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DIAVIK WATER LICENCE AMENDMENT – FINAL CLOSURE AND RECLAMATION PLAN V. 1.0: PLAIN LANGUAGE BRIEFING AND TECHNICAL REVIEW COMMENTS

Technical Memorandum # 367-23-01

Prepared for:

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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") Version 1.0 of its Final Closure and Reclamation Plan (FCRP). The review was restricted to consideration of the aquatic environment as it relates to aquatic life and excluded consideration of the aquatic environment as it may relate to humans or wildlife.

This review incorporates comments submitted as part of a review of the Diavik Water Licence Amendment Application – Progressive Reclamation – Re-Establishing Natural Drainages to EMAB (NSC 2023), discussions at the Technical Sessions held March 6-10, 2023, comments identified based on review of additional documents, and responses to Information Requests.

Key comments and recommendations from this review are summarized below.

POST-CLOSURE MONITORING

- **Runoff Monitoring: Mixing Zone Sampling Methods**: Diavik proposed to sample water at the "Mixing Zone Boundaries (MZB)" in Lac de Gras, downstream of site runoff. The proposed sites would be located either at a point 100 m from shore or farther from shore until water depth reaches 5 m. Water would be collected using a sampling device from the upper 1 m of the water column.
    - **Recommendation 1:** Sample at 100 m distance from shore in all mixing zones (or closer if full mixing occurs closer to shore); change the sampling method if needed to sample shallower water depths.
    - **Recommendation 2:** Collect water samples across the water column at the MZB stations if water is not fully mixed.
    - **Recommendation 3:** Conduct a plume survey in each mixing zone.
- **Runoff Monitoring: Monitoring Flow and Verifying Dilution**: Diavik has proposed that monitoring of flow from ponds post-breaching will be limited to presence/absence observations when the runoff is being sampled for chemistry or toxicity. This is inadequate to understand runoff inputs and for interpretation of monitoring results**.**
    - **Recommendation**: Recommend regular monitoring of runoff discharge (e.g., daily).
- **Runoff Monitoring: Discontinuation of SNP Stations**: It is proposed to drop a Surveillance Network Program (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 1**: 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.
    - **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.
- **Runoff Monitoring: Sites:** It is proposed that runoff will be sampled for chemistry and toxicity at the breach locations. Monitoring of the streams should also be conducted near the mouths to determine if and how water quality changes along the length of the stream and prior to discharging to the lake.
    - **Recommendation:** Recommend sampling runoff for water quality analysis at an additional site near the stream mouths to assess changes in water quality conditions for a minimum of one year.
- **Runoff and MZB Monitoring: Freshet:** It is expected that due to safety considerations, sampling of the MZB SNP stations will not be possible early in the spring when runoff begins to flow but the lake is still ice-covered. An alternate sampling plan should be developed that can feasibly and safely be implemented in these instances.
    - **Recommendation 1:** Develop an alternate sampling plan for scenarios in which the MZB stations cannot be sampled for safety reasons. Recommend sampling the mouth of the runoff stream (if sampling these sites regularly is not required) and/or the nearshore area of the lake as feasible.
    - **Recommendation 2:** Estimate concentrations using predicted dilution factors at the SNP MZB stations in the event the sites cannot be sampled for safety reasons.
- **Runoff Monitoring: Low Flow:** Stream flow may be too low at the pond breach sites to allow for collection of water samples for chemistry and/or toxicity testing during some periods.
    - **Recommendation:** Identify alternate sampling sites in runoff streams and/or the nearshore area of the lake if sampling at the proposed runoff SNP stations is not possible (e.g., flow or depth is too low).
- **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.

- **Pit Lakes: Monitoring:** It is proposed to decrease the frequency of monitoring of Pit Lakes post-closure to twice per year. A greater frequency of sampling may be warranted for the initial years of post-closure until there is enough data to demonstrate conditions are stable and as predicted.

  - **Recommendation:** Include more frequent sampling (quarterly or monthly in the open-water season) - at a minimum for pit lake A418 - during the initial years of post-closure until there are enough data to conclude water quality is stable and as predicted.

- **North Inlet: Monitoring:** Closure criteria for the North Inlet (NI) water quality will be assessed against a single station and monitoring would be conducted two times per year post-closure. Assessment of closure and post-closure conditions in the NI should incorporate more than one sampling station and water quality monitoring should be done more than twice per year to provide a robust dataset and confirm predictions.

  - **Recommendation**: Include several water quality monitoring sites in the NI during closure (pre-breaching of the dike) and post-closure until adequate data are obtained to be confident that water quality is stable and suitable for aquatic life. Sample quarterly prior to breaching and during the initial post-closure phase to establish water quality conditions are stable and as predicted.

- **Surface Water Action Level Framework (SWALF): 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 Aquatic Effects Monitoring Program (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: Implementation**: The structure of the SWALF means there may be long lag times between a trigger being exceeded and implementation of an action (estimated to be on the order or 3-5 weeks depending on the trigger). These time delays may create practical issues associated with implementing actions either effectively or at all.

  - **Recommendation**: Describe what the response and actions will be if an action is triggered but the runoff is no longer flowing, the quality and/or quantity of runoff changes notably, and/or if actions can no longer be implemented due to inadequate flow or for safety reasons.

- **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**: Describe how water quality conditions in the mixing zone will be incorporated into the SWALF and clarify what the actions would be if AEMP benchmarks are not met at the MZB sites.
- **Surface Water Action Level Framework: Proposed Revisions**: Diavik proposed some options for modifications to the SWALF, which include the addition of triggers associated with monitoring conducted under the AEMP. Some of the details of these proposed changes are unclear.
    - **Recommendation 1**: Apply the Action Level 2 trigger to individual water quality, plankton, fish, and benthic invertebrate sampling stations and not to the overall average of all sites in the Nearfield area.
    - **Recommendation 2**: Describe how Farfield data will be incorporated in the assessment.
    - **Recommendation 3**: Provide a rationale for the proposed critical effects sizes (i.e., magnitude of effect on aquatic life that would trigger an action).
    - **Recommendation 4:** Define "effects threshold" for water quality and if not defined, explain when and how it will be defined. Describe how the trigger will be assessed if there is no effects threshold.
    - **Recommendation 5**: Clarify if the water quality trigger proposed for the Midfield area would apply to individual stations or to all stations combined.

AQUATIC EFFECTS MONITORING PROGRAM

- **Monitoring and Schedule**: Diavik has clarified that fish sampling at the new sampling areas around East Island will not be done until 2025. Other aquatic environment components would be sampled in 2023 or 2024 at new sites where schedule permits. Diavik noted that only winter water quality would be sampled prior to breaching Ponds 2 and 7.
    - **Recommendation**: Two years of pre-closure sampling at the new areas/sites is recommended. At a minimum, one round of monitoring for all components (water quality and plankton (winter and summer), sediment quality, benthic invertebrates, fish, and metals in fish) should be done before ponds are breached.
- **New Sampling Areas**: The Closure and Post-Closure AEMP Design Plan proposes to add new sites to address specific effects of the closure – including breaching of collection ponds. The water quality modeling predicts the greatest effects on water quality in runoff and Lac de Gras in the bay that will receive runoff from C3 (hereafter referred to as the "C3 bay"). No sampling sites have been included for this area.

- **Recommendation**: Sample all components in the C3 bay and collect a minimum of one year of pre-closure monitoring data to facilitate pre- vs. post-closure comparisons.

SITE WATER QUALITY MODEL

- **Model Inputs: Baseline Water Quality Data**: The site water quality model used to predict effects of site runoff used a constant and "average" (median) background water quality condition for runoff based on sampling done at 8 streams in 1996 (none of which are on East Island). No details are provided and there is no discussion of this dataset in the submission (e.g., were conditions highly variable). This information is important to understand as it is a major input to the modeling that was done.

  - **Recommendation 1**: Provide a table showing the loading (amount of each substance predicted to be released into the runoff) for each source in each of the drainages.

  - **Recommendation 2**: Conduct modeling of site runoff water quality using higher concentrations for background water quality (e.g., maximum measured concentrations).

HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT (HHERA)

- **Metals in Lake Trout**: The HHERA indicates that there are only data for mercury in Lake Trout and no other metals. There are existing datasets for metals other than mercury.

  - **Recommendation**: Verify that the conclusions of the HHERA would not change with the use of actual Lake Trout metals data.

- **Metals in Slimy Sculpin**: The HHERA used existing data for metals in Slimy Sculpin from the period of 2007-2019. Issues with two years (2007 and 2016) of this dataset have been identified. It would be prudent to assess whether any conclusions of the risk assessment would change with exclusion of these data.

  - **Recommendation**: Verify conclusions of the HHERA would not be affected by removal of the 2007 and 2016 slimy sculpin metals datasets.

- **Mercury in Lake Trout**: It is unclear what data were used for mercury in Lake Trout in the HHERA. The sample size presented in the HHERA does not align with the Lake Trout mercury dataset provided by Diavik previously.

  - **Recommendation**: Verify and clarify what specific mercury in Lake Trout datasets were used to define summary statistics to support the HHERA. Data sets should exclude replicate samples and analyses (e.g., 2008 dataset). Verify that the conclusions of the HHERA would not change with use of a corrected dataset (if applicable).

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1.0 BACKGROUND AND SCOPE OF WORK

Diavik Diamond Mines (2012) Inc. (DDMI; Diavik) submitted Version 1.0 of its Final Closure and Reclamation Plan (FCRP) on October 13, 2022. The Wek'èezhìi Land and Water Board (WLWB) completed their conformity check with the Water Licence and distributed the FCRP for review on December 23, 2022. Several files were re-posted after December 23, including Appendix X-19 to X-23 (January 16, 2023).

The Environmental Monitoring Advisory Board (EMAB) requested that North/South Consultants (NSC) undertake a technical review of portions of the FCRP that pertain to the aquatic environment as follows:

- FCRP Main Body (sections relevant to the aquatic monitoring program only);
- Appendix V: Detailed Tabulation of Closure Objectives and Criteria (sections relevant to the aquatic environment only);
- Appendix VI-1: Closure and Post-Closure Monitoring Version 3.1 (sections relevant to the aquatic environment only);
- Appendix VI-2: Closure and Post-Closure AEMP Design Plan Version 1.0;
- Appendix X-20: DDMI Closure Feasibility Study Site Water Quality Model, 1:100 Dry Year Scenario, and Climate Change Considerations (sections relevant to the aquatic environment only);
- Appendix X-21: Hydrodynamic and Water Quality Modelling of Pit Lakes and Lac de Gras;
- Appendix X-22: Rationale for Assessed Runoff Mixing Zones During Post-Closure;
- Appendix X-25: Human Health and Ecological Risk Assessment (aquatic environment only); and
- Appendix X-27: Surveillance Network Program Data (aquatic environment only).

The review was restricted to consideration of the aquatic environment as it relates to aquatic life, and excluded consideration of the aquatic environment as it may relate to humans or wildlife.

Technical review comments submitted as part of a review of the Diavik Water Licence Amendment Application – Progressive Reclamation – Re-Establishing Natural Drainages to EMAB (NSC 2023a) are also included herein as requested by EMAB. The review also incorporates discussions at, and responses to Information Requests (IRs) from, the Technical Sessions held March 6-10, 2023.

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. The comments tables include comments submitted by NSC with respect to an initial review of the Diavik Water Licence Amendment Application (NSC 2023b), responses provided by DDMI, and any revisions to comments and recommendations based on review of DDMI's responses, review of additional documents, and discussions and IR submissions relating to the Technical Sessions.

2.0 KEY COMMENTS

Comments described in Sections 2.1 through 2.4 refer to the following general subjects:

Appendix VI-1: Closure and Post-Closure Monitoring

- Runoff Monitoring: Mixing Zone Sampling Methods;
- Runoff Monitoring: Discharge Monitoring and Model Verification;
- Runoff Monitoring: Discontinuation of Surveillance Network Program (SNP) Stations;
- Runoff Monitoring: Sampling Frequency;
- Runoff Monitoring: Sites;
- Runoff and Mixing Zone Boundary (MZB) Monitoring: Freshet;
- Runoff Monitoring: Low Flow;
- Mixing Zone Monitoring: Chlorophyll *a*;
- Pit Lakes: Monitoring;
- North Inlet (NI): Monitoring;
- Surface Water Action Level Framework (SWALF): Nutrients and Eutrophication;
- Surface Water Action Level Framework: Implementation;
- Surface Water Action Level Framework: Application; and
- Surface Water Action Level Framework: Proposed Revisions; and
- Surface Water Action Level Framework: North Inlet Monitoring.

