Review Comment Table

Information Requests for EA1819-01 (MVEIRB)

File(s):

Proponent: Diavik Diamond Mines (2012) Inc.

Reviewer Comments Due By: June 20, 2019

Proponent Responses Due By: July 4, 2019

Documents:

Item For Review Distributed On Apr 25 at 09:46 Distribution List
June 18 at 16:10 Distribution List

Item Description

The Review Board has issued its *Scope of Environmental Assessment and Reasons for Decision* on EA1819-01. Parties and Diavik are asked to use the Online Review System to ask and respond to information requests.

Diavik is asked to respond to all initial Review Board information requests, including providing a Summary Impact Statement (see IR#1) by May 9, 2019. Parties can use this information in drafting their own information requests, which are due by May 30, 2019. Diavik's final response to all party information requests is due on June 13, 2019.

For more information, please see the Review Board's *Notice of Proceeding on Information Requests* for EA1819-01.

Please see the *Updated Workplan* for EA1819-01 for more information about EA timelines and next steps.

The Review Board has also issued information requests to parties. Information requests to parties, and instructions on how to answer them, can be found on our public registry.

*****May 3 UPDATE*****

Diavik plans to submit its responses to initial Review Board information requests by May 9, 2019 and the *Summary Impact Statement* by May 16, 2019. Accordingly, parties will have an additional week to draft information requests, which will be due on June 6, 2019. All information request responses, including from Diavik and any parties to which information requests were directed, must be submitted by June 20, 2019.

An updated Notice of Proceeding has been posted to the public registry for this file describing these changes.

*****May 28 UPDATE*****

On May 21, 2019, Lutsel K'e Dene First Nation requested a two-week extension for preparing information requests. On May 28, 2019, the Review released a Notice of Proceeding granting that request. Accordingly, all parties will have an additional two weeks to draft information requests, which will now be due on **June 20, 2019**. All information request responses, including from Diavik and any parties to which information requests were directed, must be submitted by **July 4, 2019**.

General Reviewer Information

The purpose of information requests is to give parties and the Review Board the information needed to help reach conclusions on whether or not the project could have potentially significant adverse impacts on the environment, including people.

The Review Board is using the ORS and Excel spreadsheet format for information requests from parties and responses from Diavik.

- the "topic" column includes your reference to the public registry document that your information request is based on
- the "comment" column contains the preamble and rationale for your information request
- the "recommendation" column contains your information request

Please contact Review Board staff (contact information below) if you need help using the Online Review System.

Contact Information Catherine Fairbairn 867 766-7054 Kate Mansfield 867-766-7062

Comment Summary

Diavik Diamond Mines (2012) Inc. (Proponent)			
ID	**Topic**	**Reviewer Comment/Recommendation**	**Proponent Response**
1	General File	**Comment** DDMI's Cover Letter and Response to MVEIRB's IRs **Recommendation**	
2	General File	**Comment** Cover Letter and Summary Impact Statement for the Processed Kimberlite to Mine Workings Project Proposal **Recommendation**	
3	General File	**Comment** Attachment #1_Contigency Plan **Recommendation**	
4	General File	**Comment** Attachment #2_Figure 4-3 **Recommendation**	
5	General File	**Comment** Attachment #3_Figure 1 **Recommendation**	
6	General File	**Comment** Attachment #4_Table 4-3 **Recommendation**	
7	General File	**Comment** Attachment #5_DDMI List of Commitments from SIS **Recommendation**	
8	General File	**Comment** Attachment #6_Figure 2 **Recommendation**	
9	General File	**Comment** Attachment #7_Table 1 **Recommendation**	
10	General File	**Comment** Attachment #8_TK Panel Session 1_A Way of Life_Caribou Monitoring **Recommendation**	
11	General File	**Comment** Attachment #9_TK Panel Session 2_Reviewing Our Landscape **Recommendation**	

12	General File	**Comment** Attachment #10_TK Panel Session 8_Reefs and Water Monitoring **Recommendation**	
13	General File	**Comment** Attachment #11_TK Panel Session 9_Caribou and NCRP Closure Plan **Recommendation**	
14	General File	**Comment** Attachment #12_TK Panel Session 11_Options for Processed Kimberlite **Recommendation**	
15	General File	**Comment** Attachment #13_TK Panel Session 12_Our Youth Our Future_Monitoring_Land_Water_Fish_Air **Recommendation**	
16	General File	**Comment** Cover Letter Re DDMI Responses to 2nd IRs **Recommendation**	
17	General File	**Comment** Attachment#10_TK Panel Session 8_Reefa and Water Monitoring **Recommendation**	
18	General File	**Comment** Attachment #11_YK Panel Session 9_Focus on Caribou and NCRP Closure Plan **Recommendation**	

Canadian Northern Economic Development Agency: Agnes Simonfalvy

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
8	General File	**Comment** ~~On behalf of the the Government of Canada, the Northern Project Management Office is please to provide the federal departments Environment and Climat Change Canada and Fisheries and Oceans Canada are Information Requests and comment table for consideration. **Recommendation**	
9	General File	**Comment** Environment and Climate Change Cover Letter **Recommendation**	
10	General File	**Comment** Department of Fisheries and Oceans, cover letter and information requests **Recommendation**	
1	ECCC #1.Table 4-3: Revised Ecological Thresholds for Water Quality	**Comment** (Submitted after Due Date) Table 4-3 summarizes the ecological thresholds used in the assessment, including a 30 ug/L benchmark for zinc. However, a footnote provides additional justification on the selection of this benchmark, stating that, "the CWQG for zinc has been decreased from 30 ug/L to 7 ug/L; however, for consistency with the AEMP benchmark the threshold has been kept at 30 ug/L." Given that the update to the zinc guideline resulted in a decrease in concentration allowed based on	**July 4:** A 30 microgram/L (µg/L) zinc benchmark threshold for the protection of aquatic life was used to maintain consistency with the 1998 assessment and the 2017 AEMP. Since submission of the SIS, the zinc predictions for the different scenarios were compared with the updated and draft lower CCME guideline of 7 µg/L. Tables 4-7 through 4-9 in the SIS provide maximum predicted concentrations for modelled parameters. For A418 (all scenarios), A154 (all scenarios) and A21 (scenarios 2a and 4a), the maximum zinc concentrations range from 0.22 to 2.0 µg/L, below the draft CWQG of 7 µg/L. For A21 scenario 3a, the maximum zinc concentration at the surface (5.4 µg/L) is below the draft

		the most up to date science and toxicity information on zinc (based on the current CCME guideline for Protection of Aquatic Life), it is not sufficient justification to continue to use the old guideline to remain consistent with the AEMP benchmark. **Recommendation** ECCC recommends that the Proponent use the updated benchmark of 7 ug/L dissolved zinc in analysis of potential impacts to water quality from the Project.	CWQG, but the maximum at 40 m depth (17 µg/L) is above the draft CWQG and would be considered a high magnitude, long-term effect on water quality within the Project Development Area (PDA) for Project and cumulative effects. However, this re-evaluation for zinc would not change the outcome of the assessment because A21 3a has already been identified as having this characterization at 40 m depth associated with the predictions for nitrite, nitrate, and molybdenum (higher than AEMP benchmarks by 133%, 37%, and 5%, respectively). It is noted that these effects are predited to occur at 40 m depth, not the upper layers of the water column typically inhabited by fish and accesssed by wildlife, and are limited to the PDA.
2	ECCC #2. Summary Impact Statement Section 4.9 - Summary of Commitments	**Comment** (Submitted after Due Date) The summary impact statement consistently refers to the breaching of the dikes when observed water quality meets the thresholds. Specifically, the summary of commitments indicates that the Proponent intends to, "breach dikes following receipt of monitoring results that show acceptable water quality within the pits lake". Although the commitment to not breach dikes until water quality is appropriate but there will need to be further details provided on how this will be assessed. The Proponents response to MVEIRB IR-4 outlines the frequency of the sampling during closure that will contribute to the assessment of pit water stability, but does not elaborate on how stability of pit water quality will be assessed (number of consistent samples, consistency over seasonal changes). Given that the risk to the aquatic environment associated with the project is primarily during the closure phase, it is important to adequately and confidently assess the rationale, calculation, and certainty behind the stability of the pit water quality prior to dike breach. **Recommendation** ECCC recommends the Proponent provide a discussion on the specifics of how the water quality will be determined to be stable enough before dike breach. This should include a description of the series of events and sampling that would be required prior to dike breach.	**July 4:** Please see response to EMAB-15.
3	ECCC #3. Section 4.4.2 - Summary of Project Residual Environmental Effects	**Comment** (Submitted after Due Date) This report has assessed the potential environmental impacts of depositing Processed Kimberlite (PK) into A418, A154, and A21, however A418 is the preferred pit for PK deposition. The Summary Impact Statement indicates that, based on the 3 modelling scenarios (2a, 3a, 4a) for the 3 pits, that only A21 has the potential to cause residual environmental effects. Specifically, A21 scenario 3a predicts residual effects on the aquatic environment with an adverse effect of high magnitude within the Project Disturbance Area (PDA) during closure and post-closure. In addition, while meromixis is modelled to establish and remain over the 100-year simulation period in A418 and A154, under the modelled scenarios there is the potential for meromixis in A21 to break down and fully mix after 50 years, which could lead to adverse affects on surface waters. Overall, the A21 pit has the highest uncertainty for closure and post-closure water quality, establishment of meromixis, and potential impacts to Lac de Gras. However, there is no discussion from the Proponent	**July 4:** Please see response to MVEIRB-34 regarding consideration of A21. Please see response to GNWT-11 for key options to mitigate potential poor water quality.

		on whether A21 has been eliminated as an option for PK deposition based on these results. Alternately, if A21 is to be used, what mitigations could be employed to ensure that these issues are reduced or eliminated (i.e. increase freshwater cap depth, decrease volume of PK). If A21 is to be included for PK deposition, mitigations for A21 specifically should be provided to reduce potential impacts. **Recommendation** ECCC recommends that the Proponent clarify whether A21 is intended for PK deposition based on the modelling results provided. If A21 is to be used for PK deposition, mitigations specific to A21 should be provided to ensure that any potential impacts to water quality are minimized.	
4	ECCC #4. Appendix B - Summary Impact Statement Water Quality Model Results - Water Quality Modelling of A418 (Corrected) A154 and A21 Mined out pits - Scenarios 2a, 3a, and 4a	**Comment** (Submitted after Due Date) The summary of water quality modelling outlines the associated documents that describe the water quality modelling results, including "Water Quality Modelling of A418 (corrected) A154 and A21 Mined Out Pits - Scenarios 2a, 3a, and 4a." Although the results of this modelling are summarized and discussed throughout the Summary Impact Statement, the report has not been provided and Table 1 indicates that a link to the document is not yet available. In addition, the description of the report indicates that the modelling results for A418 have been corrected from Golder 2019a but there is no discussion of what updates and/or corrections were required between Golder 2019a and Golder 2019b in relation to the modelling of A418. **Recommendation** ECCC recommends the Proponent provide the source report for the modelling included in the Summary Impact Statement, and a discussion of the changes completed to the A418 model between Golder 2019a and Golder 2019b.	**July 4:** Please see response to EMAB-8.
5	ECCC #5. Appendix B - Summary Impact Statement Water Quality Model Results - Water Quality Modelling of A418 Mined Out Pit - Scenarios 2a, 3a, 4a	**Comment** (Submitted after Due Date) As an outcome of the technical sessions on January 16-17 2019, Wek'èezhìi Land and Water Board (WLWB) had several IR's for the Proponent. IR#5 asked Diavik Diamond Mines Incorporated (DDMI) to complete several additional water quality modelling scenarios to further refine the existing modelling to a more realistic scenario. These additional models included changes to the pore water chemistry. The recommended approach for pore water chemistry was to base the fine processed kimberlite (FPK) pore water concentration on 350 mg/L TDS and other parameters to be based on a representative statistic on saturated processed Kimberlite containment (PKC) samples as presented in Moncur and Smith, 2014. For scenario 3a, the pore water chemistry was to be further refined, accounting for a 50:50 mix of FPK and slimes, where slimes chemistry was to be extracted from representative pore water samples in Moncur and Smith, 2014. In response, DDMI has stated that instead of using data from saturated samples for the FPK they used processed kimberlite (PK) slurry at point of discharge, stating that this data is more representative of "fresh" PK that would be deposited into the	**July 4:** Please see response to EMAB-11.

