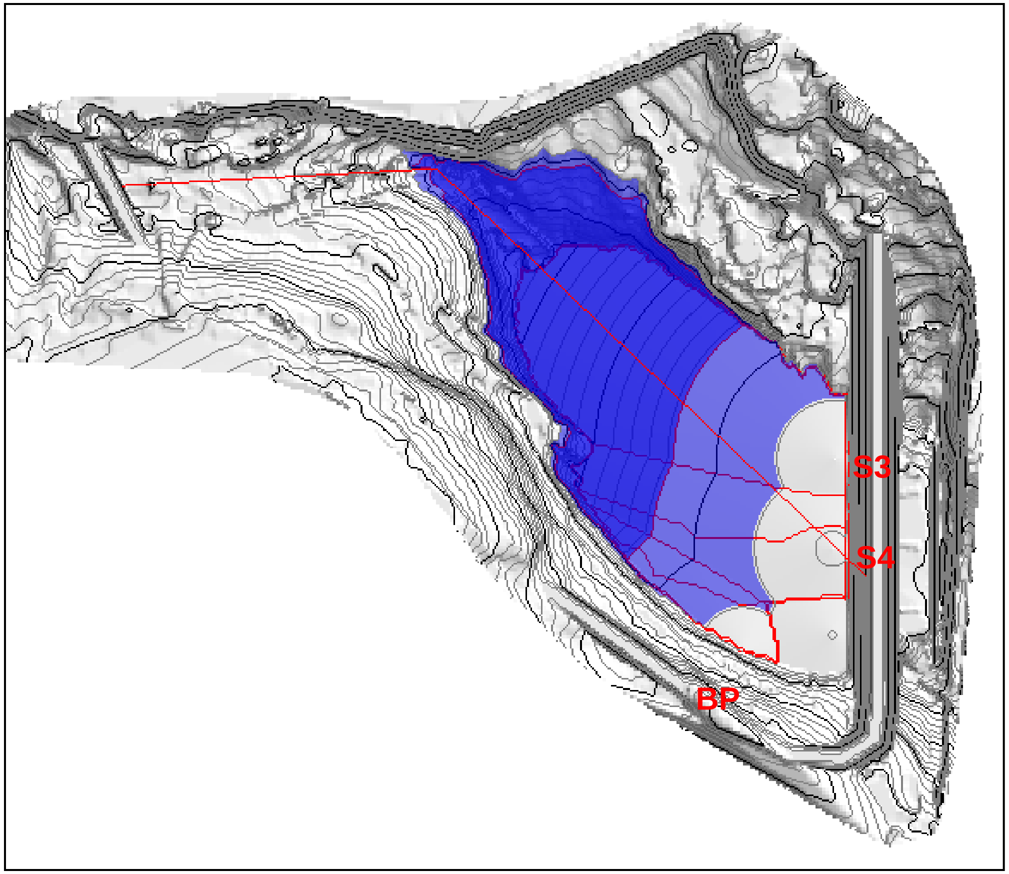


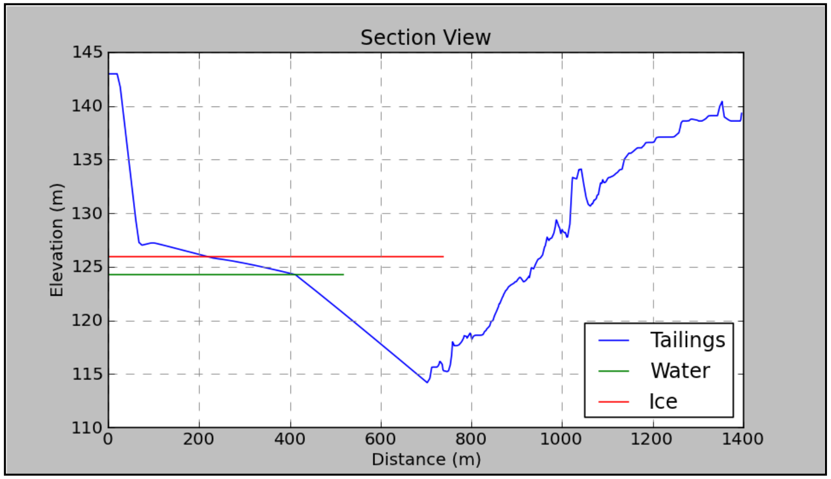
South Cell TSF deposition plan
April 2016

Duration	Deposition Point	Tonnes	Elevation (m)
25	S3	265,469	126.971
5	S4	55,225	127.284
1	BP	11,049	126.710

MODEL INPUT	
Pond Volume (m3)	863,882
Ice thickness (m)	1.70
Tonnes (t)	331,743

MODEL OUTPUT	
Total water volume (m³)	863,882
Free water volume (m³)	569,374
Ice volume (m³)	294,508
Pond elevation (m)	125.959
Free water elevation (m)	124.277
Pond bottom elevation (m)	113.309
Ice ratio (%)	34%
Ice entrampment (%)	50%
Transfer (m³)	0



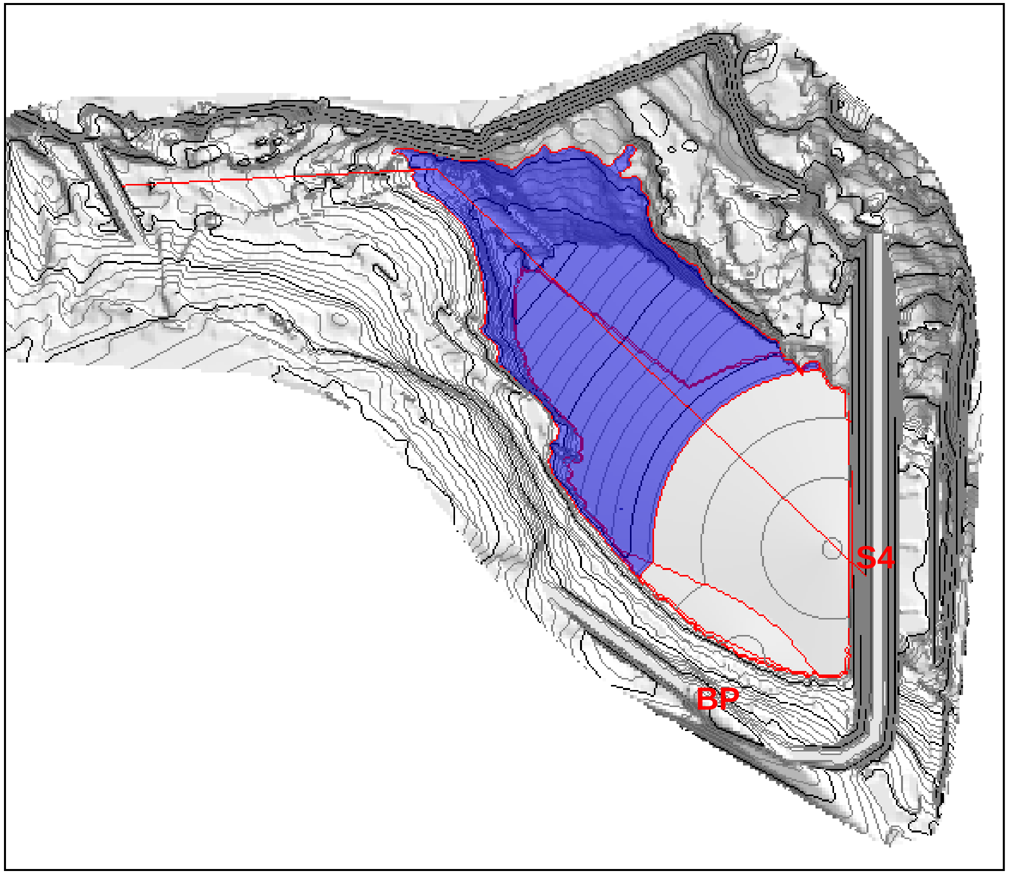


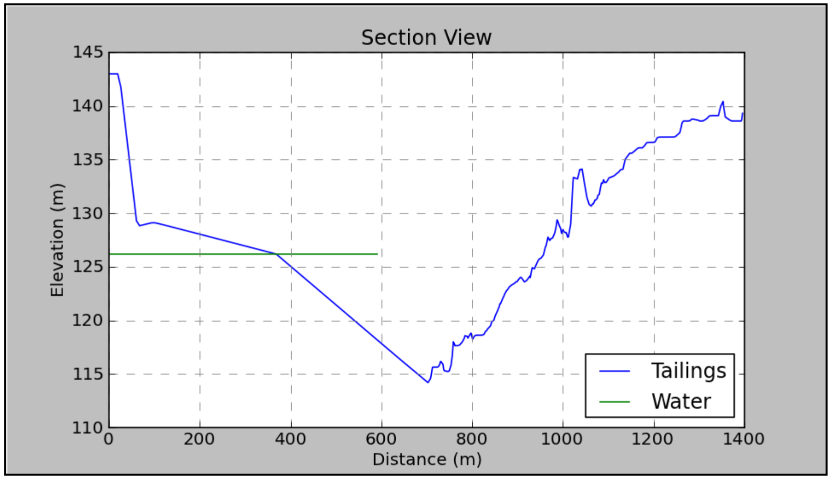
South Cell TSF deposition plan
May 2016

Duration	Deposition Point	Tonnes	Elevation (m)
30	S4	336,678	129.168
1	BP	11,236	128.355

MODEL INPUT	
Pond Volume (m3)	802,734
Ice thickness (m)	0.00
Tonnes (t)	348,719

MODEL OUTPUT	
Total water volume (m³)	800,270
Free water volume (m³)	800,270
Ice volume (m³)	0
Pond elevation (m)	126.190
Free water elevation (m)	126.190
Pond bottom elevation (m)	113.391
Ice ratio (%)	0%
Ice entrampment (%)	40%
Transfer (m³)	0



