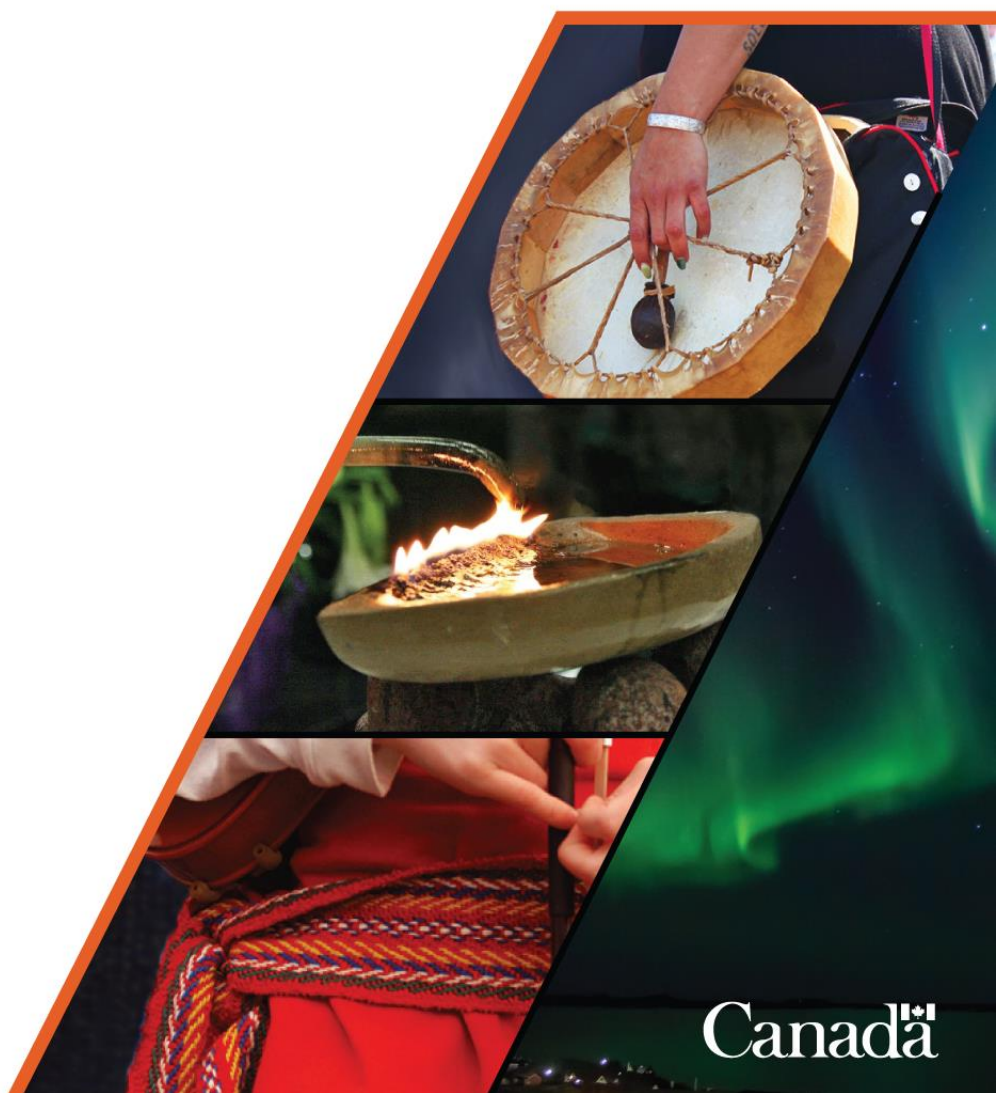




Updates on Technical Review Comments

AEM's FEIS Addendum for the Meliadine Extension Project Proposal

March 15, 2023



2.0 TECHNICAL REVIEW COMMENTS

Review Comment #	CIRNAC-TRC #1
Subject / Topic	Discovery Waterline
References	Meliadine Extension FEIS Addendum, July 2022 Appendix D-35 – Water Management Plan Appendix H-07 – Meliadine Extension Water Balance and Water Quality Model - Technical Report CIRNAC Information Requests (CIRNAC-IR-1) (September, 2022) AEM Responses to Information Requests (CIRNAC-IR-1, SDFN/NDFN-IR-2, KivIA-IR-9) (September 26, 2022)
Summary	The Meliadine Extension FEIS Addendum lacks details regarding the design and operation of the Discovery waterline, as well as any associated environmental impacts and mitigation measures. AEM's responses to Information Requests (IRs) provide clarity regarding the proposed waterline and how it might impact the environment. The responses also identify measures AEM will take to eliminate or reduce such impacts. CIRNAC is satisfied with the proposed mitigations and recommends that they be formally documented in the form of terms and conditions, should the project be approved.
Importance of Issue to Impact Assessment	Formal commitments to appropriate design, monitoring, operation and management of the Discovery waterline are required as part of the amendment to ensure that potential impacts to the environment are eliminated or mitigated. Commitments to this end should be explicitly incorporated into any approvals issued for the Meliadine Extension.
Detailed Review Comment	<p>Saline and surface contact water collected at the Discovery site will be conveyed through a 21-km waterline (with a maximum diameter of 10 inches) to the Saline Effluent Treatment Plant (SETP), where it will be treated prior to discharge into the receiving environment (Itivia Harbour) using the previously approved waterline. The FEIS Addendum does not describe the Discovery waterline, or how it will be operated. In addition, potential environmental interactions and impacts associated with the Discovery waterline are not assessed. To address these information gaps, CIRNAC-IR-1 requested that AEM:</p> <p>a) Provide descriptions of the Discovery waterline infrastructure (physical characteristics, placement, alignment, operation, etc.).</p> <p>b) Provide an assessment of potential environmental interactions and impacts associated with the Discovery waterline.</p> <p>For the purpose of the current Environmental Assessment (EA) process, item a) was addressed adequately in AEM's response to SDFN/NDFN-IR-2 and KivIA-IR-9. Regarding item b), AEM's response to CIRNAC-IR-1 presents a high-level summary of the potential environmental interactions and impacts associated with the Discovery waterline. In addition, AEM's response to SDFN/NDFN-IR-2 indicates that the mitigation measures that are being applied to the approved waterline from Meliadine Mine to Itivia Harbour will also be applied to the Discovery waterline. This includes the following:</p> <ul style="list-style-type: none"> • Implementing a leak detection system; • Implementing an emergency response number; • Covering the waterline; • Placing markers along the waterline; and • Testing the waterline prior to each discharge season. <p>The above-noted commitments address CIRNAC's concern.</p>
