AGNICO EAGLE

MEADOWBANK MINE

Vault Pit Expansion into Phaser Lake

Project Description

JULY 2014

Executive Summary

AEM is proposing to expand the Vault Pit operations into Phaser Lake (referred to as Phaser Pit). The following document provides a mini project description and re-evaluation of the terms and conditions related to Phaser Lake. The Vault Pit expansion into Phaser Lake, is a small open pit that extends to the southwest from the perimeter of the Vault Pit and into Phaser Lake. AEM believes the Phaser Pit addition is an insignificant change to the project and is within the scope of the original project permitted by NIRB Project Certificate No.4. Furthermore, it is within the KIA Production Lease (KVPL08D280). AEM has applied for an authorization to the DFO and has an approved NNL Plan (AEM, 2012) that has an offsetting plan to account for fisheries losses to Phaser Lake that will ultimately improve its connectivity to Vault and Wally Lake. Furthermore, based on current mine plans, Phaser Lake no longer requires water diversion into Turn Lake, which was originally predicted to be a potential impact. The dewatering activity proposed in this document will follow current dewatering plans approved by the NIRB and NWB. Therefore AEM is requesting NIRB to reconsider the Terms and Conditions of the Project Certificate related to Vault Pit Expansion into Phaser Lake under Section 12.8.2 of the NLCA.

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(AEM) ᐊᑲᓂᔨᑦ ᐊᖏᑕᓕᑕᐊᖅᓯᔪᒪᔪᑦ (Vault Pit) ᖃᓄᑦ ᐱᑦ ᐊᐅᓪᓛᖅᓂᓗᓕᕆᔨᑦ (Phaser) ᖁᐃᓯ ᑕᓯᖏᒧᑦ (Phaser Pit-ᓪᖅᑕᐅᔪᖅ). ᐅᔨᐊ ᑎᑎᖅᑲᐃᑦ ᒥᑭᓇᖅᓯᒪᔪᒥᑲ ᐱᓕᓗᐊᑦ ᖃᑲᓇᐃᔾᔨᓂᕆᓕᕆᖏᓐᓂᐅᔪᖅ ᑐᑭᐅᔪᓂ ᐊᒪᓗ ᖃᑎᖅᑕᐅᓂᖏᓐᓂᐅᔪᖅ ᐱᔪᐊᑎᖅᑲᓂᐅᔪᓂᑦ (Phaser) ᖁᐃᓯ ᑕᓯᖏᒥᑦ. ᐊᖏᑕᓕᑕᐊᖏᓂᖏᓐ (Vault Pit) ᖃᓄᑦ ᐱᒡᒥᑦ (Phaser) ᖁᐃᓯ ᑕᓯᖏᓗᑦ, ᒥᑭᔪᔪᖅ ᐅᖅᑯᐃᖏᓐᓇᖅ ᒪᓂᕆᖏᒥᑦ ᑎᑭᐅᑎᒡᓗᓂ ᓂᑕᖅᖢᓯᖏᓗᑦ ᐱᖏᓐᓇᖅᖢᓯᖏᓗᑦ ᑭᓚᓕᐅᖅᑕᐅᓯᒪᓂᕆᖏᓐᓂᐅᔪᖅ (Vault Pit) ᖃᓄᑦ ᐱᑦ ᐊᒪᓗ ᑕᐃᑯᖏᓐᓄ (Phaser) ᖁᐃᓯ ᑕᓯᖏᓗᑦ. (AEM) ᐊᑲᓂᔨᑦ ᐅᖅᐱᑕᓯᑐᑦ (Phaser Pit) ᖁᐃᓯ ᐱᒡᒥᑦ ᐃᑕᓯᓂᐅᔪᖅ ᐊᓯᐊᖓᔪᖏᓐᓄᓐᓄ ᐅᔾᔨᓇᖕᖏᑭᓂᖏᓐᓂᐅᔪᖅ ᐱᓕᕆᐊᒧᑦ ᐊᒪᓗ ᐱᓕᕆᐊᖓᔪᖏᓐᓇᖅᑎᑕᐅᓂᖏᓐᓂᓚᓐᓂᐅᔪᖅ (NIRB) ᓄᓇᕗᒻᒥ ᐊᐅᑐᖅᓯᓂᒧᑦ ᖃᑎᖅᑕᐅᔾᔨᑯᓐᓂᐅᔪᖅ ᐱᓕᕆᐊᒧᑦ ᐊᒪᓗ ᐱᓕᕆᐊᖓᔪᖏᓐᓇᖅᑎᑕᐅᓂᖏᓐᓂᐅᔪᖅ 4-ᒥᑦ. ᐊᒪᓗᐅᑲᓂᖅ, ᑭᖕᓕᓂᖅ ᐃᓄᐃᑦ ᑲᑐᔾᔨᖅᑎᑎᒋᑦ ᐱᖕᓕᓂᐊᓂᖓᓂᒧᑦ ᐊᑐᖅᑐᐊᑭᑎᖓᓂᓂᑦ (KVPL08D280)-ᒥᑦ. (AEM) ᐊᑲᓂᔨᑦ ᑐᓯᕿᑕᓯᑕᓕᕆᖅᑐᑦ ᐱᖕᓕᖅᑎᑕᐅᔾᔨᐅᑎᒋᓂᖓᓂᒧᑦ ᐃᒪᕿᐅᑕᓕᓚᓴᓂᖓᓂᐅᔪᖅ ᐊᒪᓗ ᓅᓱᒪᑲᐅᔾᔨᕿᑎᑦ NNL-ᓗᑦ ᐸᕐᓇᐅᑎ (AEM, 2012) ᐅᑎᖅᑎᕐᑎᓂᓗᑦ ᐃᕐᑲᕐᑐᓂᖅ ᐊᓯᐅᔨᓂᓗᑦ ᐱᐸᕐᓇᐅᑎᒥᑦ (Phaser) ᖁᐃᓯ ᑕᓯᕿᑦ ᐱᖃᓕᓂᖅᑎᕐᑎᓂᐅᔪᐊᖅᑐᖅ ᑲᑎᓂᓂᑕᐅᓂᖏᓐᓂᐅᔪᖅ (Vault) ᖃᓄᑦ-ᓗᑦ ᐊᒪᓗ (Wally) ᐅᐊᓕ ᑕᓯᓗᑦ. ᐊᒪᓗᐅᑲᓂᓂᖅ, ᐃᓂᓇᐅᔾᔨᖅ ᐅᔪᖅᑕᓇᐊᒥᑦ ᐸᕐᓇᐅᑎᐅᔾᔨᑦ ᐊᑐᖅᓴᑎᑦ, (Phaser) ᖁᐃᓯ ᑕᓯᕿᑦ (Turn) ᑐᕐᓐ ᑕᓯᕐᓗᐊᖅᑎᕐᑎᔪᓇᐊᓯᖅᑲᓂᖅᓴᓂᖅᖢᓂᓴᓂᐅᔪᖅ, ᓂᓇᐅᑎᔪᐅᔾᔨᑐᖅᑕᐅᓗᐅᓂᖅᑐᖅ ᐊᐅᑐᖅᓯᓂᐅᑐᐃᓇᓇᐊᓯᖅᓂᓂᖏᓐᓄᓐᓄᑦ. ᐃᓚᐃᔪᐃᓂᖅ ᐱᓕᕆᐊᖓᔪᓚᔾᔨᖅ ᑕᖏᖁᓂ ᑎᑎᖅᑲᒥᑦ ᐃᓚᐃᔪᐅᔾᔨᖅ ᐃᓚᐃᔪᐃᓂᕐᓗᑦ ᐸᕐᓇᐅᑎᓂᒃ ᐅᓪᓛᖅᓂᓗᑦ ᐊᑐᖅᑐᐊᑭᑎᖓᓂᓂᑦ (NIRB) ᓄᓇᕗᒻᒥ ᐊᐅᑐᖅᓯᓂᒧᑦ ᖃᑎᖅᑕᐅᔾᔨᑯᓐᓂᐅᔪᖅ (NWB) ᓄᓇᕗᒻᒥᑦ ᐃᓚᕆᓚᔾᔨᑯᓐᓄᑦ. ᑕᐃᓚᓕ (AEM) ᐊᑲᓂᔨᑦ ᑐᓯᕿᑦᑐᑦ (NIRB) ᓄᓇᕗᒻᒥ ᐊᐅᑐᖅᓯᓂᒧᑦ ᖃᑎᖅᑕᐅᔾᔨᑯᓐᓂᐅᔪᖅ ᐃᓯᓚᓴᕿᓯᐅᑎᖅᑲᓴᓂᐅᔪᖅᑐᑦ ᑐᑭᐅᔪᓂ ᐊᒪᓗ ᖃᓄᐃᑦᑐᓂᖏᓐᓂᐅᔪᖅ ᐱᓕᕆᐊᒧᑦ ᐊᑐᖅᑐᐊᑭᑎᖓᓂᐅᔪᖅ (Vault Pit) ᖃᓄᑦ ᐱᒡᒥᑦ ᐊᖏᑕᓕᑕᐊᖅᑎᑕᐅᓂᖅ (Phaser) ᖁᐃᓯ ᑕᓯᖏᒥᑦ ᒪᑕᓴᓇᒍ ᐃᓕᑕᐅᓴᐅᔪᖅ 12.8.2 NLCA-ᒥᑦ.