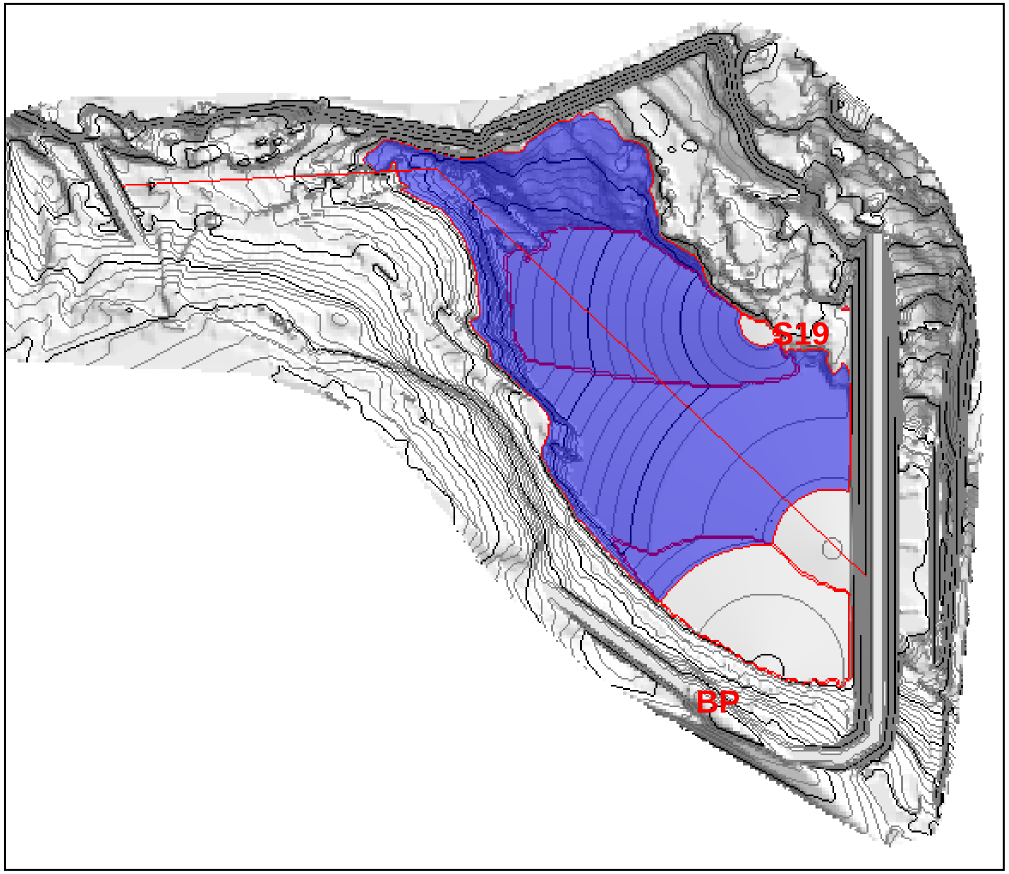


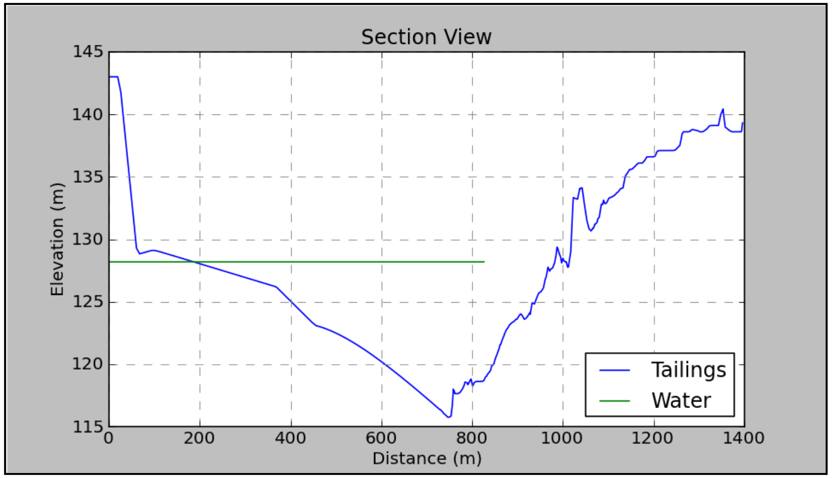
South Cell TSF deposition plan
June 2016

Duration	Deposition Point	Tonnes	Elevation (m)
8	BP	83,764	130.279
22	S19	231,868	128.569

MODEL INPUT	
Pond Volume (m3)	1,070,188
Ice thickness (m)	0.00
Tonnes (t)	315,480

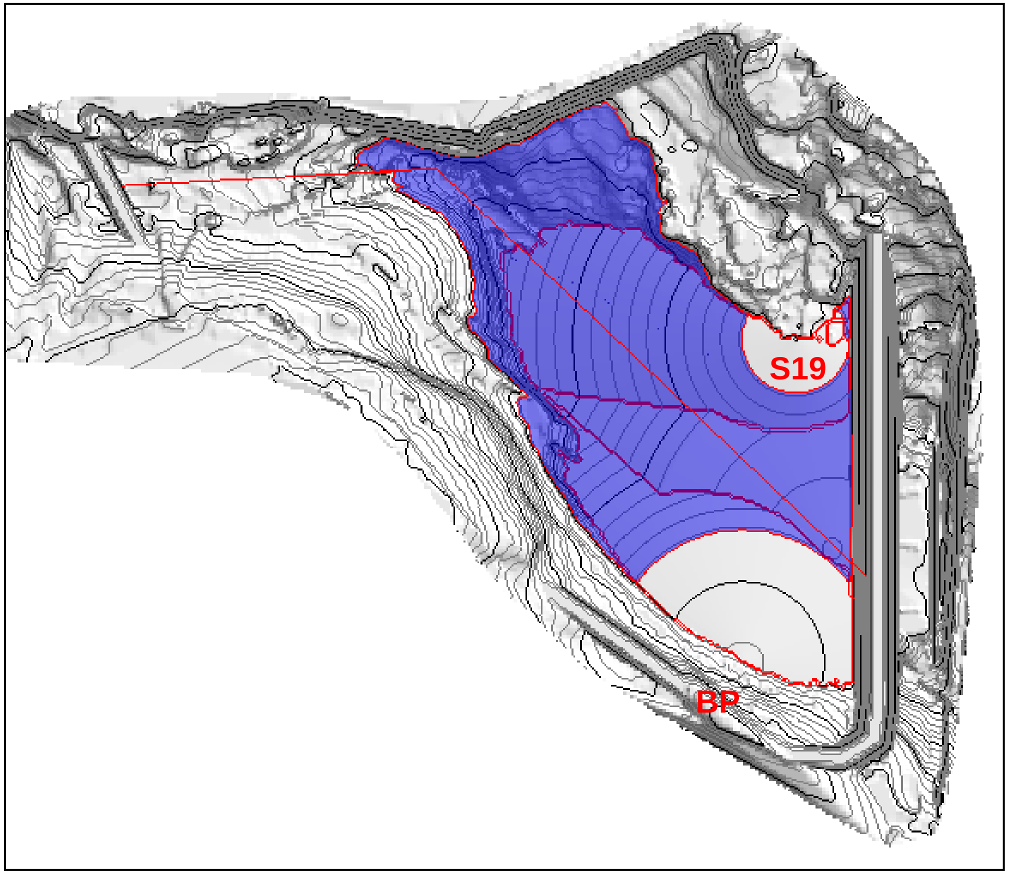
MODEL OUTPUT	
Total water volume (m³)	1,065,711
Free water volume (m³)	1,065,711
Ice volume (m³)	0
Pond elevation (m)	128.182
Free water elevation (m)	128.182
Pond bottom elevation (m)	115.126
Ice ratio (%)	0%
Ice entrapment (%)	30%
Transfer (m³)	0





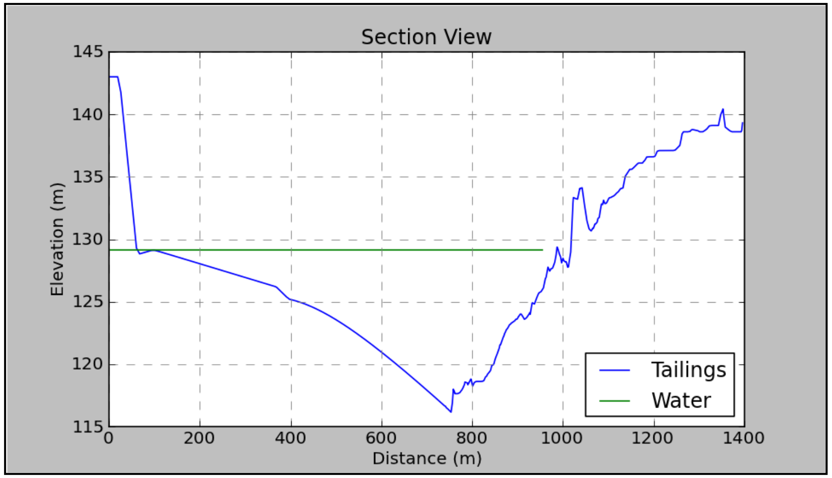
South Cell TSF deposition plan July 2016

Duration	Deposition Point	Tonnes	Elevation (m)
15	BP	165,915	131.349
16	S19	177,352	130.037



MODEL INPUT	
Pond Volume (m3)	1,175,775
Ice thickness (m)	0.00
Tonnes (t)	342,922

MODEL OUTPUT	
Total water volume (m³)	1,172,687
Free water volume (m³)	1,172,687
Ice volume (m³)	0
Pond elevation (m)	129.142
Free water elevation (m)	129.142
Pond bottom elevation (m)	115.551
Ice ratio (%)	0%
Ice entrampment (%)	30%
Transfer (m³)	0