Recommendation / Request	CIRNAC recommends that any approvals issued for the Meliadine Extension include terms and conditions requiring that the Discovery waterline be designed, constructed and operated in a fashion that implements the same environmental impact controls as are



Review Comment #	CIRNAC-TRC #1
	<p>required for the approved waterline from the Meliadine Mine to Itivia Harbour. At a minimum, those controls shall include:</p> <ul style="list-style-type: none"> • Implementing a leak detection system; • Implementing an emergency response number; • Covering the waterline; • Placing markers along the waterline; and • Testing the waterline prior to each discharge season.
Updates on March 15, 2023	<p>This TRC is considered to be resolved pending fulfilling the following commitments made by AEM:</p> <ul style="list-style-type: none"> • AEM updates the Spill Contingency Plan, Water Management Plan, and Adaptive Management Plan within 90 days following the issuance of the Project Certificate (PC) to include nomenclature around the Discovery waterline, specific to the mitigation measures that were included within the Spill Contingency Plan updated during the Waterline Application. • The existing relevant terms and conditions (#119, 124, 125 and 134) of PC 006 Amendment 02 be revised to include that all commitments made for the approved waterline would also be required for the Discovery waterline, should the project be approved. <p>Status: Resolved conditionally</p>

Review Comment #	CIRNAC-TRC #2
Subject / Topic	In-Pit Disposal of Tailings and/or Waste Rock
References	<p>Meliadine Extension FEIS Addendum, July 2022 Appendix D-18 – Conceptual Closure and Reclamation Plan Appendix D-21 – Mine Waste Management Plan Appendix H-06 – Hydrogeology Modelling Report Appendix H-07 – Meliadine Extension Water Balance and Water Quality Model - Technical Report CIRNAC Information Requests (CIRNAC-IR-2) (September, 2022) AEM Responses to Information Requests (CIRNAC-IR-2) (September 26, 2022)</p>
Summary	<p>The Meliadine Extension FEIS Addendum identifies the disposal of waste rock and tailings in mined-out pits as a waste management option. However, minimal information has been provided on the proposed in-pit disposal methods and potential environmental implications. For example, the FEIS Addendum does not evaluate potential interactions/impacts between the mine wastes that would be stored in pits and the surface/groundwater environment. Additional information and analysis should be provided before in-pit disposal at the Meliadine Mine is authorized to proceed.</p>
Importance of Issue to Impact Assessment	<p>There is currently insufficient information to demonstrate that in-pit disposal of tailings and waste rock can be implemented without resulting in significant environmental impacts. Further, in the absence of any information evaluating potential interactions between the disposed mine wastes and the environment, there is uncertainty regarding whether in-pit disposal is an environmentally superior alternative to the currently approved tailings and waste rock disposal practices.</p>
Detailed Review Comment	<p>As part of the current assessment, AEM is seeking approval for the following options/alternatives to complement the current mine waste management strategy:</p> <ul style="list-style-type: none"> • use of exhausted pits to store tailings; and • use of exhausted pits to store waste rock.



