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**DIAVIK WATER LICENCE AMENDMENT – PROGRESSIVE  
RECLAMATION – RE-ESTABLISHING NATURAL DRAINAGES:  
PLAIN LANGUAGE BRIEFING AND TECHNICAL REVIEW  
COMMENTS**

Technical Memorandum # 367-23-01

***DRAFT***

**Prepared for:**

Environmental Monitoring Advisory Board (EMAB)  
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## PLAIN LANGUAGE SUMMARY

The Environmental Monitoring Advisory Board (EMAB) requested a technical review of sections of the Diavik Diamond Mines (2012) Inc. (DDMI; “Diavik”) Water Licence Amendment – Progressive Reclamation – Re-establishing Natural Drainages submission package (dated November 24, 2022). This review focused on proposed aquatic monitoring related to the Licence Amendment Application – specifically, monitoring as it relates to the proposed pond breaching.

Documents that were reviewed include:

- Appendix A: Water Licence Amendment Application;
- Appendix D: Conformity Tables Between Proposed Schedule 8 Condition 3 and Supporting Materials;
- Appendix E: FCRP Main Body (sections relevant to the aquatic monitoring program only);
- Appendix VI-1: Closure and Post-Closure Monitoring Version 3.1; and
- Appendix VI-2: Closure and Post-Closure AEMP Design Plan Version 1.0.

Key comments and recommendations from this review are summarized below.

### **SURFACE RUNOFF CLOSURE AND POST-CLOSURE MONITORING**

- **Runoff Monitoring: Discontinuation of SNP Stations**: It is proposed to drop a SNP station if runoff cannot be sampled in two back-to-back years. The drainages are relatively small and flow may range from little flow in dry years to more flow in wet years.
  - **Recommendation**: A decision on whether to drop a monitoring station needs to consider whether wet and dry conditions were captured in the monitoring. If the period of monitoring does not capture relatively high flow conditions, the station should remain active.
- **Runoff Monitoring: Sampling Frequency**: It is proposed to decrease runoff monitoring frequency from weekly to monthly or quarterly after 1 year of monitoring. This frequency may be inadequate to properly measure runoff quantity or quality.
  - **Recommendation**: Recommend a minimum of two years of weekly monitoring of SNP runoff sites. Any reductions in sampling frequency thereafter should be based on the results of the monitoring, including flow and water quality conditions.

- **Mixing Zone Monitoring: Chlorophyll *a***: The proposed water quality program for the mixing zones does not include chlorophyll *a* (an indicator of the amount of algae in water). Chlorophyll *a* should be included to monitor for effects related to nutrients. This is particularly relevant since a key nutrient (phosphorus) is predicted to increase post-closure.
  - **Recommendation**: Add chlorophyll *a* to the list of water quality parameters to be monitored at the SNP Mixing Zone stations.
  
- **Surface Water Action Level Framework: Nutrients and Eutrophication**: The proposed surface water action level framework includes triggers and associated actions based on (1) measures of sub-lethal toxicity of runoff; and (2) comparison of the runoff quality to AEMP benchmarks. There is no trigger relating to water quality at the mixing zone boundary stations. The proposed framework does not properly incorporate triggers and actions relating to nutrients and the potential for increases in algae in the lake.
  - **Recommendation 1**: Revise the surface water action level framework to include appropriate triggers for phosphorus and chlorophyll *a*.
  - **Recommendation 2**: Add a trigger/response/action level for chlorophyll *a* in the mixing zone.
  
- **Surface Water Action Level Framework: Application**: It is unclear how results of monitoring at the mixing zone boundary fit into the proposed action level framework. Specifically, there are no triggers in the framework relating to surface water quality in the mixing zone.
  - **Recommendation**: Clarify when and how the surface water action level framework will be applied to runoff and the mixing zone and what criteria will be applied with respect to AEMP benchmarks.

### **AQUATIC EFFECTS MONITORING PROGRAM**

- **Fish Sampling Areas**: The Closure and Post-Closure AEMP Design Plan proposes to add two new Nearfield (NF) sampling areas for Slimy Sculpin monitoring: (1) one area in the area of the outflow from Pond 4 (referred to as NFC-3); and (2) one area in the area of the outflows from Ponds 1, 5, 10, and 13 (referred to as NFC-6). There is no rationale for why these two areas were selected. Do the three NF areas include sampling in the areas predicted to be most affected by the Project post-closure?
  - **Recommendation**: Provide a rationale for the proposed NF/NFC fish sampling areas. If these areas do not include the areas predicted to be most affected by the Project post-closure, add a new area or replace one of the proposed areas with one expected to be most affected.
  
- **Monitoring and Schedule**: The proposed AEMP for closure and post-closure includes new sampling sites and would start in 2025. The proposed schedule for pond breaching begins in 2023 – prior to the start of the revised AEMP. This will affect the ability to conduct a pre-

closure round of monitoring at the new AEMP sampling sites and areas – including the two new fish sampling areas. Sampling at new sites should be done before ponds are breached to provide a “baseline” for comparison.

- **Recommendation:** Two years of pre-closure sampling at the new areas/sites is recommended. At a minimum, one round of fish monitoring at the new NFC fish locations and sampling of other components (water quality, plankton, invertebrates) prior to breaching of ponds should be done.
- **Fish Data Analysis:** The proposed approach for analysing fish monitoring data under the AEMP does not include comparisons to the “Reference Condition” as proposed for all other AEMP components. The current AEMP Action Levels for fish health are defined based on comparisons to Reference Conditions. This approach was adopted because Mine effluent was detected in the Farfield areas of the lake.
  - **Recommendation:** Data analysis and reporting for fish health and metals in fish should include comparison to the Reference Conditions which represent "baseline" conditions for the Project.
- **Action Levels and Response Plan:** The proposed AEMP Design does not include response plans/action levels like the current Operations AEMP. Rather, it is stated that the SNP Runoff Water Quality Response Framework will be applied. This framework applies only to pond runoff and – to a limited extent – the mixing zones in Lac de Gras. It is unclear how the results of the AEMP will be assessed and what if any associated actions would be taken if AEMP monitoring results indicate a potential issue/concern with the aquatic environment.
  - **Recommendation:** Provide a clear description of action levels and associated actions for the AEMP. At a minimum, a conceptual framework for reviewing and identifying monitoring results that would trigger further actions should be included.