Appendix VI-2: AEMP Design Plan

- Pre-Closure Monitoring and Schedule; and
- Sampling Areas.

Appendix X-20: Site Water Quality Model

- Runoff Modeling: Background Water Quality Data and Project Effects.

Appendix X-25: Human Health and Ecological Risk Assessment (HHERA)

- Metals in Lake Trout;

- Metals in Slimy Sculpin; and
- Mercury in Lake Trout.

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

2.1.1 Runoff Monitoring: Mixing Zone Sampling Methods

Sampling at the Mixing Zone Boundary (MZB) is proposed to be at fixed locations – either 100 m from shore or farther offshore to the 5 m depth contour. Diavik clarified at the Technical Sessions that the proposed sampling at the 5 m depth contour is due to logistical constraints (i.e., assumed 2 m ice thickness, sampling 2 m off the bottom and using a 1 m Kemmerer). Diavik also clarified at the Technical Sessions that the MZB sites are expected to be fully mixed but that *in situ* depth profile measurements will be collected.

It is our understanding that the MZB SNP stations would not be sampled under ice either because runoff will not be flowing, and therefore sampling is not required, or because conditions on the lake would be unsafe for sampling when runoff is flowing but ice remains on the lake. Assuming this is correct, then the presence of ice (and therefore the need to account for 2 m of ice depth) is not applicable to the selection of the precise location (i.e., minimum 5 m depth).

Other sampling methods (i.e., other than a 1 m vertical Kemmerer water sampler) could also be used for sampling these sites including but not limited to grab sampling (directly filling sample bottles) or use of a horizontal sampler or a peristaltic pump. These methods would allow for sampling of shallower depths.

In addition, if sites are not fully mixed it would be more appropriate to collect a depth-integrated sample for chemistry and toxicity testing, rather than sampling the upper 1 m of the water column as proposed.

It would be most appropriate to locate all MZB SNP stations at the 100 m distance from shore as proposed, or closer to shore if the full mixing is achieved closer than 100 m from shore, rather than applying a minimum water depth. A plume survey would assist with delineating the dimensions of the plume and identifying the location of full mixing.

Recommendation 1: Sample at 100 m distance from shore in all mixing zones (or closer if full mixing occurs closer to shore); change the sampling method if needed to sample shallower water depths.

Recommendation 2: Collect depth-integrated samples at the MZB stations rather than only a portion of the water column in the event that a site is not fully mixed.

Recommendation 3: Conduct a plume survey in each mixing zone to establish the size, dimensions, and location of full mixing. Review the proposed MZB sampling site locations based on the results of the plume survey and move stations as required and appropriate.

2.1.2 Runoff Monitoring: Discharge Monitoring and Model Verification

NSC previously submitted a technical comment in a review of the Diavik Licence Amendment Application - Progressive Reclamation – Re-Establishing Natural Drainages (NSC 2023) seeking clarification of what monitoring is proposed with respect to site runoff discharge. It was noted that Appendix VI-1 does not clearly indicate whether runoff discharge will be monitored at all sites post-breaching of the ponds or what methods would be employed - specifically measurement frequency.

DDMI responded: "Post-decommissioning surface runoff flow (discharge) will be monitored through presence/absence observations at the time of planned sampling."

Clarification was provided by Diavik at the Technical Sessions that model validation would consist of verification of the predicted dilution factors at the MZB. Diavik noted this would involve comparing the concentrations from the runoff and MZB "plus background". It is our understanding that there is no "background" water quality sampling planned in the lake to be used for this purpose.

Recommendation 1: It is recommended that discharge of surface runoff be monitored regularly (e.g., daily discharge) if/as feasible to: (A) provide a means to monitor the overall flow conditions encountered each year (i.e., hydrograph, periods of flow, volume of runoff); (B) document the range of discharge conditions to assist with interpretation of monitoring results (e.g., was toxicity testing sampling or mixing zone sampling conducted during a relatively high or low discharge); and (C) to facilitate verification of modeling results, including verification of dilution, and allow for calculation of loadings from site runoff.

Recommendation 2: Model validation of dilution factors should compare water quality in the runoff directly to the water quality at the MZB (i.e., background conditions should not be added to the MZB measurements).

2.1.3 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: A decision to deactivate 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.

2.1.4 Runoff Monitoring: Sampling Frequency

The appendices indicate a reduction of monitoring frequency for runoff from weekly for 1 year to monthly (quarterly for toxicity) and ultimately twice per year thereafter. 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 for more than a 1-year period.

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.

2.1.5 Runoff Monitoring: Sites

It is proposed that runoff will be sampled for chemistry and toxicity at the breach locations. Monitoring of the streams should also be conducted near the mouths to determine if and how water quality changes along the length of the stream and prior to discharging to the lake.

Recommendation: Recommend sampling runoff for water quality analysis at an additional site near the stream mouths to assess changes in water quality conditions for a minimum of one year.

2.1.6 Runoff and MZB Monitoring: Freshet

It is expected that due to safety considerations, sampling of the MZB SNP stations will not be feasible early in the spring when runoff begins to flow but the lake is still ice-covered. In the absence of the ability to monitor the mixing zone in these instances, an alternate sampling plan should be developed that can feasibly and safely be implemented. Sampling the runoff stream at the mouth (point of entry to the lake) as recommended in Section 2.1.5 (or an alternate site as/if needed) and/or in the nearshore area of the lake if safe/feasible is recommended.

Recommendation 1: Develop an alternate sampling plan for scenarios in which the MZB stations cannot be sampled for safety reasons. Recommend sampling the mouth of the runoff stream (if regular sampling of these sites is not required) and/or the nearshore area of the lake as feasible.

Recommendation 2: Estimate concentrations using predicted dilution factors at the SNP MZB stations in the event the sites cannot be sampled for safety reasons.

2.1.7 Runoff Monitoring: Low Flow

It has been noted that due to the nature of the drainages and flow conditions, that runoff flow may be inadequate to facilitate collection of water samples for chemistry and/or toxicity testing during some periods. Though this constraint may apply to the entirety of some/all of the drainages, sampling should be attempted at alternate locations farther downstream in the event sampling cannot be completed at the proposed runoff SNP stations. If sampling cannot be completed at any site in the stream(s), sampling should be conducted in the nearshore of the lake near the point of entry of the runoff.

Recommendation: Identify alternate sampling sites in runoff streams downstream of the breach locations to be sampled in the event of practical constraints on sampling at the proposed runoff SNP stations. Identify alternate sampling sites in the nearshore of the lake in the event that runoff cannot be sampled at any location in the runoff streams.

2.1.8 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 total phosphorus (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.

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

2.1.9 Pit Lakes: Monitoring

Appendix VI-1 indicates that at post-closure, the frequency of monitoring of Pit Lakes will be reduced to twice per year and will align with AEMP sample collection. Sampling will include collection of depth profiles and grab samples for chemical analysis. "The duration of post-closure monitoring will depend on the results documented in the Performance Assessment Reports (Section 3.7.3); however, monitoring of the rejoined areas is expected to continue for five years."

A greater frequency of sampling may be warranted for the initial years of post-closure until there is sufficient data to demonstrate conditions are stable and as predicted. Sampling twice per year would leave long durations without any information to confirm water quality is stable and aligned with predictions.

Recommendation: Recommend more frequent sampling (quarterly or monthly in the open-water season) - at a minimum for pit lake A418 - during the initial years of post-closure until there are sufficient data to conclude water quality is stable and as predicted.

2.1.10 North Inlet: Monitoring

Table 3-25 indicates that closure criteria for the NI water quality will be assessed against a single station (SNP 1645-13) post-closure. Assessment of closure and post-closure conditions in the NI should incorporate more than one sampling station to provide robust data. It is also indicated that monitoring of the NI during post-closure will be conducted twice per year (once in each of the ice-cover and open-water seasons). It would be prudent to monitor at a higher frequency (e.g., quarterly) prior to breaching and during the initial post-closure period to provide a robust dataset and confirm predictions.

Recommendation: Include several water quality monitoring sites in the NI during closure (pre-breaching of the dike) and post-closure until adequate data are obtained to be confident that water quality is stable and suitable for aquatic life. Sample quarterly prior to breaching and during the initial post-closure phase to establish water quality conditions are stable and as predicted.

2.1.11 Surface Water Action Level Framework: Nutrients and Eutrophication

The surface water action level framework (SWALF) Action Level AL1A - Runoff monitoring triggers for the aquatic environment (SW2) are: (1) runoff > 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.

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

- the trigger of 10 x the AEMP benchmark (in runoff) for TP would be 7.5 µg/L x 10 = 75 µg/L and for chlorophyll *a* would be 4.5 µg/L x 10 = 45 µg/L. These triggers are 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 acknowledged that the annual loading of phosphorus to Lac de Gras is expected to decrease post-closure. However, nutrient inputs from pond drainages would occur over a shorter period (open-water season) than those from operation (i.e., from the North Inlet Water Treatment Plant [NIWTP]), and therefore comparisons of loading between these two scenarios should be limited to the open-water period, and the receiving environments differ in terms of mixing and habitat conditions such as water depth. Therefore, effects of site runoff on nutrients in the mixing zones may be expected to differ from those observed near the NIWTP.

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.

2.1.12 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 × 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 lags associated with sampling, laboratory analysis, and subsequent implementation of actions (estimated to be on the order or 3-5 weeks depending on the trigger). Time lags between initial runoff sampling and subsequent implementation of Action Level AL2A sampling (MZB sampling) could result in issues associated with changes in runoff quantity and/or quality between the sampling events. Time lags on the order of several or more weeks may also

result in a scenario in which runoff to Lac de Gras ceases prior to implementation of MZB sampling and/or where sampling conditions become unsafe for sampling.

Recommendation: Describe what the response and actions will be in the event that action AL1A (runoff toxicity) or AL2A is triggered (i.e., MZB sampling) but the runoff is no longer flowing, the quality and/or quantity of runoff changes notably, and/or if actions can no longer be implemented due to lack of flow or safety considerations.

2.1.13 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 10X 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.

Further, the framework does not include direct assessment of water quality conditions and comparisons to AEMP benchmarks in the mixing zone. Therefore, the framework lacks a mechanism to invoke an action in the event that water quality conditions are above benchmarks but rather relies entirely on results of toxicity testing of the mixing zone – which would only be tested in the event that site runoff exhibits toxicity.

Recommendation: Describe how water quality monitoring results in the mixing zone will be incorporated into the SWALF and clarify what the actions would be in the event that AEMP benchmarks are not met at the MZB.

2.1.14 Surface Water Action Level Framework: Proposed Revisions

Diavik has proposed some options for modifications to the SWALF in their response to Information Requests (DDMI 2023; Attachment B). For aquatic life, proposed changes include the addition of two chemistry parameters to Action Level 2 (total suspended solids [TSS] and pH) and addition of triggers from the AEMP to the SWALF. We support the inclusion of triggers and actions for the AEMP and integration within the SWALF. However, we offer the following comments/questions:

- Action Level 2 - Fish:
    - It is unclear what is meant practically by the “Nearfield mean” (NF). Only two sampling areas for fish are proposed for the nearfield area adjacent to drainages where collection pond breaches will occur; the third is proposed in the area

adjacent to the North Inlet. An "effect" may be observed in one of the NF areas but not the others and applying a mean for all areas may mask this effect.

- How will Farfield (FF; i.e., matched "reference areas") data collected concurrently with the NF data be utilized in the proposed framework?
- What is the rationale for the proposed critical effect size (CES) of 1.5x the reference condition? Metal and Diamond Mining Effluent Regulations (MDMER) specify CESs for fish metrics of 10% (condition) to 25% (all other metrics).