Review Comment #	CIRNAC-TRC #2
	<p>The FEIS Addendum indicates that in-pit disposal has been approved for the Meadowbank Mine and, on that basis, AEM suggested that in-pit disposal should not be included in the scope of the current Meliadine reconsideration process. CIRNAC notes that, in the case of Meadowbank, AEM completed a broad array of site-specific baseline studies and analyses that were considered when in-pit disposal was assessed, prior to the practice being approved. For the Meliadine Mine, there is limited evidence that similar studies have been performed. For example, the FEIS Addendum and supporting documents provide limited information regarding how in-pit disposal would be applied at the Meliadine site. In addition, the FEIS Addendum does not evaluate the potential environmental interactions and impacts associated with in-pit disposal. For instance, analyses of potential impacts to groundwater quality/quantity and surface water quality/quantity are not provided. In the absence of this information, CIRNAC is unable to determine whether in-pit disposal might result in significant adverse environmental impacts at the Meliadine Mine. To address these information gaps, CIRNAC-IR-2 recommended that AEM:</p> <ul style="list-style-type: none"> a) Describe the in-pit disposal methods, general design parameters, operating practices and limitations; b) Describe the specific circumstances that would trigger the option to use in-pit disposal; c) Describe the evaluations that would be done prior to regulatory approval of in-pit disposal (e.g., updated site-specific hydrogeological and geochemical modelling, etc.); d) Describe expected closure approaches (e.g., water and/or granular covers); and e) Provide an assessment of potential environmental interactions and impacts associated with in-pit disposal. <p>AEM's response to CIRNAC-IR-2 provided limited additional information to address the above-noted recommendations. Instead, AEM's response generally indicated that the requested information would be provided to the Nunavut Water Board (NWB) during the Type A Water Licence Amendment process.</p> <p>In the absence of the requested information, CIRNAC is unable to evaluate the environmental impacts of in-pit disposal at the Meliadine Mine. Relying exclusively on the evaluation of in-pit tailings disposal at another site (i.e., the Meadowbank Mine) is not an acceptable surrogate for site-specific evaluations of potential environmental impacts at the Meliadine Mine. For example, there are potentially substantive differences between the geochemical properties of mine wastes, groundwater regimes and surface water context of the Meadowbank and Meliadine sites, all of which have the potential to influence the impacts of in-pit disposal.</p>
<p>Recommendation / Request</p>	<p>CIRNAC recommends that AEM provide the following information :</p> <ul style="list-style-type: none"> a) Detailed descriptions of the in-pit disposal methods, quantities, design parameters, operating practices and limitations; b) Descriptions of the specific circumstances that would trigger the option to use in-pit disposal; c) Site-specific technical evaluations of hydrogeological and geochemical conditions associated with in-pit disposal. This should include updated surface and groundwater quality predictions of water in or draining from pits that are used for the disposal of tailings or waste rock; d) Conceptual closure plans for any pits filled with tailings and waste rock (e.g., water and/or granular covers); e) Assessments of potential environmental interactions and impacts associated with in-pit disposal. At minimum, interactions and impacts should be assessed quantitatively for surface water quality/quantity and groundwater quality/quantity. Predictions of operational and post-closure pit water quality should also be



Review Comment #	CIRNAC-TRC #2
	<p>provided. Where necessary, appropriate mitigations are to be identified and implemented; and</p> <p>f) Provide evidence that in-pit disposal is an environmentally superior alternative to the currently approved tailings and waste rock disposal practices at the Meliadine Mine site.</p>
<p>Updates on March 15, 2023</p>	<p>Since the Technical Session, AEM has provided multiple supplemental analyses related to the disposal of tailings and waste rock in mined-out pits. Collectively, AEM concluded these assessments indicate that deposition of tailings and waste rock in pits could occur without resulting in significant environmental impacts. However, AEM also indicated that pit filling would need to occur based on site-specific designs for each pit, taking into consideration source terms, pit properties, fill depths, closure strategies, etc. AEM has committed to implementing such pit-specific designs through the NWB process.</p> <p>Based on this commitment and the findings of the supplemental analyses since the Technical Session, CIRNAC generally supports AEM's conclusion that deposition of tailings and waste rock in mined-out pits is unlikely to result in significant adverse impacts, if appropriate analysis and controls are put in place prior to deposition. To ensure this occurs, CIRNAC recommends that a set of new terms and conditions be incorporated into the Project Certificate and/or an amended Water Licence, if the Meliadine Extension is authorized to proceed. At minimum, the topics that should be addressed by the new terms and conditions should include the following:</p> <ol style="list-style-type: none"> 1) Definition of acceptable environmental quality criteria in pits (water and sediment); 2) Characterization of source terms for specific pits; 3) Analysis and selection of placement methods and quantities/fill depths; 4) Pit-specific closure strategies (e.g., wet or dry covers); 5) Monitoring and adaptive management strategies; 6) Adjustments to authorized volumes to be disposed in terrestrial facilities; 7) Updates to Water Quality and Water Balance models; 8) Review periods for pit-specific designs and associated studies. <p>Issue Status: CIRNAC considers the issue to be moving towards resolution, provided that appropriate terms and conditions are developed.</p>