		mined out pits. With the introduction of the new modelling, DDMI also identified issues/gaps with two water quality constituents: nitrogen (all forms) and silver. DDMI has stated that the water chemistry for nitrogen forms in Moncur and Smith, 2014 is incomplete, and therefore has used nitrogen monitoring results from Ekati's Beartooth pit as an analogue. For silver, DDMI states that they identified a possible issue with the results for silver in the in situ sampling of PKC slimes and PK slurry and have therefore assumed the pore water concentration to be 0.24 ug/L based on the results for the saturated zone of in situ PK. Upon review of the data used in calculation of the pore water chemistry for the FPK, ECCC noted that: 1. The "fresh" PK slurry data is based on anywhere from 1-3 samples depending on the parameter. 2. The data used for "fresh" PK slurry is based on data from 2009, 2012, and 2013. 3. Overall, the concentrations in "fresh" PK slurry are significantly lower than all other pore water chemistry presented from all other sources. DDMI has not provided discussion of the small sample size, why data from 6-10 years ago is representative of the FPK that will be deposited into the mined out pits, or why the concentrations in "fresh" PK slurry are significantly different from the data provided in Moncur and Smith, 2014. Given this, plus the uncertainty associated with silver and the incomplete dataset for nitrogen forms, additional model refinement may be required. **Recommendation** ECCC recommends that DDMI: 1). Explain how "fresh" PK slurry from 2009, 2012, 2013 is representative of the FPK that will be deposited in pit A418, 2). Explain how data from 3 samples provides sufficient data to estimate pore water quality, 3). Provide a discussion regarding the differences in water chemistry between Moncur and Smith, 2014 and the "fresh" PK slurry samples, including supporting rationale for the selection of PK slurry, 4). Explain how the data uncertainty surrounding nitrogen forms and silver will be resolved with future sampling and modelling, and 5). Explain how subsequent water quality modelling planned for 2019 and 2020 is sufficient to address the gaps discussed in 1,2,3,4.	
6	ECCC #6. Section 7.4.2: Assessment of Residual Environmental Effects on Wildlife - Mitigation	**Comment** (Submitted after Due Date) Section 7.4.2.2 states: "If wildlife monitoring and water quality monitoring indicate a potential for adverse health effects on wildlife and use of the pit lakes by wildlife during the period of infilling and stabilization of water quality, then appropriate devices and regular wildlife dispersal patrol teams will be used to minimize wildlife access to pit lakes until water quality benchmarks are achieved." However, in Section 7.8 Follow-up and Monitoring, DDMI does not reference the development and implementation of a migratory bird-monitoring program. Given, waterfowl monitoring ended in 2014, the current wildlife monitoring program may not capture the potential use of pit lakes by migratory birds during infilling and water quality stabilization. **Recommendation** ECCC requests that a wildlife monitoring	**July 4:** DDMI commits to updating the wildlife monitoring program for Diavik to include the PKMW Project. The updated monitoring program will support site monitoring to determine whether migratory birds, including waterfowl, interact with pit(s)/mine workings during infilling and prior to stabilization of water quality.

		program for migratory birds be implemented during the period of infilling and stabilization of water quality to determine whether migratory birds, including waterfowl, are accessing the pit lakes and have potential for adverse health effects.	
7	ECCC #7. Section 7.4.4 Assessment of Residual Environmental Effects on Wildlife - Accidents and Malfunctions	**Comment** (Submitted after Due Date) DDMI has reviewed the potential impacts of the processed kimberlite slurry pipeline. Section 7.4.4.1 states: "Pipeline failure could result in release of pipeline liquids to land or water and depending on the scale of the failure, there is a potential for interaction with wildlife." Section 7.4.4.2 states: "No significant effect to wildlife would be expected to occur due to elevated contaminant concentrations in pit lakes due to a destratification event... Although the effects on aquatic wildlife are likely to be localized and reversible, the consequence is considered moderate." DDMI does not provide an updated Spill Contingency Plan and Emergency Response Plan with information to address a pipeline failure or destratification event associated with the new activities under the Processed Kimberlite to Mine Workings Project. **Recommendation** ECCC requests that DDMI provide an updated Spill Contingency Plan and Emergency Response Plan to include migratory bird and species at risk monitoring and mitigation if a pipeline failure or destratification event occurs that may impact migratory birds and species at risk.	**July 4:** To address this recommendation, DDMI has included Attachment 1: an updated Spill Contingency and Emergency Response Plan, which includes migratory bird and species at risk monitoring and mitigation. This Plan will be implemented for pipeline failure or a destratification event that may impact migratory birds and species at risk. DDMI notes that the likelihood of a pipeline failure or a destratification event is considered to be low.

Environmental Monitoring Advisory Board: EMAB EMAB

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
1	General File	**Comment** EMAB Cover Letter **Recommendation**	
2	General File	**Comment** NSC Technical Review **Recommendation**	
3	General File	**Comment** SEC Technical Review **Recommendation**	
4	Assessment Methods - Thresholds for Significance	**Comment** For four of the five Valued Components[1] (VCs) considered in the SIS, DDMI defines thresholds for significance and describes the factors and quantitative measures used to characterize the significance of effects. For most VCs (i.e., Water Quality, Fish and Fish Habitat and Wildlife and Wildlife Habitat), DDMI relies on thresholds and definitions that are the same as or "consistent with" the 1998 Comprehensive Study, with a few noted minor modifications. It argues that applying the previously developed thresholds and definitions provides consistency with the original mine assessment, but does not provide any additional rationale for why the thresholds and definitions are still relevant and applicable. The definition of significance from the 1999 Comprehensive Study Report, completed under the Canadian	**July 4:** The environmental assessment of the PKMW Project has been prepared to meet the requirements of the Mackenzie Valley Resource Management Act and to facilitate a decision by the Mackenzie Valley Environmental Impact Review Board on the significance of impacts of the PKMW Project on the environment, including the impact of accidents or malfunctions, as well as the cumulative impacts of the PKMW Project combined with other developments in the vicinity of the Project. Environmental assessment methods used to develop the Supplementary Impact Statement, described in Section 3.2.4 of the SIS, use a framework developed by Stantec that has been used in environmental assessments under the Canadian Environmental Assessment Act, 2012 (CEAA 2012), Nunavut Planning and Project Assessment Act, MVRMA and Inuvialuit Final Agreement. These environmental assessment methods are based on a structured approach that takes a reviewer through the steps that: identify potential effects, assess and characterize those effects following the application of mitigation meaures; identify and assess cumulative

			Environmental Assessment Act (CEAA), is applied directly for Water Quality, and Wildlife and Wildlife Habitat: "The definition of a significant adverse effect is an effect that has a high probability of a permanent or long-term effect of high magnitude, within the regional area, that cannot be technically or economically mitigated." For Water Quality for example, Table 4-2 in the SIS describes the factors and quantitative measures used to characterize effects. High magnitude effects are those where contaminant concentrations exceed the Aquatic Effects Monitoring Program (AEMP) Benchmarks by more than 20%. Long-term effects are those that last more than 30 years. The Regional Area is defined as anything more than 1 km from East Island. With DDMI's definitions and threshold, modelling would have to confidently predict contaminant concentration(s) more than 20% higher than AEMP Benchmarks for more than 30 years at distances more than 1 km from East Island before an effect would be considered significant. While the significance thresholds and definitions for Cultural Use are not drawn from the 1999 CEAA Comprehensive Study, they apply similar methods and set thresholds of similar magnitude. Based on the definition of significance developed to evaluate effects on Cultural Use, effects will only be considered significant if the residual effects extend beyond decommissioning and abandonment and cause critical reduction or elimination of Cultural Use within the Regional Assessment Area (RAA). The RAA is a 13,865 km2 area, shown in Figure 8-1 in the Summary Impact Statement. DDMI does not provide a definition for critical reduction of Cultural Use. The decision to rely on significance thresholds and definitions from the 1999 CEAA Comprehensive Study does not adequately consider the changes in conditions and context that have occurred since that assessment was conducted. Environmental conditions and contexts have changed and need to be considered. The issue needs to be addressed for all VCs, but most notably, the conditions and context for the Bathurst caribou herd have changed dramatically and the significance threshold has likely also changed. When the 1999 Comprehensive Study was completed the Bathurst caribou herd had a population over 42 times the current population. At that time, such a definition of significance may have provided sufficient protection for the herd. In the "Scope of the Environmental Assessment and Reasons for Decision" document, the Review Board emphasizes the precarious state of the Bathurst caribou herd and states that any potential impact of the proposed activities on the herd should be carefully considered and mitigated. This careful consideration should extend to the thresholds for significance and the definitions used to characterize effects. For the water quality assessment for zinc, DDMI proposes to rely on the AEMP benchmark of 30 µg/L as a basis for calculating significance thresholds. However, the context for this threshold has also changed. DDMI acknowledges that the Canadian Water Quality Guideline for the Protection of Aquatic Life has been decreased to	effects; and, finally assess the significance of residual Project and cumulative effects on the environment. These methods are fundamentally unchanged from those used by DDMI in its 1998 Comprehensive Study, which was developed to meet the requirements of the former (prior to 2012) Canadian Environmental Assessment Act. These methods are also consistent with both federal and MVEIRB guidance, in that reasoned argumentation is used to apply relevant standards, guidelines and objectives to establish a definition or limit of significance for a specific environmental effect. Notably, previous decisions by regulators in respect of significance (e.g,. CEAA's Comprehensive Study Report, 1999) and currently applicable benchmarks (e.g, AEMP) where applicable, are directly applied in the assessment. The SIS also notes the limitations of applying a single definition of significance to effects on cultural use. DDMI believes that its method remains consistent with both federal and MVEIRB guidelines. , Specific to the effects of the PKMW Project on Indigenous use and perspectives of the project area, DDMI acknowledges that significance of effects is not limited to availability of resources and physical accessibility, and this is reflected in the definition of significance for cultural use provided in the SIS: " [A] significant adverse effect on cultural use is defined as a long-term loss of availability of traditional use resources or access to lands relied on for cultural use practices or cultural use sites and areas, such that cultural use is critically reduced or eliminated within the Regional Assessment Area. This may include disruption to cultural use activities and practices where biological resources, or physical sites are not significantly affected in the RAA." Further, as required by MVEIRB's Final Scope and Reasons for Decision, the assessment of Cultural Use undertaken in SIS considered how traditional land users perceive the safety, quality, and health of Lac de Gras, where that information has been provided by Indigenous groups. As noted in Section 8.3.1, the assessment of potential effects of the PKMW Project on Cultural Use considers information from Indigenous groups provided in the 1998 Comprehensive Study, information shared by Indigenous participants in the DDMI TK Panel Reports, information contained in other TK reports and studies commissioned by DDMI, and a review of publicly available literature containing information about cultural use by potentially affected Indigenous groups. Observations, concerns and issues from the TK Panel Session reports, which included participation of Elders and knowledge holders, have been included in Cultural Use assessment and considered in the characterization of residual effects and determination of significance. The Cultural Use assessment also explicitly states that appropriate conditions for current use entail more than the availability of resources and access to sites and areas for cultural use and acknowledges that Indigenous groups may choose not to pursue cultural use activities near the Project for a variety of personal, practical, aesthetic, and spiritual reasons. In particular, TK Panel Session participants expressed concerns with effects of further development on safety, quality, and health of wildlife, birds, fish, and water quality and these were factored into both residual effects characterizations and the significance determination.

		7 µg/L, but proposes to use the outdated guideline for consistency. The cultural and legislative/policy context has also changed since the completion of the 1999 Comprehensive Study. CEAA no longer applies and has been replaced by the Mackenzie Valley Resource Management Act, with its foundation in land claim agreements with Indigenous groups. People's understanding of mining and its effects has also changed. Governments and citizens have much more experience with diamond mining. Reconciliation with Indigenous groups has become an important Canadian policy initiative. The thresholds for significance appear to rely almost entirely on the technical characteristics of the effects (e.g., magnitude, geographic extent, duration), with little consideration of the values of society or the people that are most likely to be affected by the project. Nonetheless, societal values need to play a central role in determining significance of effects. Clearly the people who will be most affected by the project are those who use the area for their life sustaining activities. Consideration of these people's perspectives should be a fundamental part of determining the significance of effects, but the SIS does not address how perspectives and values have been considered in establishing the definitions and thresholds for significance. The recalibration of the assessment that arises from updated definitions and thresholds could lead to identification of important effects that are not currently considered in the assessment. For example, the current assessment for Wildlife and Wildlife Habitat focuses on changes in wildlife health due to water quality effects during the closure and post-closure periods. Revisions of thresholds for wildlife may mean that other potential effects become relevant. [1] DDMI's VCs are Water Quality, Surface Water Quantity, Fish and Fish Habitat, Wildlife and Wildlife Habitat and Cultural Use. **Recommendation** DDMI should update its definitions and thresholds for significance to reflect the current conditions and context for the environmental assessment. The updated definitions and thresholds should be supported by rationale that includes information about how the perspectives and values of the people who will be most affected have been considered.	
5	Assessment Methods - Temporal Boundaries	**Comment** For all VCs, DDMI concludes that there are no project interactions during the construction and operation phases, and therefore no effects to be considered in the assessment. The operation of pits as PK disposal facilities will create large open water areas during operations. The pits will have supernatant water overlying the PK. The quality of this water likely will not meet AEMP benchmarks during operations, and may have concentrations that exceed safe levels for wildlife and/or birds. In the north, it is common for active mine waste storage facilities to have open water earlier in the season than surrounding lakes. In this case, waterfowl may be attracted to the open water, leading to exposure to the pit water. This potential effect has not been considered in the assessment.	**July 4:** DDMI acknowledges the potential for wildlife to encroach on the pits/mine workings during the operations phase of the PK to Mine Workings. To minimize wildlife, including bird, interactions with the mine workings during operations, DDMI will implement the existing wildlife, monitoring and management procedures for Diavik, which include the following measures: 1. Monitoring/tracking of wildlife presence and/or proximity to the mine workings. 2. Training all site personnel to record and/or report incidental sittings of wildlife, including birds, in the general area of the mine workings during operations. 3. Use of wildlife deterrence techniques such as truck horns, bear bangers, 12Ga cracker shells, 12Ga bean bags, scarecrows, decoy foxes and falcons, noise makers (Wetland Wailer Mk IV), and hanging screens down the high walls of the pits. DDMI notes that the activities considered to be part of the PKMW project are described in section 2.3 of the SIS. They include infrastructure and activities not currently authorized or previously assessed as part of Diavik Mine operations as a whole. Table 2-6 of the SIS