- Action Level 2 - Invertebrates and Plankton:
  - As above, it is unclear what is meant practically by the "Nearfield mean". Would the mean be calculated from all NF sites collectively or would this apply to specific areas adjacent to collection pond breaches independently?
  - As above, what is the rationale for the proposed CES of 50% lower than the reference condition for invertebrates and plankton? MDMER specify CESs for benthic invertebrates of 2 x standard deviation (SD).
- Action Level 2 - Water Quality:
  - An Action Level 2 trigger for water quality is defined as "a Nearfield station greater than the normal range plus 50% of the effects threshold." It is unclear what is meant by the "effects threshold". If the effects thresholds have not been defined for water quality, how will this trigger be assessed? Assuming they have not been defined, what trigger would be applied to cause an effects threshold to be defined?
- Action Level 3 - All:
  - It is unclear if the water quality trigger proposed for the Midfield area would apply to individual stations or to all stations combined;
  - Since water quality will be monitored annually and benthic invertebrates and fish on a three-year rotation, it is unclear if the proposed water quality trigger would apply to any year or only the year(s) in which the biological sampling was conducted;
  - The term reference conditions (RC) and NR (assuming this is normal range) are used in the revised SWALF. Can Diavik clarify if these are referring to the same data?

Recommendation 1: Clarify what is meant by the nearfield mean for the fish component (Action Level 2 trigger). Recommend assessing this trigger for each individual NF area against the reference condition. Include a description of how FF data will be incorporated in the assessment.

Recommendation 2: Clarify what is meant by the nearfield mean for the plankton and benthic invertebrate components (Action Level 2 trigger). Recommend assessing this trigger for each individual NF area adjacent to the pond breaches against the reference condition. Include a description of how FF data will be incorporated in the assessment.

Recommendation 3: Provide a rationale for the proposed CES of 1.5x the reference condition for fish and 50% of the reference condition for plankton and benthic invertebrates.

Recommendation 4: Define "effects threshold" for water quality. If the effects thresholds have not been defined for water quality, describe how the Action Levels 2 and 3 triggers will be assessed. Assuming effects thresholds have not been defined, identify what trigger would be applied to cause an effects threshold to be defined.

Recommendation 5: Clarify if the water quality trigger proposed for the Midfield area would apply to individual stations or to all stations combined.

2.1.15 Surface Water Action Level Framework: North Inlet Monitoring:

Appendix VI-1 indicates that the SWALF would be implemented in the event that Closure Criteria for the NI Closure Objectives NI2, 3, and 5 were not met post-closure (i.e., AEMP benchmarks are exceeded).

It is unclear how the SWALF will be applied to the Closure Criteria. The SWALF shown in Figure 5.4-2 in the FCRP is structured to be applied to surface water runoff and not the NI or Pit Lakes. Further, action levels 0/1 for surface water quality with respect to aquatic life refer to runoff toxicity texting results and runoff water quality exceeding 10X AEMP benchmarks.

What specifically are the triggers and actions associated with aquatic life for Closure Criteria NI2, 3, and 5 in the SWALF?

Recommendation: Provide a description of the criteria, triggers, and action levels that will be applied to NI water quality monitoring within the SWALF with respect to aquatic life. Modify the SWALF figure or create a second figure to be specific to the NI monitoring and Closure Criteria N2, 3, and 5. If the SWALF will not be applied to NI monitoring, identify triggers and actions for NI monitoring.

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.

In addition, the proposed AEMP indicates the A21 Pit Lake would be breached in July 2025; if sampling were not initiated until 2025 this schedule would also interfere with obtaining baseline data prior to breaching of the pit lake.

DDMI clarified that fish sampling is not planned to be undertaken prior to breaching closure drainages, the North Inlet, or the pit lakes and that the first planned sampling is in 2025. Diavik indicated that sampling will be undertaken “where schedule permits” for water quality, plankton, sediment quality, and benthic invertebrates in 2023 or 2024 but only ice-cover season sampling for water quality would be completed before breaching of Ponds 2 and 7.

All new sampling sites for all components should be sampled prior to pond breaching to provide a “baseline” data set for comparison to closure/post-closure monitoring. This is critical information as these areas have not been sampled previously. For Slimy Sculpin, past monitoring conducted under the AEMP has noted considerable variability in the data sets and confounding factors with respect to similarities in habitat between the FF (reference) areas and the NF/MF areas which has affected data interpretation. This consideration renders the need for pre-closure data collection particularly important.

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 monitoring at the new NFC should

be completed for all components (water quality, plankton, sediment quality, invertebrates, fish, and metals in fish) prior to breaching of ponds or pit lakes. For water quality and plankton, the pre-closure sampling should include at least one summer and one winter sampling event.

2.2.2 NF 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). Additionally, it is proposed to drop one NF area in the vicinity of the A21 pit (MF3 area).

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 and no other sampling (i.e., water quality, plankton, benthic invertebrates, and sediment quality) is proposed in the bay that will receive C3 runoff (hereafter referred to as the "C3 bay").

NSC had previously requested clarification for the rationale used to select fish sampling areas and DDMI responded that sites were selected based on habitat constraints (water depth of 18-22 m) and that this bay does not meet these criteria.

While the desire to maintain consistency in habitat attributes when selecting sites is understood (and is critical), this constraint should not preclude sampling in areas where monitoring is particularly important. Water quality sampling is generally not constrained by habitat attributes and should be completed in this area. Fish sampling is conducted in nearshore areas and is decoupled from sampling of other components – therefore fish site selection is not dependent upon water depth and substrate offshore. Sediment quality and benthic invertebrates could be affected by sampling at shallower depth and/or in areas with different. However, sampling could be undertaken in the C3 bay in shallower habitat and data could be analysed through a pre-closure vs. closure/post-closure approach (i.e., before-after approach) or potentially through alternative study designs (e.g., gradient design).

Given that the C3 bay is predicted to experience the largest impacts related to the Project post-closure, the AEMP should not only include some sampling in this area, this area should be a high priority for monitoring. It is further suggested that collection of data in the C3 bay will increase confidence/reduce uncertainty with respect to predicted effects of the Project post-closure and would provide valuable data to inform the understanding of closure impacts.

Recommendation: Sample all components in the C3 bay and collect a minimum of one year of pre-closure monitoring data to facilitate pre- vs. post-closure comparisons of conditions.

2.3 APPENDIX X-20: SITE WATER QUALITY MODEL

2.3.1 Runoff Modeling: Background Water Quality and Project Effects

The baseline (i.e., pre-Project) water quality data for streams used in the modeling is not presented in the submission (only median values are presented) and the reader is referred to Diavik (1998) for details. The Environmental Assessment Report (Diavik 1998) presents one table with minimum, maximum, and median statistics for water quality measured in eight streams. The number of samples, frequency and timing of sampling, and locations of the sampling are not provided. There is also no discussion of the occurrence of "natural" exceedances of AEMP benchmarks for these streams in this reference.

The information as provided is inadequate to: (1) understand the quantity and quality of baseline water quality data for these systems (which formed the basis of model inputs); (2) determine what if any water quality parameters exceeded AEMP benchmarks before the Project and if exceedances occurred, how frequently and by what magnitude; (3) understand the appropriateness of the use of a median for defining background water quality conditions for water quality modeling; and (4) interpret modeling results and – in particular – discriminate Project-related effects on water quality. Ultimately the information presented is insufficient to determine if modeling was appropriate and adequate and what the Project-specific effects are projected to be.

In response to a question on the baseline data used from modeling, Diavik indicated the raw data and details regarding the stream baseline water quality sampling are presented in **Golder Associates. 1996. Technical Memo #9-3. Stream/watershed water quality report.** Review of the data presented in this report indicate that none of the streams sampled in 1996 (the baseline dataset used for water quality modeling) were located on East Island. Further, the vast majority of the data were obtained in spring; only three streams were sampled in summer and fall. Lastly, total phosphorus was only measured in summer and fall at these three streams (total n = 6).

Detection limits are only provided for the summer and fall programs (not spring) and there is only one blank sample reported for the whole program (submitted with the spring program). The single field blank sample indicates potential sample contamination – including for total copper.

For the site water quality modeling, background water quality conditions for unimpacted drainages (i.e., "natural" runoff) were assigned the median concentrations from baseline studies conducted in 1996 and these values were held constant (i.e., background water quality does not vary with differing climate/flow conditions) in the modeling conducted. In addition, the modeling assumed that source loading is constant over time; this assumption is unlikely to be accurate and likely not conservative. This approach may not be adequately sensitive or appropriate. It appears that the only model input that was varied under the different climate change scenarios is flow; therefore, the model only predicts increases or decreases in runoff constituents as a direct function of flow/volume (i.e., dilution).

It is unclear what if any exceedances of water quality benchmarks and/or acute toxicity benchmarks beyond those predicted based on the median background water quality values would be predicted if a higher background water quality statistic were selected. Specifically, for those parameters that were predicted to be higher in runoff than background median concentrations but lower than AEMP benchmarks, would use of a different statistic for background water quality conditions result in runoff concentration exceeding AEMP benchmarks?

Inclusion of loading data used for all source inputs would assist with determining what drainages may be more affected by the background water quality source term (e.g., a table identifying loads from each source, including background water quality).

Recommendation 1: Provide a table(s) of source term loads used in runoff modeling to assist with identifying what source terms are the most significant in each drainage.

Recommendation 2: Conduct runoff modeling using a more conservative background water quality source term (e.g., maximum or 95th percentile) and compare to predictions based on the median baseline water quality values.

2.4 APPENDIX X-25: HUMAN HEALTH AND ECOLOGICAL RISK ASSESSMENT

2.4.1 Metals in Lake Trout

The HHERA indicates that the only COPC with measurements for Lake Trout is mercury. There are data available for other metals in Lake Trout. For example, Lake Trout muscle was analysed for a suite of metals in 2015 (Golder 2017) and 2018 (Golder 2019) as part of the Traditional Knowledge Study.

Recommendation: Verify that the conclusions of the HHERA would not change with the use of actual Lake Trout metals data.

2.4.2 Slimy Sculpin Metals Data

Appendix C indicates that summary statistics for metals in Slimy Sculpin were calculated using near-field and mid-field data collected from 2007 to 2019. DDMI recently noted that the 2007 Slimy Sculpin metals dataset is anomalous as the laboratory analysis method differed from other years. This observation would warrant exclusion of the 2007 dataset, though it is noted that the 2007 data are believed to be "biased high" and therefore their inclusion may err on the side of being conservative in the HHERA.

The 2016 data are also considered to be problematic due to inadvertent exclusion of sculpin livers in the analysis of metals in sculpin carcasses; in this case the dataset is expected to be biased on the low side.

Table C-39 presents the Reference Condition concentrations for Slimy Sculpin metals. These values may also be affected by inclusion of these two datasets. Additionally, derivation of Bioaccumulation Factors (BAF) presented in the HHERA may be affected as they reportedly include metals measured in Slimy Sculpin over the period of 2007-2019.

While exclusion of the 2007 and 2016 datasets from the HHERA may have little to no effect on the risk assessment conclusions, it would be prudent to assess whether any conclusions of the RA would change with exclusion of these data.

Recommendation: Verify conclusions of the HHERA would not be affected by removal of the 2007 and 2016 slimy sculpin metals datasets.

2.4.3 Mercury in Lake Trout

It is unclear what data were used for mercury in Lake Trout in the HHERA. Table C-38: Summary Statistics for Small-Bodied and Large-Bodied Fish Tissue Concentrations Used in the ARA, WRA and HHRA for Post-Closure Conditions indicates that the Lake Trout mercury summary statistics were derived from a sample size of 250, however the text (p. 54) indicates that monitoring data from 2008-2018 were used. Based on Lake Trout mercury data provided to NSC by DDMI previously, this sample size appears to be in error and appears to include data prior to 2008 and possibly multiple measurements made on the same fish in 2008 and/or duplicate samples.

Could the specific dataset used for this task be clarified? For the 2008 data for which there are three sets of measurements, which dataset was used?

Recommendation: Verify and clarify what specific mercury in Lake Trout datasets were used to define summary statistics to support the HHERA. Data sets should exclude replicate samples and analyses (e.g., 2008 dataset). Verify that the conclusions of the HHERA would not change with use of a corrected dataset (if applicable).

Table 1. Technical review comments and recommendations on the Final Closure and Reclamation Plan v. 1.0.