TABLE OF CONTENTS

List of Figure

List of Table

List of Appendix

Document Control

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SECTION 1. INTRODUCTION

Since 2009, the Meadowbank Gold Project operated by Agnico Eagle Mines Limited - Meadowbank Division (AEM) has operated the Meadowbank Gold Mine, which is located 75 km north of the Hamlet of Baker Lake, Nunavut. The project components include marshalling facilities in Baker Lake, the 110 km All Weather Private Access Road (AWPAR) between Baker Lake and Meadowbank, the Vault mine site and the Meadowbank mine site. The Meadowbank mine consists of several gold-bearing deposits that will be mined until 2018. Mining at Meadowbank is occurring in three open pits (Goose Pit, Portage Pit and Vault Pit) (Figure 1-1). Much of the pit development is located in close proximity to the mill, office and lodging infrastructure, with the exception of the Vault Pit which is approximately 8 km northeast of the main mine site.

These various components and activities associated with the project are subject to several authorizations, regulations, leases and permits from regulatory agencies that AEM applied for and were granted prior to construction and operation (see Appendix A that summarizes the leases, regulations and permits). This includes the Nunavut Water Board (NWB Type A Water License 2AM- MEA0815), Environment Canada (EC) Metal Mining Effluent Regulations (MMER) and Schedule II listing of Second Portage Lake Northwest Arm; the Department of Fisheries and Oceans Canada (DFO); Aboriginal Affairs and Northern Development Canada (AANDC); the Kivalliq Inuit Association (KIA) and the Nunavut Impact Review Board (NIRB- Project Certificate No.4).

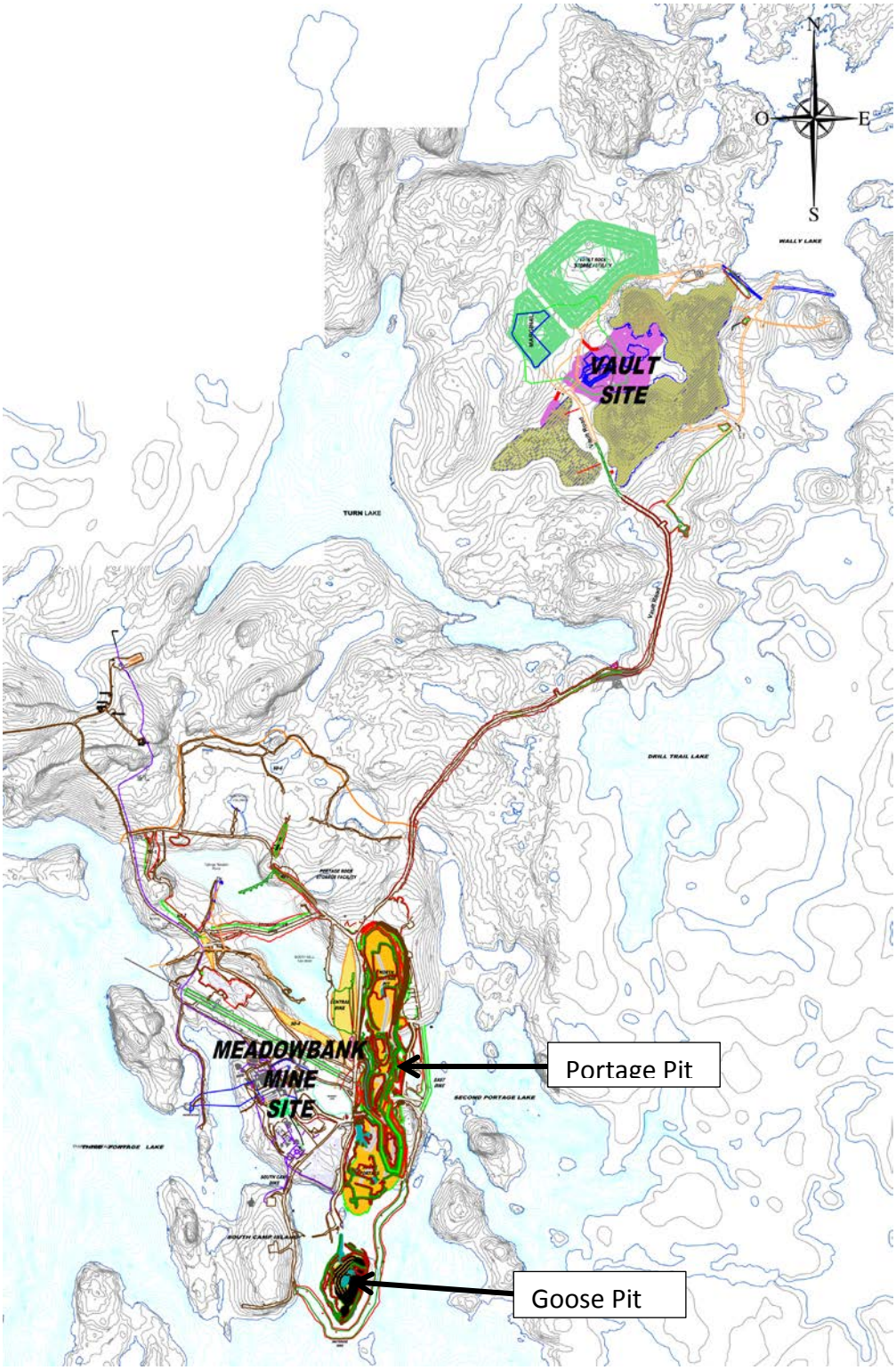
All of the permits were approved and were based on the original (2005) environmental management plans and the associated life of mine (LOM) plans which did not consider the expansion of Vault Pit into Phaser Lake. Consideration for expansion of the mine is a continuous process. Initial feasibility studies did not consider Phaser Pit, however this was dependant on scale, timing, the potential environment impacts and the economics at the time. As the economics of the project have changed and the details of last few years of the Meadowbank mine are optimized, mine engineers began considering the feasibility of expanding Vault Pit.