Review Comment #	CIRNAC-TRC #3
Subject / Topic	Temporary Storage of Saline and Surface Contact Water in Pits
References	<p>Meliadine Extension FEIS Addendum, July 2022 (S2.5.3)</p> <p>Appendix D-35 – Water Management Plan</p> <p>Appendix H-07 – Meliadine Extension Water Balance and Water Quality Model – Technical Report</p> <p>CIRNAC Information Requests (CIRNAC-IR-3) (September 2022)</p> <p>AEM Responses to Information Requests (CIRNAC-IR-3) (September 26, 2022)</p>
Summary	<p>Section 2.5.3 of the Meliadine Extension FEIS Addendum clearly indicates that exhausted open pits may be used as an alternative for temporary saline and surface contact water storage. However, minimal information has been provided on the proposed use of the pits for temporary water storage. In addition, insufficient information has been provided on the potential environmental implications of the practice.</p>
Importance of Issue to Impact Assessment	<p>There is currently insufficient information to demonstrate that storage of contact water in pits will occur without resulting in significant environmental impacts. Furthermore, there is uncertainty regarding whether the storage of contact water in pits is an environmentally superior alternative when compared to the currently approved water management practices (i.e., storage of saline and surface contact water in ponds).</p>
Detailed Review Comment	<p>Section 2.5.3 of the FEIS Addendum clearly indicates that exhausted open pits may be used as an alternative for temporary saline an surface contact water storage. However,</p>



Review Comment #	CIRNAC-TRC #3
	<p>other than identifying the pits that are being considered for water storage (i.e., TIR02, WES04 and WES05 see Fig 2.5-3), the FEIS Addendum and supporting documents do not contain any information on the alternative. For example:</p> <ul style="list-style-type: none"> • The FEIS Addendum does not evaluate potential environmental interactions and impacts associated with temporary storage of contact water in pits; • The Water Balance and Water Quality Model (Appendix H-07) does not account for storage of water in pits; and • The Water Management Plan (Appendix D-35) does not describe how water stored in pits will be managed. <p>In summary, the FEIS Addendum and supporting documents present insufficient information to assess the environmental implications of storing water in pits. To address these information gaps, CIRNAC-IR-3 requested that AEM:</p> <ol style="list-style-type: none"> Describe the approaches that will be used to store contact water in pits including general design parameters, operating practices and limitations (e.g., volumes stored, storage duration, any required treatment, eventual discharge to the environment); Describe the specific circumstances that would trigger the option to store contact water in pits; Describe the evaluations that would be done prior to regulatory approval of in-pit storage of contact water (e.g., updated site-specific hydrogeological and geochemical modelling); and Provide an assessment of potential environmental interactions and impacts associated with storing contact water in pits. <p>AEM's response to CIRNAC-IR-3 provided limited additional information to address requests noted above. For instance, in the case of item a), AEM indicated that the requested information would be addressed during the Type A Water Licence Amendment process with the NWB. With regard to item b), AEM referred to documentation that has already been provided in the FEIS submission. For item c), AEM states they will provide 60 days notice prior to initiating water storage in pits, but there is no indication that further studies will be performed. Finally, AEM's response to item d) refers only to permafrost interactions and impacts, with no reference to other impact mechanisms (e.g., geochemical and/or hydrological interactions).</p> <p>In the absence of detailed responses to the requests presented in CIRNAC-IR-3, CIRNAC is unable to evaluate the environmental impacts of storing saline and surface contact water in pits.</p>
<p>Recommendation / Request</p>	<p>CIRNAC recommends that AEM provide comprehensive responses to each of the following:</p> <ol style="list-style-type: none"> Describe the approaches that will be used to store contact water in pits including general design parameters, operating practices and limitations (e.g., volumes stored, storage duration, any required treatment, eventual discharge to the environment); Describe the specific circumstances that would trigger the option to store contact water in pits; Describe the evaluations that would be done prior to regulatory approval of in-pit storage of contact water (e.g., updated site-specific hydrogeological and geochemical modelling); Provide an assessment of potential environmental interactions and impacts associated with storing contact water in pits. At minimum, interactions and impacts should be assessed quantitatively for surface water quality/quantity and groundwater quality/quantity; and



Review Comment #	CIRNAC-TRC #3
	e) Provide evidence that contact water storage in mined-out pits is an environmentally superior alternative when compared to the currently approved water management practices.
Updates on March 15, 2023	<p>CIRNAC considers this TRC is to be resolved for the purpose of the Environmental Assessment, provided that AEM commits to submit the following information during subsequent Water Licencing processes:</p> <ul style="list-style-type: none"> Operational details on the storage of water in pits, including but not limited to: the volume and quality of water to be stored in each pit, the anticipated duration of storage and environmental monitoring of stored water. Pit-specific quantitative analysis of interactions between stored water and the groundwater regime. <p>Issue Status: CIRNAC considers the issue to be moving towards resolution, provided that appropriate terms and conditions are developed.</p>