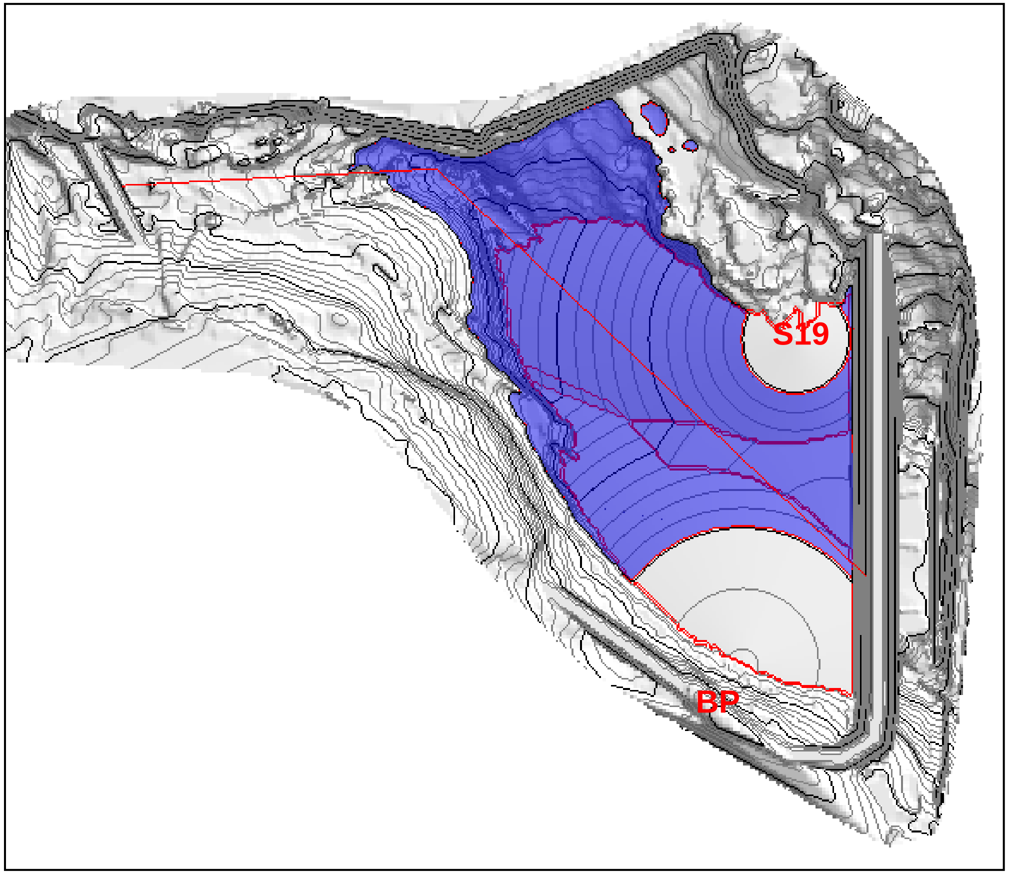


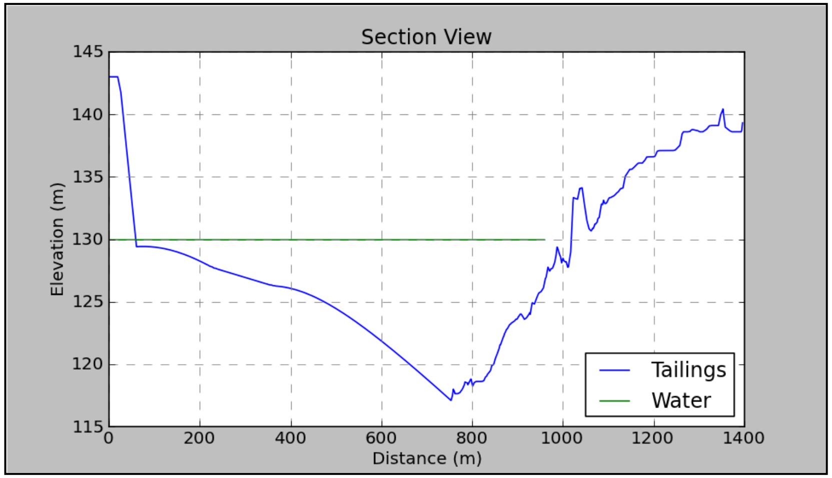
South Cell TSF deposition plan August 2016

Duration	Deposition Point	Tonnes	Elevation (m)
15	BP	162,879	132.260
16	S19	173,680	130.872

MODEL INPUT	
Pond Volume (m3)	1,251,372
Ice thickness (m)	0.00
Tonnes (t)	336,288

MODEL OUTPUT	
Total water volume (m³)	1,250,735
Free water volume (m³)	1,250,735
Ice volume (m³)	0
Pond elevation (m)	129.955
Free water elevation (m)	129.955
Pond bottom elevation (m)	116.047
Ice ratio (%)	0%
Ice entrapment (%)	30%
Transfer (m³)	0



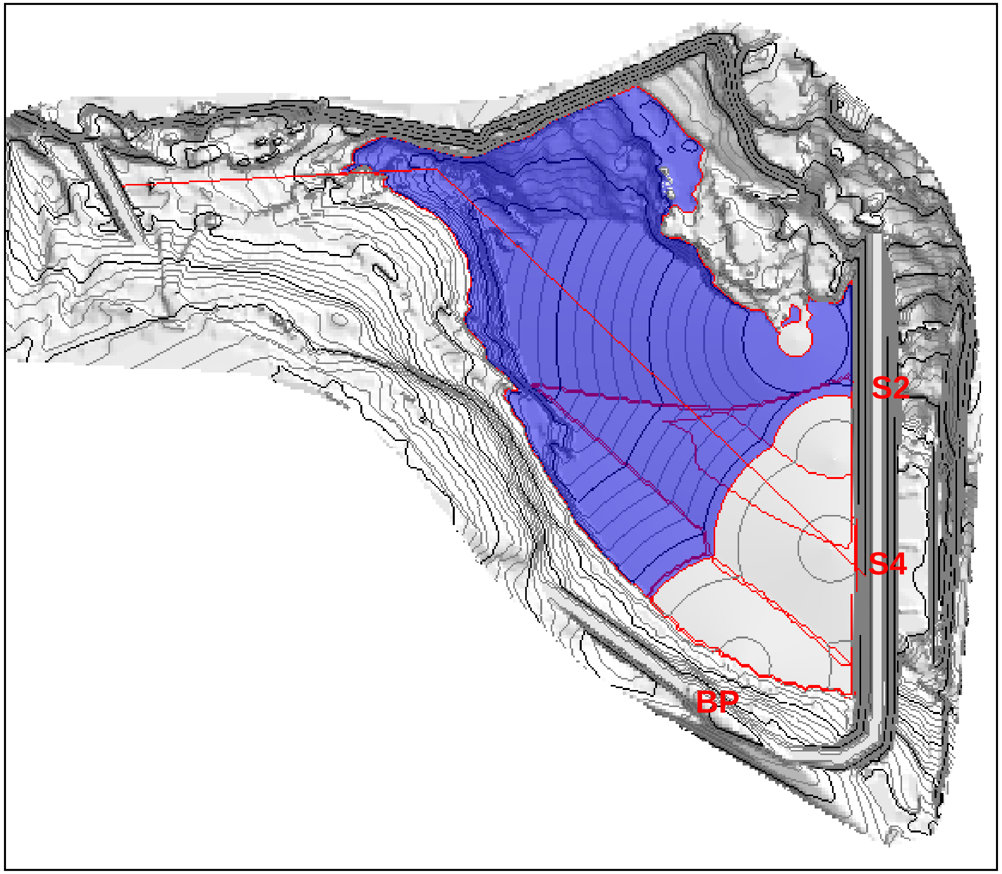


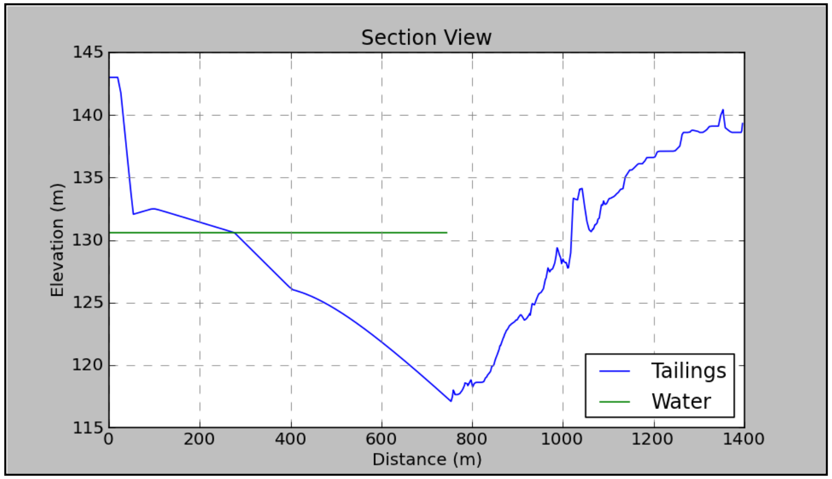
South Cell TSF deposition plan September 2016

Duration	Deposition Point	Tonnes	Elevation (m)
15	S3	146,775	131.644
14	S4	137,898	132.550
1	BP	9,870	132.464

MODEL INPUT	
Pond Volume (m3)	1,316,073
Ice thickness (m)	0.00
Tonnes (t)	296,010

MODEL OUTPUT	
Total water volume (m³)	1,312,200
Free water volume (m³)	1,312,200
Ice volume (m³)	0
Pond elevation (m)	130.585
Free water elevation (m)	130.585
Pond bottom elevation (m)	118.5899
Ice ratio (%)	0%
Ice entrampment (%)	30%
Transfer (m³)	0