The Vault Pit expansion is a small open pit that extends from the perimeter of the Vault Pit to the southwest into Phaser Lake. Until recently, for economic reasons, it has not been part of the life of mine (LOM) at Meadowbank. AEM discussed the Vault Pit expansion with the Baker

Lake HTO, KIA and DFO beginning in 2012 (as part of a revision to DFO mine site authorizations) and to NIRB representatives during a conference call hosted on March 11th, 2014.

The following document presents an overview of the Vault Pit Expansion to the NIRB, which AEM believes is not a significant change to the project, is within the scope of the original project permitted by NIRB Project Certificate No.4, and is within the KIA Production Lease (KVPL08D280). Therefore AEM is requesting NIRB to reconsider the Terms and Conditions of the Project Certificate related to Vault Pit Expansion under Section 12.8.2 of the NLCA.

Figure 1-1: Meadowbank Mine General Layout



SECTION 2. LOCATION AND DESCRIPTION OF PROPOSED VAULT PIT EXPANSION

The Vault Pit is approximately 8 km North East of the main mine site and is accessible by a haul road which was constructed in 2012. In 2013, the mine began stripping and preparing for operations of the Vault Pit which began in Q1 of 2014. The Vault Pit area currently consists of a maintenance shop, shelter/refuge, a waste rock storage facility, an attenuation pond, a water collection and treatment system, haul roads and the Vault Pit. Figure 2-1 presents the infrastructure.

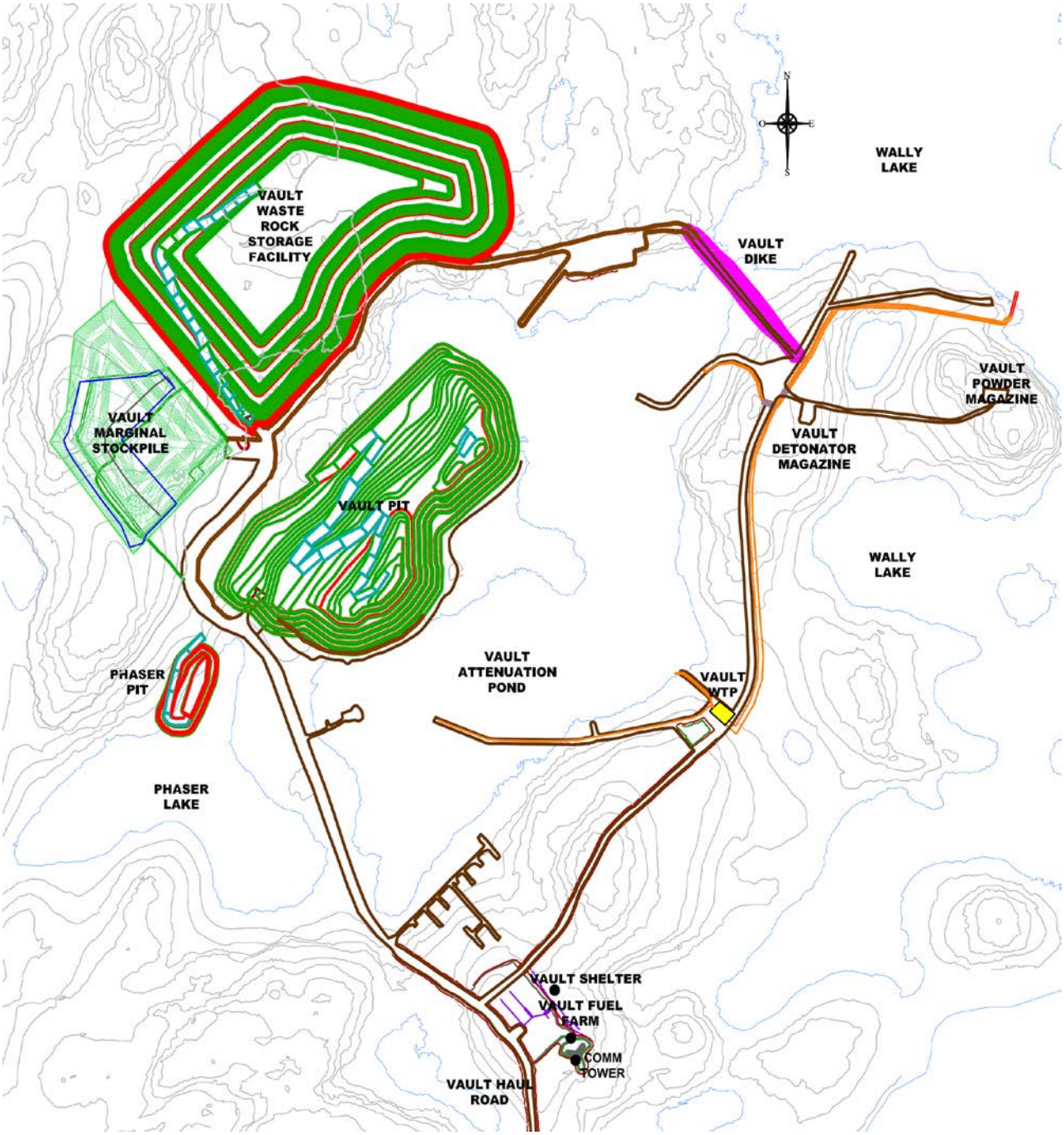
2.1 Vault Pit Expansion into Phaser Lake

The Vault Pit expansion is a small open pit that extends from the perimeter of the Vault Pit to the southwest into Phaser Lake. AEM is planning to mine this small open pit in 2017. The production details of the proposed Vault Pit expansion in Phaser Lake are presented in Table 2-1. AEM will use the same equipment already on site.

Table 2-1 – Proposed Vault Pit Expansion production

	Proposed Vault Pit Expansion
Total Rock Removed (tonnes)	1,723,981
Waste Rock (tonnes)	1,061,404
Overburden (tonnes)	452,551
Ore (tonnes)	210,026
Au (oz)	21,511

Figure 2-1: Vault Infrastructures



2.2 Existing Production at Vault Pit and the Vault Pit proposed Expansion

As approved under the NIRB Project Certificate No. 4 and NWB Type A water license NWB-2AM-MEA0815 AEM has dewatered Vault Lake, has established a waste rock storage facility and began pit development and mining in 2014 of the Vault Pit. The production details of the approved Vault Pit are presented in Table 2-2. It is evident from these data that waste rock storage and milling will not significantly change as a result of the proposed Vault Pit expansion into Phaser Lake. In summary, the Vault Pit Expansion represents 210,026 tonnes of ore or 2.42% of the total ore of Vault Pit.

Table 2-2 – Overall Mine and Vault Pit Production as compared to the proposed Vault Pit Expansion

	Meadowbank Mine (2013 LOM)	Vault Pit	% of Mine	Proposed Vault Pit Expansion	% of Mine	% of Vault Pit
Total Rock Removed (tonnes)	218,900,000	53,228,322	24%	1,723,981	0.01	3.24%
Waste Rock (tonnes)	191,000,000	42,205,090	22%	1,061,404	0.01	2.51%
Ore (tonnes)	27,900,000	8,689,083	31%	210,026	0.01	2.42%
Au (oz)	~1,751,388	658,139	38%	21,511	0.01	3.27%

2.3 Water management

AEM proposes to begin dewater Phaser Lake in Q3 of 2015 while completing a fishout, and then completely dewater it in Q3 2016, in advance of mining in 2017. This will take less than 3 months (volume of Phaser Lake is estimated at 700,000 m^3). Water is proposed to be transferred into the Vault Attenuation Pond and discharged through a diffuser into Wally Lake. Our Water Quality Monitoring and Management Plan for Dike Construction and Dewatering will be followed. The mining is expected to occur during the winter months and we are not expecting having any pit water. If pit water is encounter, it will be send to the Vault Attenuation Pond.