Review Comment #	CIRNAC-TRC #4
Subject / Topic	Minimizing Discharges to Meliadine Lake
References	<p>Meliadine Extension FEIS Addendum, July 2022 Appendix D-01 – Adaptive Management Plan for Water Management Appendix H-07 – Meliadine Expansion Water Balance and Water Quality Model - Technical Report AEM response to CIRNAC TRC-05 from the Waterline Review Process CIRNAC Information Requests (CIRNAC-IR-6) (September, 2022) AEM Responses to Information Requests (CIRNAC-IR-6) (September 26, 2022)</p>
Summary	The FEIS Addendum for the Meliadine Extension indicates that discharges to Meliadine Lake will be more than 300% greater than discharges that were predicted during the most recent Environmental Assessment (EA) process for the site (i.e., the EA for the Meliadine Waterline). Additional information is required to demonstrate that this increase aligns with AEM's commitment to minimize discharges to Meliadine Lake.
Importance of Issue to Impact Assessment	The FEIS Addendum for the Meliadine Extension indicates that discharges to Meliadine Lake will be significantly greater than previously predicted. Further information on the causes of these increases is necessary to understand the potential incremental impacts associated with the Meliadine Extension.
Detailed Review Comment	<p>During the NIRB review of AEM's proposal for the "Saline Effluent Discharge to the Marine Environment", AEM developed an Adaptive Management Plan (AMP) for Water Management. The AMP was submitted as Appendix D-01 to the FEIS Addendum for the Meliadine Extension. The first guiding principle of the AMP is as follows:</p> <p><i>1. Water discharges to Meliadine Lake will be minimized or eliminated (per commitment made during the waterline application and reflected in Term and Condition 25a, per Project Certificate No.006 – Amendment 002).</i></p> <p>At the time of the Waterline EA, AEM indicated that discharges to Meliadine Lake would be significantly lower than had been predicted during the original approval of the Meliadine Mine (per the 2014 FEIS). Specifically, the Waterline EA indicated that the maximum volume of water requiring discharge to Meliadine Lake would be 4,034 m³/day if the waterline was approved (see AEM response to CIRNAC TRC-05 from the Waterline Review process). Assuming water is also discharged via the waterline at a maximum rate of 20,000 m³/day, discharges to Meliadine Lake were therefore predicted to represent only 17% of all discharges (with the remaining 83% being discharged to Itivia Harbour).</p> <p>In contrast, the FEIS Addendum for the Meliadine Extension Project (Appendix H-07 S.5.1.4) states:</p>