		Recommendation DDMI should consider whether operational conditions may lead to establishment of an open water area that may attract wildlife. If this is possible, the potential effects should be addressed in the assessment.	identifies the schedule for PKMW Project activities and places them in development phases: construction, operations, closure and post-closure. The valued components (VCs) to be assessed reflect the MVEIRB's Final Scoping Document and Reasons for Decision, and include: 1. Water quality 2. Water quantity 3. Fish and fish habitat 4. Cultural use of the area 5. Caribou, aquatic and migratory birds and species at risk Potential interactions between the PKMW Project and these VCs during each phase of the project are identified and discussed in each VC section of the SIS (4.3 for water quality; 5.3 for water quantity; 6.3 for fish and fish habitat; 7.3 for wildlife; and, 8.3 for cultural use). Where there is no interaction identified, or the interaction has previously been assessed, no further assessment is conducted. The PKMW Project will not contribute to effects to these VCs during construction and operations incremental to the effects of the Diavik Mine project as a whole.
6	Water Quality Modeling - Discrepancy between results	**Comment** None **Recommendation** Please confirm the assumption that data presented in tables are correct and provide corrected version of time series figures presented in Appendices. If the assumption is incorrect, provide revised tables, figures, and text as required.	**July 4:** DDMI has reviewed the tables and figures including the specific example noted by EMAB's consultant and we have not found any discrepancies. As such we believe the information provided in the Appendices are correct.
7	Water Quality Modeling - stability of meromixis	**Comment** None **Recommendation** The conclusions of the EA should be modified to reflect the reduced stability of meromixis when the closure cap is <100 m. Would DDMI consider limiting storage of PK to pits where the closure cap can be greater than 100 m to increase the probability of long-term stable meromictic conditions?	**July 4:** DDMI believes the conclusions included in the SIS accurately reflect the information and analysis presented. The 50m minimum water cover depth was a preliminary estimate provided in response to a request by the WLWB. DDMI plans to conduct additional water quality modelling with updated information and a refined project design if the project proposal is approved by the MVEIRB and WLWB. It is very possible that the final water cover depth may be greater than 100m as it is in all of the A418 modelled scenarios.
8	Water Quality Predictions - Modelling Information	**Comment** The characterization and evaluation of effects on water quality rely on predictions of water quality in the pits once PK placement is complete and pits have been filled with water from Lac de Gras. Appendix B of the SIS provides a very short summary of the modelling with references to other memos prepared by Golder. The currently available memos that were provided as part of the water licence amendment process were reviewed. However, Golder refers to "Water Quality Modelling Results A418 (corrected) A154 and A21 Mined Out Pits – Scenarios 2a, 3a and 4a" which is "not yet available." It was assumed that the results presented and discussed in the SIS are from the most recent, corrected memo, but it is not clear what changes and corrections have been made. As a result, it is not possible to reach any conclusions about the modelling results presented. **Recommendation** DDMI should provide the most recent detailed report describing the assumptions, inputs, analysis, results and interpretation for water quality predictions used in the effects assessment.	**July 4:** On May 9, 2019 DDMI submitted responses to MVEIRB IRs 1 through 25 inclusive. Included with the response submission was Appendix 3: Erratum to DDMI Response to WLWB Information Request #5 from the Technical Session for the Water Licence Amendment. This Appendix in combination with Golder (2018) provides the assumptions, inputs and general interpretation of the pit lake modelling results. DDMI would also recommend that EMAB review responses to MVEIRB 1-25 as these responses address several questions regarding the modelling. The Summary Impact Statement (SIS) (PR#53) is based on the modelling as described above. EMAB notes that the information was listed as "not yet available". What is actually stated in SIS Appendix B is that the electronic link to the Public Registry was not available. Appendix 3 was posted on the ORS May 9, 2019. DDMI recognizes that the change in process and public registries may have caused confusion as well as having information located on both the MVEIRB public registry and the ORS. EMAB or its consultants are requested to contact DDMI directly with any questions regarding the location of information.
9	Water Quality Modeling - Sensitivity Analysis	**Comment** None **Recommendation** Please provide in a single document the methods used for the sensitivity analysis, including the rationale for selected input parameters, the results, and the significance of those results in terms of the model outputs presented in this assessment.	**July 4:** The sensitivity analysis is described in PR#12 with results in PR#7. The results are provided separately from the description of the analysis as they are provided in an electronic format as this was expected to be the easiest way to review and compare results from the different sensitivity scenarios. Please advise DDMI directly if EMAB or its consultants would prefer a PDF version of the Excel file attached to PR#12.

10	Water Quality Predictions - Loading Sources to Pits	**Comment** Water quality modelling results provided in the June 2018 Amendment Application did not incorporate potential loading from pit walls or groundwater inflow. In the January 2019 Response, DDMI provided a sensitivity analysis that considered impacts of additional sources on long-term water quality conditions. It also considered a potential pool of water remaining on top of the PK at the initiation of pit filling. These scenarios were considered as separate events. There was no prediction of conditions of combined events, even though this is the most likely scenario. The sensitivity analysis also considered different rates of pore water release from the PK, but only considered slower rates of release, making the optimistic assumption that conditions would not be worse than the initial predictions, but they could be better. With respect to groundwater inflows, DDMI's sensitivity analysis considered a groundwater input of 177,647 m3 during pit filling. This number seems small in comparison to the previous modelling that used the following approach: "The groundwater inflow rate was estimated based on a linear relationship developed from historical pit dewatering rates and pit depths. ... the groundwater inflow rate at the start of filling was set to 28,300 m3/day. It was then assumed to decline over the filling period as water levels in the pit increased, ultimately reaching a value of zero when the pit was full of water." (Golder Associates. 2010. Preliminary Pit Lake Mixing Study. Appendix -3 of Interim Closure and Reclamation Plan, Version 3.2). All of these load sources are likely to contribute to water quality in the pit and should be directly included in the modelling. They do not represent "sensitivity" conditions because they are expected sources, not uncertain contributors. **Recommendation** DDMI should either provide updated water quality predictions that incorporate loading from all reasonable, foreseeable sources, or provide rationale why these sources are not relevant for predictions of water quality conditions.	**July 4:** Pit lake modelling analysis began with Golder (2018) and then followed with sensitivity analysis as requested by EMAB (PR#12 and PR#7). All of these results were presented and discussed at the WLWB Technical Session where three additional model scenarios (2a, 3a and 4a) were defined for the three mine areas (A21, A418 and A154). The final 9 model results were used as the basis for the Summary Impact Statement as requested in MVEIRB-1. DDMI modelled an additional 9 scenarios to consider the cumulative impact of the pit lakes that considered all reasonable foreseeable developments including Ekati and the Jay Project. Scenario 4a was defined at the WLWB Technical Session and assumes there would be 15m of decant water above the settled PK at the time the mine workings were to be filled with water from Lac de Gras. The 15m of decant water was assumed to have developed through the final years of operations through an accumulation of PK slurry/pore water and groundwater inflow. In A418 this 15m of initial decant water represents a volume of around 1,040,632 m3. This would represent a worst case volume of lower quality water during pit filling. EMAB participated fully in the Technical Sessions and did not object to the scenario definitions developed at the session and included in WLWB IR#5. Further EMAB did not advise the WLWB or Diavik that they required any additional modelling scenarios despite WLWB IR#15 to all Parties including EMAB specifically requesting Parties: "To identify what additional information, if any, is necessary to inform the preliminary screening determination of the Amendment Application. If any, please provide rationale for why this information is needed."
11	Water Quality Predictions - PK Pore Water	**Comment** Water quality and hydrodynamic modelling for deposit of PK in mine workings relies on an understanding of pore water quality from PK. The pore water expelled from PK as it consolidates is expected to be an important source of high Total Dissolved Solids (TDS) water at the pit bottom, supporting establishment of permanent stratification (layering) in the pit lakes. The PK pore water is also the main source of contaminant loading in the pit lakes, with modelling indicating that this load will gradually diffuse upward and disperse into Lac de Gras over a period of many decades. The information provided in the June 2018 Amendment Application was not sufficient to understand the basis for DDMI's input assumptions about pore water quality. Each of the subsequent submissions provided additional information, with the January 2019 Response providing summary statistics for "in situ PKC beach sampling." Unfortunately, the response did not clarify if this was surface or subsurface sampling from the beach, leaving outstanding uncertainty about the adequacy of the data supporting	**July 4:** DDMI considers the "Development Case" scenario described in Golder (2018) (PR#11) to be the worst case scenario for both PK pore water volume and concentration of contaminants. Table B-2 of the Summary Impact Statement (SIS)(PR#53) compares the various available sources of PK pore water. These include: 1. in situ PKC Beach Pore Water – all beach samples 2. in situ PKC Beach Pore Water – unsaturated samples only 3. in situ PKC Beach Pore Water – saturated samples only 4. in situ Slimes sampled from the PKC Barge 5. "Fresh" PK Slurry Highest concentrations of contaminants would be expected from #2 where the PK material would have had years of weathering exposure compared with #3 and #4 where PK was stored in saturated conditions limiting the extent of weathering. Lowest concentrations of contaminants would be expected from #5 where water has been in contact with PK material for a relatively limited time. These samples were directly from the PK slurry as it was being released to the PKC. The "Development Case" (Golder (2018) assumed a water chemistry based on all samples (#1) as this was expected to provide a reasonable maximum pore water concentration covering both direct deposition of PK material and re-depositing of EFPK (slimes) from the PKC. At the WLWB Technical Sessions the suggestion was rather than lumping all the PK samples together (i.e. #1 which was understood to be possibly too worst-case) to sort the results

			water quality input assumptions. The February 2019 Response provides additional clarification about the sampling, with the Table in Attachment 1 referring to "PKC Beach Pore Water" samples and citing data from Moncur and Smith (2014) in the table notes. There is no reference provided for Moncur and Smith (2014) but it is assumed that it is a paper titled "Four-Year Hydrogeochemical Field Investigation of Processed Kimberlite Weathering at Diavik Diamond Mines Inc. " that was submitted to the Wek'èezh?i Land and Water Board as part of the Diavik 2014 ICRP Annual Progress Report. If this is the correct source, then the report appears to confirm that the samples are of pore water in PK material and the new information helps to support the modelling inputs that DDMI applied up to January 2019. One challenge with these inputs is that DDMI relied on average values so it is possible that more adverse conditions could occur. Nonetheless, DDMI continues to assert that its models represent a "worst-case rather than being representative of the conditions that could be expected at Diavik" (Responses in Review Comments Table, January 2019). In the February 2019 Response, DDMI chose to reconsider its model inputs and use data from water collected from fresh PK slurry. Contaminant concentrations for this assumption are much lower than in previous modelling and therefore the models predict much lower effects on water quality in the pit and Lac de Gras. However, the results presented in Moncur and Smith (2014) appear to indicate that relying on water from fresh PK is likely to underestimate the pore water concentrations in deposited PK, for example: "Although the exposed FPK had only been weathering for about one month, porewater extracted from the upper 0.25 m of the FPK had elevated dissolved concentrations of cations and SO4, much higher than the PKC Pond water or water from the End of Pipe." (Moncur and Smith [2014], Section 6.4) "Within 1 month of fresh slurried FPK deposited over the East Beach of the PKC facility, elevated concentrations of dissolved SO4 and major cations were observed in the upper 0.25 m of the FPK, suggesting rapid oxidation/dissolution of FPK minerals." (Moncur and Smith [2014], Section 9.0) DDMI's May 10, 2019 response to Review Board Information Request #19 confirms that the model relies on data from fresh PK slurry and also acknowledges that this may underestimate the concentrations in PK porewater. DDMI argues that its sensitivity analyses indicate that the model results for Lac de Gras are not sensitive to changes in porewater chemistry. This does not consider the potential characteristics of the water in the pit during operations. Also, the porewater is likely the largest source of contaminant loading in the pit lakes so models should be reflective of reasonably conservative estimates of loading. The revised modelling in the February 2019 Response predicts that water quality in the pit will remain below the AEMP benchmarks even with full mixing of the pit. This may be an optimistic prediction given the revised input assumptions about pore water quality. The predictions for unanticipated mixing in the	based on sample type to better reflect pore water from a) PK deposited directly to mine workings and b) EFPK re-deposited from the PKC. At the time of the Technical Sessions fresh PK slurry was discussed but data availability was not considered. DDMI selected the PK slurry data (#5) as being the most representative of pore water from PK directly deposited to mine workings recognizing the limited sample size(n=3). Pore water quality from the slimes sampled from the PKC Barge (#5) was selected to represent EFPK pore water. Consolidation and pore water testing underway at the University of Alberta (U of A) are expected to provide more definitive estimates of pore water chemistries when they are complete later in 2019. A brief review of an initial series of preliminary results from the University of Alberta generally support the use of PK slurry data. For example PK slurry data for sulphate used in the SIS modelling ranged from 59-329 mg/L and chloride ranged from 33-86 mg/L (SIS Table B-2) compared with initial UofA results with sulphate concentrations ranging from 159-185 mg/L and chloride concentrations ranging from 96-103 mg/L.