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## 1.0 BACKGROUND AND SCOPE OF WORK

Diavik Diamond Mines (2012) Inc. (DDMI; Diavik) submitted an Application to the Wek'èezhii Land and Water Board (WLWB) to Amend Water Licence W2015L2-0001 “to enable authorization to re-establish island pre-development runoff conditions through sequential, and where practical, progressive decommissioning of the water management system (i.e., collection ponds).” (DDMI 2022a). The Application submission (submitted November 24, 2022) included a number of documents – many of which were submitted as part of the Final Closure and Reclamation Plan (FCRP) v. 1.0 submitted to the WLWB on October 13, 2022.

The Environmental Monitoring Advisory Board (EMAB) requested that North/South Consultants (NSC) undertake a technical review of portions of the Water Licence Amendment Application Package that pertain to aquatic effects monitoring as follows:

- Appendix A: Water Licence Amendment Application;
- Appendix D: Conformity Tables Between Proposed Schedule 8 Condition 3 and Supporting Materials;
- Appendix E: FCRP Main Body (sections relevant to the aquatic monitoring program only);
- Appendix VI-1: Closure and Post-Closure Monitoring Version 3.1; and
- Appendix VI-2: Closure and Post-Closure AEMP Design Plan Version 1.0.

The review was restricted to consideration of the proposed aquatic monitoring related to the Licence Amendment Application – specifically, monitoring as it relates to the proposed pond breaching. The applicable Closure Objective is SW2. Other aspects of the closure/post-closure monitoring, such as monitoring in relation to the North Inlet and the pit lakes was outside of the scope of this review.

Section 2 provides a discussion of key review comments and recommendations for consideration by EMAB. Detailed technical review comments and recommendations are provided in Table 1 and in the Excel comments template as required for submission to the WLWB.

## 2.0 KEY COMMENTS

The following sections present key comments in relation to technical review of the documents listed in Section 1.0 and with respect to aquatic effects monitoring. Sections 2.1 and 2.2 present key comments for consideration, including the following general subjects:

### Appendix VI-1: Closure and Post-Closure Monitoring

- Runoff Monitoring: Discontinuation of SNP Stations
- Runoff Monitoring: Sampling Frequency
- Mixing Zone Monitoring: Chlorophyll a
- Surface Water Action Level Framework: Nutrients and Eutrophication
- Surface Water Action Level Framework: Implementation
- Surface Water Action Level Framework: Application

### Appendix VI-2: AEMP Design Plan

- Pre-Closure Monitoring and Schedule
- Fish Sampling Areas
- Action Levels and Response Plan
- Fish Data Analysis

## 2.1 APPENDIX VI-1: CLOSURE AND POST-CLOSURE MONITORING

### 2.1.1 Runoff Monitoring: Discontinuation of SNP Stations

Appendix VI-1 indicates that a proposal will be submitted to make an SNP station inactive in the event surface and runoff monitoring of a current SNP station establishes that flow is "unable to be successfully sampled for two consecutive monitoring years."

There may be considerable variability in inter-annual flow/discharge and two years may be insufficient to capture a range of high and low flow conditions. For example, the first two years may be atypically dry which would lead to inactivation of the SNP site based on the proposed approach. It would be more appropriate to consider the specific hydrological conditions encountered during the initial monitoring years (i.e., dry or wet years) relative to the estimated range of flow conditions for each stream when determining if a station could be deactivated.

**Recommendation:** Consideration of deactivation of an SNP station should consider the hydrological conditions/climatological conditions encountered during initial monitoring relative to the range of flow conditions for each stream. If the period of monitoring did not capture relatively high flow conditions, the station should remain active.

### **2.1.2 Runoff Monitoring: Sampling Frequency**

Despite conflicting information presented Appendices VI-1 and VI-2 regarding runoff sampling frequency, the appendices indicate a reduction of monitoring frequency for runoff to monthly or quarterly after 1 year of monitoring. This reduced sampling frequency may not be adequate to effectively characterize discharge and water quality in the drainages given that inter-annual variability may be considerable. In addition, site runoff is likely to be highly variable within the open-water season and quarterly sampling may be inadequate to fully characterize these source waters; sampling needs to capture periods of intermittent flow, which may be highly variable in time and for brief periods (i.e., days). More frequent sampling (weekly or biweekly sampling) may be required to capture a range of flow and water quality conditions.

**Recommendation 1:** Recommend a minimum of two years of weekly monitoring of SNP runoff sites; reductions in sampling frequency thereafter should be based on the results of the monitoring, including consideration of hydrological conditions encountered during the initial monitoring (i.e., wet or dry years/ range of flow conditions encountered during initial monitoring years) and variability of water quality conditions.

**Recommendation 2:** Identify the approach that will be taken to trigger sampling of the streams subject to infrequent/intermittent flows, including the time required to mobilize and complete toxicity/water quality sampling once flow is detected.

### **2.1.3 Mixing Zone Monitoring: Chlorophyll a**

The water quality parameters that will be monitored at the mixing zone stations do not include chlorophyll a. This parameter should be included to monitor for effects related to potential nutrient enrichment. This is particularly relevant as water quality modeling indicated TP is one of the parameters that are predicted to increase post-closure. It is also noted in Appendix VI-2 (p. 17) that biological uptake will reduce concentrations in the lake, particularly during the open-water season; a measure of algal abundance is needed to account for the effect of nutrients released in runoff.

**Recommendation:** Add chlorophyll *a* to the list of water quality parameters to be monitored at the SNP Mixing Zone stations.



#### **2.1.4 Surface Water Action Level Framework: Nutrients and Eutrophication**

The surface water action level framework Action Level AL1A - Runoff monitoring triggers for the aquatic environment (SW2) are (1) runoff  $> 10 \times$  AEMP benchmarks for aquatic life; or (2) runoff exhibits sublethal toxicity. The only trigger in the framework with respect to SW2 for the mixing zone monitoring is sublethal toxicity; there are no triggers for the mixing zone boundary (MZB) based on water quality for SW2.

The proposed framework is not appropriate for application to nutrients and the eutrophication pathway. Two key issues are:

- the trigger of  $10 \times$  the AEMP benchmark for TP would be  $7.5 \text{ ug/L} \times 10 = 70 \text{ ug/L}$  and for chlorophyll *a* would be  $4.5 \text{ ug/L} \times 10 = 40 \text{ ug/L}$ . These triggers are far too high/insensitive and represent eutrophic/hypereutrophic conditions. Triggers for TP and chlorophyll *a* need to be identified that are adequately sensitive; and
- the framework needs to explicitly consider chemistry at the MZB for the nutrient enrichment pathway - specifically, the program should monitor for effects on chlorophyll *a* in the lake proper and the framework should include a trigger for chlorophyll *a* at the MZB. It is also noted that the AEMP does not include action levels or responses; as currently proposed, effects of nutrient enrichment in the lake are not incorporated into any action level response framework.