Commented [MC1]: See excel table

TOPIC	COMMENT	RECOMMENDATION
Appendix E FCRP Main Body, Section 2.5.2.1 Comprehensive Study Report Conclusions, p. 2-10	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." 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? It is unclear if fish will access and use the streams and therefore, what would be the Project-related effects on fish on East Island. Recommendation: 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. DDMI Response: "Signage is planned/required to advise people that the area is a closed mine. This is included in the FCRP and Reclaim estimate."	Comment partially addressed. Provide clarification if any monitoring of fish from East Island will be undertaken.
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	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." 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. DDMI response: "Sediment samples have been collected from 10 Collection Ponds and the E21 sump and the results are provided in FCRP Appendix X-27. One sample was collected from each of the ponds using a glass soil sampling jar attached to an extendable pole to collect a sample approximately 1-2m from the shore of the pond. Parameters analysed are listed in FCRP Appendix X-27 and include moisture, hydrocarbons, and metals. DDMI is using a THP threshold of 1,500 mg/kg as a trigger to require a cover. On that basis and in consideration of the management strategies identified in Appendix 11: Remedial Strategy Report, the initial monitoring results indicate that rock cover would be appropriate at Pond 5 and 10." It was clarified at the Technical Sessions that the trigger is actually F3 500 mg/kg. How many samples will be collected in each pond and what depth of sediment will be sampled? What information is there respecting what depth of pond sediment may be mobilized into the stream once breached?	Provide a description of the collection pond sediment sampling and analysis (number of sites, depth of sediment collected and analysed) that will be undertaken to make a determination regarding contamination and associated actions. Provide a description of the chemistry of the depth of sediment that may be mobilized after pond breaching.

TOPIC	COMMENT	RECOMMENDATION
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.3, Hydrology	NSC previously submitted a technical comment in a review of the Diavik Licence Amendment Application - Progressive Reclamation – Re-Establishing Natural Drainages (NSC 2023) seeking clarification of what monitoring is proposed with respect to site runoff discharge. Specifically, it was noted that Appendix VI-1 does not clearly indicate whether runoff discharge will be monitored at all sites post-breaching of the ponds or what methods would be employed - specifically measurement frequency. DDMI response: “Post-decommissioning surface runoff flow (discharge) will be monitored through presence/absence observations at the time of planned sampling.” Clarification was provided by Diavik at the Technical Sessions that model validation would consist of verification of the predicted dilution factors at the mixing zone boundary (MZB). Diavik noted this would involve comparing the concentrations from the runoff and MZB “plus background”. It is our understanding that there is no “background” water quality sampling planned in the lake to be used for this purpose.	It is recommended that discharge of surface runoff be monitored regularly (e.g., daily discharge) if/as feasible to: (A) provide a means to monitor the overall flow conditions encountered each year (i.e., hydrograph, periods of flow, volume of runoff); (B) document the range of discharge conditions to assist with interpretation of monitoring results (e.g., was toxicity testing sampling or mixing zone sampling conducted during a relatively high or low discharge); and (C) to facilitate verification of modeling results, including verification of dilution, and allow for calculation of loadings from site runoff. Model validation of dilution factors should compare water quality in the runoff directly to the water quality at the MZB (i.e., background conditions should not be added to the MZB measurements).
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	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). Recommendation: Clarify if all impacted drainages will be subjected to monitoring. If monitoring is not proposed in all drainages, provide a rationale. DDMI Response: "All drainages with collection ponds will be monitored once collection ponds have been decommissioned. Catchments without collection ponds will not be monitored. Observations throughout Operations has not identified monitorable discharges from these catchments."	Comment addressed (clarification provided).
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	It is proposed that runoff will be sampled for chemistry and toxicity at the breach locations. Monitoring of the streams should also be conducted near the mouths to determine if and how water quality changes along the length of the stream and prior to discharging to the lake.	Recommend sampling runoff for water quality analysis at an additional site near the stream mouths to assess changes in water quality conditions for a minimum of one year.

TOPIC	COMMENT	RECOMMENDATION
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	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. DDMI Response: "It is DDMI's understanding that WLWB approval will be required to deactivate an SNP station and any request will likely be distributed for public comment including EMAB. DDMI will likely include with any request the historical pond water quality data collected over a full range of hydrologic conditions."	Comment partially addressed. Recommendation is reiterated. A decision to deactivate 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

TOPIC	COMMENT	RECOMMENDATION
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, p. 19	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. 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? 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? Recommendation: 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. DDMI Response: "The mixing zone monitoring location will be at 100m from the discharge location unless the water depth in the area is less than 5m. In this case the monitoring location would be moved further away until a 5m depth of water is located." Comment: Sampling at the Mixing Zone Boundary (MZB) is proposed to be at fixed locations – either 100 m from shore or farther offshore to the 5 m depth contour. Diavik clarified at the Technical Sessions that the proposed sampling at the 5 m depth contour is due to logistical constraints (i.e., assumed 2 m ice thickness, sampling 2 m off the bottom and using a 1 m Kemmerer). Diavik also clarified at the Technical Sessions that the MZB sites are expected to be fully mixed but that in situ depth profile measurements will be collected. It is our understanding that the MZB SNP stations would not be sampled under ice either because runoff will not be flowing, and therefore sampling is not required, or because conditions on the lake would be unsafe for sampling when runoff is flowing but ice remains on the lake. Assuming this is correct, then the presence of ice (and therefore the need to account for 2 m of ice depth) is not applicable to the selection of the precise location (i.e., minimum 5 m depth). Other sampling methods (i.e., other than a 1 m vertical Kemmerer water sampler) could also be used for sampling these sites including but not limited to grab sampling (directly filling sample bottles) or use of a horizontal sampler or a peristaltic pump. These methods would allow for sampling of shallower depths. In addition, if sites are not fully mixed it would be more appropriate to collect a depth-integrated sample for chemistry and toxicity testing, rather than sampling the upper 1 m of the water column as proposed. It would be most appropriate to locate all MZB SNP stations at the 100 m distance from shore as proposed, or closer to shore if the full mixing is achieved closer than 100 m from shore, rather than applying a minimum water depth. A plume survey would assist with delineating the dimensions of the plume and identifying the location of full mixing.	Remove the 5 m depth constraint for establishing MZB stations and modify sampling methods as required to sample shallower depths if/as needed. Collect depth-integrated samples at the MZB stations rather than only a portion of the water column in the event that a site is not fully mixed. Conduct a plume survey in each mixing zone to establish the size, dimensions, and location of full mixing. Review the proposed MZB sampling site locations based on the results of the plume survey and move stations as required and appropriate
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, p. 19	It is expected that due to safety considerations, sampling of the MZB SNP stations will not be feasible early in the spring when runoff begins to flow but the lake is still ice-covered. In the absence of the ability to monitor the mixing zone in these instances, an alternate sampling plan should be developed that can feasibly and safely be implemented. Sampling the runoff stream at the mouth (point of entry to the lake) as recommended in Section 2.1.5 (or an alternate site as/if needed) and/or in the nearshore area of the lake if safe/feasible is recommended.	Develop an alternate sampling plan for scenarios in which the MZB stations cannot be sampled for safety reasons. Recommend sampling the mouth of the runoff stream (if regular sampling of these sites is not required) and/or the nearshore area of the lake as feasible. Estimate concentrations using predicted dilution factors at the SNP MZB stations in the event the sites cannot be sampled for safety reasons.

TOPIC	COMMENT	RECOMMENDATION
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.1.4, Seepage and Runoff, p. 19	It has been noted that due to the nature of the drainages and flow conditions, that runoff flow may be inadequate to facilitate collection of water samples for chemistry and/or toxicity testing during some periods. Though this constraint may apply to the entirety of some/all of the drainages, sampling should be attempted at alternate locations farther downstream in the event sampling cannot be completed at the proposed runoff SNP stations. If sampling cannot be completed at any site in the stream(s), sampling should be conducted in the nearshore of the lake near the point of entry of the runoff.	Identify alternate sampling sites in runoff streams downstream of the breach locations to be sampled in the event of practical constraints on sampling at the proposed runoff SNP stations. Identify alternate sampling sites in the nearshore of the lake in the event that runoff cannot be sampled at any location in the runoff streams.
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	The appendices indicate a reduction of monitoring frequency for runoff from weekly for 1 year to monthly (quarterly for toxicity) and ultimately twice per year thereafter. 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 for more than a 1-year period. Recommendation: 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. 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. DDMI Response: "The WLWB will be required to approve a change in monitoring frequency and any request will likely be distributed for public comment including EMAB. DDMI will likely include with any request the many years of pond water quality data collected over the range of historical hydrological conditions as supporting evidence. (See FCRP Appendix X-27)."	Comment partially addressed. Recommendation is reiterated. 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. 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.
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	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. Recommendation: Clarify monitoring frequency for mixing zones. DDMI Response: "The Mixing zone boundary (MXB) MXB will be sampled quarterly, with safe access for the first two years. There is an error in the text of Section 3.1.4.3."	Comment addressed (clarification provided).

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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	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. Further, the framework does not include direct assessment of water quality conditions and comparisons to AEMP benchmarks in the mixing zone. Therefore, the framework lacks a mechanism to invoke an action in the event that water quality conditions are above benchmarks. Since the proposed AEMP lacks a response framework, including triggers and actions levels and responses, collectively the proposed monitoring programs do not include a framework for actions related to changes in water quality conditions, but rather rely entirely on results of toxicity testing of the mixing zone – which would only be tested in the event that site runoff exhibits toxicity. 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. Describe how water quality conditions in the mixing zone will be incorporated into the SWALF. DDMI Response: "Action Level 0/1 of the Surface Water Action Level Framework (SWALF) will be applied to runoff from any breached collection pond. Water chemistry will be compared with the 10XAEMP trigger and toxicity compared with the IC25-12.5% trigger. At action level 2 sampling includes the mixing zone boundary (MZB) for sublethal toxicity and water chemistry. At this point sublethal toxicity test results will be compared against the IC50-100% threshold and water chemistry will be used to review dilution factors and AEMP benchmarks." Comment: The response does not appear to align with the statement "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."	Describe how water quality monitoring results in the mixing zone will be incorporated into the SWALF and clarify what the actions would be in the event that AEMP benchmarks are not met at the MZB.
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	The monitoring timing and frequency with respect to runoff and the mixing zones and the application of the surface water action level framework is unclear. Recommendation: 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. DDMI Response: "DDMI believes the information requested is contained within the application and notes the SWALF identifies monitoring frequencies (runoff and MZ) on a page. Expanded discussion or clarification is provided within these comment responses and DDMI will be prepared for further discussion after EMAB reviews these responses during the Technical sessions. "	Comment addressed (clarification regarding monitoring frequency provided).

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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	NSC previously commented: "The surface water action level framework identifies several assessment steps with an associated action. For aquatic life, these are: - Action Level AL1A - trigger - runoff > 10X 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 lags associated with sampling, laboratory analysis, and subsequent implementation of actions (estimated to be on the order or 3-5 weeks depending on the trigger). Time lags between initial runoff sampling and subsequent implementation of Action Level AL2A sampling (MZB sampling) could result in issues associated with changes in runoff quantity and/or quality between the sampling events. Time lags on the order of several or more weeks may also result in a scenario in which runoff to Lac de Gras ceases prior to implementation of MZB sampling and/or where sampling conditions become unsafe. DDMI Response: "The sampling frequency /schedule is summarized in the SWALF (Figure 3-3). Analytical turn around times and timing of action levels would be the same as currently exists for SNP 1645-18/18b and the Water License EQC. This is typically 3 weeks from the date of sampling but can fluctuate depending on flight availability and the workload of the commercial laboratories and if they required any re-work."	Describe what the response and actions will be in the event that action AL1A (runoff toxicity) or AL2A is triggered (i.e., MZB sampling) but the runoff is no longer flowing, the quality and/or quantity of runoff changes notably, and/or if actions can no longer be implemented due to lack of flow or safety considerations.