2.4 Waste management

The Vault Pit expansion will generate 1,061,404 tonnes of waste rock and 452,551 t of overburden. All this material will be send to the actual Vault Rock Storage Facility.

2.4.1 Closure

The closure concepts for Phaser Pit will not significantly change from what was documented in the FEIS. The Vault Pit expansion into Phaser Lake will be re-flooded. Phaser Lake volume has been estimated at 700,000 m^3 (SNC, 2013); although the volume of the Vault Pit expansion has not been estimated, the total area of Phaser Lake is presently 25.05 ha and the pit area will

increase the area of Phaser Lake by only 3.94 ha, therefore reflooding is not expected to significantly change, nor the timing of the reconnection of Phaser and Vault Lake to Wally Lake. Geochemical predictions during the FEIS (and to date) indicated that the Vault Waste Rock will not require capping and is expected to freeze; this remains unchanged with the addition of the proposed pit expansion.

2.5 Timing

It is expected that Vault Pit expansion into Phaser Lake (often referred to as Phaser Pit) will be mined in Q1 of 2017. With NIRB, NWB and DFO approval, the preliminary schedule requires dewatering and a fishout of Phaser Lake to begin as early as Q3 of 2015. As will be discussed in the rest of the report, the NIRB, NWB and DFO have approved the concepts of dewatering and removing fish as part of the original NIRB screening and NWB Type A License.

2.6 NIRB Terms and Conditions related to Vault Extension into Phaser Lake

Presently, Phaser Lake is an isolated "offline" lake that drains into Vault Lake through a boulder field. During the original NIRB hearings, water management plans were designed to control water accumulation in Vault attenuation area from Phaser Lake and maintain a natural water level to protect fish habitat (specifically overwintering habitat). The water management plan that was presented included the pumping of water from Phaser Lake into Turn Lake, an adjacent watershed. At that time, the DFO had concerns with the water management plan and the protection of Phaser Lake fish habitat through the life of the mine and ensuring no sedimentation occurs during pumping into Turn Lake. As a result, *NIRB Condition 48 states – Cumberland shall demonstrate to the satisfaction of the DFO that the water management framework, including the embankment details and diversion ditch, will permit the maintenance of over-wintering fish habitat in Phaser Lake through the life of the Project.*

Since then, the Vault waste rock pile has been reconfigured (i.e. there is a smaller footprint than originally proposed), water management plans have changed to keep water within the Vault Lake watershed and AEM has worked closely with the DFO to ensure the protection and/or offset of fish habitat in the Vault Area that includes Phaser Lake through the revisions to the No Net Loss Plan (AEM, 2012 - Appendix C). During the dewatering of the Vault Lake and initial phase of the Vault Operations, Phaser Lake overwintering fish habitat has been protected as per NIRB Condition 48, to the satisfaction of the DFO (water levels have been maintained around 139.55 masl, with some freshet volume discharging into Vault Lake). After dewatering Vault Lake, it was not deemed necessary to pump water into the adjacent watershed, thus protecting Turn Lake and maintaining Phaser Lake fish habitat. With revised LOM plans to include Vault Pit Expansion into Phaser Lake and the resulting changes to Phaser Lake that have

been in the No Net Loss Plan (AEM, 2012), AEM is requesting NIRB to reconsider the Terms and Conditions of the Project Certificate (specifically Condition 48) as described in Section 3, under NIRB's authority in Section 12.8.2 of the NLCA.

SECTION 3. REVIEW OF ASSOCIATED IMPACT PREDICTIONS

The Meadowbank FEIS (Cumberland, 2005) was completed to determine the potential effects that the various activities of the project would have on identified Valued Ecosystem Components (VECs) and Valued Social and Economic Components (VSECs). Predictions were outlined in the FEIS and supporting documents. Impacts were predicted for the Vault area, however these predictions did not include the Vault Pit Expansion into Phaser Lake. As previously presented, although the impacts are very small changes to the mine plan (i.e. tonnes moved, waste rock storage, mining duration, etc.), that most of the impact predictions in the original FEIS encompass the Vault Pit Expansion.

The following section provides a discussion of the extent to which the proposed expansion will affect the original FEIS impact predictions on previously identified valued ecosystem components (water quantity, water quality, air quality, noise, terrestrial wildlife and fish/fish habitat) and presents a discussion of the potential additional impacts generated by the Vault Pit expansion into Phaser Lake. The potential effects and the predictions of impacts generated by the proposed pit expansion, along with the proposed mitigation and monitoring strategies are summarized in the text below based on evaluations presented in Appendix B.

3.1 Air Quality and Noise

The generation of dust and emissions was identified as a potential effect generated by the mine activity in Vault Pit Area and hauling between the Vault and the mill. There is a small increase in overburden stripping, excavation and mine activity in the Vault Pit Expansion into Phaser Lake, but the increase is within the original project footprint. However there are no additional trucks expected and existing dust mitigation plans will be followed (i.e. a dedicated water truck is presently in use around the Vault operations). The related changes to air quality and noise is insignificant and the dust control and noise abatement strategies will apply to the expansion; therefore the Vault Pit expansion is not considered dissimilar from the predictions made in the original FEIS for air and noise.

3.2 Terrestrial Ecosystem

Seven VECs were considered part of the terrestrial ecosystem in the FEIS: vegetation, raptors, other breeding birds, waterfowl, predatory mammals, small mammals and ungulates.

3.2.1 Vegetation

The loss of vegetation and vegetation degradation were identified in the FEIS as a potential effect as a result of operations at Vault Pit. Pit stripping is primarily within Phaser Lake, thus

the direct loss of vegetation is not expected to significantly change from the original predictions. Monitoring and mitigation strategies remain unchanged; the original predictions for impacts to vegetation are still applicable and are not expected to significantly change due to the Vault Pit expansion.

3.2.2 Raptors, other breeding birds and waterfowl

The potential effects on raptors, birds and waterfowl were identified in the FEIS due to Vault Pit mining activity. Specifically, loss and disturbance of foraging habitat, mortality due to collisions with traffic, reduction in habitat use due to noise, habitat degradation due to dust and emissions, and potential for increased contaminant loading in prey. Similar effects on raptors and breeding birds are not expected to significantly be impacted. None of these potential effects have been observed to date during the initial mining of the Vault Pit.

Despite the temporary loss of Phaser Lake waterfowl habitat, there are no significant changes predicted due to waterfowl habitat loss as only 1 waterbird (1 common loon was observed in 2005 on Phaser Lake, pers. comm. Martin Gebauer on May 2, 2014) has been observed occupying Phaser Lake. Similar monitoring and mitigation strategies will be implemented as originally proposed and currently applied; the original predictions for impacts to raptors, other breeding birds and waterfowl are still applicable and are not expected to significantly change due to the Vault Pit expansion into Phaser Lake.