**Recommendation 1:** Revise the surface water action level framework to include appropriate triggers for TP and chlorophyll *a*.

**Recommendation 2:** Add a trigger/response/action level for chlorophyll *a* in the mixing zone.

#### **2.1.5 Surface Water Action Level Framework: Implementation**

The surface water action level framework identifies several assessment steps with an associated action. For aquatic life, these are:

- Action Level AL1A:
  - Trigger - runoff  $10 \times$  AEMP benchmarks for aquatic life;
  - Action - sub-lethal toxicity testing of runoff at 12.5% dilution;
- Action Level AL2A:
  - Trigger - sublethal toxicity observed in runoff at 12.5% dilution;
  - Action - sublethal toxicity testing of undiluted surface water from the mixing zone boundary (MZB);

- Action Level AL3A:
  - Trigger - sublethal toxicity observed at MZB;
  - Action - re-establish temporary water collection; conduct a special effects study on the extent of effects in Lac de Gras; toxicity identification evaluation; and, identification of mitigations.

The process is conceptually logical; however, in practice may be problematic to implement in some cases due to time delays associated with sampling, laboratory analysis, and subsequent implementation of actions. When are analytical (chemical and toxicity testing) results of runoff monitoring anticipated to be received relative to the date of sample collection? Will the time elapsed between initial runoff sampling and subsequent implementation of Action Level AL2A sampling (MZB sampling) result in issues associated with changes in runoff quantity and/or quality between the sampling events? Or are MZB conditions expected to be relatively stable over the short-term? Could the time delay result in cases where runoff to Lac de Gras ceases prior to implementation of MZB sampling?

What will be the steps regarding sample collection and analysis of runoff? AL1A specifies that runoff quality would be measured first and then sublethal toxicity testing would be undertaken in the event parameters are greater than 10 x the AEMP benchmark. Similar to the comments above, what would be the time delay between collecting the runoff and receipt of analytical chemistry results? If the delay is lengthy this may introduce practical considerations for applying the specified action (i.e., conducting the most sensitive sublethal toxicity testing on runoff).

**Recommendation:** Provide details regarding the sampling schedule, analytical turnaround times, and expected timing of Action Levels AL1A and AL2A sampling should they be triggered through the framework.

### **2.1.6 Surface Water Action Level Framework: Application**

The text indicates that "If SNP source water samples collected from the pond breach location did not meet closure criteria, or if concentrations at the edge of the mixing zone exceeded AEMP effects benchmarks then sampling would continue, and the surface water action level framework would be applied (see Section 3.1.4.4 and Figure 3-3)."

The surface water action level framework appears to apply criteria (AL 0/1) of 10 x AEMP benchmarks and these appear to apply specifically to the runoff and not the mixing zone. It is unclear how these two actions interconnect as the framework does not apply the criterion of conditions being below AEMP benchmarks at the MZB.

**Recommendation:** Clarify when and how the surface water action level framework will be applied to runoff and the mixing zone and what criteria will be applied with respect to AEMP benchmarks.

## 2.2 APPENDIX VI-2: AQUATIC EFFECTS MONITORING PROGRAM DESIGN PLAN

### 2.2.1 Pre-Closure Monitoring and Schedule

The AEMP Design Plan for the Closure and Post-Closure Phases indicates sampling would start under this Design Plan in 2025 (anticipated start of closure) and that the comprehensive monitoring (including fish, invertebrates, and FF sites) would be done in 2025 and 2028 with sampling frequency to be determined thereafter. The Closure and Post-Closure AEMP Design Plan proposed to add two new sampling areas for Slimy Sculpin monitoring: (1) one area in the vicinity of the outflow from Pond 4 (referred to as NFC3); and (2) one area in the vicinity of the outflows from Ponds 1, 5, 10, and 13 (referred to as NFC-6). Additional new NF sites for other components have also been proposed.

The FCRP indicates that "subject to schedule changes based on completion of closure work within catchments, the envisioned schedule for breaching is":

- Ponds 2 and 7: 2023;
- Ponds 1 and 13: 2025;
- Ponds 4 and 5, Sump E21: 2026; and
- Ponds 3, 10, 11, and 12: 2027.

Will fish sampling at the second new NF site (NFC-6) be undertaken prior to breaching of the two ponds in that area (Ponds 1 and 13) that is proposed to occur in 2025? Given that the new NF fish sampling areas have not been sampled previously, it would be important to undertake a minimum of one year of monitoring in these areas prior to breaching of collection ponds to provide data for comparison post-breaching.

Similarly, it would be important to complete monitoring for other components – notably at the new NF sampling sites – prior to breaching of the collection ponds.

**Recommendation:** Two years of pre-closure sampling at the new areas/sites is recommended to provide robust data for comparison. At a minimum, one round of fish monitoring at the new NFC fish locations and sampling of other components (water quality, plankton, invertebrates) prior to breaching of ponds should be completed. For water quality and plankton, the pre-closure sampling should include at least one summer and winter sampling event.

### 2.2.2 Fish Sampling Areas

The Closure and Post-Closure AEMP Design Plan proposed to add two new sampling areas for Slimy Sculpin monitoring: (1) one area in the vicinity of the outflow from Pond 4 (referred to as NFC-3); and (2) one area in the vicinity of the outflows from Ponds 1, 5, 10, and 13 (referred to as

NFC-6). There is no rationale for why these two areas were selected. Additionally, it is proposed to drop one NF area in the vicinity of the A21 pit (MF3 area) Do the three NF areas include sampling in the areas predicted to be most affected by the Project post-closure? The summary of water quality modeling results indicates that the highest predicted concentrations of constituents in runoff during post-closure are associated with the PKC Facility and the E21 and A418 Pit drainages and that the PKC Facility drainage will flow to drainage C3. None of the three NF fish sampling areas are in the areas of runoff discharge from these drainages/sources.

**Recommendation:** Provide a rationale for the proposed NF/NFC fish sampling areas. If these areas do not include the areas predicted to be most affected by the Project post-closure, add a new area or replace one of the proposed areas with one expected to be most affected.

### **2.2.3 Fish Data Analysis**

The proposed data analysis approach for the fish health and metals in fish components is to compare between NF and FF areas in a given year and after 2025 (first proposed round of new fish monitoring program), to results from the 2025 survey. The AEMP Design does not include comparison to Reference Conditions, as is proposed for all other components and as is currently done under the Operations AEMP. These comparisons would provide the opportunity to assess overall changes to these components and a means for assessing a return to pre-Project conditions (accepting that the Reference Conditions do not represent true pre-Project measurements). It is also noted that the current AEMP Action Levels for fish health are defined based on comparisons to Reference Conditions - this approach was adopted due to the detection of mine-related effects in the FF areas of Lac de Gras.