		November 2018 Response are likely more realistic and should form the basis for the additional modelling scenarios requested by the WLWB following the January 2019 technical session. Attachment 7 of the January 2019 Response describes comparisons of laboratory and field scale predictions of PK effluent, but results are described as preliminary and no information is provided about how this information has or could inform model inputs and predictions. **Recommendation** DDMI should revise its modelling to incorporate more realistic estimates of pore water quality that consider evolution of chemistry after placement of PK. A rationale for use of "fresh PK" data, rather than data previously used in earlier submissions and the data that was identified to be used in the WLWB IR #5, should be provided. If the fresh PK slurry is confirmed to be the most appropriate and representative source for estimating effects on water quality, it is recommended that additional sampling of the fresh PK slurry be completed and modeling be rerun using updated results. Given that the porewater chemistry dataset used for the most recent modeling was based on limited PK chemistry data with a relatively large range of concentrations (i.e., the fresh PK slurry dataset), it is recommended that modeling be repeated using the maximum concentrations from the PK slurry dataset to provide a conservative estimate of potential effects and risks to aquatic biota.	
12	Water Quality Predictions - Unanticipated mixing scenario effects benchmarks	**Comment** Both the November 2018 and January 2019 Responses rely on comparison with acute effects benchmarks to conclude that unanticipated mixing of the pit lake after it is connected with Lac de Gras would not cause unacceptable aquatic effects[1]. However, the predictions indicate that exceedance of chronic effects benchmarks could extend for periods of up to two years: "As the time series … show, it would take an estimated one to two years for conditions within the pit to fall below AEMP benchmarks for all parameters following turnover" (January 2019 Response, Attachment 6). In this case, chronic effects benchmarks appear more relevant. Also, it is worth noting that the assessment definitions and thresholds would not consider a two-year exceedance as a significant effect. **Recommendation** DDMI should provide additional details about the benchmarks and used for evaluating the unanticipated mixing scenario, and rationale for the selected benchmarks and significance thresholds. It should also provide further information about potential chronic effects associated with exceedance of chronic benchmarks for periods of more than 30 days.	**July 4:** DDMI understands that EMAB's IR relates to the information in the Summary Impact Statement (SIS) (PR#53). The Benchmarks listed in Table 4-3 and applied in Tables B-4, B-5, and B-6 in the SIS are the AEMP Benchmarks as approved by the WLWB for application to Lac de Gras. The significance thresholds listed in Table 4-3 of the SIS are the AEMP benchmarks converted to be equal to a high magnitude effects classifications as described in Table 4-2 of the SIS. Generally, AEMP Benchmarks are intended to be the level below which chronic effects on aquatic life are not expected to occur.
13	Water Quality Predicitions - PK Density	**Comment** The consolidation and density of PK material once placed in the pits has implications on the final depth of the water cover over the PK, the capacity of the pits for PK storage, the release of pore water from the PK during consolidation, and the volume of excess water that may require treatment during operations. The consolidation and water quality models rely on	**July 4:** Density estimates of grit-rich CPK and grit-poor CPK were measured directly through field sampling and are considered to be accurate. Density estimates for FPK and EFPK are back-calculated annually based on the total mass of PK deposited in the Processed Kimberlite Containment Facility (PKCF - direct measurement) and the related increase in volume taken up by PK (annual survey of the PKCF) and are considered to be conservative. Density estimates for FPK and EFPK are conservative (low) because the

		assumptions of density for making predictions of effects. The adequacy of operational water treatment capacity also relies on an understanding of consolidation and density. The June 2018 Amendment Application stated assumptions about PK density and provided some information about existing data and measurements. However, there was still uncertainty about how PK may perform in pits. For example: Section 3.2 of the Amendment Overview referred to dry densities of various types of PK based on results of field trials (grit-rich Coarse PK 1.8 t/m3, grit-poor Coarse PK 1.35 t/m3, Fine PK 0.75 t/m3). Tables 7 and 8 in Section 3.3.2 of the Amendment Overview provided estimates of pit filling levels and excess water volumes based on dry density of placed PK of 0.8 t/m3; In Section 3.3.6 the Amendment Overview identified the slimes (Extra Fine PK) density in the PKC facility as 0.4 t/m3 but proposed that density in the pit will be 25% higher at 0.5 t/m3. Following the January 2019 technical session, the WLWB requested an update of Table 8 in the June 2018 Amendment Application, "based on a lower dry density of fine PK (based on a range of dry density estimates that is foreseeable in the future)." The February 2019 Response provided a revised table of "Potential Decant Volumes" considering an assumed FPK dry density of 0.6 t/m3. The table indicated that excess water volume would be greater for the lower dry density (i.e., less consolidated material). This was counterintuitive and indicated a potential error in the calculations. Tables 2-2a through 2-2i provide updated information about volumes of settled PK and excess slurry water and appear to correct the previous error. However, there is no information about assumed densities for PK slurry or settled PK, or the basis for any of the calculations. The calculation of "Supernatant Water Overlying PK Surface" is not clear – it seems like it should be the difference between the "Slurry Water Plus Groundwater" and "Total Decanted Water" but the numbers do not reflect this result. **Recommendation** DDMI should provide details about its estimates and calculations related to slurry density and water volumes. Any changes in calculated volumes should be considered and incorporated into the effects assessment, including any changes in volumes of water that may require treatment and discharge.	measurement incorporates the entrapment of ice in the PKCF. Field densities for the PKMW project are expected to be higher because there will not be a related entrapment of ice in the mine working. A higher PK density will equate to a reduction in the total volume of PK in the Mine Working resulting in a deeper water cover. This will have a positive outcome on water quality in the pit lake and thus using a lower PK density provides a conservative estimate of pit water quality. In addition, a lack of ice entrapment in the mine working will result in more decant water requiring treatment during operations. It should also be noted that the groundwater inputs would be expected to gradually reduce as the water level within the mine workings increases. In the simplified analysis Diavik has conservatively assumed groundwater inputs have remained constant over the operational years. This conservative assumption results in an over-estimate of the amount of decant water that would need to be managed during operations. The operational treatment capacity of the North Inlet Water Treatment Plant is 33 Mm3/year and these variables have a negligible impact on the site water balance and would remain within the treatment capacity of the plant. Results from ongoing consolidation testing will be used to inform updates to PK density estimates that will be incorporated into model updates during the detailed design phase of the project.
14	Water Quality Predictions - Model Calibration	**Comment** DDMI states (SIS Section 4.4.1) that it was unable to calibrate its model because the pit lake is not yet established. Instead it states that its model relied on rates and constants from previous model calibrations in the region, and refers to the Jay Project at the Ekati Mine and the Gahcho Kue Project. It is our understanding that pit lakes also do not yet exist at these projects, so it is unclear how they could be used for calibration. Additional detail about calibration is needed. **Recommendation** DDMI should provide additional details about the referenced model calibrations in the region.	**July 4:** The referenced text from SIS Section 4.4.1 was summarized from Golder (2018) and may have lost some of the intended information. Below is the complete text: "Calibration— Because the pit lake is not yet constructed, model calibration is not possible at this time. However, rates and constants were applied from previous model calibrations in the region. The approach used is commensurate with the model set up for the Jay Project (DDEC 2014) at the Ekati Mine and the pit lakes at the Gahcho Kue Project (DeBeers 2012; Vandenberg et al. 2015). The parameter values in the ice module were taken from calibrated hydrodynamic models developed nearby, where water temperature data measured were available. The objective of the calibration was to match simulated and observed timing for ice formation/melting on the lake. The calibrated model predicts that ice starts forming on the lake around mid-October and melts by mid- to late June, in agreement with available measured proxy data. The predicted time for ice melting in the

			pit lakes leads to an open-water season which is longer than that observed at Lac de Gras, where ice melt generally occurs in mid-July. The extended open water season represents a more conservative approach, as the exposure to wind-driven forces over the pit lakes surface is extended over time."
15	Water Quality Modeling - criteria for connecting pit lakes to Lac de Gras	**Comment** None **Recommendation** Please describe the process whereby water quality in the pit lakes will be assessed to determine whether dikes should be breached including a description of the frequency and season of sampling (i.e., would a single sampling episode be considered sufficient?), the location and depth of sample collection, and the parameters and benchmarks that would be assessed.	**July 4:** The proposed pit water quality sampling prior to breaching has been described in detail in DDMI's Response to MVEIRB-IR#10: Once prior to breaching dike and reconnecting Mine Workings to Lac De Gras at a minimum of five (5) stations evenly spaced along a longitudinal transect will be sampled as approved by an Inspector. At each station, samples must be collected 2m below surface and at twenty (20) meter intervals with a final sample 2m above the bottom. Results will inform whether water quality is behaving according to model predictions and remains stable over time. If sample results are below all AEMP benchmarks in the top 40m of the water column the dike may be breached. DDMI suggests this criteria be finalized during the Water License Amendment phase of the PKMW Project.
16	Water Quality Effects - Characterizing Magnitude	**Comment** Table 4.1.5 in the SIS describes the characterization for effects on water quality. For magnitude, effects are considered negligible if there is "no measurable change or the concentration of the parameter is less than 5% above the AEMP benchmarks." AEMP benchmarks are established based on use-protection for aquatic life, and can be much higher than natural conditions in a waterbody. As such, for some parameters a change that reaches an AEMP benchmark may constitute a substantial change in contaminant concentration. Negligible change should be defined based on non-degradation of water quality conditions, not on use-protection. **Recommendation** DDMI should provide additional rationale for its decision to apply a use-protection approach for defining negligible change in water quality.	**July 4:** DDMI recognizes that the AEMP benchmarks are higher than historical and existing concentrations for many parameters, and that the Project would result in changes in concentrations up to and in some cases beyond the benchmarks. However, it is still protective, conservative, and scientifically defensible to use the water guidelines for protection of aquatic life and drinking water (the basis for the AEMP benchmarks) to identify whether the predicted change would result in toxicity risks to aquatic life and human health.
17	Water Quality Modeling - dilution of pit lake water by Lac de Gras	**Comment** None **Recommendation** Provide a discussion of the long-term loading of constituents in the porewater to Lac de Gras or provide an explanation of the mechanism for the long-term decrease in concentrations observed at depth in the pit lakes.	**July 4:** DDMI acknowledges that PK deposition in a mine area would result in some level of long term loading of trace elements to Lac de Gras even with a stable meromixis (see also response to MVEIRB-35). In the following discussion TDS will be used to describe constituent loading. For context current TDS conditions in Lac de Gras, particularly the eastern portion are influenced by the discharge from Diavik's North Inlet Water Treatment Plant. Annual TDS loadings to Lac de Gras have typically been in the range of 3,000,0000 to 4,000,000 kg/y (Attachment 2) and have been assessed as high as 7,911,401 kg/y from the NIWTP for 2023 (Jay Project EA). With mine closure (starting in 2025) the NIWTP discharge will be eliminated as will these TDS loading. Post-closure TDS loadings from pit lakes where PK material has been deposited are estimated to be on average 1,814 kg/y (A418 Scenario 2a) and 5,951 kg/y (A418 Scenario 3a) over the 100 year model simulation. Additionally DDMI estimates total post-closure runoff from the east island of 1,880,004 kg/y (DDMI 2019 in preparation). In total DDMI is currently estimating a 37-76% reduction in TDS loading to Lac de Gras post-closure that is expected to result in a measureable reduction in Lac de Gras TDS levels. The long-term decrease in TDS concentrations at depth in the pit lakes is due to the diminishing volume of pore water released as the PK material becomes fully consolidated. This is shown in Figure 2 of Golder (2018).
18	Dissolved oxygen	**Comment** None **Recommendation** We recommend that dissolved oxygen	**July 4:** (i) In pit lakes, as in natural lakes, meromictic lakes tend to become anoxic in the lower layer over time, whereas the surface layers remain oxygenated to the full mixing

			concentrations be further investigated considering: (i) the development of anoxic conditions in bottom waters due in part to chemical oxygen demand from the PK; (ii) DO depletion that would occur naturally at depth under ice cover, based on observed conditions in Lac de Gras; (iii) the depth to which water would circulate below the upper 40 m given the narrow and deep profile of the pit lake. It should be noted that results of the sensitivity analyses indicated that the water column in the pit lakes would be quite stable; therefore the entire water column above the chemocline may not be well-mixed; (iv) water circulation during most of the open water season in the upper 40 m of the water column given a thermocline between 5-15 m; (v) the depth to which water is likely to become fully re-oxygenated on an annual basis vs the potential for long term depletion in the mid water column; and (vi) theoretical surface concentrations of DO if, as a worst case, an anoxic monimolimnion was mixed to establish whether or not there is potential for a fish kill and/or critical risk to aquatic biota. It is recommended that DDMI conduct a mass-balance estimate of potential fully mixed DO concentrations in surface waters that could assume anoxic conditions in the monimolimnion and a reasonable estimate of concentrations in the overlying waters.	depth. This has been confirmed through modelling and monitoring studies. For example, vertical profiles of Waterline pit lake at Faro Mine (Pieters and Lawrence 2014) show that dissolved oxygen (DO) is about 10 mg/L uniformly to the depth of stratification (as indicated by the temperature and salinity plots) and near zero below that level. Similar profile plots can be seen for 10 pit lakes in Alberta in the Coal Valley End-Pit Lake report (Hatfield 2011); Springer pit lake in BC (Vandenberg and Litke 2018); Meirama [pit] Lake, Spain (Juncosa et al. 2016); 4 pit lakes in Poland (Marszelwsi et al. 2017, Molenda et al. 2014); Udden pit lake in Sweden (Ramstedt et al. 2003); Dombrovska pit lake in Ukraine (Zurek et al. 2018); Summer Camp pit lake in Nevada (Castro et al. 1999); Berkely pit lake in Montana (Davis and Ashenberg 1989). Exceptions to this rule include pit lakes where mechanical mixing introduces DO at depth, such as Main Zone pit lake at Faro (Pieters and Lawrence 2014); where hydrothermal vents cause mixing, such as in volcanic lakes (Williams and Von Herzen 1983), or lakes where excessive biochemical oxygen demand exists in the mixolimnion, causing whole-lake anoxia. None of these conditions are expected to be present in the Diavik closure scenario. Therefore, it can be safely assumed that Diavik's pit lakes will follow the ubiquitous trend observed in other pit lakes, whereby DO concentrations follow the same pattern as density profiles, with the only difference being time of onset. The time to onset is a function of sediment oxygen demand and biochemical oxygen demand. Both of these oxygen demands will be influenced by the chemical oxygen demand from PK and oxygen demand from decaying biological material. A comprehensive conceptual model of oxygen demand in pit lakes that contain mine waste is available elsewhere (Vandenberg et al. 2015). The time lag is expected to be on the order of months, so after the first few years of closure, the DO profile should mirror the density profile in perpetuity. Given this pattern, the DO profile will vary in each pit lake according to the materials placed in the pit. To use the example of Pit A418 in Scenario 3A (with 5 Mm3 of PK, 5 Mm3 of slimes and 5 Mm3 of pore water), the top 60 m (approximately) of water would be fully oxygenated, while the bottom 50 m of water would be anoxic over the long term. Figure 1 (see Attachment 3) illustrates the predicted TDS for A418, and as noted above, the DO would follow a similar spatial-temporal pattern, with high DO in the mixolimnion (including both the epilimnion and hypolimnion) and low or no DO in the monimolimnion. In all likelihood, DO would penetrate slightly deeper than this, as indicated by the occasional mixing of about 5-10 m at the interface, but a conservative approach would be to assume that all waters below 60 m remain anoxic. (ii) Baseline DO monitoring completed at the Diavik Diamond Mine has shown that while Lac de Gras is generally well oxygenated during summer, there are some areas of decreased DO during ice-cover conditions due to natural processes in the lake. Therefore, these results indicate the existence of naturally low oxygen conditions in Lac de Gras. Specific locations assessed during ice-cover conditions in Lac de Gras reported substantial DO gradients with low DO levels (2 to 4 mg/L) within 1 to 2 m of the bottom of the lake. These were natural occurrences (i.e., documented prior to operation of the Mine). In addition, concentrations were frequently below both acute and chronic Canadian Council of Ministers of the Environment (CCME) DO guidelines at water depths greater than 10 m. These conditions were confirmed during several years of baseline and early operational monitoring and have also been consistently observed during operational monitoring under the AEMP. Also confirmed during baseline and early operational monitoring, including AEMP monitoring, is the presence of healthy fish populations in Lac de Gras as evidence of fish exhibiting avoidance behavior of low DO areas in Lac de Gras under natural conditions. (iii) As noted in part (i) of this response, the vertical mixing depth will vary by pit and depending on the specific materials placed in