3.2.3 Mammals and Ungulates

The potential effects on mammals and ungulates were identified in the FEIS due to Vault Pit mining activity. Specifically, loss and disturbance of foraging habitat, mortality due to collisions with traffic, reduction in habitat use due to noise, habitat degradation due to dust and emissions, and potential for increased contaminant loading in prey. None of these potential effects have been observed to date during the initial mining of the Vault Pit. No significant residual impacts on mammals and ungulates were anticipated; this remains unchanged with the expansion of Vault Pit.

3.3 Physical Environment

3.3.1 Surface Water Quantity

The potential effects on surface water quantity due to Vault Pit mining activity were identified in the FEIS. Dewatering and mining activities at Vault Pit were predicted to alter Phaser Lake water quantity (i.e. changes in the Vault Lake were predicted to increase the volume of water over time in Phaser Lake due to freshet and rain events). As a result, a water management

strategy was developed which required that Phaser Lake water level be monitored and if deemed necessary, pumped to Turn Lake, which would require the monitoring of sedimentation and volume/ water level changes in Turn Lake, an adjacent watershed. Currently, the plan is to pump water into Vault Attenuation pond and discharge as needed, thus maintaining the watershed volumes within the Vault Lake watershed[*]. This is actually an improvement to the original plan as Turn Lake will not have any potential impacts as no water will be pumped to this water body.

Similarly, the revised Vault Pit Expansion plan also maintains Phaser Lake historical drainage within the Vault Lake watershed. AEM proposes to begin dewater Phaser Lake in Q3 of 2015 while completing a fishtout, and then completely dewater it in Q3 2016, in advance of mining in 2017. This will take less than 3 months (volume of Phaser Lake is estimated at 700,000 m^3). Water is proposed to be transferred into the Vault Attenuation pond and discharged through a diffuser into Wally Lake. Following dewatering of Phaser Lake, it is expected that no additional impacts to the watershed will occur during operations than what was originally predicted in the FEIS for the Vault Area. By directing water in Phaser Lake to Vault Attenuation and ultimately discharging it into Wally Lake, no changes in water levels in Wally Lake, Turn Lake and Drill-trail Lake are expected.

AEM believes dewatering of Phaser Lake is within the scope of the original FEIS as per the NWB Type A Water Board License Part D Item 16. AEM is approved to dewater lakes and will follow the dewatering strategies outlined in AEM (2010) to minimize potential effects on the receiving water levels due to dewatering. Mitigative strategies and monitoring related to Vault Lake (i.e. monitoring lake water level in Wally Lake) identified in the FEIS will be applied to dewatering Phaser Lake. Increased quantity of in-pit seepage is not expected to significantly increase and following dewatering, there is only a minor interference in surface water drainage of the Phaser Lake watershed. As a result, the proposed expansion of Vault Pit into Phaser Lake will similarly mitigate any of the originally predicted effects to water quantity in the FEIS; there are no significant residual impacts on water quantity due to the proposed Vault Pit expansion.

3.3.2 Surface Water Quality

Changes to surface water quality due to dewatering, operations (increased dust and fuel spills) and waste rock storage were considered in the FEIS and predicted for the Vault Operation in the Physical Environmental Impact Assessment (Cumberland 2005) to have potential effects on water quality. Best management practices will be implemented and mitigation strategies

[*] This was considered as an option in Golder (2005)- Meadowbank Gold Project Mine Waste and Water Management (Doc #500 and 485)

remain unchanged from the original FEIS assessment related to operational expansion of Vault Pit into Phaser Lake. In addition, the FEIS identified concerns related to surface water quality of run-off from the Vault waste rock storage facility potentially impacting Phaser Lake (throughout operation and closure) and Vault Lake (during closure). Water quality predictions for runoff of Vault Rock Storage Facility indicate good water quality. Vault Pit Expansion water will be collected in the sump and pumped to the Vault Attenuation pond. Surface water that will accumulate in the Vault Pit Expansion will be directed towards the Vault Attenuation pond and water quality will be monitored prior to discharge. This remains unchanged from what was proposed in the original FEIS.

During dewatering of Phaser Lake, there is a potential for the release of TSS into Wally Lake during discharge. AEM intends to transfer Phaser Lake water into the Vault Attenuation pond, treat if needed (for TSS removal) and discharge the water into Wally Lake through the diffuser in accordance with NWB Type A water License Part F Item 3. AEM is approved to dewater lakes and will follow the dewatering strategies outlined in AEM (2010) to minimize potential effects on the receiving water levels due to dewatering. AEM believes dewatering of Phaser Lake is within the scope of the original FEIS, as per NWB Type A Water Board License Part D Item 16. As a result, as per the original FEIS, there are no significant predicted residual impacts on water quality due to the proposed Vault Pit Expansion.

3.4 Fish and Fish Habitat

Prior to the acquisition of the mining rights for Meadowbank by AEM in 2007, Cumberland Resources Ltd. (Cumberland) had begun baseline studies to begin the permitting process for the alteration, disruption or destruction of fish habitat, Cumberland obtained a Nunavut Impact Review Board (NIRB) Project Certificate (No 004 – dated December 30, 2006), which required Fisheries and Oceans Canada (DFO) approval as part of the Final Environmental Impact Statement. Subsequently, a Fisheries Authorization from DFO (NU-03-0191) for the main portion of the mine site (Second and Third Portage Lakes) was provided to AEM in 2008 following DFO approval of the original NNLP with amendments (Cumberland, 2006; Azimuth, 2007). In 2012, AEM submitted a revised plan that described the impacts to fish habitat that were expected to occur, and the habitat compensation measures (under the new Fisheries Act, now referred to as offsetting) that would be implemented to re-gain the lost habitat that included losses within the Vault Lake area. This included conceptual plans to mine Vault Pit expansion, thus included Phaser Lake habitat offsetting.

Following the example of similar mining projects in the north, the original NNLP used a modified Habitat Evaluation Procedure (HEP) to calculate losses and account for them with

gains in habitat units. In 2010 and 2011, AEM revisited the original NNLP and addendums, and found discrepancies between the number of habitat units described in the plan and those in the Authorization granted by DFO. Since these discrepancies could not be accounted for by AEM, Cumberland consultants and DFO, the development of a new NNLP for the Meadowbank site was proposed by AEM and approved by DFO in 2012 with revised authorizations received in 2013.

The entire NNL Plan (AEM, 2012) is provided in Appendix C of this report (which was reviewed thoroughly by DFO (in consultation with Dr. Ken Minns), and uses a Habitat Evaluation Procedure which was approved by DFO for use at the Meadowbank and Meliadine mine sites. Because the Vault Pit Expansion was not considered part of the life of mine until recently, and due to the fact that it was not part of the Project Certificate, AEM and DFO did not include Phaser Lake in the Vault Lake Area authorization as it was not screened by NIRB in the original FEIS. However, all of the calculation of losses and gains of Phaser Lake have been accounted for in AEM (2012).

The footprint of mining activities in the Vault Lake Area (which includes Phaser Lake) is shown in Figure 3-5 of the NNL (Appendix C), including the location of pits, roads and dikes. Fish habitat losses in the Vault Lake Area have occurred in Vault Lake and are proposed for Phaser Lake. Most of Vault Lake was dewatered in 2013 and mine operations have started in the Vault Pit. The shallow passage between Vault Lake and the adjacent Wally Lake was diked in Q1 of 2013 to provide hydraulic separation for these otherwise isolated lakes. With DFO approval, a fish salvage program was conducted prior to and during dewatering in Vault Lake. With DFO approval, AEM proposes to do the same fish salvage program of Phaser Lake which will aim to transfer as many fish as possible to Wally Lake or nearby waterbodies, helping to alleviate temporary losses in fish productivity in the area.