**Recommendation:** Data analysis and reporting for metals in fish and fish health should include comparison to the Reference Conditions which represent "baseline" conditions for the Project.

### **2.2.4 Action Levels and Response Plan**

The AEMP Design Plan indicates that "evaluation of compliance with closure criteria will not be assessed through the AEMP or other environmental monitoring programs...but will be assessed based on the results of the performance monitoring programs and activities as described in the FCRP. Responses in measurement endpoints evaluated by the AEMP during closure and post-closure will not specifically be assessed against closure criteria." (p. 3)....

"During operations, AEMP Response Plans are produced if effects of a specified magnitude, as defined by Action Level triggers in the operational AEMP Response Framework, are encountered as a result of the monitoring activities conducted under the AEMP. During closure and post-closure, AEMP Response Plans will no longer be relevant, as the Response Framework used for the operational AEMP will be discontinued and replaced by the SNP Runoff Water Quality Response Framework described in the FCRP. The SNP Runoff Water Quality Response Framework also

describes the reporting mechanism and requirements associated with Action Level triggers in the response framework. " (p. 94).

It is also noted that the Runoff Water Quality Response Framework is described as "an adaptive management framework intended to address unexpected issues related to runoff water quality." (p. 3-4)

It is unclear how the results of the AEMP will be assessed and what if any associated actions would be taken in the event that monitoring results indicate a potential issue/concern with the aquatic environment.

The SNP Runoff Water Quality Response Framework does not incorporate biological monitoring other than toxicity testing. How will the results of the plankton, invertebrates, and fish monitoring completed under the AEMP be assessed and interpreted? What framework/responses will apply to these data sets?

**Recommendation:** Provide a clear description of action levels and associated actions for water quality, sediment quality, plankton, invertebrates, and fish in the AEMP. At a minimum a conceptual framework for reviewing and identifying monitoring results that would trigger further actions should be included.

### **3.0 REFERENCES**

- Diavik Diamond Mines Inc. (DDMI). 2022a. Diavik Diamond Mines (2012) Inc. Appendix A: Water Licence Amendment Application Form for Natural Drainage.
- DDMI. 2022b. Diavik Diamond Mines (2012) Inc. Final Closure and Reclamation Plan Version 1.0. December 2022.
- DDMI. 2022c. Diavik Diamond Mines (2012) Inc. Final Closure and Reclamation Plan Version 1.0. Appendix D: Conformity Tables Between Proposed Schedule 8 Condition 3 and Supporting Materials.
- DDMI. 2022d. Diavik Diamond Mines (2012) Inc. Appendix VI-1: Closure and Post-Closure Monitoring Version 3.1. October 2022.
- Golder. 2022a. Diavik Diamond Mines (2012) Inc. Appendix VI-2: Closure and Post-Closure AEMP Design Plan Version 1.0. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, September 2022.
- Golder. 2022b. Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program Design Plan, Version 6.0. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, April 2022.

**Table 1. Technical review comments and recommendations on the Water Licence Amendment Application Submission: Aquatic Environment Monitoring.**

<u>TOPIC</u>	<u>COMMENT</u>	<u>RECOMMENDATION</u>
Appendix E FCRP Main Body, Section 2.5.2.1 Comprehensive Study Report Conclusions, p. 2-10	<p>The FCRP includes a summary of conclusions from the Comprehensive Study Report relevant to closure. One of the CSR conclusions that is included indicates: "At post closure, metal concentrations in fish flesh in some of the East Island lakes are predicted to exceed consumption guidelines. The RAs agree that Diavik should monitor metal concentrations post-closure and agree with KIA's recommendation that a plan be developed to warn people fishing these lakes (e.g., posting signs), if the predictions are correct."</p> <p>The current aquatic monitoring plans do not include any monitoring of fish in East Island lakes or streams. Is this conclusion still applicable and if so, will monitoring of metals in fish from East Island lakes be undertaken during closure/post-closure? Is it expected that fish will be able to access the streams created by the collection pond breaches? If so, what species are expected to use the streams? Will the ponds be accessible to fish? Are any effects on fish on East Island anticipated as a result of the Project?</p>	Clarify if the conclusion from the CSR is still relevant and applicable and what if any fish use is expected of streams and collection ponds post-closure. Include a description of any monitoring of fish from East Island waterbodies that will be undertaken if effects on fish are expected.
Appendix E FCRP Main Body, Section 5.2.8 Permanent Closure Requirements – North Inlet and Surface Water Management, Section 5.2.8.3.2 Collection Ponds, p. 5-68	<p>The FCRP indicates that "In addition to water quality monitoring and toxicity testing as outlined in Appendix VI-1, sampling and analysis of collection pond sediment will be conducted prior to breaching to confirm that accumulated sediment is not contaminated and will not contribute contamination to Lac de Gras. Any identified sediment contamination within the pond will be either removed or isolated in place with a layer of rock or till from the pond breach excavation."</p> <p>There are no details provided regarding sampling and analysis of collection pond sediments provided or what criteria will be applied to determine if sediments are "contaminated" and require removal or isolation.</p>	Provide a description of the collection pond sediment sampling and analysis referenced in the FCRP and criteria that will be used to determine "contamination" triggering isolation and removal.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.3, Hydrology	Section 3.1.3 does not clearly indicate whether runoff discharge will be monitored at all sites post-breaching or what methods would be employed - specifically measurement frequency.	Provide a description of runoff discharge monitoring post-closure, including frequency of measurement.