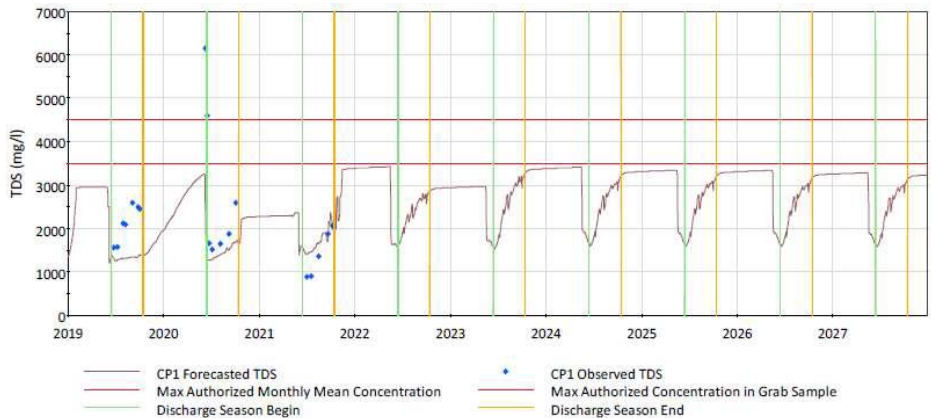


Review Comment #	CIRNAC-TRC #4
	<p><i>The maximum predicted annual discharge volume to Meliadine Lake translates to a daily maximum discharge rate of 17,200 m³/day assuming that the EWTP discharges continuously over the full discharge window of 151 days between June 2 and October 30.</i></p> <p>Under this scenario, discharges to Meliadine Lake would be more than 300% greater than predicted at the time of the Waterline EA. In addition, the proportion of discharges to Meliadine Lake would also increase to 46% (with the remaining 54% being discharged to Itivia Harbour).</p> <p>Based on our review of the FEIS Addendum for the Proposed Project, CIRNAC is unable to identify the rationale for the substantive increases in the volume of discharges to Meliadine Lake relative to the volumes that were predicted at the time the Waterline EA was approved. In addition, CIRNAC has not identified information to confirm that discharges to Meliadine Lake will be minimized under the Meliadine Extension proposal. To address these information gaps, CIRNAC-IR-6 requested that AEM:</p> <ul style="list-style-type: none"> a) Confirm the maximum discharge volumes to Meliadine Lake, as presented in the Waterline FEIS and the Meliadine Extension FEIS; b) Present the rationale for any differences in the volumes reported under a); and c) Indicate what steps will be taken to fulfill the commitment to minimize or eliminate discharges to Meliadine Lake (e.g., ongoing grouting to limit saline water inflows to the mine). <p>AEM's response to CIRNAC-IR-6 provided limited additional information to address the requests noted above. For instance, in the case of item a), AEM cited the maximum discharge volumes associated with the 2014 FEIS, not the Waterline FEIS. Regarding item b), AEM's stated rationale is insufficient to explain the more than 300% increase in discharges to Meliadine Lake under the Meliadine Expansion FEIS relative to the Waterline FEIS. Finally, for item c), given the predicted 300% increase in discharges to Meliadine Lake under the Meliadine Extension FEIS relative to the Waterline FEIS, CIRNAC does not support AEM's position that discussions regarding the steps AEM will take to fulfill their commitment to minimize discharges to Meliadine Lake should be deferred to the Type A Water Licence Amendment process with the NWB.</p>
Recommendation / Request	<p>CIRNAC recommends that AEM¹:</p> <ul style="list-style-type: none"> a) Confirm the maximum discharge volumes to Meliadine Lake, as presented in the Waterline FEIS and the Meliadine Extension FEIS; b) Present the rationale for any differences in the volumes reported under a); and c) Indicate what steps will be taken to fulfill the commitment to minimize or eliminate discharges to Meliadine Lake (e.g., ongoing grouting to limit saline water inflows to the mine).
Updates on March 15, 2023	<p>From technical point of view CIRNAC has concluded that this issue is classified as resolved as the volumetric discharges to Meliadine Lake under the extension are less than those that were assessed under the 2014 FEIS. As such, it is CIRNAC's opinion that the activity was already approved under the existing project certificate.</p>

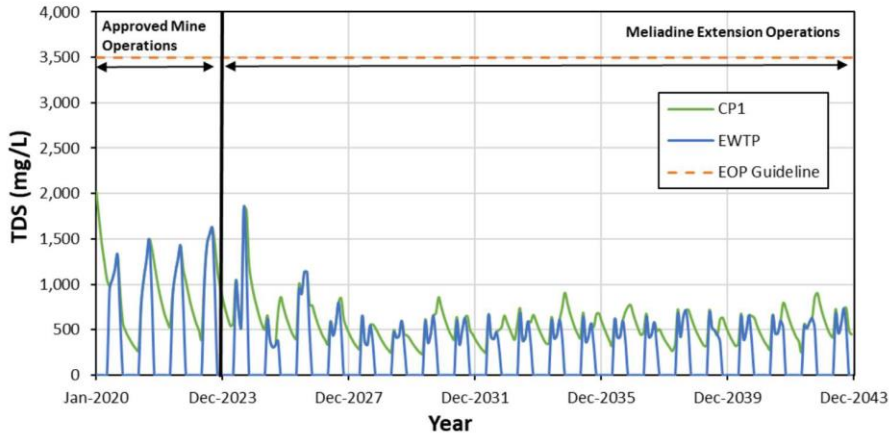
¹ The same recommendations were included in CIRNAC-IR-6. AEM's response to the IR did not provide sufficient information for CIRNAC to evaluate the incremental environmental impacts associated with the Meliadine Extension. As a result, the recommendations are repeated in the current TRC. If there is uncertainty regarding the intent of the recommendations, AEM is encouraged to contact CIRNAC for clarification.



Review Comment #	CIRNAC-TRC #4
	<p>However, CIRNAC would like to make a note that as it's a major issue raised by KivIA, CIRNAC supports KivIA's lead on this issue and recommends that AEM take actions to address KivIA's concerns.</p> <p>Issue Status: The issue is considered resolved if the volume of discharges to Meliadine Lake remain below the volumes that were assessed in the 2014 FEIS.</p>

Review Comment #	CIRNAC-TRC #5
Subject / Topic	Total Dissolved Solids (TDS) Concentrations in CP1
References	<p>Meliadine Extension FEIS Addendum, July 2022</p> <p>Appendix H-07 – Meliadine Expansion Water Balance and Water Quality Model - Technical Report</p> <p>2021 Meliadine Annual Report (as submitted to the NIRB)</p> <p>CIRNAC Information Requests (CIRAC-IR-7) (September, 2022)</p> <p>AEM Responses to Information Requests (CIRNAC-IR-7) (September 26, 2022)</p> <p>NIRB Direction to AEM Regarding Information Requests (September 9, 2022)</p>
Summary	AEM indicates that the Meliadine Extension does not include material changes to the mining practices that were previously approved. Nonetheless, the FEIS for the Meliadine Extension predicts that concentrations of Total Dissolved Solids (TDS) in contact water collected by the project will now be 70% lower than predictions that were prepared as recently as 2021. CIRNAC requires additional information to understand the rationale for these substantive reductions and to determine whether they might be relevant to environmental impacts of the Meliadine Extension.
Importance of Issue to Impact Assessment	The FEIS for the Meliadine Extension presents TDS predictions that deviate significantly from prior predictions. Additional information is required to demonstrate why the predictions have changed and to determine how the new predictions might influence potential environmental impacts.
Detailed Review Comment	<p>Higher than expected TDS concentrations in mine contact water at the Meliadine Mine have triggered several major changes since the project was originally approved. Those changes include: a) an amendment to the Water Licence No. 2AM-MEL1631 to increase the TDS effluent quality criterion (EQC) for discharges to Meliadine Lake from 1,400 mg/L to 3,500 mg/L; and b) the addition of a waterline to discharge mine contact water to Itivia Harbour. Concentrations of TDS in Collection Pond 1 (CP1) are used as an indicator of TDS management challenges experienced at the site. The following figure, which was extracted from AEM's 2021 Annual Report to the NIRB, indicates that maximum TDS concentrations in CP1 will consistently approach the Emergency Amendment discharge criterion of 3,500 mg/L.</p>  <p>In contrast, the following figure was extracted from Appendix H-07 (Figure 6-4) of the FEIS Addendum. In this case, concentrations of TDS in CP1 are predicted to remain well</p>