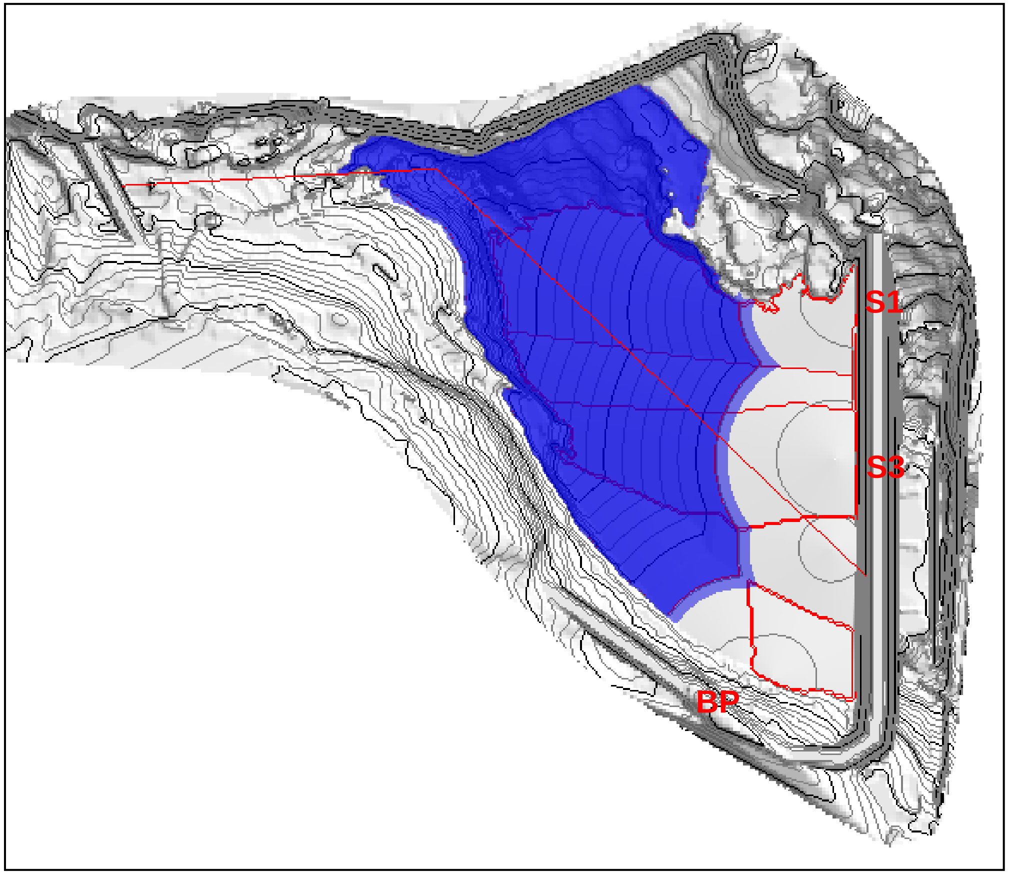


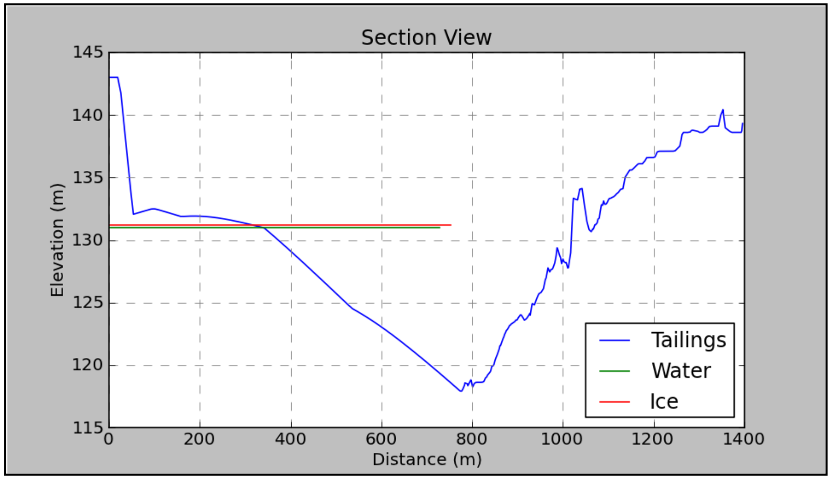
South Cell TSF deposition plan October 2016

Duration	Deposition Point	Tonnes	Elevation (m)
15	S1	166,610	133.011
15	S3	165,925	132.976
1	BP	11,047	132.724

MODEL INPUT	
Pond Volume (m3)	1,261,153
Ice thickness (m)	0.20
Tonnes (t)	344,162

MODEL OUTPUT	
Total water volume (m³)	1,261,153
Free water volume (m³)	1,208,280
Ice volume (m³)	52,873
Pond elevation (m)	131.181
Free water elevation (m)	130.968
Pond bottom elevation (m)	116.747
Ice ratio (%)	4%
Ice entrampment (%)	40%
Transfer (m³)	0



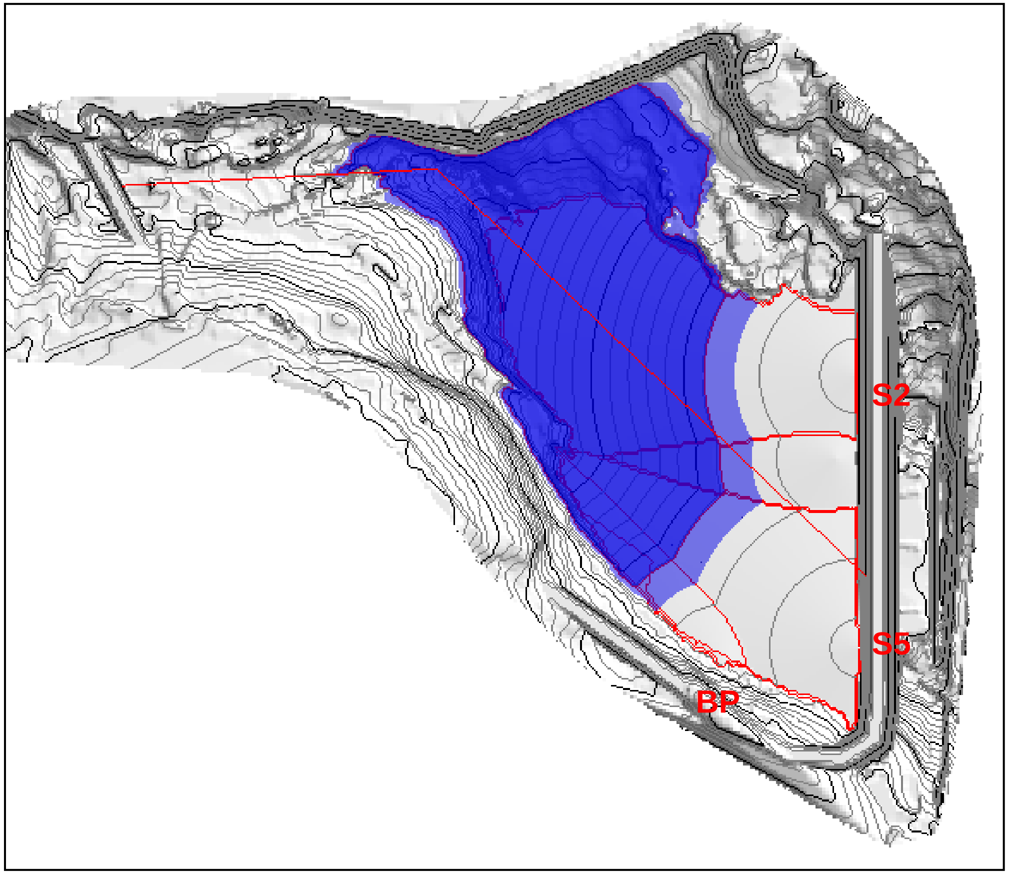


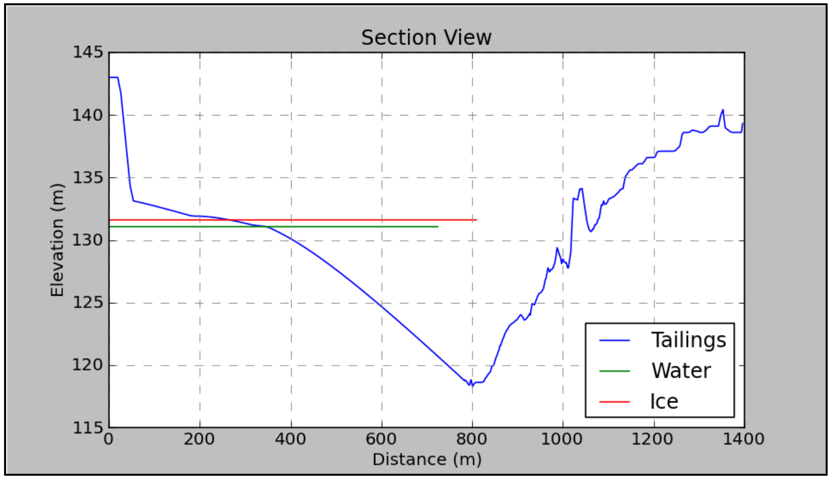
South Cell TSF deposition plan November 2016

Duration	Deposition Point	Tonnes	Elevation (m)
10	S5	111,048	134.482
19	S2	211,633	133.621
1	BP	11,126	133.001

MODEL INPUT	
Pond Volume (m3)	1,199,728
Ice thickness (m)	0.50
Tonnes (t)	334,800

MODEL OUTPUT	
Total water volume (m³)	1,199,728
Free water volume (m³)	1,075,883
Ice volume (m³)	123,845
Pond elevation (m)	131.588
Free water elevation (m)	131.068
Pond bottom elevation (m)	117.900
Ice ratio (%)	10%
Ice entrampment (%)	50%
Transfer (m³)	0