the pit. Unlike the sediment-water interface, which will exert an upward oxygen demand to the overlying water column, the interface at the chemocline will not. Therefore, pit lakes tend to have near uniform DO concentrations from surface to chemocline. Accordingly, the 3 pit lakes are anticipated to remain well oxygenated to the depth of the chemocline, as seen in other pit lakes (cited in part i). (iv) Beneath the thermocline and above the chemocline, there will be little to no mixing of waters during the period of thermal stratification. Although there will be no aeration during this time, there will also be very little decline in DO, because (a) there will be no sediment oxygen demand (see response to part iii); (b) there will be negligible biochemical oxygen demand; and (c) waters will remain cold in this region, limiting the rate of oxygen consumption. DO in this zone is therefore expected to remain above all applicable thresholds and guidelines. (v) The mid-region will be fully mixed with the surface layer twice per year. For this reason, and the reasons listed in parts (i) to (iv), DO in the pit lakes is expected to remain above all applicable thresholds and guidelines throughout the water column above the chemocline. (vi) It must be re-iterated that this response requires that we assume hypothetical conditions that are in opposition to all available evidence. This response provides an answer to the information request, but it should not be interpreted to imply that such conditions are likely to occur. Assuming the worst-case conditions of a full pit overturn at the point of maximum volume of anoxia, again using Scenario 3A and pit A418, a simple mass balance would assume the following conditions in late summer with a shallow epilimnion: • Anoxic below 350 m; volume = 6.2 Mm3 • DO = 10 mg/L at surface, with 5-m deep thermocline; volume = 2.0 Mm3 • DO = 9 mg/L in intermediate zone; volume = 15.1 Mm3 An unanticipated turnover during these conditions would yield a whole-pit-lake DO concentration of 6.9 mg/L. DO in the surface waters would be rapidly replenished, with nearly instantaneous re-aeration at the air-water interface and replenishment in the mixed zone within hours or days, depending on prevailing conditions and the amount of turbulence in the pit lake generated by the hypothetical mixing event. If the mixing is wind-driven, the same process would entrain dissolved oxygen throughout the water column as part of the mixing process. Although the duration of the hypothetical period of low DO is unknown at this time, changes in DO concentrations may be within the range of natural fluctuations in DO that occur in Lac de Gras and other natural lakes. Whether from an oxygen demand in the PK slurry at the bottom of the pit or from decomposition of long-term deposition of detrital matter in natural areas of the lake, fish are expected to move elsewhere to avoid the volumes that remain well stratified at the lake bed as oxygen is depleted over time. The diked area has been designed to provide suitable conditions for fish upon closure of the A418 pit including water quality conditions within the pit to support healthy populations of fish. As discussed in a previous response to the second round of IRs from the Environmental Monitoring Advisory Board (please see EMAB #30), we do not expect increased productivity as a result of nutrient enrichment in the surface waters of the pit (as per Attachment 1 to the original report, Figure A-1, A-4 and A-7; e.g., phosphorus); therefore, we also do not anticipate DO depletion in the surface water of the pit under normal conditions. References Castro, J. M., B. W. Wielinga, J. E. Gannon, and J. N. Moore. 1999. Stimulation of Sulfate-Reducing Bacteria in Lake Water from a Former Open-Pit Mine Through Addition of Organic Wastes. Water Environment Research 71:218–223. Davis, A., and D. Ashenberg. 1989. The aqueous geochemistry of the Berkeley Pit, Butte, Montana, U.S.A. Applied Geochemistry 4:23–36. Hatfield. 2011. An Evaluation of Water Quality in Existing End-Pit Lakes in the Coal Valley Mine Area. Page 57. North Vancouver, Canada. Juncosa, R., J. Delgado, F. Padilla, P. Rdgz-Vellando, and H. Hernández. 2016.

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19	Water Quality Effects - Cumulative Effects	**Comment** The implications of the above definition of magnitude of effect are apparent in the cumulative effects assessment discussed in Section 4.5.2.1 of the SIS. DDMI proposes that no cumulative effects are anticipated because the dikes will not be breached until water quality meets the AEMP Benchmarks – defined as a negligible effect. However, achieving the AEMP Benchmarks does not mean that the pit reconnection will not degrade water quality in Lac de Gras: it only means that the Diavik project on its own will not lead to conditions that exceed the AEMP Benchmarks. Effects of Diavik-related changes that are less than AEMP Benchmarks still need to be considered in a cumulative effects assessment. **Recommendation** DDMI should update its cumulative effects assessment for water quality to consider the predicted changes caused by the Diavik project (even though less than AEMP Benchmarks) in combination with other projects that also affect water quality in Lac de Gras.	**July 4:** DDMI agrees with EMAB that effects of Diavik-related changes that are less than AEMP Benchmarks should be considered in a cumulative effects assessment. As part of the cumulative effects assessment for water quality, DDMI assessed the potential for residual effects from past and present physical activities, including the existing Diavik project, and resource use to interact with predicted residual effects from the PK to Mine Workings Project. Residual effects are considered as measurable effects above baseline after implementation of mitigation measures; hence, measurable effects below AEMP Benchmarks are included in the cumulative effects assessment for water quality and inform conclusions regarding the significance of adverse cumulative effects on water quality.
20	Water quality mitigation - adverse effects	**Comment** None **Recommendation** Diavik's commitment to close the dike breaches of isolate the pit lake from Lac de Gras is a key component to address unforeseen effects to water quality and fish and fish habitat in Lac de Gras as it could effectively isolate the mine pits if they are found to be the source of unacceptable effects to water quality or result in periodic fish kills (e.g., if low DO occurs more often than anticipated). However, this mitigation measure could be fleshed out more fully (e.g., response to a fish kill from low DO, response to breakdown of meromixis). Can DDMI provide additional information on how risks will be identified and defined and the	**July 4:** The proposed pit water quality sampling prior to breaching has been described in detail in the Developer's Response to MVEIRB-IR#10 and EMAB-IR#15. Post-closure and dike breaching, Lac de Gras will continue to be monitored through a modified Aquatic Effects Monitoring Program which will include action levels reflective of the post-closure environment. Updates to the AEMP were described in Appendix 1 of DDMI's Response to MVEIRB's April 18, 2019 IRs. In addition, DDMI recommends continued monitoring of any mine working which contains processed kimberlite as described in MVEIRB-IR#4 and the Summary Impact Statement. Suggested pit lake monitoring frequency is quarterly for the first year, annually for year two and three, transitioning to every 3-years to match the AEMP program thereafter (DDMI 2017). If pit water quality does not meet AEMP benchmarks in the top 40m an investigation will be triggered. In situ treatment options will be evaluated and if ineffective the breaches will be closed to isolate the pit lake from

		process for determining where and when this mitigation would be implemented?	Lac de Gras. The final monitoring schedule and response plan will be developed through the Water License Amendment and adjusted as Closure Planning progresses. Reference: Diavik Diamond Mines (2012) Inc. (DDMI). 2017. Closure and Reclamation Plan Version 4. April 2017.
21	Follow-up and Monitoring - water quality	**Comment** Section 4.8 of the SIS lists proposed follow-up and monitoring activities aimed at verifying environmental effects predictions, and effectiveness of mitigation. Some additional components should be included in the monitoring and follow-up programs **Recommendation** DDMI should collect information needed to support modelling calibration and updates. As well, periodic calibration and update of consolidation, pit mixing, and water quality monitoring should be completed. In order to complete those elements, DDMI should update its list of follow-up and monitoring requirements to include: a description of measurement parameters, sampling sites, frequencies, and methods, a response management framework, including benchmarks, action levels, and associated actions and mitigation. This information is a critical part of the overall management and mitigation plan for this Project and is essential to ensuring that risk is minimized and can be adequately addressed moving forward. Monitoring of the quantity and quality of water in the pits once PK deposition starts. The monitoring program should be designed to establish a good understanding of temporal and spatial variability in water quality; Monitoring of quantity and quality of groundwater inflows into the pit where possible; Completion of proposed characterization of PK consolidation and release water (January 2019 Response, Attachment 2); Consideration of results re: comparison of laboratory and field-scale predictions of PK effluent (January 2019 Response, Attachment 7); and, Temperature monitoring in Lac de Gras to support modelling.	**July 4:** Monitoring of the quantity and quality of water in the pits once PK deposition starts is described in detail in DDMI's Response to MVEIRB-IR#10. Post-closure, DDMI will continue monitoring of the pit lakes and Lac de Gras as described in Response to EMAB-IR#20. DDMI believes this level of detail is appropriate at the Environmental Assessment stage of approvals. Results from ongoing monitoring and studies will be used to inform model updates that will be implemented during the detailed design phase of the project.
22	Follow-up and Monitoring - aquatic life	**Comment** None **Recommendation** Please provide a post-closure monitoring program of fish use and movements of the first pit lake to be restored. Depending on feasibility, the study should include monitoring of depths to which fish descend during periods of no thermal stratification in spring and fall and under ice, when deeper waters could provide more suitable habitat in terms of temperature. If monitoring of DO indicates the presence of critically low DO concentrations, then monitoring of fish movements should be adapted to confirm that fish are able to successfully avoid these areas. If monitoring demonstrates that fish are not behaving as anticipated and are at increased risk due to exposure to adverse water quality conditions, the closure plans for the other two pit lakes could be modified and the need for further mitigative action for the initial pit lake be assessed.	**July 4:** Please also see response to GNWT #2. There is currently no plan to monitor fish use and movement in the pit lakes at closure. The AEMP is expected to continue to evolve at closure and post-closure, as it does during operations, with design updates occurring on a three-year schedule, or as per the requirements of the Water Licence to adapt effectively to closure monitoring needs. It is anticipated that the AEMP design plan for closure, specifically the fish component, will continue sampling in the area that is now outside of the A21 pit (Golder 2014 and 2016), in proximity to the new fish habitat that will be created after dikes are breached and are connected to Lac de Gras. In addition, as a condition of the Fisheries Act Authorization for the Mine (File SC980001), DDMI will be implementing the monitoring programs defined in the Mine's "No Net Loss Plan" (NNLP; DDMI 1998) and "No Net Loss Addendum" (DDMI 1999) at post-closure. This post-closure monitoring program is intended to evaluate the effectiveness of constructed fish habitat compensation and mitigation set out in the NNLP and addendum, which includes compensation measures constructed on the internal edges of the dikes (see below for a brief overview of pit lake habitat). One of the post-closure monitoring programs defined in the NNLP relates to habitat compensation constructed within the open pits and dikes, and evaluates fish use of the habitat. While the post-closure monitoring required under