<b>TOPIC</b>	<b>COMMENT</b>	<b>RECOMMENDATION</b>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.1 Overview of Closure Objectives, Criteria, and Monitoring Activities, p. 16 and Figure 3-2, p. 19</p>	<p>The SNP description for site-wide monitoring, seepage and runoff, indicates that monitoring will occur "within all impacted closure drainage areas that will report to Lac de Gras at post-closure (Figure 3-2)." Figure 3-2 shows the absence of SNP runoff stations in drainages A, B, C, and F (drainages E and D are not impacted according to Figure 2.2-1, Appendix VI-2). The table of sites presented in Figure 3-2 also does not include all SNP sites presented in the figure (e.g., SNP 1645-96).</p>	<p>Clarify if all impacted drainages will be subjected to monitoring. If monitoring is not proposed in all drainages, provide a rationale.</p>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.1 Overview of Closure Objectives, Criteria, and Monitoring Activities, p. 17</p>	<p>Appendix VI-1 indicates that a proposal will be submitted to make an SNP station inactive in the event surface and runoff monitoring of a current SNP station establishes that flow is "unable to be successfully sampled for two consecutive monitoring years."</p> <p>There may be considerable variability in inter-annual flow/discharge and two years may be insufficient to capture a range of high and low flow conditions. For example, the first two years may be atypically dry which would lead to inactivation of the SNP site based on the proposed approach. It would be more appropriate to consider the specific hydrological conditions encountered during the initial monitoring years (i.e., dry or wet years) relative to the estimated range of flow conditions for each stream when determining if a station could be deactivated.</p>	<p>Consideration of deactivation of an SNP station should consider the hydrological conditions/climatological conditions encountered during initial monitoring relative to the range of flow conditions for each stream. If the period of monitoring did not capture relatively high flow conditions, the station should remain active.</p>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, p. 19</p>	<p>Figure 2-2 presents the proposed SNP monitoring stations associated with seepage and runoff. One site is proposed at the mixing zone boundary in 10 drainages/areas.</p> <p>Are the proposed locations to be "fixed" points in space or is the intention for the site to move in accordance with the actual mixing zone boundary location at the time of sampling?</p> <p>Do the results of the mixing zone modeling indicate the mixing zone boundary will be highly variable in space and if so, how were the specific monitoring site locations identified given the variable nature of the boundary location?</p>	<p>Describe if the mixing zone monitoring sites are "fixed" or will move in relation to changes in the size and characteristics of the mixing zones.</p>



<b>TOPIC</b>	<b>COMMENT</b>	<b>RECOMMENDATION</b>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, p. 17 and Figure 3-3, p. 20</p>	<p>The Seepage and Runoff monitoring program appears to provide conflicting information regarding sampling frequency. Section 3.4.4.3 (Post-Closure Monitoring) indicates water quality of runoff from breached ponds will be monitored weekly for one year and then reduced to monthly. Samples for toxicity testing will be collected quarterly (if sufficient sample volume). It is then indicated that "after the completion of closure activities on site, monitoring will be reduced to twice annually for both chemical analysis and toxicity."</p> <p>Figure 3-3 (p. 20) indicates that runoff water quality monitoring will be weekly in year 1 and then monthly from years 2-5 - monitoring to end after 5 years. Toxicity sampling is indicated to be quarterly and to end after 5 years.</p>	<p>Clarify monitoring frequency for the seepage and runoff sampling.</p>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, p. 17 and Figure 3-3, p. 20</p>	<p>Despite conflicting information presented Appendices VI-1 and 2 regarding runoff sampling frequency, the appendices indicate a reduction of monitoring frequency for runoff to monthly or quarterly after 1 year of monitoring. This reduced sampling frequency may not be adequate to effectively characterize discharge and water quality in the drainages given that inter-annual variability may be considerable. In addition, site runoff is likely to be highly variable within the open-water season and quarterly sampling may be inadequate to fully characterize these source waters; sampling needs to capture periods of intermittent flow, which may be highly variable in time and for brief periods (i.e., days). More frequent sampling (weekly or biweekly sampling) may be required to capture a range of flow and water quality conditions.</p>	<p>Recommend a minimum of two years of weekly monitoring of SNP runoff sites; reductions in sampling frequency thereafter should be based on the results of the monitoring, including consideration of hydrological conditions encountered during the initial monitoring (i.e., wet or dry years/ range of flow conditions encountered during initial monitoring years) and variability of water quality conditions.</p> <p>Identify the approach that will be taken to trigger sampling of the streams subject to infrequent/intermittent flows, including the time required to mobilize and complete toxicity/water quality sampling once flow is detected.</p>

<b>TOPIC</b>	<b>COMMENT</b>	<b>RECOMMENDATION</b>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, SNP Monitoring of Mixing Zones, p. 18 and Figure 3-3, p. 20</p>	<p>The Seepage and Runoff monitoring program appears to provide conflicting information regarding monitoring frequency for mixing zones. Section 3.1.4.3 (p. 18) indicates that "sampling at the edges of mixing zones around the East Island will occur once annually, during early open-water conditions beginning in the first year following the decommissioning of associated collection ponds and reconnection of the drainage to the Lac de Gras receiving environment. Sampling will occur in July, immediately following the period of increased runoff rates and stream-flows associated with the spring freshet. This timing corresponds with modelled worst-case conditions for both site runoff and receiving environment water quality (Golder 2022c, and 2022d)...Sampling will occur for two years following decommissioning of the associated collection pond; these mixing zone stations would then be deactivated." Figure 3-3 (p. 20) indicates that mixing zone water quality monitoring will be quarterly in years 1 and 2 and then discontinued.</p>	<p>Clarify monitoring frequency for mixing zones.</p>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, p. 18 and Figure 3-3, p. 20</p>	<p>The text indicates that "If SNP source water samples collected from the pond breach location did not meet closure criteria, or if concentrations at the edge of the mixing zone exceeded AEMP effects benchmarks then sampling would continue, and the surface water action level framework would be applied (see Section 3.1.4.4 and Figure 3-3)." The surface water action level framework appears to apply criteria (AL 0/1) of 10 x AEMP benchmarks and these appear to apply specifically to the runoff and not the mixing zone. It is unclear how these two actions interconnect as the framework does not apply the criterion of conditions being below AEMP benchmarks at the MZB.</p>	<p>Clarify when and how the surface water action level framework will be applied to runoff and the mixing zone and what criteria will be applied with respect to AEMP benchmarks.</p>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, Figure 3-3, p. 20</p>	<p>The monitoring frequency with respect to runoff and the mixing zones and the application of the surface water action level framework is unclear.</p>	<p>Provide a summary table identifying each type of monitoring, frequency and timing of monitoring, and details of the proposed action level framework including a schedule/timing and under what circumstances when it would be implemented and applied.</p>