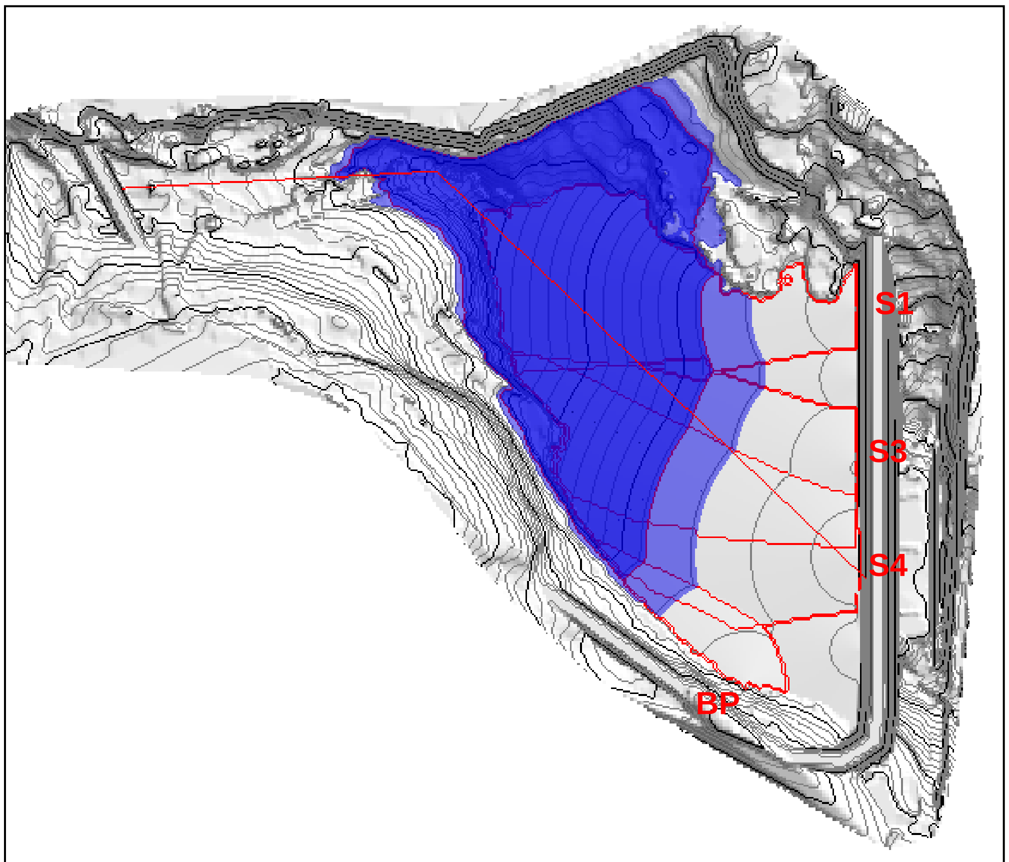


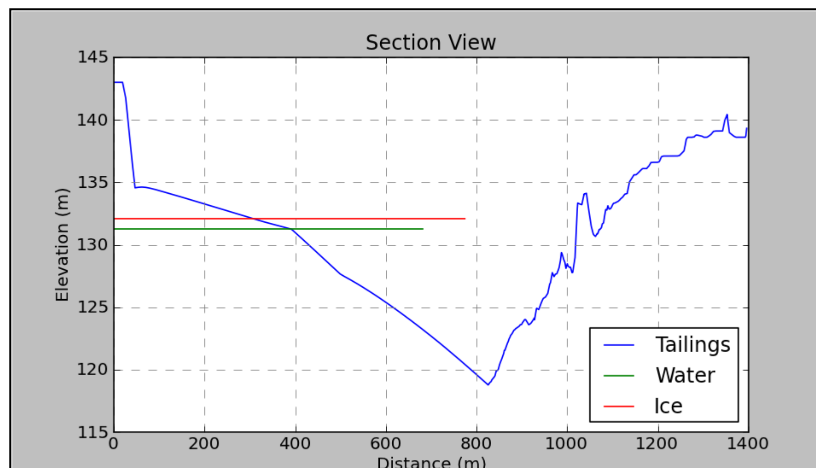
South Cell TSF deposition plan
December 2016

Duration	Deposition Point	Tonnes	Elevation (m)
10	S1	112,486	133.817
10	S3	112,757	134.127
10	S4	112,247	134.800
1	BP	11,253	133.930

MODEL INPUT	
Pond Volume (m3)	1,136,620
Ice thickness (m)	0.80
Tonnes (t)	349,897

MODEL OUTPUT	
Total water volume (m³)	1,136,620
Free water volume (m³)	939,785
Ice volume (m³)	196,835
Pond elevation (m)	132.087
Free water elevation (m)	131.243
Pond bottom elevation (m)	118.776
Ice ratio (%)	17%
Ice entrampment (%)	50%
Transfer (m³)	0



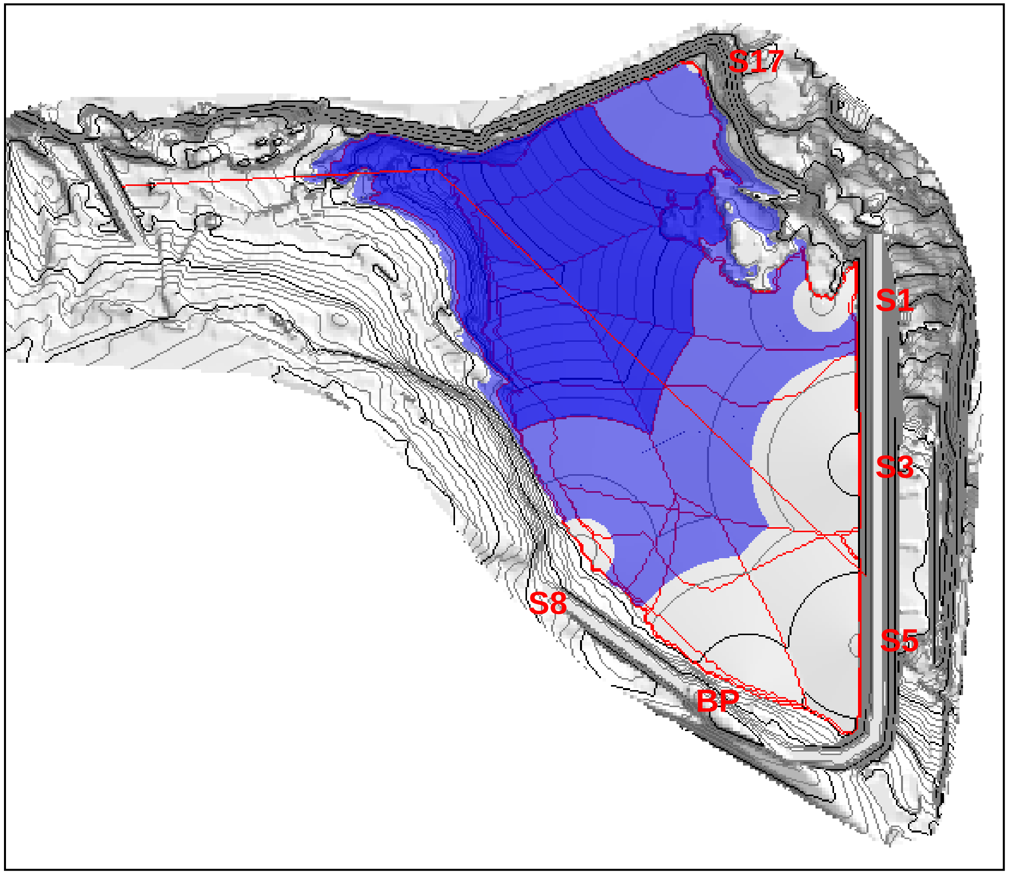


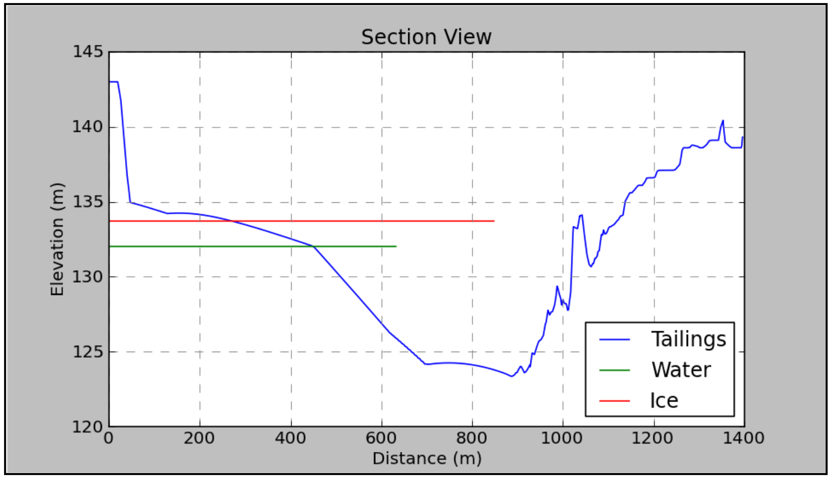
South Cell TSF deposition plan 2017-Q1

Duration	Deposition Point	Tonnes	Elevation (m)
15	S1	162,380	134.201
20	S3	216,180	135.525
10	S5	108,099	136.207
21	S8	226,568	134.261
21	S17	227,246	133.857
3	BP	32,390	135.930