Review Comment #	CIRNAC-TRC #5
	<p>below 1,000 mg/L after 2026. This represents a reduction of more than 70% when compared to the predictions presented in the 2021 Annual Report.</p>  <p>Based on review of the FEIS Addendum, CIRNAC was unable to determine why TDS concentrations in CP1 are now predicted to be substantively lower than previously anticipated. While AEM's response to CIRNAC-IR-7 provided explanations of changes to the modelling assumptions used by AEM, further information is necessary to demonstrate the basis for predicted TDS concentrations in CP1 dropping by more than 70% when compared to the most recent prior predictions.</p>
Recommendation / Request	<p>CIRNAC requests that AEM:</p> <ol style="list-style-type: none"> Present a detailed, quantitative description of the factors that resulted in predicted TDS concentrations in CP1 reducing by more than 70% under the proposed Meliadine Extension.²
Updates on March 15, 2023	Issue status: Resolved

Review Comment #	CIRNAC-TRC #6
Subject / Topic	Post-Closure Arsenic Loadings from SP B7 to Tiri Pit Lake
References	<p>Meliadine Extension FEIS Addendum, July 2022 Appendix H-07 – Meliadine Extension Water Balance and Water Quality Model - Technical Report CIRNAC Information Requests (CIRNAC-IR-8 and CIRNAC-IR-9) (September, 2022) AEM Responses to Information Requests (CIRNAC-IR-8 and CIRNAC-IR-9) (September 26, 2022)</p>
Summary	During the post-closure phase, concentrations of arsenic in some water bodies are elevated relative to baseline conditions. Additional information is required to demonstrate that elevated arsenic concentrations will remain below impact threshold concentrations.
Importance of Issue to Impact Assessment	There is currently insufficient information to demonstrate that arsenic concentrations will remain below impact thresholds in all areas of all water bodies during the post-closure phase. As a result, CIRNAC is unable to confirm that significant adverse impacts will not occur.
Detailed Review Comment	As shown in Figure 6-19 from Appendix H-07 of the FEIS Addendum (reproduced below), arsenic concentrations in SP B7 are predicted to be consistently above the Aquatic Effects Management Plan (AEMP) guideline of 0.025 mg/L.

² Consistent with NIRB's direction to AEM (September 9, 2022), AEM's response to CIRNAC-IR-7 committed to addressing this information requirement during the Technical Review phase of the current EA.



Review Comment #	CIRNAC-TRC #6
	<div data-bbox="570 254 1484 747"> </div> <p data-bbox="565 764 1523 877">AEM has indicated that the guideline will not apply to SP B7 because the waterbody will be designated under Schedule 2 of the MDMER. CIRNAC defers to ECCC and DFO on the Schedule 2 designation and any Fisheries Act implications associated with the elevated arsenic concentrations in SP B7.</p> <p data-bbox="565 909 1523 993">CIRNAC notes that water draining from SP B7 will flow into the Tiri Pit Lake during post-closure. In this regard, Figure 6-31 from Appendix H-07 (reproduced below) presents the predicted arsenic concentrations in the Tiri Pit Lake throughout post-closure.</p> <div data-bbox="570 1035 1330 1444"> </div> <p data-bbox="565 1461 1523 1514">When considering the predicted arsenic concentrations presented in the above figure, CIRNAC notes the following:</p> <ul data-bbox="613 1549 1523 1831" style="list-style-type: none"> • AEM's response to CIRNAC-IR-9 b) indicates that water quality predictions presented in the FEIS Addendum are based on complete mixing in pit lakes and that no stratification or initial dilution zone considerations have been incorporated into model predictions. Consequently, some areas of the Tiri Pit Lake will have arsenic concentrations above the values shown in the above figure. For instance, drainage from SP B7 will create locally elevated arsenic concentrations within the Tiri Pit Lake near the point of discharge. The spatial extents of the elevated arsenic concentrations are not presented in the FEIS Addendum. Therefore, it is unclear whether some areas of the Tiri Pit Lake will have arsenic concentrations above the AEMP guideline.