Compared to the Portage Lakes and Vault Lake (94 ha), Phaser Lake is a small offline waterbody (25 ha). Vault Lake was connected via a semi-passable channel to the larger Wally Lake. One fish was observed crossing this passage in baseline studies (Azimuth, 2005). Adjacent to Vault Lake, Phaser Lake is small and isolated, with a maximum depth of 4-5 m. The fish populations of Vault and Phaser Lakes were examined briefly in a 2004 study for the BAEAR (Azimuth, 2005), and again in 2012 (AEM, 2012). Phaser Lake was found to contain populations of lake trout and round whitefish. There is no known sport fishing occurring in Phaser, no traditional Inuit fishing, and given that Phaser is a disconnected lake, it does not support a commercial fishery.

After mining, Vault Pit will connect Vault Lake to Phaser Lake, the Pits and former lake beds will be reflooded and the Vault Dike will be breached. Currently, Phaser Lake has limited overwintering habitat. By connecting Phaser Pit to a shallow pit additional overwintering habitat will be available in one large continuous lake that extends from Wally to Phaser Lake. Once Vault and Phaser lakes are hydraulically and chemically stable and meet water quality requirements, the Vault Dike will be removed, allowing fish from Wally Lake the ability to access Vault and Phaser Lakes (AEM, 2012). Improvement of the connection to Wally Lake from Vault Lake by deepening the channel inside the Vault Dike to a depth of at least 3 m will allow fish passage to the Phaser, Vault and Wally Lake system year-round post closure.

Overall, based on the NNLP under post closure scenarios, AEM believes this is an improvement in the fish habitat of Phaser Lake as losses to fish habitat and productivity of the system will be maintained through fish salvage and enhancements will provide a net gain in available fish habitat in Phaser Lake. As a result, the offsetting of fish habitat losses proposed within the Vault Pit Expansion is within the scope of the original FEIS and has been adequately accounted for in the revised NNLP (AEM, 2012).

3.5 Socioeconomics and Archaeology

Given the insignificant change in operations and the decrease in the overall life of mine since the original FEIS, the socioeconomic predictions in the original FEIS remain unchanged. No new archaeological sites were identified within the Vault Pit Expansion area (FMA Heritage Inc., 2010), as a result the original predicted impacts in the FEIS remain unchanged.

3.6 Cumulative Effects

Given the insignificant change in operations (waste tonnage, ore tonnage and ounces), footprint and offsetting fisheries habitat/mitigation for dewatering, the cumulative effects predicted in the original FEIS remain unchanged.

3.7 Closure

The closure concepts for Vault Pit will not significantly change from what was documented in the FEIS. Vault Pit (including the pit expansion into Phaser Lake) will be re-flooded. Flooding of Vault Area is anticipated to begin in 2020 and will include Phaser Lake. Phaser Lake volume has been estimated at 700,000 m^3 (SNC, 2013); although the volume of the Vault Pit expansion has not been estimated, the total area of Phaser Lake is presently 25.05 ha and the pit area will increase the area of Phaser Lake by only 3.94 ha, therefore reflooding is not expected to significantly change, nor is the timing of the reconnection of Phaser and Vault Lake to Wally Lake. Geochemical predictions during the FEIS (and to date) indicated that the Vault Waste

Rock will not require capping and is expected to freeze; this remains unchanged with the addition of the proposed pit expansion.

As previously stated, it is expected that under post closure scenarios, the improvement in the fish habitat of Phaser Lake and proposed enhancements will provide a net gain in available fish habitat in Phaser Lake. Phaser Lake currently has limited overwintering habitat. By connecting Phaser Pit to a shallow pit additional overwintering habitat will be available in one large continuous lake that extends from Wally to Phaser Lake. Once Vault and Phaser lakes are hydraulically and chemically stable and meet water quality requirements, the Vault Dike will be removed, allowing fish from Wally Lake the ability to access Vault and Phaser Lakes (AEM, 2012). Improvement of the connection to Wally Lake from Vault Lake by deepening the channel inside the Vault Dike to a depth of at least 3 m will allow fish passage to the Phaser, Vault and Wally Lake system year-round post closure. Details of the Vault Pit Expansion into Phaser Lake will be included in the Final Closure Plan.

SECTION 4. PUBLIC CONSULTATION

AEM has consulted with NIRB representatives, HTO and DFO regarding the Vault Pit Expansion project. Table 4.1 summarizes the consultation to date related to Vault Pit Expansion.

Table 4-1 – Vault Pit Expansion Consultation

Date	Description	Attendees
23-Feb-12	AEM presented NNL Plan concepts to HTO during site visit	Meeting with AEM and HTO at Meadowbank
30-Mar-12	Email from DFO detailing expectations for a new Meadowbank NNLP	Sent by DFO to AEM
15-Jun-12	Submission of Draft NNL Plan that included Vault Pit Expansion into Phaser Lake	Sent by AEM to DFO
19-Jul-12	Email- Comments and feedback from DFO on Draft NNL Plan; Email Entitled- Meadowbank Authorization Amendment and NNLP Contingency Plan	DFO response to AEM
13-15 Aug- 2012	Meadowbank site visit with DFO representatives- discussions included the review of DFO comments and feedback on NNL Plan and monitoring programs	DFO and AEM at Meadowbank
11-Mar-14	Presented the proposed Vault Pit Expansion for input from NIRB	NIRB and AEM by Conference call

SECTION 5. MANAGEMENT, MITIGATION AND OFFSETTING STRATEGIES FOR PREDICTED IMPACTS

The review of the potential impacts due to the Vault Pit Expansion into Phaser Lake and the incremental impact of increased activity (e.g. increased water discharge and road traffic) requires management and planning, mitigation and offsetting. Although this proposal to expand Vault Pit has new project components, activities (i.e. dewatering Phaser Lake and associated fish habitat loss), all of the proposed mitigation/monitoring will be based on existing protocols or plans that have already been approved, previously permitted or authorized. This section of the report provides a summary of mitigation, offsetting and management strategies for Vault Pit Expansion.

5.1 Water Quantity Management

Vault Area water management (including Vault Pit Expansion into Phaser Lake) was evaluated in AEM 2014. A total catchment area of 582.0 ha (which included Vault Pit, Vault Pit Expansion into Phaser Lake, Vault Attenuation Pond Drainage Area, and Rock Storage Area) was assessed and incorporated into the revised water management plan and it was determined that the infrastructure onsite could handle the Vault Pit expansion into Phaser Lake. The total volume of Phaser Lake was estimated at 700,000 m^3 and is expected to be dewatered in 3 months. Water is planned to be pumped from Phaser Lake into the Vault Attenuation Pond and send through the treatment plant, if necessary. Overall the planned Actiflo system, which has a maximum capacity of 750,000 m^3/month or 25,000 m^3/day is adequate to manage the additional volume in the Vault Attenuation pond according to SNC (2013). Water in the attenuation pond or in Phaser Lake could be used for dust suppression in the Vault Pit and on the haul roads. AEM (2010) will be followed to ensure dewatering volumes are managed according to NWB Type A Water Board License Part D Item 16. Monitoring of changes in Wally Lake level will be completed and changes in water quantity that might affect the aquatic system due to dewatering activity, will be completed as part of the Core Receiving Environmental Monitoring Program (this monitoring program is described in Section 6).