MODEL INPUT	
Pond Volume (m3)	566,191
Ice thickness (m)	1.60
Tonnes (t)	973,443

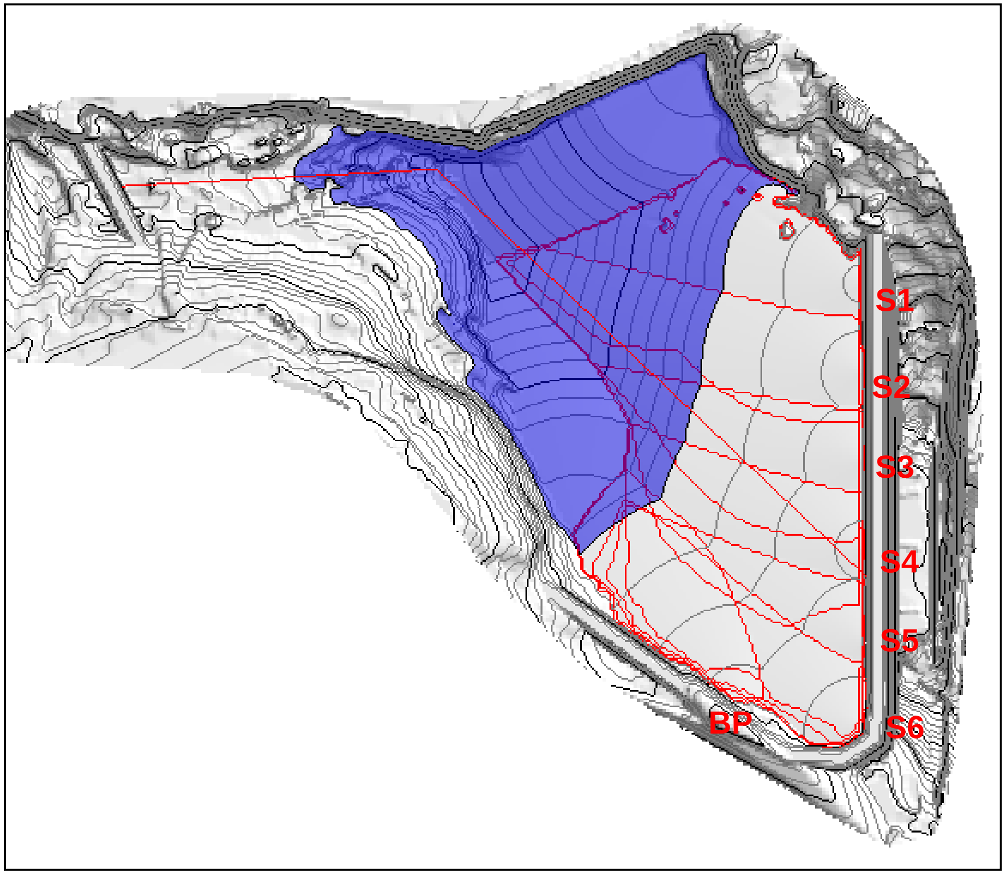
MODEL OUTPUT	
Total water volume (m³)	954,336
Free water volume (m³)	565,967
Ice volume (m³)	388,369
Pond elevation (m)	133.711
Free water elevation (m)	132.023
Pond bottom elevation (m)	122.645
Ice ratio (%)	41%
Ice entrampment (%)	50%
Transfer (m³)	0





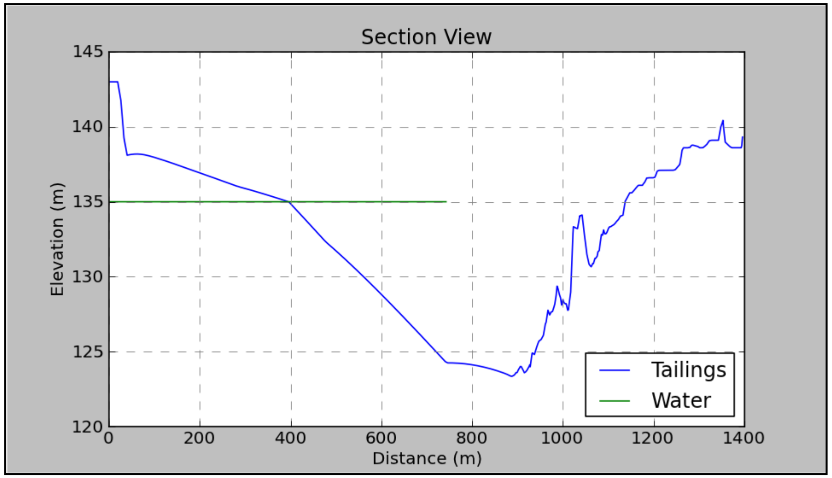
South Cell TSF deposition plan 2017-Q2

Duration	Deposition Point	Tonnes	Elevation (m)
25	S1	278,993	137.315
18	S2	200,875	137.687
15	S3	167,396	137.986
15	S4	167,227	138.485
10	S5	111,334	139.049
5	S6	55,549	139.910
3	BP	33,458	138.593



MODEL INPUT	
Pond Volume (m3)	1,107461
Ice thickness (m)	0.00
Tonnes (t)	1,013,922

MODEL OUTPUT	
Total water volume (m³)	1,104,653
Free water volume (m³)	1,104,653
Ice volume (m³)	0
Pond elevation (m)	135.000
Free water elevation (m)	135.000
Pond bottom elevation (m)	123.047
Ice ratio (%)	0%
Ice entrampment (%)	40%
Transfer (m³)	0

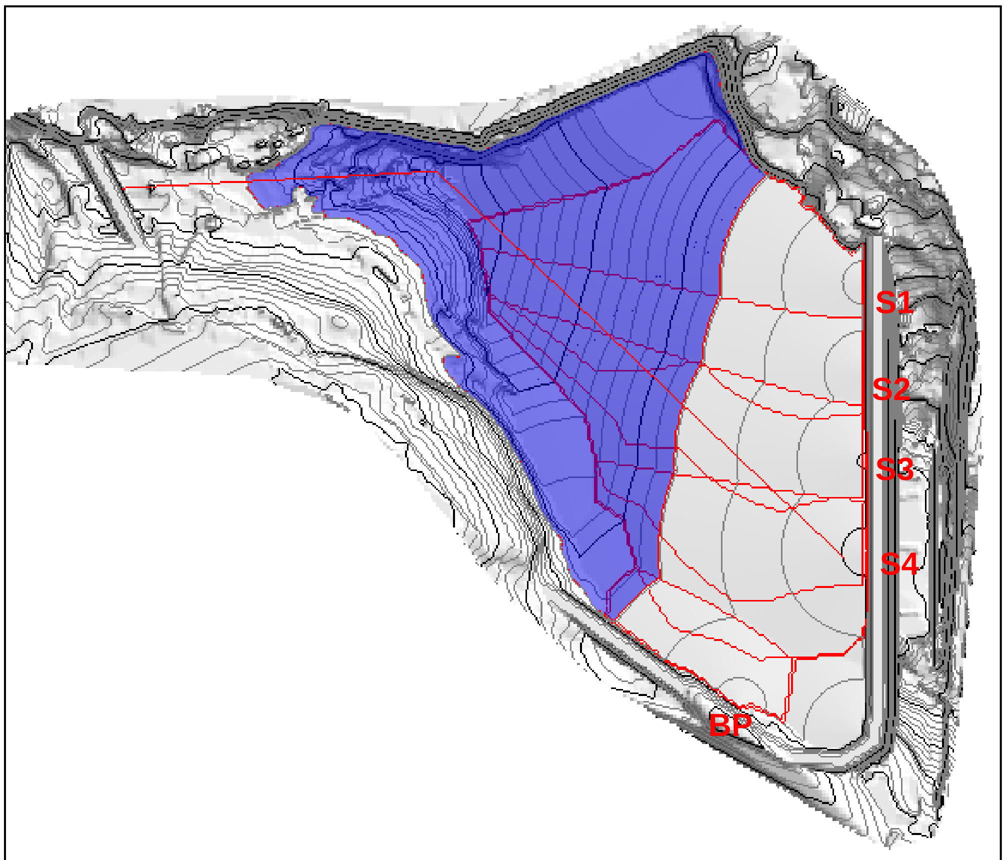


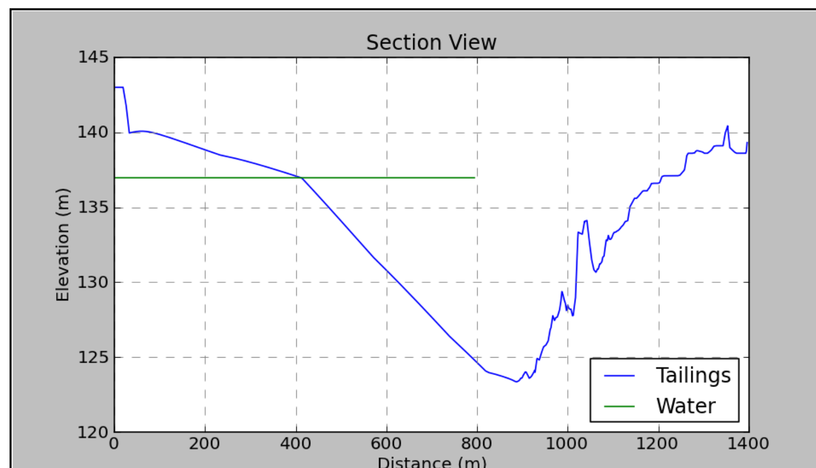
South Cell TSF deposition plan 2017-Q3

Duration	Deposition Point	Tonnes	Elevation (m)
39	S1	419,162	139,370
20	S2	215,128	139.683
20	S3	213,859	140.133
10	S4	106,997	140.399
3	BP	32,163	139.434

MODEL INPUT	
Pond Volume (m3)	1,401,411
Ice thickness (m)	0.00
Tonnes (t)	988,816

MODEL OUTPUT	
Total water volume (m³)	1,401,184
Free water volume (m³)	1,401,184
Ice volume (m³)	0
Pond elevation (m)	136.954
Free water elevation (m)	136.954
Pond bottom elevation (m)	123.230
Ice ratio (%)	0
Ice entrampment (%)	30%
Transfer (m³)	0