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	The surface water action level framework Action Level AL1A - Runoff monitoring triggers for the aquatic environment (SW2) are: (1) runoff > 10X 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. The proposed framework is not appropriate for application to nutrients and the eutrophication pathway. Two key issues are: - the trigger of 10X the AEMP benchmark for TP would be 7.5 ug/L x 10 = 75 ug/L and for chlorophyll a would be 4.5 ug/L x 10 = 45 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: the surface water action level framework to include appropriate triggers for TP and chlorophyll a. Add a trigger/response/action level for chlorophyll a in the mixing zone. DDMI Response: "Revisions to the surface water action level framework to include triggers for TP and chlorophyll a are not appropriate because nutrient loadings from runoff during post-closure are predicted to be much less than recent loadings from the water treatment plant (i.e., less than 20% of recent loadings) and will therefore not result in additional eutrophication effects beyond those that have already been identified to-date; the effects to-date have not indicated adverse effects to aquatic life, which biological monitoring has confirmed. The predicted maximum annual cumulative loading of phosphorus (23 kg/yr) from all surface water runoff discharge locations during post-closure to Lac de Gras area is an order of magnitude lower than the average annual loadings of phosphorus observed during recent years (2019 to 2021) from the NIWTP (288 kg/yr; Table 8 in Appendix X-21 of the FCRP). The predicted maximum annual cumulative loading of inorganic nitrogen (12,901 kg/yr) from all surface water runoff discharge locations during post-closure is also substantially lower than the average annual loading of inorganic nitrogen observed during recent years from the NIWTP (67,726 kg/yr; Table 8 in Appendix X-21 of the FCRP). Based on the most recent observations of eutrophication indicators in 2021, the current effluent discharge from the Mine is having a nutrient enrichment effect in Lac de Gras (WSP Golder 2022); however, nutrient enrichment Effects Benchmarks (e.g., set for phosphorus and chlorophyll a), which indicate a potential for adverse effects due to nutrient enrichment, have not been exceeded (WSP Golder 2022). Based on the most recent biological programs, benthic invertebrate and plankton community results were consistent with a low-level nutrient enrichment effect resulting from Mine discharge; however, nutrient loadings were not resulting in an adverse effect to aquatic life (e.g., fish or benthic invertebrates) (Golder 2020). References: Golder Associates (Golder). 2020. AEMP 2019 Annual Report for the Diavik Diamond Mine, NT. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. April 2020."	The previous recommendation is reiterated here. Revise the surface water action level framework to include appropriate triggers for TP and chlorophyll a. Add a trigger/response/action level for chlorophyll a in the mixing zone.
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	Comment: It is acknowledged that the loading of phosphorus to Lac de Gras is expected to decrease post-closure. However, nutrient inputs from pond drainages would occur over a shorter period (open-water season) than those from operation (i.e., from the North Inlet Water Treatment Plant [NIWTP]) and the receiving environments differ in terms of mixing and habitat conditions such as water depth. Therefore, effects of site runoff on nutrients in the mixing zones may be expected to differ from those observed near the NIWTP.	

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Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.2.3, Water Quality, Section 3.2.3.3, Post-Closure Monitoring, p. 36	Appendix VI1 indicates that at post-closure, the frequency of monitoring of Pit Lakes will be reduced to twice per year and will align with AEMP sample collection. Sampling will include collection of depth profiles and grab samples for chemical analysis. "The duration of post-closure monitoring will depend on the results documented in the Performance Assessment Reports (Section 3.7.3); however, monitoring of the rejoined areas is expected to continue for five years." A greater frequency of sampling may be warranted for the initial years of post-closure until there is sufficient data to demonstrate conditions are stable and as predicted. Sampling twice per year would leave long durations without any information to confirm water quality is stable and aligned with predictions.	Recommend more frequent sampling (quarterly or monthly in the open-water season) - at a minimum for pit lake A418 during the initial years of post-closure until there are sufficient data to conclude water quality is stable and as predicted.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.2.3, Water Quality, Section 3.2.3.1 Overview of Closure Objectives, Criteria, and Monitoring Activities, Table 3-11, p. 34 and Section 3.2.3.4 Comparison to Closure Criteria, p. 37	The closure criteria for Closure Objective M1 (Water quality in the flooded pit and dike area that is similar to Lac de Gras or at a minimum protective of aquatic life) M1-1 - states that the AEMP Benchmark is to be met within the top 40 m of water column of pit lakes (p. 34). It is later stated that "Some fish habitat enhancements have been constructed within the shallow areas of the flooded pits. It is expected fish use will occur and will be restricted to the upper layer of the pit above the chemocline, which is referred to as the mixolimnion. Fish are not expected to use the deeper water within and beneath the chemocline. Therefore, only water quality results for the mixolimnion will be required to meet closure criteria; however, data from all sample depths will be reviewed to monitor and assess water quality throughout the water column and provide additional information if needed to address any issues during post-closure." p. 37 The chemocline for the A418 Pit Lake is predicted to be much deeper than 40 m (modeling indicates a permanent chemocline will exist at a depth of 235 m). The other pit lakes are expected to fully mix on an annual basis. It is unclear why M1-1 is applied only to the upper 40 m of the pit lakes when biota may use depths greater than 40 m. It is noted that the Water Licence indicates: "17. The Licensee shall ensure that water in at least the top 40 meters of any Pit Lakes containing Processed Kimberlite meets the following objectives at closure: a) the AEMP Effects Benchmarks..." Diavik acknowledges that fish use is "expected" to be restricted to the upper layer of the pit above the chemocline. This statement inherently acknowledges that fish use below 40 m is therefore possible yet no commitment to evaluating fish use at these depths is provided.	Clarify if and how it will be determined if Diavik's expectation that fish use of the pit lakes will be restricted to the upper 40 m of the water column. If no actions are taken pre-emptively to confirm this expectation, recommend that a study be conducted to assess presence and use of water depth greater than 40 m by fish if monitoring demonstrates that AEMP benchmarks are not met below the 40 m depth.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.2.3, Water Quality, Section 3.2.3.4 Comparison to Closure Criteria, p. 36	Appendix VI-1 indicates a risk assessment may be completed and results may be used to revise AEMP benchmarks in relation to Closure Objectives M1 and M2: "In cases where constituent concentrations exceed AEMP Effects Benchmarks, a detailed risk assessment may be completed and results may be used to revise AEMP benchmarks.". There is inadequate detail provided regarding actions that would be taken in the event AEMP benchmarks are exceeded.	Provide a detailed description of actions that would be taken in the event AEMP benchmarks are exceeded in pit lakes.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.5.2, Water Quality, Section 3.5.2.1 Overview of Closure Objectives, Criteria and Monitoring Activities, Table 3-24, p. 62	Closure criterion N14-1 for closure objective N14 (water quality in the North Inlet that is as similar to Lac de Gras as possible) refers to water quality trending toward reference conditions. There are no details provided regarding how trending will be assessed.	Provide a description of how trending towards reference conditions in the North Inlet will be assessed.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.5.2, Water Quality, Section 3.5.2.1 Overview of Closure Objectives, Criteria and Monitoring Activities, Table 3-25, p. 62-63	Table 3-25 indicates that closure criteria for the North Inlet (NI) water quality will be assessed against a single station (SNP 1645-13) post-closure. Assessment of closure and post-closure conditions in the NI should incorporate more than one sampling station to provide robust data. It is also indicated that monitoring of the NI during post-closure will be conducted twice per year (once in each of the ice-cover and open-water seasons). It would be prudent to monitor at a higher frequency (e.g., quarterly) prior to breaching and during the initial post-closure period to provide a robust dataset.	Include several water quality monitoring sites in the NI during closure (pre-breaching of the dike) and post-closure until adequate data are obtained to be confident that water quality is stable and suitable for aquatic life. Sample quarterly prior to breaching and during the initial post-closure phase to establish water quality conditions are stable and as predicted.

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Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Section 3.5.2, Water Quality, Section 3.5.2.4 Comparison to Closure Criteria, p. 63-64	Appendix VI-1 indicates that the Surface Water Action Level Framework (SWALF) would be implemented in the event that Closure Criteria for the North Inlet Closure Objectives NI2, 3, and 5 were not met post-closure (i.e., AEMP benchmarks are exceeded). It is unclear how the SWALF will be applied to these Closure Criteria. The SWALF shown in Figure 5.4-2 in the FCRP is structured to be applied to surface water runoff and not the NI. Further, action levels 0/1 for surface water quality with respect to aquatic life refer to runoff toxicity texting results and runoff water quality exceeding 10X AEMP benchmarks. What specifically are the triggers and actions associated with aquatic life for Closure Criteria NI2, 3, and 5 in the SWALF?	Provide a description of the criteria, triggers, and action levels that will be applied to NI water quality monitoring within the SWALF with respect to aquatic life. Modify the SWALF figure or create a second figure to be specific to the NI monitoring and Closure Criteria N2, 3, and 5. If the SWALF will not be applied to NI monitoring, identify triggers and actions for NI monitoring.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Attachment 2, Table 4	Attachment 2 indicates that water quality monitoring of pit lakes A21 and A154 post-closure will begin one year following breaching of the dikes. Monitoring should occur during/immediately following breaching of the dikes to verify that water quality conditions are stable and meet Closure Criteria.	Monitor water quality in the A21 and A154 pit lakes during and immediately following breaching of the dikes - rather than beginning a year following breaching.
Appendix VI-1, FCRP v 1.0 Closure and Post-Closure Monitoring, Attachment 2, Table 27, p. 25	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.	Add chlorophyll a to the list of water quality parameters to be monitored at the SNP Mixing Zone stations.
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, p. 14 & Appendix VI-1, Section 3.1.4 Seepage and Runoff, Figure 3-3, p. 20	The AEMP design plan indicates that "a Runoff Water Quality Response Framework" was developed to provide "an adaptive management framework to address unexpected issues related to runoff water quality or the stability of water quality in the reconnected pits and NI throughout post-closure" (p. 14). The SWALF presented in Appendix VI-1 (see Figure 3-3, p. 20) only refers to site drainage and mixing zones downstream of these discharges.	Clarify how the Runoff Water Quality Response Framework will be applied to the NI and reconnected pits in the SNP.
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 5.0 Description of AEMP Components, Section 5.3.4.4.1 Source Water Quality and Quantity, p. 64	The AEMP indicates that results of water quality modeling in flooded pits and the NI area will not be incorporated into the AEMP. This information is an important component of the overall monitoring of Lac de Gras and should be incorporated into the AEMP.	Include results for SNP monitoring at the NI and the flooded pits.
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	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. Recommendation: Clarify that results of mixing zone monitoring conducted as part of the SNP will be included in the AEMP reporting. DDMI Response: "During closure and post closure, sampling for surface water quality will occur at the edges of mixing zones associated with the North Inlet Water Treatment Plant and with post-closure discharge points located around the East Island. As is the case during operation, this sampling and associated reporting of results will occur as a component of the Mine's SNP (Appendix V1-2 Sections 4.1, 4.5, 5.3.2, 5.3.4.2) in accordance with the approach as described in the FCRP (Appendix V1-1). DDMI confirms that the results of sampling at mixing zone boundaries will be reported in the SNP but also support interpretation of the closure and post-closure AEMP. This sampling is proposed to occur for a period of two years following reconnecting each closure drainage to Lac de Gras. As is the case during operation, the closure and post-closure AEMP will continue to integrate the results of SNP source water sampling into the AEMP to provide context for interpreting potential effects in the receiving environment. See Section 5.3.4.4 of Appendix V1-2 for additional detail. "	Comment addressed (commitment to include mixing zone monitoring results in AEMP is provided).

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. NSC had recommended including water quality and flow monitoring for drainages D and/or E (i.e., tributaries/inflows to Lac de Gras) to serve as reference areas. DDMI's response was: "There is already sufficient data to date to provide indications of reference conditions. New reference area sampling would not improve the SWALF or AEMP interpretation." Inclusion of monitoring unaffected streams would provide valuable contextual data that would assist with confirming predicted effects of the Project and help to discriminate Project-related effects on water quality. It is also noted that there is no pre-Project or contemporary water quality data for East Island streams; baseline data identified by Diavik is restricted to 8 streams sampled in 1996 - none of which were on East Island.	Recommend including water quality and flow monitoring for drainages D and/or E (i.e., tributaries/inflows to Lac de Gras) to provide "reference area" information and to provide water quality information for East Island streams in general.