5.2 Water Quality Management

Water quality is not expected to change due to the Vault Pit Expansion into Phaser Lake as AEM predicted in the FEIS. Water quality will be monitored during the dewatering of Phaser Lake. AEM intends to transfer Phaser Lake water into the Vault Attenuation pond, treat if needed, and discharge the water into Wally Lake through the diffuser and in accordance with NWB Type A water License Part F Item 3. An Actiflo system, which has a maximum capacity of 750,000

m^3/month or 25,000 m^3/day will be used to remove TSS and will ensure the Type A Water License Part F Item 3 requirements for discharge are met.

As per reflooding plans for the closure of the Meadowbank site, AEM will monitor the water quality in Vault Lake (which includes Vault Attenuation, Vault Pit and Phaser Pit) to ensure WQ meets CCME water quality criteria for the protection of aquatic life, prior to breaching the Vault dike to ensure the protection of the aquatic environment after closure.

5.3 Offsetting Fish Habitat

Following the example of similar mining projects in the north, the original NNLP used a modified Habitat Evaluation Procedure (HEP) to calculate losses and account for them with gains in habitat units. In 2010 and 2011, AEM revisited the original NNLP and addendums, and found discrepancies between the number of habitat units described in the plan and those in the authorizations granted by DFO. Since these discrepancies could not be accounted for by AEM, Cumberland consultants and DFO, the development of a new NNLP for the Meadowbank site was proposed by AEM and approved by DFO. It was developed in accordance with DFO's No-Net-Loss (NNL) policy, which was current at the time of NNLP development, and focussed on compensation for aquatic habitats affected by HADD resulting from the Project. Since the submission of AEM (2012), there have been significant changes to the *Fisheries Act,* with the emphasis shifting from compensation for habitats affected by HADD to the concepts of offsetting potential impacts to the productivity of CRA fisheries.

Although the language has changed to reflect the new objectives of the current *Fisheries Act* (i.e., to maintain or enhance productivity of CRA fishery and avoid serious harm to fish), the original plan remains focused on changes in the availability and suitability of fish habitat, as estimated by the total number of habitat units (HU – a surrogate for productivity) before and after the expansion. The proposed use of HUs as a surrogate for estimating productivity of CRA fishery was discussed with DFO in January 2014 as part of the Meliadine offsetting plan when it was agreed that the methods of estimating habitat losses and gains under the new policy can remain similar to the requirements of the NNL policy under the previous legislation.

In view of the above agreement the following describes the offsetting (or HU gains) described in AEM (2012). Because the Vault Pit Expansion was not considered part of the life of mine until recently, and due to the fact that it was not part of the Project Certificate, AEM and DFO did not formerly include Phaser Lake losses in the Vault Lake Area authorization. However, all of the calculation of losses and gains of Phaser Lake have been accounted for in AEM (2012), and are included in the Vault Area that is authorized under DFO authorization NU 03-0191.4. The Vault

Authorization and entire NNL Plan (AEM, 2012) is provided in Appendix C of this report which was reviewed thoroughly by DFO (in consultation with Dr. Ken Minns), and uses a Habitat Evaluation Procedure which was approved by DFO for use at the Meadowbank and Meliadine mine sites.

The footprint of mining activities in the Vault Lake Area (which includes Phaser Lake) is shown in Figure 3-5 of the NNLP (see Appendix C), including the location of pits, roads and dikes. Habitat Loss in the Vault Lake Area will occur in two lakes - Vault Lake and Phaser Lake. Most of Vault Lake was dewatered in 2013. This lake will be completely dewatered in 2014. Mine operations started in Q1 2014, in the Vault Pit. The shallow passage between Vault Lake and the adjacent Wally Lake was diked in Q1 of 2013 to provide hydraulic separation for these otherwise isolated lakes. With DFO approval, a fish salvage program was conducted prior to and during dewatering in Vault Lake in 2013. With DFO approval, AEM proposes to salvage the fish from Phaser Lake which will be transferred to Wally Lake or nearby waterbodies, helping to alleviate temporary losses in productive capacity in the watershed. A site specific fishout workplan, based on Tyson et al. (2011), will be developed in consultation with DFO representatives and implemented upon approval by DFO.

Compared to the Portage Lakes and Vault Lake (94 ha), Phaser Lake is a small offline waterbody (25 ha). Vault Lake was connected via a semi-passable channel to the larger Wally Lake. One fish was observed crossing this passage in baseline studies (Azimuth, 2005). Adjacent to Vault Lake, Phaser Lake is small and isolated waterbody, with a maximum depth of 4-5 m. The fish populations of Vault and Phaser Lakes were examined briefly in a 2004 study for the BAEAR (Azimuth, 2005), and again in 2012 (AEM, 2012). Phaser Lake was found to contain a small population of lake trout and round whitefish. The total HU lost due to the proposed Vault Pit Expansion is 5.35 HUs.

After mining, Vault Pit will connect Vault and Phaser Lakes, the Pits and former lake beds will be reflooded and the Vault Dike will be breached to allow both lakes to gradually re-fill. Once these lakes are hydraulically and chemically stable (see Golder, 2005) and meet water quality requirements, the Vault Dike will be removed, allowing fish from Wally Lake access to Vault and Phaser Lakes.

Post-closure alterations to Vault and Phaser Lakes will result from construction of pits, pit caps, roads and dikes (as seen in Figure 3-5 of the NNL Appendix C). Both lakes will be expanded as a result of land-to-lake conversion in the Vault Pit. Backfilling of a portion of the pit (3.94 ha) in Phaser (or Vault Lake) to 2-4 m depth will reduce the amount of ultra-deep areas and create a

diversity of fish habitat. However, the un-filled portion of the pit will actually provide improved overwintering habitat, which is limited in these relatively shallow lakes. Further habitat improvements in these lakes will be made through development of shoals due to permanent roadway construction which will be scarified, areas of mixed substrate from temporary haul roads, and the improvement of the connecting channels between Vault and Wally Lakes, and Vault and Phaser Lakes, to allow improved fish movements. The total Habitat Unit gains for Vault Pit expansion into Phaser Lake is 12.87 HUs. In particular, the connection to Wally Lake will provide access for arctic char (after connection to W3), which were present in Vault Lake in low numbers[†] and have not been found in Phaser Lake. This specific compensation project was discussed in Section 2.2.6 and is discussed further in Section 4.2.4 of this report (AEM, 2012). Improvement of the connection to Wally Lake will involve deepening the channel inside the Vault Dike to a depth of at least 3 m, while the lake is dewatered, to allow fish passage year-round after removal of the dike. The features of Vault and Phaser Lakes post-closure are described in Table 5-1.

Table 5-1: Features of Phaser Lake and details of the changes and assumptions used to calculate habitat type areas for each feature, post-closure.

Lake	Feature Name	Description of Feature	Description of Habitat
Phaser Lake	Basin	Area in Vault Lake that is not covered by other features	Placement of coarse material for temporary roads will result in mixed substrate throughout basin area at depths based on pre-construction contours
	Vault Pit – Phaser portion	Portion of Vault Pit that overlays Phaser Lake	Backfilled to 2-4 m to provide increased habitat suitability; all substrate is coarse
	Vault Pit Cap – Phaser portion	Cap around outside of Vault Pit in in-water portion of Phaser Lake; design pending - assumed width similar to dike sides	Cap area provides coarse substrate shoal habitat; no change in depth
	Vault Pit Land-to-Lake – Phaser portion	Portion of Vault Pit – Phaser portion, that overlays land	Habitat types change based on pit excavation depths; all substrate is coarse; > 10 m is habitat type 11
	Roads	Haul road to run north-south across Phaser Lake	Simulated coarse substrate reef habitat at pre-construction depth

[†] During the 2013 Vault Lake fishout, a small population of Arctic char was found in Basin A in a small isolated, but deep basin in Vault Lake. It is expected that this population will expand and char from W3 will expand into Vault and Phaser Lake by providing improved access to a specific niche that is occupied by char.