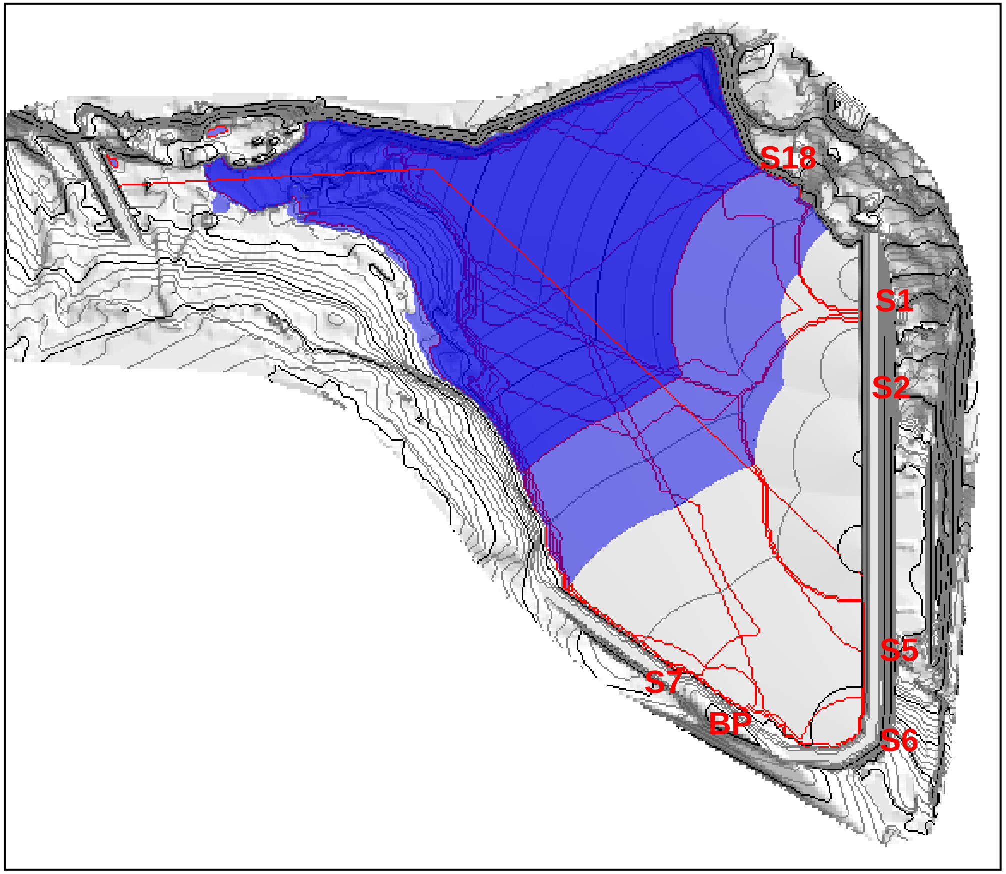


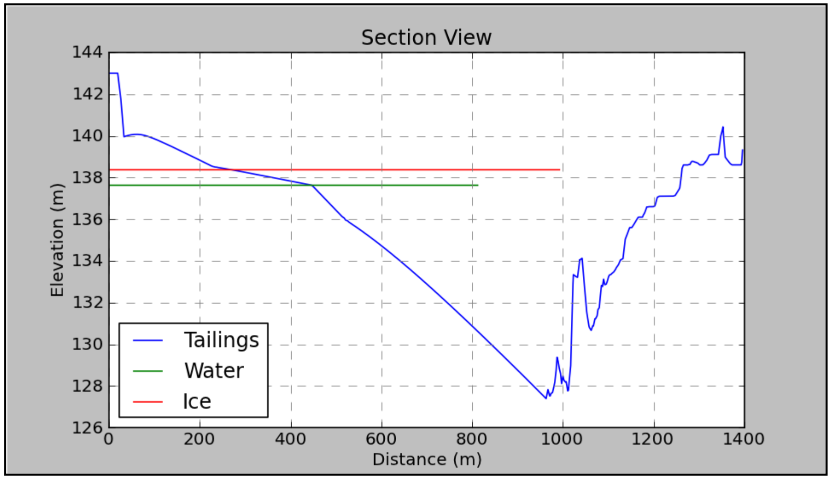
South Cell TSF deposition plan 2017-Q4

Duration	Deposition Point	Tonnes	Elevation (m)
14	S18	159,221	137.231
14	S7	159,161	138.276
20	S1	227,243	138.298
20	S2	227,538	138.906
15	S5	170,452	139.811
6	S6	68,251	140.303
3	BP	33,917	139.742

MODEL INPUT	
Pond Volume (m3)	1,044,063
Ice thickness (m)	0.80
Tonnes (t)	1,034,724

MODEL OUTPUT	
Total water volume (m³)	1,044,063
Free water volume (m³)	823,459
Ice volume (m³)	220,604
Pond elevation (m)	138.369
Free water elevation (m)	137.625
Pond bottom elevation (m)	126.500
Ice ratio (%)	21%
Ice entrampment (%)	82%
Transfer (m³)	0





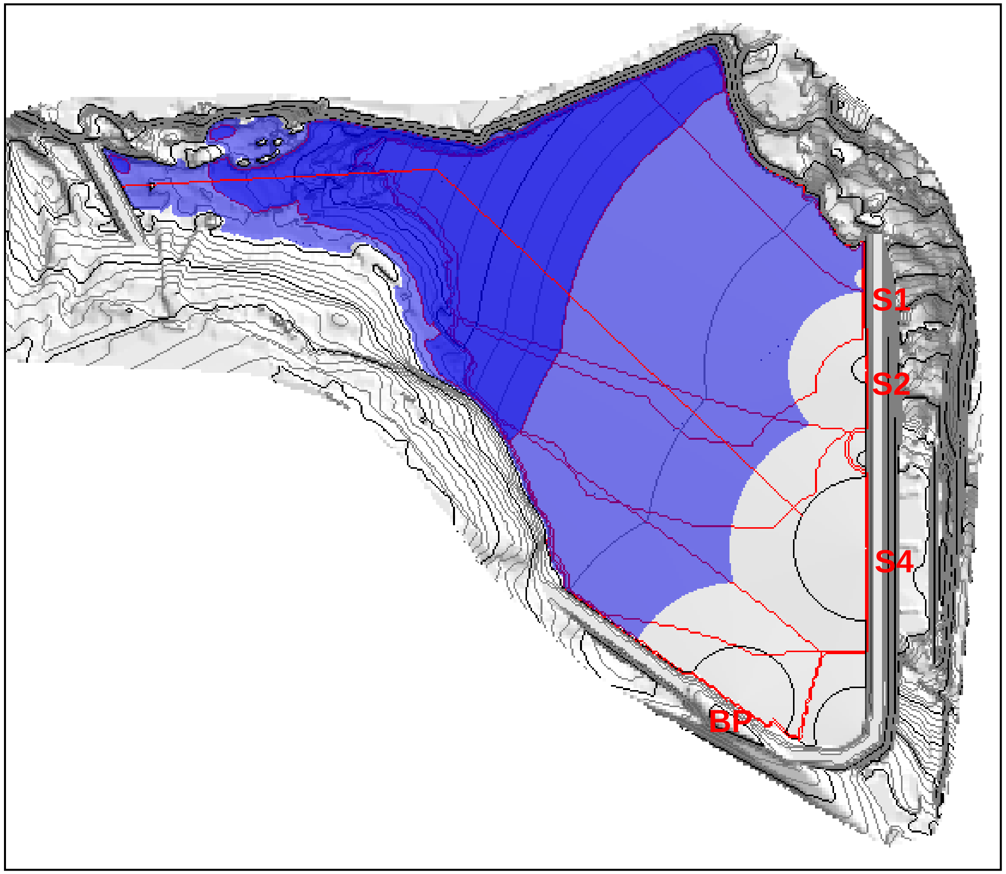
South Cell TSF deposition plan 2018-Q1

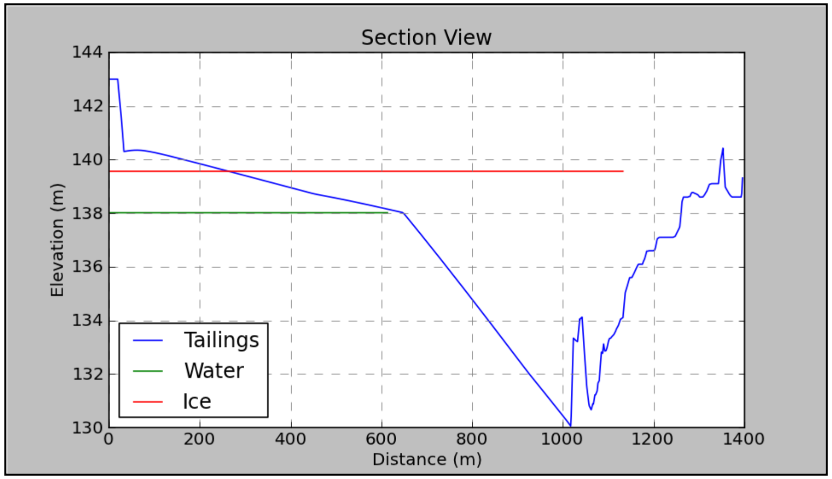
Operational risk
Planned tailings volume above water of 220,768 m³

Duration	Deposition Point	Tonnes	Elevation (m)
47	S1	423,713	139.630
30	S2	270,218	140.089
10	S4	89,924	140.485
3	BP	26,977	140.374

MODEL INPUT	
Pond Volume (m3)	846,583
Ice thickness (m)	1.60
Tonnes (t)	810,000

MODEL OUTPUT	
Total water volume (m³)	846,583
Free water volume (m³)	398,363
Ice volume (m³)	448,220
Pond elevation (m)	139.564
Free water elevation (m)	138.018
Pond bottom elevation (m)	129.248
Ice ratio (%)	53%
Ice entrampment (%)	90%
Transfer (m³)	0