TOPIC	COMMENT	RECOMMENDATION
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 2.0 Project Description, Section 2.2.3 Post-closure Source Water and Surface Water Quality Modeling, p. 16	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). Additionally, it is proposed to drop one NF area in the vicinity of the A21 pit (MF3 area). 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 and no other sampling (i.e., water quality, plankton, benthic invertebrates, and sediment quality) is proposed in the bay that will received C3 runoff. NSC had previously requested clarification for the rationale used to select fish sampling areas and DDMI responded that sites were selected based on habitat constraints (water depth of 18-22 m) and that this bay does not meet these criteria. DDMI Response: "DDMI's perspective is that the currently proposed NFC-3 sampling station (Figures 4.4-2 and 4.4-3 of Appendix V1-2) provides an appropriate near-field sampling point for the C3 drainage. The locations of new NFC stations, including the proposed NFC-3 station, were estimated in consideration of the results of post-closure water quality modelling and bathymetric information for Lac de Gras. Water depth, specifically the location of the 18-22 depth contour, was a key factor that limited where new AEMP stations could be located around the East Island. Water depth was particularly limiting around the north end of the East Island, where the lake is generally shallower. As indicated in Section 4.4.2 of Appendix V1-2, water depth is an important consideration for the AEMP sediment and benthic invertebrate components, which are influenced by physical characteristics of bottom sediments. Since the primary physical variable that influences sediment composition and benthic invertebrate communities in lakes is water depth, AEMP stations should be located within the existing AEMP station depth range of 18 to 22 m. Situating a station outside of the AEMP target depth range would complicate the data analysis for sediments and benthic invertebrates in particular, and could introduce data comparability issues for other AEMP components. As all other AEMP stations (i.e., both the current operational and proposed closure and post-closure stations) are situated along the 18 to 22 m depth contour in Lac de Gras, locating a single station, particularly an NFC station associated with one of the potentially more affected areas of Lac de Gras, outside of this target depth range is problematic as it would introduce data comparability issues, thereby potentially influencing the sensitivity of the AEMP to detect effects from the Mine. The currently proposed NFC-3 sampling station is situated at the closest deep hole that intersects the 18-22 depth contour, without encroaching on the post-closure mixing zone located in the C2-C3 bay (Figure 3-2 of Appendix V1-1). Although a small area within the appropriate depth range exists within the C2-C3 bay, situating a station inside or immediately adjacent to a mixing zone is not appropriate as the exposure level would be much higher than at other NFC area stations and would not be representative of the overall receiving environment in the near-field area around the East Island. There are some additional deeper locations within the 18-22 depth contour in the prominent West Island bay that extends in a northwesterly direction away from the East Island (Figure 3-2 of Appendix V1-1); however, locating a station in this bay is not recommended, as this area is relatively isolated and may have naturally different physical habitat characteristics compared to other NFC area stations which are situated in open-water areas of the lake. As outlined above this could introduce data comparability issues with other AEMP stations. Station NFC-3 is located as close as feasible to the East Island and the C3 drainage, while remaining within the appropriate water depth contour for the AEMP. Based on projected water quality conditions, the station is expected to provide an appropriate level of sensitivity to detect effects associated with Mine water drainage inputs." (continued in row below)	

TOPIC	COMMENT	RECOMMENDATION
Continued from row above	Comment: 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). Additionally, it is proposed to drop one NF area in the vicinity of the A21 pit (MF3 area). 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 and no other sampling (i.e., water quality, plankton, benthic invertebrates, and sediment quality) is proposed in the bay that will receive C3 runoff (hereafter referred to as the "C3 bay"). NSC had previously requested clarification for the rationale used to select fish sampling areas and DDMI responded that sites were selected based on habitat constraints (water depth of 18-22 m) and that this bay does not meet these criteria. While the desire to maintain consistency in habitat attributes when selecting sites is understood (and is critical), this constraint should not preclude sampling in areas where monitoring is particularly important. Water quality sampling is generally not constrained by habitat attributes and should be completed in this area. Fish sampling is conducted in nearshore areas and is decoupled from sampling of other components – therefore fish site selection is not dependent upon water depth and substrate offshore. Sediment quality and benthic invertebrates could be affected by sampling at shallower depth and/or in areas with different. However, sampling could be undertaken in the C3 bay in shallower habitat and data could be analysed through a pre-closure vs. closure/post-closure approach (i.e., before-after approach) or potentially through alternative study designs (e.g., gradient design). Given that the C3 bay is predicted to experience the largest impacts related to the Project post-closure, the AEMP should not only include some sampling in this area, this area should be a high priority for monitoring. It is further suggested that collection of data in the C3 bay will increase confidence/reduce uncertainty with respect to predicted effects of the Project post-closure and would provide valuable data to inform the understanding of closure impacts.	Sample all components in the C3 bay and collect a minimum of one year of pre-closure monitoring data to facilitate pre- vs. post-closure comparisons of conditions.
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. Recommendation: Include descriptions of model predictions for water hardness, pH, TN, and mercury. DDMI Response: "DDMI confirms that the constituents referenced by the reviewer were not discussed in the summary of water quality modelling results for Lac de Gras (Section 2.2.3 of Appendix V1-2) because these constituents were not included in the receiving environment water quality modelling completed to support closure planning (Golder 2022). As outlined in Section 3.5.1 of Golder (2022), modelled constituents included in the Lac de Gras 3D model consisted of water temperature, constituents with AEMP Effects Benchmarks, and four mine water tracer variables. Hardness and total nitrogen do not have AEMP Effects Benchmarks and therefore were not included in the modelling. Mercury was not included in the model due to the considerations noted in Section 3.5.1 of Golder 2022. pH has an AEMP Effects Benchmark but was not included in the modelling because changes to the geochemical environment are not expected to be large enough to cause changes in pH that would overcome the current buffering capacity of the lake. The only meaningful driver that could change pH would be the potentially acid generating material encapsulated in the North Country Rock Pile, which has a cover deliberately designed to maintain that material in a frozen state. Golder. 2022. Hydrodynamic and Water Quality Modelling of Pit Lakes and Lac De Gras. Golder document number 20365423-2263-R-Rev0-3660. 25 July 2022." Diavik provided additional information and rationales regarding parameters not included in modeling in their response to IR #7.	Comment addressed (additional information provided)

TOPIC	COMMENT	RECOMMENDATION
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. Recommendation: Include a map showing current and proposed closure/post-closure AEMP sampling sites DDMI Response: "DDMI acknowledges the comment and confirms that it will add a map showing the current AEMP sampling stations (i.e., as approved in AEMP Design Plan Version 6.0) to the next update or version of the closure and post-closure AEMP for reference purposes and to facilitate review of the proposed changes to the AEMP sampling locations. DDMI notes that the currently approved AEMP sampling stations are illustrated in Figure 3.4-1 of AEMP Design Plan Version 6.0. Table 4.4-1 of Appendix V1-2 also provides a tabular comparison of sampling locations between the operational AEMP (Version 6.0) and closure and the post-closure AEMP (Version 1.0)."	Comment addressed (commitment provided).
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	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. Recommendation: Identify physical parameters and criteria for completing the final site selection in the field. DDMI Response: "Factors that will be considered for completing the final station selection in the field are as follows: (a) Confirmation that water depth is within the target range for the AEMP of 18 to 22 m. (b) Confirmation that substrate conditions are suitable for sampling for sediments (i.e., Ekman grab and gravity-feed core samples) and benthic invertebrates (i.e., Ekman grab samples). Locations with rocky substrates are unsuitable for sediment and benthic invertebrate sampling. Additionally, hard clay, or sandy substrates are unsuitable, as the Ekman grab and gravity-feed core sampler cannot penetrate the lake bottom to collect a sample. (c) Confirmation that sediment physical characteristics do not differ appreciably from conditions at other AEMP stations, based on a visual assessment completed in the field. (d) Confirmation that stations can be safely accessed (e.g., by sled, helicopter, or boat) for the proposed sampling schedule. The final field-verified locations for the new AEMP stations would be reported in the first closure and post-closure AEMP Annual Report."	Comment addressed (information provided).
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	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. 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. Recommendation: 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. DDMI Response: "DDMI will continue to collect ice-cover season water quality samples from the Lac du Sauvage outlet during comprehensive monitoring years, consistent with the operational AEMP. The collection of ice-cover season water quality data from Lac du Sauvage will likely require either sampling at LDS-1 or relocating LDS-4 as necessary to ensure that sampling at this station during winter conditions can occur safely. The commitment to sample at the Lac du Sauvage outlet during ice-cover conditions will be clarified in the next version or update to the closure and post-closure AEMP Design Plan."	Comment addressed (commitment provided to continue sampling the outlet of Lac du Sauvage provided).

TOPIC	COMMENT	RECOMMENDATION
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 Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.5 Sampling Schedule, p. 43 FCRP - MAIN BODY; Section 5.2.8.3.2 Collection Ponds (p. 138-140)	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. 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 -Ponds 3, 10, 11, and 12: 2027. DDMI clarified that fish sampling is not planned to be undertaken prior to breaching closure drainages, the North Inlet, or the pit lakes and that the first planned sampling is in 2025. Diavik indicated that sampling will be undertaken “where schedule permits” for water quality, plankton, sediment quality, and benthic invertebrates in 2023 or 2024 but only ice-cover season sampling for water quality would be completed before breaching of Ponds 2 and 7. All new sampling sites for all components should be sampled prior to pond breaching to provide a “baseline” data set for comparison to closure/post-closure monitoring. This is critical information as these areas have not been sampled previously. For Slimy Sculpin, past monitoring conducted under the AEMP has noted considerable variability in the data sets and confounding factors with respect to similarities in habitat between the FF (reference) areas and the NF/MF areas which has affected data interpretation. This consideration renders the need for pre-closure data collection particularly important.	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 monitoring at the new NFC should be completed for all components (water quality, plankton, sediment quality, invertebrates, fish, and metals in fish) prior to breaching of ponds. For water quality and plankton, the pre-closure sampling should include at least one summer and one winter sampling event.

TOPIC	COMMENT	RECOMMENDATION
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	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 criteria. 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? 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). Recommendation: Clarify why a Mine water tracer concentration of approximately 0.5-2.0% was used as a criterion for AEMP NFC site selection. Include sites that capture areas with the greatest anticipated effects on water quality. Include SNP (runoff and mixing zone) monitoring stations on AEMP maps 4.4-2 and 4.4-3 and others as appropriate. DDMI Response: "The following factors were considered when estimating locations for new NFC sampling stations: •Site drainage conditions on the East Island at post-closure, specifically the locations of discharge points and mixing zones •Bathymetric information, specifically, the location of the 18 to 22 m depth contours in Lac de Gras. •Results of water quality modelling for post-closure •Consideration to integrate a subset of existing NF and MF area stations into the post closure NFC area to allow for consistency with operational monitoring. DDMI notes that water depth (i.e., location of 18 to 22 m depth contour) was the main factor that limited where new AEMP stations could be located around the East Island. New stations were generally located as close to the East Island as possible based on the 18 to 22 m depth contours (Figure 4.4-3 of Appendix V1-2), while avoiding encroaching on the proposed post-closure mixing zones (Figure 3-2 of Appendix V1-1). The modelled mine water tracer results were used to confirm that NFC area stations were situated in waters exposed to mine effluent, and that stations were not located too far from the East Island such that dilution would limit the potential to detect effects. The mine water tracer concentration was used as an additional information source to support decision making, and not as a definitive criterion for locating new stations (i.e., a specific threshold concentration was not defined). Runoff water chemistry reporting from the East Island, and consequently, exposure conditions in the NFC area, are predicted to be spatially variable (Golder 2022a). Given the importance of prioritizing that near-field (NF) sampling points were included in the general vicinity of all closure discharge points, a specific threshold concentration for the mine water tracer was not defined. However, as the concentration range for the mine water tracer ranged from approximately 0.5 to 2% in the NFC area, stations are expected to be exposed to effluent concentrations up to four-fold greater than those in the rest of the lake….” (continued in row below)	