TOPIC	COMMENT	RECOMMENDATION
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, Figure 3-3, p. 20</p>	<p>The surface water action level framework identifies several assessment steps with an associated action. For aquatic life, these are:                      - Action Level AL1A - trigger - runoff &gt; 10 × AEMP benchmarks for aquatic life; Action - sub-lethal toxicity testing of runoff at 12.5% dilution;                      - Action Level AL2A: trigger - sublethal toxicity observed in runoff at 12.5% dilution; Action - sublethal toxicity testing of undiluted surface water from the mixing zone boundary (MZB);                      - Action Level AL3A: trigger - sublethal toxicity observed at MZB; Action - re-establish temporary water collection; conduct a special effects study on the extent of effects in Lac de Gras; toxicity identification evaluation; and, identification of mitigations.</p> <p>The process is conceptually logical; however, in practice may be problematic to implement in some cases due to time delays associated with sampling, laboratory analysis, and subsequent implementation of actions. When are analytical (chemical and toxicity testing) results of runoff monitoring anticipated to be received relative to the date of sample collection? Will the time elapsed between initial runoff sampling and subsequent implementation of Action Level AL2A sampling (MZB sampling) result in issues associated with changes in runoff quantity and/or quality between the sampling events? Or are MZB conditions expected to be relatively stable over the short-term? Could the time delay result in cases where runoff to Lac de Gras ceases prior to implementation of MZB sampling?</p> <p>What will be the steps regarding sample collection and analysis of runoff? AL1A specifies that runoff quality would be measured first and then sublethal toxicity testing would be undertaken in the event parameters are greater than 10 x the AEMP benchmark. Similar to the comments above, what would be the time delay between collecting the runoff and receipt of analytical chemistry results? If the delay is lengthy this may introduce practical considerations for applying the specified action (i.e., conducting the most sensitive sublethal toxicity testing on runoff).</p>	<p>Provide details regarding the sampling schedule, analytical turnaround times, and expected timing of Action Levels AL1A and AL2A sampling should they be triggered through the framework.</p>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Attachment 2, Table 27, p. 25</p>	<p>The water quality parameters that will be monitored at the mixing zone boundary stations do not include chlorophyll a. This parameter should be included to monitor for effects related to potential nutrient enrichment. This is particularly relevant as water quality modeling indicated TP is one of the parameters that is predicted to increase post-closure. It is also noted in Appendix VI-2 (p. 17) that biological uptake will reduce concentrations in the lake, particularly during the open-water season; a measure of algal abundance is needed to account for the effect of nutrients released in runoff.</p>	<p>Add chlorophyll a to the list of water quality parameters to be monitored at the SNP Mixing Zone stations.</p>

<b>TOPIC</b>	<b>COMMENT</b>	<b>RECOMMENDATION</b>
<p>Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, Section 3.1.4.3 Post-closure Monitoring, Figure 3-3, p. 20</p>	<p>The surface water action level framework Action Level AL1A - Runoff monitoring triggers for the aquatic environment (SW2) are (1) runoff &gt; 10 × AEMP benchmarks for aquatic life; or (2) runoff exhibits sublethal toxicity. The only trigger in the framework with respect to SW2 for the mixing zone monitoring is sublethal toxicity; there are no triggers for the MZB based on water quality for SW2.</p> <p>The proposed framework is not appropriate for application to nutrients and the eutrophication pathway. Two key issues are:</p> <ul style="list-style-type: none"> <li>- the trigger of 10 x the AEMP benchmark for TP would be 7.5 ug/L x 10 = 70 ug/L and for chlorophyll a would be 4.5 ug/L x 10 = 40 ug/L. These triggers are far too high/insensitive and represent eutrophic/hypereutrophic conditions. Triggers for TP and chlorophyll a need to be identified that are adequately sensitive; and</li> <li>- the framework needs to explicitly consider chemistry at the MZB for the nutrient enrichment pathway - specifically, the program should monitor for effects on chlorophyll a in the lake proper and the framework should include a trigger for chlorophyll a at the MZB.</li> </ul> <p>It is also noted that the AEMP does not include action levels or responses; as currently proposed, effects of nutrient enrichment in the lake are not incorporated into any action level response framework.</p>	<p>Revise the surface water action level framework to include appropriate triggers for TP and chlorophyll a.</p> <p>Add a trigger/response/action level for chlorophyll a in the mixing zone.</p>

TOPIC	COMMENT	RECOMMENDATION
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 1.0 Introduction, Section 1.3 Integration of the AEMP with Closure and Reclamation Planning, p. 3-4; Section 6.1 AEMP Reporting, Overview (p. 94)</p>	<p>The AEMP Design Plan indicates that "evaluation of compliance with closure criteria will not be assessed through the AEMP or other environmental monitoring programs...but will be assessed based on the results of the performance monitoring programs and activities as described in the FCRP. Responses in measurement endpoints evaluated by the AEMP during closure and post-closure will not specifically be assessed against closure criteria." (p. 3). It is unclear how the results of the AEMP will be assessed and what if any associated actions would be taken in the event that monitoring results indicate a potential issue/concern with the aquatic environment.</p> <p>"During operations, AEMP Response Plans are produced if effects of a specified magnitude, as defined by Action Level triggers in the operational AEMP Response Framework, are encountered as a result of the monitoring activities conducted under the AEMP. During closure and post-closure, AEMP Response Plans will no longer be relevant, as the Response Framework used for the operational AEMP will be discontinued and replaced by the SNP Runoff Water Quality Response Framework described in the FCRP. The SNP Runoff Water Quality Response Framework also describes the reporting mechanism and requirements associated with Action Level triggers in the response framework. " (P. 94). It is noted that the Runoff Water Quality Response Framework is described as "an adaptive management framework intended to address unexpected issues related to runoff water quality." (p. 3-4)</p> <p>The SNP framework does not incorporate biological monitoring other than toxicity testing. How will the results of the plankton, invertebrates, and fish be assessed and interpreted? What framework/responses will apply to these data sets?</p>	<p>Provide a clear description of action levels and associated actions for water quality, sediment quality, plankton, invertebrates, and fish in the AEMP. At a minimum a conceptual framework for reviewing and identifying monitoring results that would trigger further actions should be included.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 1.0 Introduction, Section 1.3 Integration of the AEMP with Closure and Reclamation Planning, p. 4</p>	<p>The AEMP Design Plan indicates that the AEMP reporting will incorporate results of the SNP for "source waters and monitoring during dust deposition" during closure and post-closure. It is unclear if the results of mixing zone monitoring also conducted as part of the SNP will be included in the AEMP reporting.</p>	<p>Clarify that results of mixing zone monitoring conducted as part of the SNP will be included in the AEMP reporting.</p>