Once screened by NIRB, AEM will work with DFO to authorize the Vault Pit Expansion into Phaser Lake. Overall, AEM will salvage as many fish as possible to maintain the fish productivity within the Wally Lake and Vault Lake system. Under post closure scenarios, AEM believes this is an improvement in the fish habitat of Phaser Lake as demonstrated in the Vault Lake Area fish habitat unit calculations in AEM (2012).

SECTION 6. SUMMARY OF MONITORING

Local fish and fish habitat in the receiving environment will be monitored to evaluate the potential impact of seepage discharge as per NWB Type A Water License Vault Attenuation discharge Part F. Although most of the impacts will be mitigated by use of a diffuser and discharge will be directed to minimize effects to the aquatic environment in Wally Lake, physical habitat (water quality and sediment quality), food supply (benthic invertebrates), and fish health could be altered. To prevent impacts to the receiving environment, sediment and erosion control measures will be implemented. Furthermore, monitoring programs will be conducted to evaluate both the physical and biological impacts - Type A Water License discharge limits will be respected, MMER monitoring will continue, and Core Receiving Environmental Monitoring Program (CREMP) monitoring will continue. The monitoring programs are discussed in the following text.

6.1 Water Level and Erosional Changes

As previously described, as per Type A Water License conditions, AEM will monitor water levels on a monthly basis and during open water season to evaluate erosional changes in Wally Lake during the dewatering of Phaser Lake. AEM does not expect any changes to occur, as Phaser Lake is part of the Wally watershed; however, if changes occur, the frequency of monitoring will increase. Mitigative options will be discussed with regulators should this occur and could include a cessation of discharge.

6.2 Dewatering and Water Quality Monitoring (MMER- EEM)

Water levels in Wally Lake will be monitored monthly at the effluent discharge station in accordance with the Water Quality and Flow Monitoring Plan (AEM, 2010). Historical water levels in Wally Lake have not been altered since the dewatering of Vault Lake, and are not expected to be altered during the dewatering and operation of Vault Pit expansion into Phaser Lake.

AEM has been monitoring the current discharge of Vault pursuant to Environment Canada's MMER. To date there have been no exceedences of MMER criteria during discharge activities of Vault Lake. This will be applied to the additional water volume that will be discharged as part of the Phaser Lake dewatering. AEM will meet the current Water License limits Part F item 3 and MMER schedule 4.

6.3 Fish Habitat Monitoring

The habitat monitoring program was finalized by AEM in consultation with DFO in 2014 (AEM, 2014) and maintains the major elements of the original 2008 version (structure, water quality, periphyton and fish use), while slightly modifying methods based on past experience, new compensation features, current life-of-mine designs and to meet the conditions of the updated Fisheries Authorizations.

Fish habitat gains at Meadowbank are derived through both physical improvements to existing habitat (e.g. creation of reefs), and the facilitation of access to new habitat (e.g. previously fishless or underutilized areas). As per the Vault area authorization both physical and ecological components will be monitored and documented as to whether each feature is constructed and is functioning as intended. Table 6-1 summarizes the habitat compensation monitoring that will be undertaken for the Vault Pit expansion.

Table 6-1 – Vault Area Habitat Compensation Monitoring (taken from AEM, 2014)

Table 6. Summary of monitoring methods, analytical parameters, sampling frequency and number of samples for compensation features constructed in the Vault and Phaser basins (Under DFO NU-03-0181.4). Year of re-flooding completion est. 2023 (F). Year of dike breach est. 2025.

Compensation Feature	Component	Reason	Method	Parameters	Number of Samples	Sampling Schedule
Basin	Structure	Design intent met	Air photos Field survey	Area, substrate, depth zone	-	Prior to flooding
	Open basin water quality*	Possible metals leaching, anoxia	Tube sampler Grab samples Depth profiles	Conventional parameters; Anions;Nutrients; Organic parameters;Total and dissolved metals	1 per basin	3x yr from F until dike breach Afterwards, per CREMP
	Fish use	Confirm use (re-flooded basin and at dike breach)	Angling Underwater motion camera Hoopnets	CPUE Physical characteristics	TBD by field staff	2025 2030
Roads	Structure	Design intent met	Air photos Field survey	Area, substrate, depth zone	-	Prior to flooding
		Stability	Underwater camera	Qualitative observations	Representative transect TBD by field staff	2025 (post flooding)
Pits	Structure	Design intent met	Air photos Field survey	Area, substrate, depth zone	-	Prior to flooding

*Monitoring and sampling protocols will be developed and conducted in-line with CREMP sampling

Table 6. Summary of monitoring methods, analytical parameters, sampling frequency and number of samples for access enhancement compensation features (Under DFO NU-03-0181.3 and DFO NU-03-0181.4).

Feature	Component	Reason	Method	Parameters	Number of Samples	Sampling Schedule
Dogleg Ponds	Structure	Design intent met (monitor water levels, especially access to Dogleg North)	Bathymetric survey	Area of ponds, depth of access channels	All three ponds and connecting channels	2015, 2017, 2019, 2021 (Odd-numbered years); 2025
	Fish use	Confirm use by fish	Angling Underwater motion camera	CPUE Physical characteristics	TBD by field staff	Odd-numbered years until 2021; 2025
W3 Access	Structure	Design intent met (W3 passage constructed as intended)	Bathymetric survey	Width, depth of excavation	-	Upon completion
	Fish use	Confirm movement of Arctic char into Wally Lake	Hoopnets at channel	CPUE Physical characteristics	TBD by field staff	Odd-numbered years after completion 2025 2030

6.4 Core Receiving Environmental Monitoring

The Core Receiving Environmental Monitoring Program (CREMP) will monitor receiving environment at randomly selected stations throughout Wally Lake (See Figure 3.1 from 2011 CREMP Report, Azimuth, 2012) and include the following components:

- Water chemistry data will be collected up to 6 months per year (April, May, July, August, September and November/December -depending on logistical constraints - e.g., snow and ice conditions). Two randomly located subsamples will be collected at each station in each month. All samples are surface samples (3 m from the surface). In addition to the core water chemistry program, basic water quality data will be collected at key near-field areas (including Second Portage Lake) at least once mid-winter to reduce uncertainty regarding the potential occurrence of changes over winter.
- Sediment chemistry core sampling for the CREMP is intended to detect long term trends, therefore a sampling frequency of approximately every three years is recommended or will be aligned with the sampling times for benthic invertebrates required for the EEM program.
- Sediment chemistry grab sampling that matches benthic invertebrate sampling (i.e., once per year) are collected to ensure basic physical variables (e.g., particle size) not covered by sediment core sampling (due to volume limitations) but which may nevertheless affect benthic invertebrates.
- Phytoplankton is collected at the same time as the water chemistry data are collected, but only the open water samples (July to September). Two randomly located

subsamples will be collected at each station for each sampling event. All samples should be surface samples (3m from the surface).

- Benthic invertebrates are collected once per year in August at all stations, with 5 subsamples per station.

The CREMP monitoring program is an iterative process and the study design is revisited periodically based on accumulated data to ensure the ability of the CREMP to detect impacts to the receiving environment. Between erosion control measures, water quality monitoring prior to discharge, routine MMER monitoring and CREMP monitoring, the potential impacts to the receiving environment due to the Vault Pit Expansion will be adequately evaluated.

SECTION 7. REFERENCES

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