TOPIC	COMMENT	RECOMMENDATION
Continued from row above	"…Use of a mine water tracer variable to support station selection is consistent with the commonly used approach of basing station locations on the results of an initial plume delineation study. The results of a plume delineation study were used when selecting the original NF stations to be sampled in the vicinity of the NIWTP discharge for the operational AEMP. For the operational AEMP, NF stations were located within the estimated 1% effluent zone (DDMI 2007). The modelled post-closure mine water tracer concentrations in the NFC area are generally similar or higher than those defined for the operational AEMP NF area. The utility of using modelled constituent concentrations (i.e., rather than predicted mine water tracer concentrations) for selecting station locations for the AEMP is limited due to differences in runoff chemistry among the post-closure discharge points, as well as variation over time (Golder 2022a; Golder 2022b). For example, the pits generally have higher concentrations of certain nutrients compared to other discharge points, whereas the C3 drainage is associated with relatively higher concentrations of uranium. Additionally, while TDS has been used effectively as a tracer of mine effluent for the NIWTP during operation (AEMP Design Plan V6.1), it is not a useful tracer for post-closure conditions. As indicated by Golder (2022a), there are minimal differences in predicted TDS concentrations throughout the lake at post-closure, as well as among the 13 post-closure mixing zones. Therefore, TDS was not considered a reliable predictor of exposure to mine effluent for post-closure conditions. The use of a generic mine water tracer was considered to be a more broadly applicable tool for estimating exposure conditions in Lac de Gras. DDMI's perspective is that the locations of NFC area stations capture areas that are predicted to experience the largest effects on water quality related to site runoff, while still taking into consideration important habitat features (e.g., water depth) and comparability to historical AEMP data. SNP runoff monitoring locations are summarized in the closure and post closure AEMP in Figure 5.3-1 of Appendix V1-2. Mixing zone monitoring locations are summarized in Figure 3-2 of Appendix V1-1. To facilitate review of the proposed new NFC stations, DDMI will add the SNP source water stations and mixing zone arcs to the next version of the closure and post-closure AEMP. "	Comment partially addressed. Recommendation: Clarify if the proposed NFC sites capture the area(s) predicted to be most affected by pond breaching.
Appendix V1-2: FCRP v. 1.0 Closure and Post-closure AEMP Design Plan, Section 4.5 Sampling Schedule, p. 43	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." If ponds are breached prior to 2025, will SNP monitoring be incorporated into the current AEMP reporting (i.e., for Operation)? Recommendation: Clarify how SNP monitoring results will be integrated and considered in AEMP reporting if Ponds are breached prior to 2025. DDMI Response: "DDMI confirms that it will integrate the results of SNP source water sampling for ponds breached prior to 2025 in the current AEMP reporting (i.e., 2023 AEMP Annual Report). The approach used to summarize the results will follow the methods described in Section 5.3.4.4 of Appendix V1-2."	Comment addressed (commitment to integrate SNP monitoring in the AEMP reporting).
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	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. Recommendation: Recommend including in situ turbidity measurements (depth profiles) within the AEMP water quality monitoring program. DDMI Response: "DDMI confirms that the water quality program includes monitoring of turbidity in situ. Turbidity measurements are collected as vertical profiles using a field-calibrated water quality meter at each station. The results of vertical profile sampling for turbidity have been reported in the three most recent AEMP annual reports for operations. Sampling and reporting of in situ turbidity data will continue during closure and post-closure."	Comment addressed (clarification provided).

TOPIC	COMMENT	RECOMMENDATION
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	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. Recommendation: Confirm that both total and dissolved metals will be measured at all water quality sampling sites in the AEMP and SNP. DDMI Response: "As is the case during operations, AEMP water quality samples collected during closure and post-closure will continue to be analyzed for both total and dissolved metals. Although dissolved metals samples are collected and reported by the AEMP water quality component, the data analyses (e.g., tables, figures, comparisons to normal ranges) are typically based on results for the total metals fraction. The dissolved data are included in the data appendices and are considered when evaluating data quality for the water quality component. In cases where AEMP effects benchmarks are for dissolved metals, comparisons are made to dissolved data. DDMI anticipates that a similar data analysis and reporting approach to that used for dissolved metals during operation would be applied for closure and post-closure. Surface runoff sampling under the Surveillance Network Program will include analysis for total and dissolved metals as outlined in Attachment 2 of the Closure and Post Closure Monitoring Plan (Appendix VI-2 of the FCRP)."	Comment addressed (clarification provided that dissovled and total metals will be monitored).
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	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. Recommendation: Clarify how the SNP Runoff Water Quality Response Framework will be used to assist with selection of SOIs in the AEMP. DDMI Response: "Criterion 1b of the SOI selection process integrates the SNP Response Framework as follows: "Variables in source water reporting from closure drainages located around the East Island with concentrations in individual grab samples that exceed closure criteria, or the Response Trigger defined in the SNP Runoff Water Quality Response Framework, will be included as SOIs (Section 5.3.4.4.1)." The SNP Runoff Water Quality Response Framework is described in Figure 3-3 of Appendix V1-1. The "Response Trigger" referenced in Criterion 1b of the SOI selection process refers to the "Action Outcome" of "Water quality greater than 10 x AEMP benchmark" defined for Action Level 0/1 in Figure 3-3 of Appendix V1-1. This means that if the concentration of a specific constituent in source water exceeds its AEMP Effects Benchmark by a factor of 10, that variable would be included as an SOI for the AEMP water quality data analysis. DDMI notes the current trigger of 10xAEMP Benchmark is premised on the expectation that at least 10x dilution will be achieved by the mixing zone boundary. If it is determined that the dilution factor is less than 10 this may result in a reconsideration of the 10xAEMP trigger for that catchment. The same could also be true if the dilution factor is determined to be greater than 10. Similarly, if a 10xAEMP benchmark trigger occurs without a corresponding toxicological response the trigger may be adjusted. These changes may result in adaptive management of AEMP SOIs. DDMI notes that there are some differences in terminology applied between Appendix V1-1 and Appendix V1-2: (a) The term "SNP Runoff Water Quality Response Framework" used in Appendix V1-2 is the same thing as "Surface Water Action Level Framework" used in Appendix V1-1. (b) The term "Response Trigger" used in Appendix V1-2 is the same thing as the "Action Outcome" of "Water quality greater than 10 x AEMP benchmark" used in Figure 3-3 of Appendix V1-1."	Comment addressed (clarification provided).

TOPIC	COMMENT	RECOMMENDATION
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	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. Recommendation: Clarify which depth of sediment will be collected for TOC and particle size analysis. DDMI Response: "The top 10-15 cm of sediment will be collected at AEMP stations for particle size and TOC analysis to support benthic invertebrate data analysis, where these variables are used to characterize habitat. Top 1 cm of sediments will be collected at AEMP stations for analysis of chemistry as well (nutrients and metals) as TOC. Table 5.4-1 will be corrected to reflect that the top 10-15 cm of sediment will be collected."	Comment addressed (clarification provided and commitment to correct text).
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	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? Recommendation: Clarify what metrics will be included in reporting for the lethal and non-lethal fish monitoring programs. DDMI Response: "Fish health metrics to be reported for the lethal fish monitoring program will include summary statistics for length, weight, gonad weight, liver weight, and age (derived based on length frequency distributions), and fish health indices including Fulton's condition factor, liver somatic index, and gonadosomatic index. The prevalence of parasites and abnormalities will also be provided. Statistical comparisons will include age, size-at-age, relative body weight, relative liver weight and condition, as listed in Section 5.8.4.3. For the non-lethal/population survey, metrics will include summary statistics for length, weight, and Fulton's condition factor. The prevalence of abnormalities will also be provided, as well as statistical comparisons of length-frequency distribution, length, weight, proportion of young-of the-year and relative body weight, as listed in Section 5.8.4.4. Fish health metrics to be reported for the closure and post-closure AEMP are the same as those reported under the operations AEMP."	Comment addressed (clarification provided).
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	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 also provide 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 fish health and metals in fish should include comparison to the Reference Conditions which represent "baseline" conditions for the Project. DDMI Response: "As is the case for the operational AEMP, results for AEMP endpoints during closure and post-closure will continue to be compared to normal ranges documented in the AEMP Reference Conditions Report Version 1.4 (Golder 2019b). This analysis is discussed in the closure and post-closure AEMP design plan in the data analysis and interpretation methods for AEMP components; however, it was inadvertently omitted for the fish health component. DDMI confirms that it will add this analysis to the data analysis and interpretation methods for fish health in the next version or update to the closure and post-closure AEMP design plan."	Comment addressed (clarification and commitment to correct text provided).

TOPIC	COMMENT	RECOMMENDATION
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)	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. "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) 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? 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. DDMI Response: "As identified at the 2022 Water License hearings the preference indicated by most/all intervenors was to manage as close to the discharge source as practical. This preference led to the development of the Surface Water Action Level Framework (SWALF). No response framework is necessary for the AEMP. The AEMP will be used a supporting information to demonstrate performance against criteria." DDMI subsequently proposed additions of triggers for the AEMP to the SWALF in response to IR #4. See comments in next row.	Comment partially addressed in response to IR #4 (see comment and recommendation in next row).

TOPIC	COMMENT	RECOMMENDATION
AEMP triggers and action levels, DDMI Response to IR #4	Diavik has proposed some options for modifications to the SWALF in their response to Information Requests (DDMI 2023; Attachment B). For aquatic life, proposed changes include the addition of two chemistry parameters to Action Level 2 (total suspended solids [TSS] and pH) and addition of triggers from the AEMP to the SWALF. We support the inclusion of triggers and actions for the AEMP and integration within the SWALF. However, we offer the following comments/questions: 1. Action Level 2 - Fish: It is unclear what is meant practically by the "Nearfield mean" (NF). Only two sampling areas for fish are proposed for the nearfield area adjacent to drainages where collection pond breaches will occur; the third is proposed in the area adjacent to the North Inlet. An "effect" may be observed in one of the NF areas but not the others and applying a mean for all areas may mask this effect. How will Farfield (FF; i.e., matched "reference areas") data collected concurrently with the NF data be utilized in the proposed framework? What is the rationale for the proposed critical effect size (CES) of 1.5x the reference condition? Metal and Diamond Mining Effluent Regulations (MDMER) specify CESs for fish metrics of 10% (condition) to 25% (all other metrics). 2. Action Level 2 - Invertebrates and Plankton: As above, it is unclear what is meant practically by the "Nearfield mean". Would the mean be calculated from all NF sites collectively or would this apply to specific areas adjacent to collection pond breaches independently? As above, what is the rationale for the proposed CES of 50% lower than the reference condition for invertebrates and plankton? MDMER specify CESs for benthic invertebrates of 2 x standard deviation (SD). 3. Action Level 2 - Water Quality: An Action Level 2 trigger for water quality is defined as "a Nearfield station greater than the normal range plus 50% of the effects threshold." It is unclear what is meant by the "effects threshold". If the effects thresholds have not been defined for water quality, how will this trigger be assessed? Assuming they have not been defined, what trigger would be applied to cause an effects threshold to be defined? 4. Action Level 3 - All: It is unclear if the water quality trigger proposed for the Midfield area would apply to individual stations or to all stations combined; Since water quality will be monitored annually and benthic invertebrates and fish on a three-year rotation, it is unclear if the proposed water quality trigger would apply to any year or only the year(s) in which the biological sampling was conducted; The term reference conditions (RC) and NR (assuming this is normal range) are used in the revised SWALF. Can Diavik clarify if these are referring to the same data?	Clarify what is meant by the nearfield mean for the fish component (Action Level 2 trigger). Recommend assessing this trigger for each individual NF area against the reference condition. Include a description of how FF data will be incorporated in the assessment. Clarify what is meant by the nearfield mean for the plankton and benthic invertebrate components (Action Level 2 trigger). Recommend assessing this trigger for each individual NF area adjacent to the pond breaches against the reference condition. Include a description of how FF data will be incorporated in the assessment. Provide a rationale for the proposed CES of 1.5x the reference condition for fish and 50% of the reference condition for plankton and benthic invertebrates. Define "effects threshold" for water quality. If the effects thresholds have not been defined for water quality, describe how the Action Levels 2 and 3 triggers will be assessed. Assuming effects thresholds have not been defined, identify what trigger would be applied to cause an effects threshold to be defined. Clarify if the water quality trigger proposed for the Midfield area would apply to individual stations or to all stations combined.
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	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." 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. Recommendation: 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. DDMI Response: "DDMI confirms that as outlined in Section 5.3.4.6 of Appendix V1-2, the baseline and operational AEMP data will be included in the temporal data analyses completed for the closure and post-closure AEMP. The analysis will focus on evaluating trends over the duration of closure and post-closure monitoring, and relative to conditions at the end of commercial operations (2025); however, data extending back to 1996 (or as available on a component-by-component basis) will continue to be integrated into the analysis, according to the approach described in in Section 5.3.4.6 of Appendix V1-2."	Comment addressed (clarification provided that earlier data will be presented in the AEMP).