TOPIC	COMMENT	RECOMMENDATION
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 2.0 Project Description, Section 2.2.2 Closure and Post-closure Site Drainage Conditions, Figure 2.2-1, p. 15	Figure 2.2-1 indicates there are two drainages on East Island that are "unimpacted" (D and E). It would be beneficial to monitor water quality and flow for these drainages as part of the monitoring program (SNP) to serve as reference areas. This may provide useful information for gauging Project-related effects.	Recommend including water quality and flow monitoring for drainages D and/or E (i.e., tributaries/inflows to Lac de Gras).
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 2.0 Project Description, Section 2.2.3 Post-closure Source Water and Surface Water Quality Modeling, p. 16	<p>The summary of water quality modeling results indicates that the highest predicted concentrations of constituents in runoff during post-closure are associated with the PKC Facility and the E21 and A418 Pit drainages and that the PKC Facility drainage will flow to drainage C3.</p> <p>The AEMP does not include monitoring sites in Lac de Gras in the vicinity of the C3 outflow. This is presumably due to the water depth in this general area - which is assumed be less than the targeted range of 18-22 m. Given the results of the Mine water tracer modeling presented in Figure 4.4-2 (p. 41) and the high runoff volume and constituent concentrations estimated for this drainage (as summarized in the FCRP Table 5-7, p. 5-16) it would be prudent to include one additional NF station in the plume for this area - even in the event that water depths are lower than the target range of 18-22 m.</p>	Include a new NFC site in the area of the C3 drainage outflow or a rationale for excluding a site in this area.
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 2.0 Project Description, Section 2.2.3 Post-closure Source Water and Surface Water Quality Modeling, p. 17	The summary of water quality modeling results for Lac de Gras does not discuss several parameters including water hardness, total nitrogen, mercury, and pH.	Include descriptions of model predictions for water hardness, pH, TN, and mercury.
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.1 Sampling Design, p. 37	Figure 4.4-1 presents the proposed closure and post-closure AEMP sampling stations. It would be useful to include current AEMP sites on this or a second map to facilitate review of the proposed changes.	Include a map showing current and proposed closure/post-closure AEMP sampling sites.

TOPIC	COMMENT	RECOMMENDATION
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.1 Sampling Design, p. 38</p>	<p>The AEMP Study Design indicates the "final locations of new stations will be selected in the field to minimize physical variation among stations to the extent possible." It is agreed this approach (i.e., final selection in the field) is appropriate, however the document does not identify what the physical variables and criteria will be used to undertake the final site selection.</p>	<p>Identify physical parameters and criteria for completing the final site selection in the field.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.2 Sampling Locations, p. 39</p>	<p>The AEMP Study Design indicates that zooplankton will not be monitored at the outlets of Lac du Sauvage and Lac de Gras due to lotic habitat conditions. It is also indicated that site LDS-1 (lacustrine site in Lac du Sauvage) will be dropped and that no winter sampling will be conducted at LDS-4 due to site conditions); these changes result in a lack of winter sampling of the Lac du Sauvage outlet.</p> <p>As the major inflow to Lac de Gras it is important to continue monitoring the Lac du Sauvage outflow - in particular for water quality and phytoplankton - in both the open-water and ice-cover seasons. If LDS-4 cannot be safely sampled in winter then an alternate site should be included for winter sampling. Site LDS-1 serves this purpose under the current AEMP.</p>	<p>Recommend continuing to monitor water quality and plankton at site LDS-1 to provide information on the Lac du Sauvage inflow to Lac de Gras in open-water and ice-cover seasons.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.2 Sampling Locations, p. 39</p>	<p>The Closure and Post-Closure AEMP Design Plan proposed to add two new sampling areas for Slimy Sculpin monitoring: (1) one area in the vicinity of the outflow from Pond 4 (referred to as NFC-3); and (2) one area in the vicinity of the outflows from Ponds 1, 5, 10, and 13 (referred to as NFC-6). There is no rationale for why these two areas were selected. Additionally, it is proposed to drop one NF area in the vicinity of the A21 pit (MF3 area) Do the three NF areas include sampling in the areas predicted to be most affected by the Project post-closure? The summary of water quality modeling results indicates that the highest predicted concentrations of constituents in runoff during post-closure are associated with the PKC Facility and the E21 and A418 Pit drainages and that the PKC Facility drainage will flow to drainage C3. None of the three NF fish sampling areas are in the areas of runoff discharge from these drainages/sources.</p>	<p>Provide a rationale for the proposed NF/NFC fish sampling areas.</p> <p>If these areas do not include the areas predicted to be most affected by the Project post-closure, add a new area or replace one of the proposed areas with one expected to be most affected.</p>

TOPIC	COMMENT	RECOMMENDATION
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.2 Sampling Locations, p. 39</p> <p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.5 Sampling Schedule, p. 43</p> <p>FCRP - MAIN BODY; Section 5.2.8.3.2 Collection Ponds (p. 138-140)</p>	<p>The AEMP Design Plan for the Closure and Post-Closure Phases indicates sampling would start in 2025 (anticipated start of closure) and that the comprehensive monitoring (including fish, invertebrates, and FF sites) would be done in 2025 and 2028 with sampling frequency to be determined thereafter. The Closure and Post-Closure AEMP Design Plan proposed to add two new sampling areas for Slimy Sculpin monitoring: (1) one area in the vicinity of the outflow from Pond 4 (referred to as NFC3); and (2) one area in the vicinity of the outflows from Ponds 1, 5, 10, and 13 (referred to as NFC-6). Additional new NF sites for other components have also been proposed.</p> <p>The FCRP indicates that "subject to schedule changes based on completion of closure work within catchments, the envisioned schedule for breaching is":</p> <ul style="list-style-type: none"> <li>-Ponds 2 and 7: 2023</li> <li>-Ponds 1 and 13: 2025</li> <li>-Ponds 4 and 5, Sump E21: 2026</li> <li>-Ponds 3, 10, 11, and 12: 2027.</li> </ul> <p>Will fish sampling at the second new NF site (NFC-6) be undertaken prior to breaching of the two ponds in that area (Ponds 1 and 13) that is proposed to occur in 2025? Given that the new NFC fish sampling areas have not be sampled previously, it would be important to undertake a minimum of one year of monitoring in these areas prior to breaching of collection ponds to provide data for comparison post-breaching. Similarly, will the new NF sites for other components be sampled prior to breaching of any ponds?</p>	<p>Two years of pre-closure sampling at the new areas/sites is recommended to provide robust data for comparison. At a minimum, one round of fish monitoring at the new NFC fish locations and sampling of other components (water quality, plankton, invertebrates) prior to breaching of ponds is recommended. For water quality and plankton, the pre-closure sampling should include at least one round of each summer and winter monitoring.</p>