			the NNLP is not intended to provide a general assessment of fish use and movement in the pit lakes, it will provide information regarding fish use of constructed fish habitat compensation within the pits. This post-closure NNLP monitoring, combined with ongoing AEMP monitoring, will allow for effective monitoring of fish and fish habitat in Lac de Gras for closure and post-closure mine-related effects. In brief, four key fish habitat zones were identified in the pit lakes: the inside edge of the dike, reclaimed shoreline, the pit shelf, and the pelagic zone (i.e., deep water) (Golder 2003; 2008; 2017). The inside edge of the dike with a water depth of 0 to 2 m is expected to provide spawning habitat for Slimy Sculpin (Cottus cognatus) and foraging and rearing habitat for other species. The pit shelf with a water depth of 3 to 5 m will provide shallow foraging and rearing habitat for most species of fish present in Lac de Gras. Surface water is anticipated to remain below AEMP benchmarks (which are protective of fish) in the pits after flooding (i.e., under the development case). Therefore, the water quality within these habitat zones is expected to be suitable for early-life stage and adult fish, and ongoing monitoring under the AEMP is believed to be sufficient to continue to monitor Lac de Gras for mine-related effects as a result of closure and post-closure conditions. References: DDMI. 1998. "No Net Loss" Plan. Diavik Diamonds Project. Yellowknife, NT, Canada. DDMI 1999. "No Net Loss" Plan Addendum. Diavik Diamonds Project. Yellowknife, NT, Canada. DDMI (Diavik Diamond Mines [2012] Inc.). 2007. Diavik Diamond Mine – Aquatic Effects Monitoring Program – AEMP Design Document, Version 2.0. Yellowknife, NT, Canada. December 2007. Golder (Golder Associates Ltd.). 2003. Fish Habitat Design for the Pit Shelf Areas at the Diavik Mine. Submitted to Diavik Diamond Mines (2012) Inc. March 2003. Golder. 2008. Fish Habitat Design for the A418 Pit Shelf Area at the Diavik Diamond Mine. Submitted to Diavik Diamond Mines Inc. December 2008. Golder. 2014. Diavik Diamond Mine – Aquatic Effects Monitoring Program – Study Design Version 3.5. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. May 2014. Golder. 2016. Aquatics Effect Monitoring Program Design Plan Version 4.0. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. July 2016. Golder. 2017. A21 Dike Fish Habitat Design. Submitted to Diavik Diamond Mines (2012) Inc. Ref. No. 1648005-1568-R-Rev2-12000. March 2017. WLWB (Wek'èezhì`ì Land and Water Board). 2007. Diavik Diamond Mines Inc. Water Licence W2015L2-0001 (formerly W2007L2-0003, MV2005L2-0009, N7L2-1645), effective November 1, 2007. Yellowknife, NT: Wek'èezhì`ì Land and Water Board. Amended October 2015.
23	Extra Fine Processed Kimberlite	**Comment** The scope of the assessment includes the placement of extra fine PK (EFPK) from the PK Containment Facility in pits. Because the material in the PK Containment Facility has segregated during the placement and settling processes, the material coming from re-mining at certain times may have very high content of fine or extra fine PK. This could lead to elevated TSS concentrations in the water in pits during periods of re-mining. EFPK could settle very slowly, especially with water depths that may be substantially larger than those in the PK Containment Facility. Slow settling of EFPK could lead to challenges for achieving AEMP benchmarks before reconnection of pits to Lac de Gras. DDMI's modelling included predictions for a "settleable constituent" (SIS Section 4.4.1), but there is no information to demonstrate that this modelling would represent behaviour of EFPK. **Recommendation** DDMI should provide additional information about the characteristics of EFPK, its potential effects on TSS in the	**July 4:** Settling tests are being conducted with EFPK as part of the research at the University of Alberta. Once complete these results will be considered in the feasibility design phase presuming this proposal is approved by MVEIRB and WLWB to confirm the EFPK properties. Observations to date including in situ behavior and simple jar test indicate that the EFPK settles relatively quickly and is not particularly susceptible to resuspension. Significance thresholds for TSS have been added to Table 4-3 in Attachment 4 (See MVEIRB#44).

		pit, and settling rates if the material is placed in pits. This may require mechanisms to predict TSS and establishment of appropriate significance thresholds (SIS Table 4-3).	

Fort Resolution Metis Council: Katy Dimmer

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
9	General File	**Comment** Letter from FRMC to MVEIRB Re: Fort Resolution Métis CouncilInformation Requests for the Environmental Assessment of the Processed Kimberlite to Mine Workings Proposal (MVEIRB File No.: EA1819-01) **Recommendation**	
1	3.3 Public Consultation and Engagement (DDMI - Summary Impact Statement)	**Comment** Section 3.3 (p.33 of the SIS) notes that the Proponent operates under a Community Engagement plan (last updated 2018) and has focused additional engagement with signatories to a participation agreement . Fort Resolution Metis Council is not included as part of the V2.1 Engagement plan nor are we signatories to the agreement. As potentially impacted parties, whose cultural use will be impacted in the project area, we are concerned that the engagement process is unclear for stakeholders outside of the participation agreement. **Recommendation** 1) Proponent to provide details on process to-date used for engaging with Fort Resolution Metis Council on our concerns about the safety, quality, and health of Lac de Gras. 2) Proponent to commit to working with Fort Resolution Metis Council on an appropriate and agreed to engagement process going forward.	**July 4:** 1. DDMI did not engage directly with the Fort Resolution Metis Council with regard to this application to deposit Processed Kimberlite in mine workings. DDMI's engagement plan followed the WLWB-approved process that focused on Indigenous Groups/Governments that are agreement signatories. Signatories to the Environmental Agreement and the Socio-Economic Monitoring Agreement for Diavik were determined from the Diavik Review. The Agreements were conditions for federal approval of the Diavik Project. DDMI acknowledges that the Fort Resolution Metis Council is not a signatory to the Participation Agreement between Diavik and Indigenous Groups for the Diavik Diamond Mine Project (Diavik). DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users view the safety, quality, and health of Lac de Gras. DDMI will consider views and concerns brought forward by the FRMC through the MVEIRB process. DDMI has and continues to interact with land users in the Lac de Gras area to understand land and resource use information. DDMI has consistently engaged with the PA Groups regarding potential for environmental impacts to Lac de Gras, and resulting socio-economic impacts, for all phases of the Diavik project, including proposed project modifications such as the PK to Mine Workings. DDMI appreciates FRMC's interest and participation in the PK to Mine Workings Review and looks forward to interacting with FRMC during the Review and future project execution, if approved to proceed. 2. DDMI appreciates the FRMC's participation in the current Review of the PK to Mine Workings. DDMI also wishes thank the FRMC for inviting the DDMI team to discuss the PK to Mine Workings Project at the FRMC's "What Matters Most" session in Fort Resolution on June 27, 2019. DDMI looks forward to interacting with the FRMC throughout the Review and during project execution, if the Project is approved to proceed.
2	Incorporation of Fort Resolution Metis Council Indigenous Traditional Knowledge in the Summary Impact	**Comment** The Summary Impact Statement does not acknowledge or include the Indigenous traditional Knowledge (ITK) or indigenous use and occupancy patterns of Fort Resolution Metis Members. The assessment of impacts have therefore proceeded without the benefit of FRMC ITK or indigenous use and occupancy data. There have been no opportunities given to FRMC to research and provide critical baseline information such as traditional land use (TLU) for this assessment nor have any secondary sources concerning Metis ITK or traditional land use been verified with us or	**July 4:** 1. As the PK to Mine Workings overlaps the general area of influence of the existing and approved Diavik Project, DDMI engaged the PA Groups to inform early project design. DDMI has incorporated information from traditional knowledge studies and reports sanctioned by the PA Groups in all components of the effects assessment for the PK to Mine Workings. DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users perceive the safety, quality, and health of Lac de Gras. DDMI welcomes FRMC's interest in the PK

	Statement (DDMI)	our Knowledge holders. **Recommendation** 1) Proponent to provide details concerning where and how FRMC ITK and TLU informed the Summary Impact Statement including Sections: 4.0 Assessment of Potential Effects on Water Quality;5.0 Assessment of Potential Effects on Surface Water Quantity; 6.0 Assessment of Potential Effects on Fish and Fish Habitat; 7.0 Assessment of Potential Effects on Wildlife and Wildlife Habitat; and 8.0 Assessment of Potential Effects on Cultural Use. 2) Proponent to commit to working with Fort Resolution Metis Council to address any gaps identified in incorporation of FRMC ITK and TLU in the Summary Impact Statement.	to Mine Workings Review and looks forward to sharing of traditional knowledge that can inform project design as we advance through the regulatory approvals and permitting processes to project implementation. 2. DDMI appreciates the FRMC's participation in the current Review of the PK to Mine Workings. DDMI also wishes thank the FRMC for inviting the DDMI team to discuss the PK to Mine Workings Project at the FRMC's "What Matters Most" session in Fort Resolution on June 27, 2019. DDMI looks forward to working with FRMC through the ongoing Review to identify information to support project design development for the PK to Mine Workings including identification of any additional mitigation measures for potential environmental impacts.
3	8.0 Assessment of Potential Effects on Cultural Use (DDMI - Summary Impact Statement)	**Comment** Fort Resolution Metis Council members have a cultural and traditional heritage within the areas where the Diavik Diamond mine is established. Lac de Gras is a critical area for our members and FRMC is therefore greatly concerned about the potential impacts to our members' cultural use. Section 8.0 does not include an assesssment specific to the potential impacts of the Project on FRMC member cultural use. FRMC agrees with MVEIRB's (2009) "Status Report and Information Circular - Developing Cultural Impact Assessment Guidelines" where it suggests that, " impact assessment on culture must include the views of the culture holders themselves" (p.14). FRMC needs to be engaged in collecting this critical absent baseline data, identifying impact pathways on FRMC cultural use, setting thresholds of acceptable change against which effects should be assessed, and verification of the Proponent's estimations of effects on FRMC cultural use. **Recommendation** 1)Proponent to provide specific detailed information, gathered, verified, and confirmed with FRMC, about the nature, extent and importance of FRMC cultural use and values within the LAA and RAA for the Project. 2) Proponent to provide specific detailed information, verified and confirmed with FRMC, as to the impact pathways of concern for FRMC cultural use. 3) Where gaps exist in recommendation 1 and 2, Proponent to commit to working with FRMC to address those gaps.	**July 4:** As part of initial project design/planning for the PK to Mine Workings, DDMI engaged with the five Participation Agreement community organizations. DDMI also hosted a TK Panel focused on the proposed PK to Mine Workings Project. TK panel input/recommendations were considered in project design, including the development of mitigation measures for potential impacts. DDMI understands that MVEIRB has issued Information Requests (IR) to FRMC requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users view the safety, quality, and health of Lac de Gras. DDMI looks forward to our ongoing interaction with FRMC to identify information to support ongoing project design development for the PK to Mine Workings including identification of any additional mitigation measures for potential environmental impacts.
4	8.1.3 Potential Effects, Pathways and Measurable Parameters [cultural use] (DDMI - Summary Impact Statement)	**Comment** On page 140 of the SIS the Proponent notes that use of trails and travel ways, "will not be considered in this assessment because there are no pathways for interaction with these forms of cultural use." Given the future connection of the Project area to Lac de Gras there is likely to be travelways via water and ice potentially impacted. **Recommendation** 1) Proponent to please provide an examination of potential impacts to travel by water and ice as an impact pathway for cultural use, including consideration of likely avoidance effects including a defensible zone of influence around Project-affected areas.	**July 4:** As noted in Section 8.0 of the SIS, DDMI recognizes that the area around Lac de Gras was and continues to be highly valued by Indigenous groups for cultural and traditional uses and that the PKMW Project has the potential to affect traditional activities, sites and resources identified by Indigenous groups. DDMI understands that Lac de Gras was used for traditional activities like fishing and is known as a good source of fish. Apart from the Narrows, Indigenous groups engaged on the PKMW Project have not identified specific fishing sites or areas on Lac de Gras where travel by water or ice might be impeded or altered by the Project (As noted in Section 8.3.3). Nevertheless, this assessment adopts a conservative approach and assumes that Indigenous groups may travel within the LAA, including travel by water and ice on Lac de Gras. Potential effects on cultural use of trails and travelways was scoped out of the SIS because there are no Project mechanisms that are predicted to affect use of trails and travelways. The SIS for the PKMW Project relied on this conclusions of CEAA's Comprehensive Study Report (1999) for the original Diavik Diamonds Project, which stated that existing land uses had

			been adequately presented in Diavik's environmental assessment and that the Diavik Diamonds Project will not unduly interfere with hunting, fishing, and other Aboriginal land uses assured under Treaty and Land Claims. PKMW Project activities will be restricted to the existing mine footprint, and no effects on travel on Lac de Gras are expected beyond those already assessed for the original Diavik Diamonds Project. There will be no effects to travelways via water and ice from PKMW Project construction and operations, which will be limited to the PDA and will not impede travel. Similarly, effects on water quality during closure and post-closure are not predicted to affect travel on Lac de Gras because the water quality assessment concludes that with application of mitigation and environmental protection measures, the residual environmental effects on water quality are predicted to be not significant for the pit lakes (A418, A154 and A21) for all scenarios of PK deposition modelled. The pit lakes will not be reconnected with Lac de Gras until applicable water quality standards are met. Therefore, there are no predicted effects from the PKMW Project that could result in direct or indirect effects on travel by water or ice on Lac de Gras. DDMI acknowledges that appropriate conditions for current use entail more than access to resources or areas for cultural use. This assessment acknowledges that Indigenous groups may choose not to travel near the PKMW Project for a variety of personal, practical, aesthetic, and spiritual reasons. DDMI has undertaken ongoing engagement with Indigenous groups since the early planning stages for the Diavik Diamonds Project. DDMI concluded the Diavik Environmental Agreement with five potentially affected Indigenous groups and subsequently conducted several TK Panel Sessions, which included participation of Elders and knowledge holders, to better understand Indigenous concerns and issues related to the Project. To date, DDMI has not been made aware of perceived effects of the PKMW Project on travel by water or ice on Lac de Gras. DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about potential and perceived effects on travel by water and ice on Lac de Gras.
5	8.3.3 Change in Access to Resources or Areas for Cultural Use [cultural use] (DDMI - Summary Impact Statement)	**Comment** While the Proponent has acknowledged, "that Indigenous groups may choose not to pursue cultural use activities near the PKMW Project for a variety of personal, practical, aesthetic, and spiritual reasons" (p. 170) they have not provided specific impact pathways related to these forms of alienation. The Proponent has also noted that TK panel sessions, "have been an effective forum for Indigenous groups to bring forward their perceptions about the safety, quality, and health of Lac de Gras" (p.170) but have not provided evidence that these panels alleviate the concerns of members within participating Indigenous communities. FRMC members have not been party to these panels either. **Recommendation** 1) Proponent to work with FRMC and other Indigenous groups to identify and assess impact pathways related to alienation effects such as sensory change, and other "personal, practical, aesthetic, and spiritual reasons". 2) Identify any mitigation, monitoring or other commitments made by DDMI to help alleviate potential avoidance effects on cultural practices. 3) Proponent to commit to engaging FRMC in any future TK panel sessions.	**July 4:** DDMI will consider TK that FRMC brings forward through the MVEIRB process. DDMI has and continues to interact with land users in the Lac de Gras area to understand land and resource use information and to inform the development of mitigation measures for potential impacts to cultural resources and practices. As part of the Environmental Assessment for the PK to Mine Workings, DDMI identified key environmental resources (wildlife, fish, and water), with measurable parameters, that may influence traditional/cultural use and assessed the potential for the Project to impact these resources. DDMI concluded that, with the implementation of proposed measures to mitigate effects to these key resources, the overall impacts of the Project on cultural use are predicted to be negligible in magnitude and not significant. DDMI understands that MVEIRB has issued Information Requests (IR) to FRMC requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users view the safety, quality, and health of Lac de Gras. DDMI looks forward to our ongoing interaction with FRMC to identify information to support ongoing project design development for the PK to Mine Workings including identification of any additional mitigation measures for potential environmental impacts. Diavik's Traditional Knowledge Panel was initially developed by the Environmental Monitoring Advisory Board (EMAB) under the Environmental Agreement. Membership on the Panels is based on the Indigenous Parties who are signatures to the Environmental Agreement.