TOPIC	COMMENT	RECOMMENDATION
Appendix X-20 Site Water Quality Model, Section 4.1 Water Quality Source Term Inputs, p. 5, Table 1	The baseline (i.e., pre-Project) water quality data for streams used in the modeling is not presented in the submission (only median values are presented) and the reader is referred to Diavik (1998) for details. The Environmental Assessment Report (Diavik 1998) presents one table with minimum, maximum, and median statistics for water quality measured in eight streams. The number of samples, frequency and timing of sampling, and locations of the sampling are not provided. There is also no discussion of the occurrence of "natural" exceedances of AEMP benchmarks for these streams in this reference. The information as provided is inadequate to: (1) understand the quantity and quality of baseline water quality data for these systems (which formed the basis of model inputs); (2) determine what if any water quality parameters exceeded AEMP benchmarks before the Project and if exceedances occurred, how frequently and by what magnitude; (3) understand the appropriateness of the use of a median for defining background water quality conditions for water quality modeling; and (4) interpret modeling results and – in particular – discriminate Project-related effects on water quality. Ultimately the information presented is insufficient to determine if modeling was appropriate and adequate and what the Project-specific effects are projected to be. In response to a question on the baseline data used from modeling, Diavik indicated the raw data and details regarding the stream baseline water quality sampling are presented in Golder Associates. 1996. Technical Memo #9-3. Stream/watershed water quality report. Review of the data presented in this report indicate that none of the streams sampled in 1996 (the baseline dataset used for water quality modeling) were located on East Island. Further, the vast majority of the data were obtained in spring; only three streams were sampled in summer and fall. Lastly, total phosphorus was only measured in summer and fall at these three streams (total n = 6). Detection limits are only provided for the summer and fall programs (not spring) and there is only one blank sample reported for the whole program (submitted with the spring program). The single field blank sample indicates potential sample contamination – including for total copper. For the site water quality modeling, background water quality conditions for unimpacted drainages (i.e., "natural" runoff) were assigned the median concentrations from baseline studies conducted in 1996 and these values were held constant (i.e., background water quality does not vary with differing climate/flow conditions) in the modeling conducted. In addition, the modeling assumed that source loading is constant over time; this assumption is unlikely to be accurate and likely not conservative. This approach may not be adequately sensitive or appropriate. It appears that the only model input that was varied under the different climate change scenarios is flow; therefore, the model only predicts increases or decreases in runoff constituents as a direct function of flow/volume (i.e., dilution). It is unclear what if any exceedances of water quality benchmarks and/or acute toxicity benchmarks beyond those predicted based on the median background water quality values would be predicted if a higher background water quality statistic were selected. Specifically, for those parameters that were predicted to be higher in runoff than background median concentrations but lower than AEMP benchmarks, would use of a different statistic for background water quality conditions result in runoff concentration exceeding AEMP benchmarks? Inclusion of loading data used for all source inputs would assist with determining what drainages may be more affected by the background water quality source term (e.g., a table identifying loads from each source, including background water quality).	Provide a table(s) of source term loads used in runoff modeling to assist with identifying what source terms are the most significant in each drainage. Conduct runoff modeling using a more conservative background water quality source term (e.g., maximum or 95th percentile) and compare to predictions based on the median baseline water quality values.
Attachment 1 - source terms p. 1	Natural runoff was assigned one half the detection limit (DL) where constituent concentrations were below the DL. This approach is commonly applied for addressing censured values. However, it would be more conservative to apply a value equal to the DL in this instance. It would also be useful to note which values/terms were affected (i.e., below the DL) in Attachment 1.	Apply a value equal to the analytical detection limit for values reported as below the DL. Note which values/terms were below the DL in Attachment 1.

TOPIC	COMMENT	RECOMMENDATION
Attachment 1 - source terms p. 1	Natural runoff chemical constituent source terms were assigned a value of zero where data were not available. This was applied for nitrite and antimony. As previously noted, some variables (i.e., mercury) were not included in the modeling exercise. All parameters of relevance should be included in modeling (i.e., mercury and if feasible pH and dissolved oxygen) and those lacking data (i.e., nitrite and antimony) values should be assigned a value other than zero (e.g., apply a value of the lowest detection limit available).	Apply a non-zero value for all source terms for runoff water quality.
APPENDIX X-21 - Hydrodynamic and Water Quality Modelling of Pit Lakes and Lac de Gras, Section 2.2 Project Modelling Times, p. 3	The modeling report indicates that the A21 Pit Lake would be breached July 5, 2025. The schedule presented in the FCRP (Figure 5-8) also indicates breaching of this pit in 2025. The AEMP (Appendix VI-2) indicates that sampling of the proposed new AEMP sampling sites/areas would first be undertaken in 2025. This schedule does not allow for completion of "baseline" (i.e., pre-breaching) sampling to be completed if the sampling under the Closure/Post-Closure AEMP is not initiated until 2025. The Closure/Post-Closure AEMP incorporates a number of changes to the current AEMP including the addition of new sampling sites/areas that have not previously been sampled.	Please clarify when pre-breaching monitoring in Lac de Gras would be undertaken at the new sampling sites proposed under the SNP and AEMP for each monitoring component. Sampling should be conducted a minimum of once (for components monitored seasonally (i.e., for water quality and plankton, this should include a minimum of one open-water and ice-cover season round of monitoring) and ideally 2 or more years to provide adequate "baseline" to support post-closure monitoring.
APPENDIX X-21 - Hydrodynamic and Water Quality Modelling of Pit Lakes and Lac de Gras, Section 3.5 Water Quality, Modelled Constituents, p. 30-31	It is noted that mercury was not included in the modeling for three reasons: (1) baseline studies used a very high detection limit; (2) data to estimate geochemical source terms are "insufficient"; and (3) mercury was frequently below detection in water management ponds and influent to the NIWTP measured over the period of 2011-2021. Lack of sufficient data should not preclude inclusion of mercury in the modeling exercise. Rather, estimates for background conditions and geochemical source terms should be generated with associated caveats provided if appropriate/warranted. A common approach to addressing instances of high uncertainty for modeling is to conduct sensitivity analysis and/or examination of ranges of model inputs to provide a description of anticipated effects. For example, a reasonable "worst-case-scenario" could be simulated and results compared to AEMP benchmarks. If model predictions are well below AEMP benchmarks there would be reasonable certainty that conditions would not cause direct unacceptable toxicological impairment to aquatic biota. Additionally, uncertainty associated with #1 could be addressed through sampling of "unaffected runoff" on East Island. Lastly, the detection limits applicable to the 2011-2021 monitoring data that are referenced are not provided which makes it difficult to determine if this rationale is appropriate (i.e., were detection limits adequately sensitive over this period).	Recommend defining a reasonable "base-case" scenario using available information to define model inputs/source terms for mercury and conduct additional simulations with "worst-case-scenario" estimates to reduce uncertainty respecting potential anticipated conditions. Provide details on analytical detection limits for measurements of mercury in water management ponds and influent to the NIWTP for the period of 2011-2021.
APPENDIX C - Exposure Concentrations, Section 3.10 Fish Tissue, p.54	The HHERA indicates that the only COPC with measurements for Lake Trout is mercury. There are data available for other metals in Lake Trout. For example, Lake Trout muscle was analysed for a suite of metals in 2015 (Golder 2017) and 2018 (Golder 2019) as part of the Traditional Knowledge Study.	Verify that the conclusions of the HHERA would not change with the use of actual Lake Trout metals data.
APPENDIX C - Exposure Concentrations, Section 3.10 Fish Tissue, Table C-38, p.55	Appendix C indicates that summary statistics for metals in Slimy Sculpin were calculated using near-field and mid-field data collected from 2007 to 2019. DDMI recently noted that the 2007 Slimy Sculpin metals dataset is anomalous as the laboratory analysis method differed from other years. This observation would warrant exclusion of the 2007 dataset, though it is noted that the 2007 data are believed to be "biased high" and therefore their inclusion may err on the side of being conservative in the HHERA. The 2016 data are also considered to be problematic due to inadvertent exclusion of sculpin livers in the analysis of metals in sculpin carcasses; in this case the dataset is expected to be biased on the low side. Table C-39 presents the Reference Condition concentrations for Slimy Sculpin metals. These values may also be affected by inclusion of these two datasets. Additionally, derivation of Bioaccumulation Factors (BAF) presented in the HHERA may be affected as they reportedly include metals measured in Slimy Sculpin over the period of 2007-2019. While exclusion of the 2007 and 2016 datasets from the HHERA may have little to no effect on the risk assessment conclusions, it would be prudent to assess whether any conclusions of the RA would change with exclusion of these data.	Verify conclusions of the HHERA would not be affected by removal of the 2007 and 2016 slimy sculpin metals datasets.

TOPIC	COMMENT	RECOMMENDATION
APPENDIX C - Exposure Concentrations, Section 3.10 Fish Tissue, Table C-38, p.56	It is unclear what data were used for mercury in Lake Trout in the HHERA. Table C-38: Summary Statistics for Small-Bodied and Large-Bodied Fish Tissue Concentrations Used in the ARA, WRA and HHRA for Post-Closure Conditions indicates that the Lake Trout mercury summary statistics were derived from a sample size of 250, however the text (p. 54) indicates that monitoring data from 2008-2018 were used. Based on Lake Trout mercury data provided to NSC by DDMI previously, this sample size appears to be in error and appears to include data prior to 2008 and possibly multiple measurements made on the same fish in 2008 and/or duplicate samples. Could the specific dataset used for this task be clarified? For the 2008 data for which there are three sets of measurements, which dataset was used?	Verify and clarify what specific mercury in Lake Trout datasets were used to define summary statistics to support the HHERA. Data sets should exclude replicate samples and analyses (e.g., 2008 dataset). Verify that the conclusions of the HHERA would not change with use of a corrected dataset (if applicable).
APPENDIX C - Exposure Concentrations, Section Appendix E, Table E-15 (no page number indicated)	Table E-15 indicates the reference condition for mercury in Slimy Sculpin is based on the higher of the two 75th percentiles of measurements (upper end of the normal range) collected in 2007 and 2010. The value indicated (0.000085 mg/kg w.w.) is considerably lower than the 75th percentiles presented in the Reference Conditions Report (Golder 2022; 2007 = 0.085 and 2010 = 0.018 mg/kg w.w.) and lower than analytical detection limits employed over the monitoring period. Golder. 2022. AEMP Reference Conditions Report Version 2.1. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, December 2022.	Verify the Reference Condition value identified for mercury in Slimy Sculpin is correct. If incorrect, describe any changes to the assessment and conclusions.

3.0 REFERENCES

Diavik Diamond Mines Inc. (DDMI). 2023. DDMI Response to Technical Session Information Requests. March 21 and 28, 2023.

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. Appendix VI-1: Closure and Post-Closure Monitoring Version 3.1. October 2022.

Golder. 2023. Appendix X-21: Hydrodynamic and Water Quality Modelling of Pit Lakes and Lac de Gras. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, January 2023.

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.

Golder. 2022c. Appendix X-20: DDMI Closure Feasibility Study Site Water Quality Model, 1:100 Dry Year Scenario, and Climate Change Considerations. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, July 2022.

Golder. 2022d. Appendix X-22: Rationale for Assessed Runoff Mixing Zones During Post-Closure. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, July 2022.

Golder. 2022e. Appendix X-25: Human Health and Ecological Risk Assessment. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, September 2022.

Golder. 2022f. AEMP Reference Conditions Report Version 2.1. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, December 2022.

Golder. 2022g. Diavik Diamond Mines (2012) Inc. 2017 to 2019 Aquatic Effects Re-Evaluation Report v. 1.0 Addendum. Submitted to Wek'eezhii Land and Water Board, April 2022.

Golder. 2022b. Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program Study Design Version 6.1. Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, November 2022.

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Golder. 2018. Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program 2017 Annual Report. Version 1.1 Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, September 2018.

Golder. 2017. Diavik Diamond Mines (2012) Inc. Aquatic Effects Monitoring Program 2015 Annual Report. Version 1.1 Submitted to Diavik Diamond Mines (2012) Inc. Yellowknife, NT, June 2017.

North/South Consultants Inc. (NSC). 2023b. Diavik Water Licence Amendment – Progressive Reclamation – Re-Establishing Natural Drainages: Plain Language Briefing and Technical Review Comments. Prepared for the Environmental Monitoring Advisory Board. Technical Memorandum # 367-23-01 v. 2.0. April 2023.

NSC. 2023b. Diavik Water Licence Amendment – Progressive Reclamation – Re-Establishing Natural Drainages: Plain Language Briefing and Technical Review Comments. Prepared for the Environmental Monitoring Advisory Board. Technical Memorandum # 367-23-01. January 2023.