TOPIC	COMMENT	RECOMMENDATION
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.2.1 Selection of New NFC Station Locations, p. 40-42</p>	<p>Proposed new NFC sites for water quality, sediment quality, plankton, and benthic invertebrate were selected based on water depth (18-22 m) and predicted (modeled) mine water tracer concentrations of approximately 0.5-2.0%. It is noted that the depth range was selected to maintain consistency with depth range in the current AEMP. However, there is no discussion provided regarding the rationale for adopting this tracer concentration as a site selection criterion. Consideration should be granted to actual model predictions (i.e., predicted concentrations of constituents) in the receiving environment in addition to the size and dimensions of the plumes/mixing zones. The AEMP notes that the highest predicted constituent concentrations in runoff occur in Drainages 3, A21, and A418. The FCRP (Table 5-7) indicates for example that runoff site C3 has by far the highest TDS concentration and the second highest flow/discharge (surpassed slightly by the NI). Do the proposed locations capture areas that are predicted to experience the largest effects on water quality related to site runoff?</p> <p>Figures 4.4-2 and 4.4-3 do not present runoff discharge or mixing zone monitoring locations which renders it difficult to assess the entirety of the proposed monitoring programs (SNP and AEMP).</p>	<p>Clarify why a Mine water tracer concentration of approximately 0.5-2.0% was used as a criterion for AEMP NFC site selection.</p> <p>Include sites that capture areas with the greatest anticipated effects on water quality.</p> <p>Include SNP (runoff and mixing zone) monitoring stations on AEMP maps 4.4-2 and 4.4-3 and others as appropriate.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.0 Study Design, Section 4.4.2.1 Selection of New NFC Station Locations, p. 41</p>	<p>Figure 4.4-2 presents proposed AEMP NFC sites and water quality modeling output using a Mine water tracer. The figure shows a "plume" in Lac de Gras adjacent to site "D" labeled as "unimpacted runoff" on Figure 2.2-1. It is unclear why there is a plume originating from this unimpacted drainage.</p>	<p>Clarify if runoff site D is in fact located within an unimpacted drainage and if so, how the modelling predicts a plume from this site for Mine water. If the drainage is in fact "impacted" by the Project, provide a rationale for not monitoring the runoff.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.5 Sampling Schedule, p. 43</p>	<p>The AEMP Design Plan indicates that "once collection ponds are breached and closure drainages are reconnected to Lac de Gras, sampling of source water will commence at SNP stations around the East Island (Section 5.2.4.4). This information will be reported through the Mine's SNP and incorporated in the evaluation of the post-closure AEMP, as is currently the case for NIWTP effluent data during operations."</p> <p>If ponds are breached prior to 2025, will SNP monitoring be incorporated into the current AEMP reporting (i.e., for Operation)?</p>	<p>Clarify how SNP monitoring results will be integrated and considered in AEMP reporting if Ponds are breached prior to 2025.</p>

TOPIC	COMMENT	RECOMMENDATION
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.3.2 Water Quality, Field Methods, p. 58</p>	<p>The water quality monitoring program excludes measurement of turbidity in situ; while in situ turbidity is also not monitored under the current AEMP, introduction of site runoff has a greater potential to introduce suspended sediments and materials that may alter turbidity in Lac de Gras.</p>	<p>Recommend including in situ turbidity measurements (depth profiles) within the AEMP water quality monitoring program.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.3.3 Laboratory Methods, p. 59-60</p>	<p>Table 5.3-1 lists the water quality variables that will be measured in the AEMP and analytical detection limits. The table identifies total metals but not dissolved metals. Table 5.3-5 (p. 68) includes benchmarks for some dissolved metals. The current AEMP measures both total and dissolved metals in water.</p>	<p>Confirm that both total and dissolved metals will be measured at all water quality sampling sites in the AEMP and SNP.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.3.4.3 Substances of Interest, p. 61</p>	<p>The process for selection of SOIs refers back to the closure criteria for source water and the Response Triggers defined in the SNP Runoff Water Quality Response Framework. The Closure Criteria for SW2 (the applicable objective for site runoff) are restricted to toxicity testing results; toxicity testing does not identify water quality parameters and cannot be used as a means for identifying SOIs in the AEMP. It is unclear what criteria are referred to here with respect to the SNP Runoff Water Quality Response Framework.</p>	<p>Clarify how the SNP Runoff Water Quality Response Framework will be used to assist with selection of SOIs in the AEMP.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.4.2.1 Sediment Quality, Grab Samples, p. 72</p>	<p>The text indicates that the top 10-15 cm of sediment will be collected for particle size and TOC analysis, whereas Table 5.4-1 indicates sediments will be collected from the upper 5 cm.</p>	<p>Clarify which depth of sediment will be collected for TOC and particle size analysis.</p>

TOPIC	COMMENT	RECOMMENDATION
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.8.4.3 Fish Health, Data Analysis for Lethal Survey , p. 90</p>	<p>Can DDMI clarify if the same analysis approach applied for the lethal fish survey under the current Operations AEMP is proposed for the age-related metrics? Can DDMI clarify what fish health metrics will be included in reporting?</p>	<p>Clarify what metrics will be included in reporting for the lethal and non-lethal fish monitoring programs.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.8.4 Fish Health, Data Analysis and Interpretation, p. 89 and 5.9.4 Fish Tissue Chemistry, Data Analysis and Interpretation, p. 92</p>	<p>The proposed data analysis approach for the fish health and metals in fish components is to compare between NF and FF areas in a given year and after 2025 (first proposed round of new fish monitoring program), to results from the 2025 survey. The AEMP Design does not include comparison to Reference Conditions, as is proposed for all other components and as is currently done under the Operations AEMP. These comparisons would provide the opportunity to assess overall changes to these components and a means for assessing a return to pre-Project conditions (accepting that the Reference Conditions do not represent true pre-Project measurements). It is also noted that the current AEMP Action Levels for fish health are defined based on comparisons to Reference Conditions - this approach was adopted due to the detection of mine-related effects in the FF areas of Lac de Gras.</p>	<p>Data analysis and reporting for fish health and metals in fish should include comparison to the Reference Conditions which represent "baseline" conditions for the Project.</p>
<p>Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Data Analysis and Interpretation, Various Sections</p>	<p>It is unclear if reporting under the Closure/Post-Closure AEMP will include data from earlier years of Operation AEMP monitoring. The Study Design appears to restrict temporal comparisons to the Inclusion of results "at the end of commercial operations."</p> <p>Inclusion of multiple years of Operation Monitoring results would be important to allow for tracking of trends over the long-term. For example, if a water quality variable had been trending upwards during the operation period, inclusion of those data in the post-closure reporting would be important to assess if that trend continues or if and when conditions begin trending downwards. Inclusion of multiple years of data is also critical to account for inter-annual variability.</p>	<p>Clarify what data will be included in reporting for assessing temporal changes. Recommend inclusion of multiple years of operation monitoring data to assess changes to or emerging trends.</p>