6	Proposed mitigation for Assessment of Potential Effects on Cultural Use, See section 8.3.2.2 and 8.3.3.2 Mitigations and 8.8 Summary of Commitments	**Comment** The Proponent has relied on mitigations developed for biophysical components as mitigation for affects to cultural use. This is concerning for FRMC as mitigations specific to cultural use are required to account for experiential or sensory changes specific to land and water users and alienation effects related to perceptions of contamination and other stigmas, alteration of the visual landscape, reduced knowledge of navigability, and other impacts that can only be identified by cultural land users and knowledge holders. Furthermore mitigations and commitments as proposed do not reflect any input from FRMC members. **Recommendation** 1) Proponent to commit to working with FRMC and other indigenous groups to identify mitigation appropriate for preventing, reducing or compenstating/offsetting harms to cultural use. 2) Proponent to identify additional mitigations designed for the purpose noted in Recommendation 1.	**July 4:** DDMI understands that MVEIRB has issued Information Requests (IR) to FRMC and other indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users view the safety, quality, and health of Lac de Gras. DDMI looks forward to our ongoing interaction with FRMC to identify information to support ongoing project design development for the PK to Mine Workings including identification of any additional mitigation measures for potential environmental impacts.
7	8.1.6 Significance Definition [Cultural Use] (DDMI - Summary Impact Statement)	**Comment** The cultural context for Indigenous Groups is not adequately accounted for in the significance threshold or in the assessment itself. As the Review Board itself noted in its IR1 to Indigenous groups, even 20 years ago the Comprehensive Study for the Diavik Mine stated, "(t)here is wide-spread concern that traditions and customs are not practiced as they once were, contributing to a lack of common understanding and connection, of shared beliefs and values". Twenty years later, the degree of resilience/vulnerability of the individual Indigenous Group must be understood and characterized as part of effects characterization and included as a measureable significance consideration, as Indigenous Groups that have seen substantial erosion of their cultural landscape and/or cultural continuity are at higher risk of significant adverse effects from further loss. **Recommendation** 1) Proponent to work with Indigenous Groups to identify aspects of cultural vulnerability/resilience relevant to consideration of how impacts to Lac de Gras may impact on their overall cultural practices and cultural continuity.	**July 4:** As part of the Environmental Assessment for the PK to Mine Workings, DDMI identified key environmental resources (wildlife, fish, and water), with measurable parameters, that may influence traditional/cultural use and assessed the potential for the Project to impact these resources. DDMI concluded that, with the implementation of proposed measures to mitigate effects to these key resources, the overall impacts of the Project on cultural use are predicted to be negligible in magnitude and not significant. DDMI engaged with the Participation Agreement groups and communities and the TK Panel for Diavik as part of initial/conceptual project design to confirm the acceptability of the general concept of PK deposition into the mined out pits. DDMI received several recommendations from its engagement with the Participation Agreement groups and communities and the TK Panel, and has considered these recommendations in project design, including the development of mitigation measures. DDMI understands that MVEIRB has issued Information Requests (IR) to FRMC and other Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users perceive the safety, quality, and health of Lac de Gras. DDMI will consider any TK that FRMC is willing to share during the Review. DDMI has and continues to interact with land users in the Lac de Gras area to understand land and resource use information and to inform the refinement of mitigation measures for potential impacts to cultural resources and practices. DDMI appreciates the FRMC's participation in the current Review of the PK to Mine Workings. DDMI also wishes thank the FRMC for inviting the DDMI team to discuss the PK to Mine Workings Project at the FRMC's "What Matters Most" session in Fort Resolution on June 27, 2019. DDMI looks forward to working with FRMC to identify information to support ongoing project design development for the PK to Mine Workings including identification of any additional mitigation measures for potential environmental impacts.
8	8.1.6 Significance Definition [Cultural Use] (DDMI - Summary	**Comment** FRMC disagrees with the Proponent's definition of significance for cultural use whereby, "a significant adverse effect on cultural use is defined as a long-term loss of availability of traditional use resources or access to lands relied on for cultural use practices or cultural use sites and areas, such that cultural use is critically reduced or eliminated within the RAA"(p. 154). Requiring a critical reduction in the RAA dilutes potential effects and ignnores	**July 4:** DDMI acknowledges that significance of effects on cultural use is not limited to availability of resources and physical accessibility, and this is reflected in the definiton of siginificance for cultural use provided in the SIS: "[A] significant adverse effect on cultural use is defined as a long-term loss of availability of traditional use resources or access to lands relied on for cultural use practices or cultural use sites and areas, such that cultural use is critically reduced or eliminated within the RAA. This may include disruption to cultural use activities and practices where biological resources, or physical sites are not

	Impact Statement)	the context of the potential loss of highly valued, irreplacable areas in the LAA for cultural use. In addition, cultural use decisions are not limited to availability of resources and physical accessibility, which may both still be present physically in some areas where cultural use is significantly alienated by real and perceived risks and stigma related to industrial development proximity. **Recommendation** 1) Proponent to reassess using an updated definition of significance informed by the cultural users being impacted. This definition of significance (which may not be a singular statement but could include a number of significance scenarios) should include reference to the possiblity that significant impacts, in certain circumstances, may occur at the local rather than the regional area (meaning impacts on an important singular site could be deemed significant), be tied not only to physical access and physical resource presence, but also to other factors that influence cultural practice decisions, and should include consideration of cultural resilience/vulnerability as a conditioning factor (see our Recommendation on assessing cultural resilience/vulnerability above).	significantly affected in the RAA." (emphasis added). Further, as required by MVEIRB's Final Scope and Reasons for Decision, the assessment of Cultural Use undertaken in SIS considered how traditional land users perceive the safety, quality, and health of Lac de Gras, where that information has been provided by Indigenous groups. As noted in Section 8.3.1, the assessment of potential effects of the PKMW Project on Cultural Use considers information from Indigenous groups provided in the 1998 Comprehensive Study, information shared by Indigenous participants in the DDMI TK Panel Reports, information contained in other TK reports and studies commissioned by DDMI, and a review of publicly available literature containing information about cultural use by potentially affected Indigenous groups. Observations, concerns and issues from the TK Panel Session reports, which included participation of Elders and knowledge holders, have been included in Cultural Use assessment and considered in the characterization of residual effects and determination of significance. The Cultural Use assessment also explicitly states that appropriate conditions for current use entail more than the availability of resources and access to sites and areas for cultural use and acknowledges that Indigenous groups may choose not to pursue cultural use activities near the Project for a variety of personal, practical, aesthetic, and spiritual reasons. In particular, TK Panel Session participants expressed concerns with effects of further development on safety, quality, and health of wildlife, birds, fish, and water quality and these were factored into both residual effects characterizations and the significance determination. DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users perceive the safety, quality, and health of Lac de Gras.

GNWT - Lands: Marie-Christine Belair

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
23	General File	**Comment** 190620 signed GNWT cover letter_EA1819-01 information request **Recommendation**	
1	Well-being of Indigenous peoples and cultural users	**Comment** In the Summary Impact Statement, Diavik Diamond Mines Inc. concludes that the project "has the potential to affect traditional activities, sites, and resources identified by Indigenous groups," (PR#53, 145). The Summary Impact Statement did not, however, discuss how residual effects may or may not be connected to community well-being or adequately discuss and develop mitigations to support indigenous communities' perceptions of adverse effects to the safety, quality and health of Lac de Gras and the surrounding area. With this in mind, the GNWT believes that potential impacts and/or perceived impacts to Lac de Gras at closure as a result of the PK to pits project may contribute to existing cumulative impacts from this project and other diamond mining projects in the territory and may negatively impact the well-being of Indigenous peoples and cultural users. **Recommendation** The GNWT recommends that, should PK be deposited in the pits, Diavik actively engage and collaborate with	**July 4:** DDMI has and continues to engage communities during the Review of the PK to Mine Workings. DDMI commits to continue with this engagement during all phases of project implementation.

		affected small local communities during the closure phase to ensure that open communication and community concerns with well-being are being identified and addressed in a reasonable and responsive manner.	
2	Fish sampling program	**Comment** In Section 6.2.2.4, Diavik states that there are no concerns with mercury or selenium concentrations in Slimy Sculpin; however there is no metals/metalloids data on large-bodied fish (e.g. lake trout, whitefish, burbot, pike) since 1997. There were no commitments stated to conduct such a sampling program again. Including this information in the sampling program would address the uncertainties regarding changes in metals/metalloids since mining began, as well as potential pathway impact to human health from fish consumption and traditional use activities should the processed kimberlite be placed in the pits and the pits be reconnected to Lac de Gras. Without this information, potential effects on traditional fish consumers are difficult to assess. **Recommendation** The GNWT requests that Diavik comment on the adequacy of the current fish sampling program in identifying and addressing concerns regarding potential pathway effects on human health should PK be deposited into mine workings and the pits be reconnected to Lac de Gras.	**July 4:** More recent Lake Trout tissue chemistry data are available than indicated in the reviewers comment; these data are presented as part of the Aquatic Effects Monitoring Program (AEMP) annual reports, and have been summarized in the 2011 to 2013 Aquatic Effects Re-evaluation Report Version 3.2 (Golder 2016) and the 2014 to 2016 Aquatic Effects Re-evaluation Report (Golder 2019). Specifically, Lake Trout mercury data is available for 2002, 2003, 2004, 2005, 2008, 2009, 2011, 2012, 2014 and 2015, and metals and metalloid data in Lake Trout are available for 2008. In addition, metals and metalloid data in Lake Trout and Lake Whitefish in muscle tissue are collected as part of the fish palatability program every 3 years. Slimy Sculpin are the sentinel species for the Diavik AEMP fish health and fish tissue chemistry program. Now and during closure, if AEMP results from Slimy Sculpin fish tissue chemistry indicate effects equivalent to an Action Level 3 for a measurement endpoint (Golder 2017), a Lake Trout survey would be conducted, if appropriate, as part of the associated Response Plan. The Response Plan would be expected to consider risks to both aquatic and human health if the Action Level trigger was based on increasing concentrations of metals/metalloids in fish tissue. If an Action Level 3 was triggered during closure, the specific timing of a Lake Trout fish health survey would be defined in the AEMP Response Plan, which would then be implemented as and when approved by the WLWB. Reference: Golder (Golder Associates Ltd.) 2016. 2011 to 2013 Aquatic Effects Re-evaluation Report Version 3.2. Doc. No. RPT-1523 Version 0. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. Golder. 2017. Aquatic Effects Monitoring Program Design Plan Version 4.1. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. June 2017. Golder. 2019. 2014 to 2016 Aquatic Effects Re-evaluation Report for the Diavik Diamond Mine, Northwest Territories. Doc. No. RPT-1621 Version 1.1. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. June 2019.
3	SIS Section 8.1.1	**Comment** When defining the traditional users of the area and carrying out subsequent engagement on the Project, Diavik did not include the Northwest Territory Métis Nation (NWTMN) (which is made up of the Fort Resolution Métis Council, Fort Smith Métis Council, and Hay River Métis Government Council), the Deninu K'ue First Nation (DKFN) (which are a part of the Akaitcho Dene First Nations), nor the Mountain Island Métis (MIM). These Indigenous governments and organizations (IGOs) are being consulted by the GNWT (and with the exception of MIM, Canada), along with the IGOs Diavik listed, regarding this project. (The GNWT and Canada sent notices of initiation of Aboriginal consultation in March 2019; see PR#28 and PR#35.) In addition NWTMN, FRMC and DKFN are participating in the environmental assessment and are each receiving participant funding for this EA. **Recommendation** Please also engage FRMC, NWTMN (Fort Resolution Métis Council, Fort Smith Métis Council, and Hay River Métis Government Council), Deninu K'ue First Nation and MIM	**July 4:** As part of initial planning for PK to Mine Workings Project, DDMI engaged the five (5) Indigenous signatories to the Agreements for the Diavik project. DDMI understands that MVEIRB has issued Information Requests (IR) to additional Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users perceive the safety, quality, and health of Lac de Gras. DDMI acknowledges and welcomes other Indigenous groups' interest in the ongoing Review of the PK to Mine Workings Project and looks forwarding to addressing comments and considering any TK other Indigenous groups are willing to share during the Review.