Review Comment #	CIRNAC-TRC #6
	<ul style="list-style-type: none"> Arsenic concentrations in the Tiri Pit Lake trend upwards throughout the post-closure phase and it appears that equilibrium has yet to be reached by the end of the model run. Long-term modelling performed by AEM for other mine sites (e.g., the Whale Tail Pit Project) concluded that water quality predictions are accurate within one order of magnitude. The current FEIS Addendum does not specify the assumed level of accuracy of predictions. Therefore, it is unclear to CIRNAC whether the information presented in the above figure represents the upper bound of potential arsenic concentrations in Tiri Pit Lake.
Recommendation / Request	<p>CIRNAC recommends that AEM³:</p> <ol style="list-style-type: none"> Extend the duration of water quality modelling until results demonstrate that maximum concentrations within surface water receivers have been achieved; Indicate the spatial extent of areas within the Tiri Pit Lake and other surface water receivers that are predicted to exceed any AEMP criteria during post-closure; Indicate the approximate accuracy of the water quality modelling presented in the FEIS Addendum. If the accuracy is better than the “order of magnitude” estimates presented by AEM in other assessments, please describe how the accuracy was improved; and Describe the sensitivity analyses that have been performed to confirm that post-closure arsenic concentrations in the Tiri Pit Lake and other water bodies will not be substantively greater than predicted.
Updates on March 15, 2023	<p>The revised WQWBM submitted by AEM as part of their NWB Water Licence amendment application indicates that post-closure arsenic concentrations in Tiri Pit Lake will be below the AEMP threshold. As a consequence, the issue is considered resolved for the purposes of the EA. However, the topic will need to be evaluated throughout the operational phase and closure planning process.</p> <p>Issue status: Resolved</p>

Review Comment #	CIRNAC-TRC #7
Subject / Topic	Post-Closure Seepage Quality from Reclaimed Areas
References	<p>Meliadine Extension FEIS Addendum, July 2022</p> <p>Appendix H-07 – Meliadine Extension Water Balance and Water Quality Model - Technical Report</p> <p>CIRNAC Information Requests (CIRNAC-IR-10) (September, 2022)</p> <p>AEM Responses to Information Requests (CIRNAC-IR-10) (September 26, 2022)</p>
Summary	<p>AEM's post-closure water quality modelling assumes that reclaimed areas of the site will not result in chemical loadings to the environment that are higher than background. Evidence supporting this assumption is required.</p>
Importance of Issue to Impact Assessment	<p>Even after closure, reclaimed areas of mine sites have the potential to leach metals into the environment at concentrations that are above background. Exclusion of these sources from water quality modelling could result in an under-prediction of potential environmental impacts.</p>
Detailed Review Comment	<p>The Water Balance and Water Quality Model (Appendix H-07, Table 4-9) states:</p>

³ Similar recommendations were presented in CIRNAC-IR-8 and CIRNAC-IR-9. AEM provided incomplete responses to those recommendations and/or indicated that the recommendations should be addressed during the Type A Water Licence Amendment process with the NWB. However, given that the FEIS Addendum presents water quality predictions that are substantively different from those presented in earlier Environmental Assessments, CIRNAC is of the opinion that they should be considered in the current EA process. In addition, CIRNAC notes that NIRB's letter to AEM (September 9, 2022) stated that the topics should be addressed during the NIRB Technical Review process.



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	<p><i>All mine facilities areas, ore pads, and disturbed areas will be reclaimed at the end of operations. These areas will revert to background water quality at closure.</i></p> <p>In their response to CIRNAC-IR-10, AEM confirmed that water quality modelling presented in the FEIS Addendum assumes that source terms of all mine facilities will revert to background runoff concentrations during the post-closure.</p> <p>Regardless of the effectiveness of environmental controls during operations and the effectiveness of reclamation, CIRNAC differs from AEM's position that reclaimed areas of the site will not result in chemical loadings that are higher than background. For example, atmospheric dispersion of dust from ore, waste rock and tailings would typically be expected to result in some deposition of metals throughout the site at concentrations that are above background. Other materials will also serve as a source term of potential metal loading (e.g., roads and pads constructed from waste rock). These sources have the potential to leach metals into the receiving environment at concentrations that are higher than background.</p>
Recommendation / Request	<p>CIRNAC recommends that AEM:</p> <ul style="list-style-type: none"> a) Provide evidence from other mine sites that seepage from reclaimed areas will revert to background water quality at closure.⁴ b) In the absence of such evidence, an appropriate source-term should be developed for reclaimed areas of the site and water quality models should be updated.
Updates on March 15, 2023	Issue Status: Resolved.

⁴ In response to the same recommendation in CIRNAC-IR-10, AEM stated that the topic should be discussed during the Water Licence Amendment process with NWB. However, given that the FEIS Addendum presents water quality predictions that are substantively different from those presented in earlier Environmental Assessments, CIRNAC is of the opinion that they should be considered in the current EA process. In addition, CIRNAC notes that NIRB's letter to AEM (September 9, 2022) stated that the topic should be addressed during the NIRB Technical Review process.