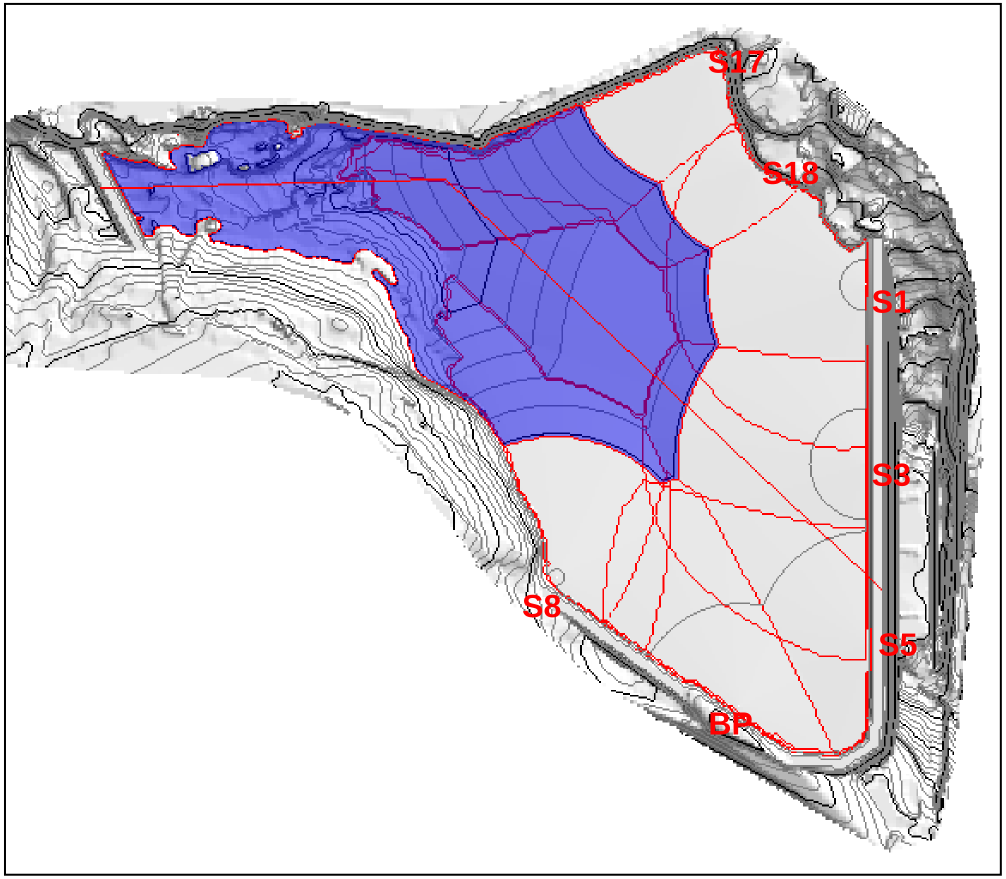


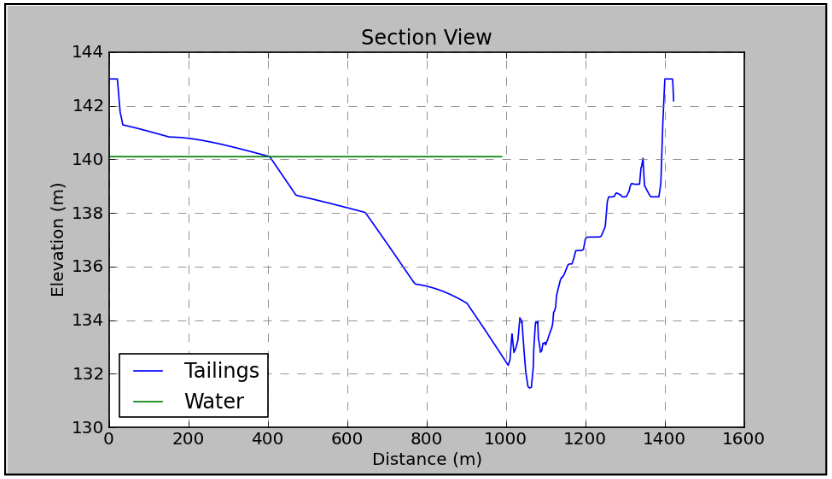
South Cell TSF deposition plan 2018-Q2

Duration	Deposition Point	Tonnes	Elevation (m)
15	S1	134,082	141.173
13	S3	116,910	141.375
13	S5	116,527	141.758
16	S18	143,582	140.738
16	S17	144,730	141.000
15	S8	134,196	141.053
3	BP	27,246	141.700

MODEL INPUT	
Pond Volume (m3)	685,688
Ice thickness (m)	0.00
Tonnes (t)	819,000

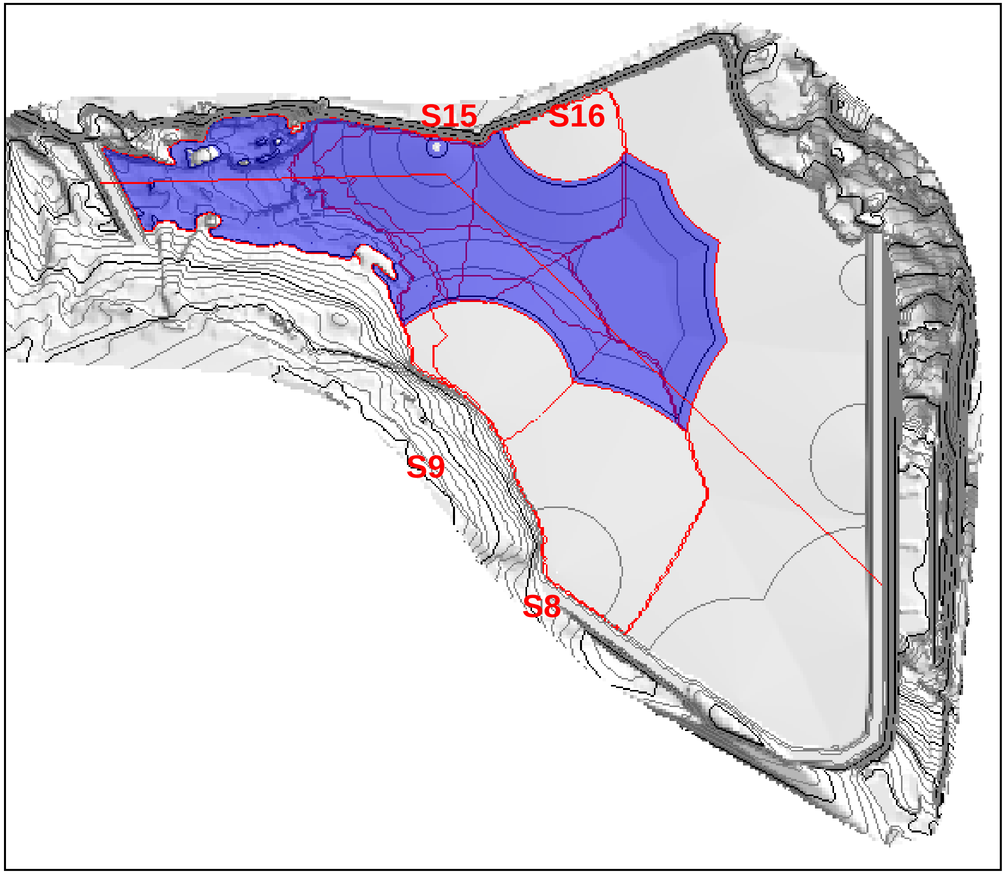
MODEL OUTPUT	
Total water volume (m³)	682,042
Free water volume (m³)	682,042
Ice volume (m³)	0
Pond elevation (m)	140.100
Free water elevation (m)	140.100
Pond bottom elevation (m)	131.080
Ice ratio (%)	0%
Ice entrampment (%)	60%
Transfer (m³)	0





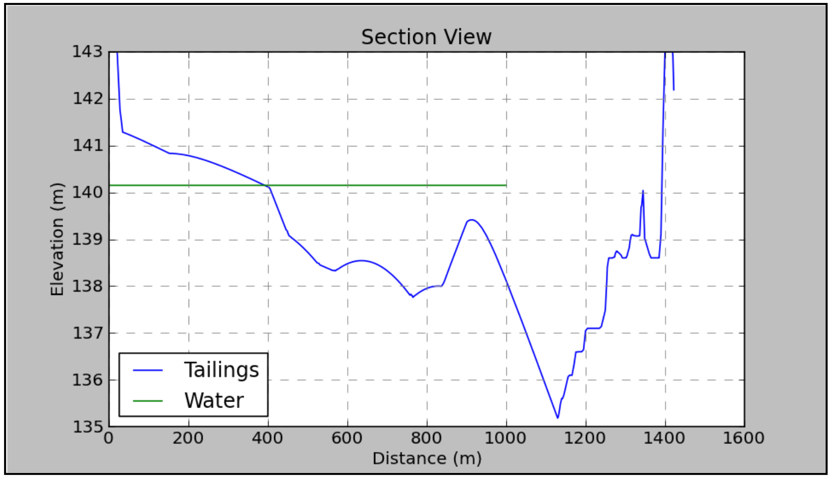
South Cell TSF deposition plan 2018-Q3

Duration	Deposition Point	Tonnes	Elevation (m)
35	S16	256,948	140.616
15	S15	109,946	140.194
20	S8	147,230	141.441
22	S9	161,387	140.847



MODEL INPUT	
Pond Volume (m3)	297,013
Ice thickness (m)	0.00
Tonnes (t)	675,251

MODEL OUTPUT	
Total water volume (m³)	295,909
Free water volume (m³)	295,909
Ice volume (m³)	0
Pond elevation (m)	140.150
Free water elevation (m)	140.150
Pond bottom elevation (m)	135.121
Ice ratio (%)	0%
Ice entrampment (%)	60%
Transfer (m³)	0



Results and Analysis

Tailings beach elevation

- Table on the right present beach elevation for each structure.
- AEM recommend to keep structures final elevation at 143masl.

Dikes elevation	Tailings elevation (masl)
Central Dike	141.5
SD3	139.0
SD4	141.4
SD5	141.6

Reclaim water volume

- Maximum reclaim water elevation reached is 140.15masl;
- 626,978m³ of reclaim water need to be transferred to Portage pit in 2018 from both NC and SC;

Operation risks

- 2018Q1 are more risky for operation. The amount of tailings planned to be stored over frozen tailings beach is over the half of the free water volume. The reclaim water consumption plan during this month was lowered in order to mitigate that risk.

Beach slopes

- The steeper beach slopes ease the protection of the Central Dike line. However it is more difficult to built up a convenient surface for closure without a low point in the middle of the pond.

Closure surface

- Layout of the tailings pond is adequate for channeling water in direction of SD3 channel. The average slope between Central Dike and SD3 is 0.25%. Rockfill will need to reach elevation 150m to have a 1% slope all along the SC TSF.

Remaining capacity

- Assuming a tailings dry density of 1.28 t/m³, the South Cell still has a capacity of 6.7Mt if structures are raised to elevation 150masl.