		and confirm that DDMI's results for cultural use of the project area remain the same. This request aligns with the GNWT and Canada's notices of initiation of Aboriginal consultation (PR#28 and PR#35).	
4	SIS Section 8.8 Summary of Cultural Use Commitments	**Comment** It is unclear if DDMI's commitment to continue to engage with potentially affected IGOs through the TK Panel Sessions and other engagement activities to better understand Indigenous perceptions includes engaging with the other IGO participants to the EA (e.g. NWTMN, FRMC and DKFN) but are not members of the TK panel sessions. **Recommendation** Please clarify if engagement with potentially affected IGOs will include NWTMN (Fort Resolution Métis Council, Fort Smith Métis Council, and Hay River Métis Government Council), MIM, and Deninu K'ue First Nation. The GNWT strongly encourages DDMI to engage with all Indigenous participants to the EA. This request aligns with the GNWT and Canada's notices of initiation of Aboriginal consultation (PR#28 and PR#35).	**July 4:** DDMI looks forward to interacting with and considering information and concerns from all Indigenous Groups and Organizations. However, DDMI acknowledges that it has focused its engagement with the five (5) PA groups as noted in the WLWB approved Engagement Plan.
5	IRR 11 Consideration of climate change	**Comment** DDMI's response says that "future reduced permafrost from filling pits with freshwater will be factored into the closure geotechnical analysis." The GNWT supports the monitoring of any changes to permafrost conditions at the site that could impact the integrity of the pit lake stability and/or water quality predictions in the pit lake(s) and Lac de Gras. **Recommendation** Please confirm if DDMI commits to incorporating monitoring of any changes to permafrost conditions at the site that could impact the integrity of the pit lake stability and/or water quality predictions in the pit lake and Lac de Gras.	**July 4:** DDMI confirms that geotechnical analysis of pit wall stability for closure will conservatively assume geotechnical parameters appropriate for thawed pit wall conditions.
6	Sequencing of depositing EFPK and CPK	**Comment** DDMI has committed to evaluating the feasibility of depositing processed kimberlite (PK) from the processed kimberlite containment (PKC) facility. As noted in Review Board IR Response No. 3 and Table 6 of Review Board IR Response No. 17, a decision on whether DDMI will deposit extra fine processed kimberlite (EFPK) from the PKC facility will occur sometime after the deposition of process plant PK ("fresh PK"). The GNWT understands that the deposit of PK including EFPK to the underground and or open pit is a preferred closure strategy for the Processed Kimberlite Containment (PKC) Facility. The GNWT is of the opinion that the EFPK should be deposited preferably to the underground workings from the PKC Facility if logistically possible at the same time as fresh PK is deposited to the open pit. Doing so would address	**July 4:** Based on the current schedule, Operational PK to Mine Workings will commence in H2 2021. DDMI has scheduled an EFPK Removal from PKC – Feasibility Assessment and PKC Closure Options Assessment – Dry Cover vs Wet Cover for H1 2021 respectively. These assessment schedules may vary depending on the results of field work scheduled for the summer of 2019, however results are expected in 2021. DDMI is committed to evaluating all option for FPK and EFPK deposition timing strategies, including concurrent FPK-EFPK deposition. DDMI notes that it is not feasible to only deposit re-mined EFPK in the underground SLR portion of the mine and Operational FPK in the open pit because deposition of Operational FPK will commence in H2 2021 and there is no reasonable scenario where all EFPK could be relocated before that date. DDMI would also like to emphasize that Operational FPK contains EFPK material. In the PKC, EFPK is naturally segregated from FPK along the beaches where differential settling creates a grain size gradient. This phenomenon is not expected to occur during mine workings deposition.

		uncertainties in closure of the PKC Facility which have been a point of discussion amongst reviewers for several years. Placing EFPK in the open pit or underground workings will provide an additional measure of protection from re-suspension of the EFPK. DDMI should discuss logistical issues that would prevent the depositing EFPK to the underground mine workings during the deposit of fresh PK. **Recommendation** 1. The GNWT requests DDMI describe key logistical issues, if any, that would prevent depositing EFPK to the underground mine workings while fresh PK is deposited to the open pit. 2. The GNWT requests DDMI comment on whether they will be agreeable to depositing EFPK only to the underground workings if there is sufficient storage capacity and is operationally viable.	
7	Modeling updates for final Water Licence Approval	**Comment** DDMI states in Review Board IR Response No. 5 that a second phase of water quality modelling would be conducted prior to any deposition of PK and submitted for final water licence approvals with the updated model input information; this would not be completed during the EA. Based on the information submitted to date, the GNWT is unclear on when this updated modelling information will be shared with the public for comment. Table 6 of Review Board IR Response No. 17 notes an associated study of "Lac de Gras Water Quality Modeling – Predicted Post-Closure Conditions (V2)" to be completed in the second half of 2020. The GNWT is seeking clarification on whether this study is the same study/report DDMI has indicated it plans to submit to the WLWB board as part of the regulatory approval process, and if there will be sufficient time before the end of the regulatory process process to develop the report by DDMI and subsequently have the results reviewed by parties. Furthermore, the GNWT would like to notify DDMI that as part of the EA intervention and public hearing process, the GNWT will be making recommendations on the information requirements to be included in the above noted report, including data for input parameters that may need to be collected in 2020 (such as surficial water temperature). To assist DDMI with the timelines associated with modeling updates, the GNWT is agreeable to discuss recommendations and requests prior to our eventual submitting of formal recommendations during any potential water licencing proceedings. Before the closure of the public registry for EA1819-01, the GNWT can provide the Review Board with a summary of discussions at that time. **Recommendation** 1. The GNWT requests DDMI provide an update on when a second phase of water quality modelling would be conducted prior to any deposition and clarify if it will be	**July 4:** Currently the plan is to provide updated water quality modelling by the end of 2020 as shown in Table 6 of DDMI response to MVEIRB#17. The updated water quality modelling would include both updated pit water quality modelling (Item #2 in Table 6) as well as Version 2 of results from hydrodynamic modelling of the pit lake interaction with Lac de Gras (Item #5 in Table 6). Note that results from Version 1 of this Lac de Gras modelling are to be submitted with Closure Plan Version 4.1 in December 2019 (Item #17 in Table 6). The schedule in Table 6 presumes receipt of timely approvals from MVEIRB and WLWB. DDMI anticipates that submission of updated modelling results may be a condition of an amended Water License and that the condition could specify a requirement for Board approval of the modelling results. With the planned submission date of end of 2020 there will be adequate time for completion of a public review process (if required) prior to proceeding with PK deposition into mine workings. DDMI understands that a similar process/Water License condition was followed for the Ekati deposition of PK to the Panda/Fox mine workings. DDMI welcomes GNWT recommendations on information they believe is necessary to include in the updated modelling planned for end of 2020 and the GNWT offer to share these in advance. Please forward/advise when the GNWT is in a position to share these recommendations. It is not possible to properly describe contingency options in advance of the modelling results but in general considering the SIS modelling and assessment results (PR#53) there are likely a few key options that would be considered including: • Ensuring that the decant water level is a low as possible prior to filling the pit with water from Lac de Gras. The SIS assumed a decant water depth range of 5m (Scenario 2a) to 15m (Scenario 3a). DDMI expects it would be practical to achieve lower decant water levels if necessary. • Limiting the amount of EFPK that is deposited into the mine workings sourced from re-mining of the PKC if this is identified as contributing to different/poorer water quality. The SIS assumes 5 million m3 of EFPK (Scenario 4a). • Excluding A21 as a potential PK deposition location if modelling results show water quality that is different/changed from what is currently expected.

		submitted for final water licence approvals with the updated model input information. 2. The GNWT requests that DDMI describe contingency options that exist if updated modeling results in different/poorer water quality within the open pits or Lac de Gras then have been assessed in this EA as a result of placing PK into open pits.	
8	Volume of EFPK	**Comment** Review Board IR Response No. 7 states that there is currently about 33.4 Mt of processed kimberlite, both coarse and fine fractions, in the PKC Facility. DDMI also states in Review Board IR Response No. 8 that the realistic scenario of PK volumes for the modeling scenarios is 4 Mt of FPK or 4 Mt of FPK overlain by 4 Mm3 of extra fine processed PK (EFPK). For the scope of the EA, the GNWT is uncertain how much EFPK is realistically expected to be deposited, including the potential of EFPK or slimes from the PKC Facility from re-mining. As DDMI has stated in Review Board IR Response No. 13, the depth of the freshwater cap is dependent on the volume of EFPK from the PKC facility, which is why the GNWT is seeking clarity on this matter. **Recommendation** 1. The GNWT requests DDMI provide the approximate volume of EFPK that is in the PKC Facility (i.e., how much of the 33.4 Mt is EFPK or slimes?). 2. The GNWT requests DDMI clarify how much EFPK would be removed from the PKC Facility, and how much would be left behind to facilitate a dry cover option for closure of the PKC Facility. 3. The GNWT requests DDMI provide an estimation of total EFPK that is expected to be deposited to the pits for all scenarios completed to date, with an emphasis on the realistic scenario. These estimates should also include the fraction of volume originating from the process plant vs the PKC Facility.	**July 4:** Out of the 33.4 Mt of PK in the PKCF, DDMI has estimated that roughly 2 Mt is EFPK. Due to the relatively low dry density of EFPK, this represents an estimated 5 Mm3 of material. This EFPK volume estimate was the basis of all 3a-modelling scenarios presented in the SIS. DDMI emphasizes that until the EFPK Removal from PKC – Feasibility Assessment and PKC Closure Options Assessment – Dry Cover vs Wet Cover in H1 of 2021, are complete, these numbers remain an estimate. The results of these studies will inform how much EFPK could be removed from the PKC Facility, and how much could be left behind to facilitate a dry cover option for closure of the PKC Facility. As stated in Response to GNWT-IR#6, in the PKC, EFPK is naturally segregated from FPK along the beaches where differential settling creates a grain size gradient. This phenomenon is not expected to occur during mine working deposition (i.e. there will be not specifically be EFPK deposited in the mine working from the Process Plant).
9	SNP Sampling	**Comment** In Review Board IR Response No. 10, DDMI has proposed Surveillance Network Program (SNP) monitoring (SNP 1645-88) for the water quality in the mine workings that will provide information on whether to re-connect the pit lake to Lac de Gras. The GNWT notes DDMI is proposing to collect samples at the 2 m, 20 m and 40 m depths for all five (5) of the SNP locations associated with SNP 1645-88. **Recommendation** The GNWT requests DDMI provide further details on how the samples will be collected and reported, specifically on whether they will be discrete or integrated samples and whether each of the five (5) SNP sub-stations will be averaged or reported individually for water quality reporting.	**July 4:** Once prior to breaching the dike and reconnecting the Mine Workings to Lac De Gras, DDMI will collect water samples at a minimum of five (5) stations evenly spaced along a longitudinal transect as approved by an Inspector. At each station, discrete water samples will be collected 2m below surface and at twenty (20) meter intervals with a final sample 2m above the bottom. All results will be presented individually in the monthly SNP Report. Results will be reviewed by an Inspector to ensure the top 40m of the water column meets AEMP benchmarks before receiving approval to reconnect the pit lakes to Lac de Gras.
10	Re-suspension	**Comment** In Review Board IR Response No. 16, DDMI states that	**July 4:** DDMI confirms that EFPK was included in the scenarios described in response to

	scenario	for an unanticipated mixing event, a greater disturbance to the pit lake would occur if PK was re-suspended as well as water being fully mixed. DDMI's consultant has concluded that re-suspension of PK material is prevented with a freshwater cap as shallow as 20 m, and if resuspension did occur, it would be only a short term event. The GNWT is not clear that DDMI's reference to PK is also referring to EFPK. Because of this, the GNWT is uncertain of the conclusion regarding the depth of the water cap and the settling time for re-suspension. The GNWT agrees with DDMI's opinion that there is a risk to water quality from a mixing event due to the re-suspension of the PK, but would like to add especially with EFPK. **Recommendation** The GNWT requests DDMI confirm if EFPK was included in the analysis by Golder discussed in Review Board IR Response No. 16. If EFPK was not fully included in the analysis, the GNWT recommends DDMI perform this analysis using the most recent information on the EFPK and porewater.	MVEIRB IR#16. All PK proposed for deposition in mine areas includes the finer EFPK fraction.
11	North Inlet Water Treatment Plant	**Comment** The Processed Kimberlite to Mine Workings (PKMW) Project proposal discusses decanting pit water to the North Inlet water treatment plant (NIWTP). It is not clear how this could affect the operations of the NIWTP. **Recommendation** 1. The GNWT requests DDMI outline the expected volume of water treated by the NIWTP that will be comprised of the pit decant water (a mixture of PK and EFPK porewater and groundwater inflow) on a monthly basis . This information should be provided for the entire proposed deposition period (e.g., years 2021-2025). 2. The GNWT requests DDMI compare the anticipated total dissolved solids (TDS) loads from the pit decant water to the current TDS loads from the NIWTP on a monthly basis over the proposed deposition period (2021-2025).	**July 4:** In general, the PKMW project will not create a significant deviation from the current operational site water balance or North Inlet Water Treatment Plant (NIWTP) Operations. As described in DDMI's Response to MVEIRB-IR#21, currently water treated at the NIWTP is a mixture of underground and surface mine water, water pumped from the PKC Pond and collected site runoff. The PKC Pond water is pumped to the North Inlet and influences the concentrations of the water treated at the Plant. If PK is deposited in mine workings the blend of water that is treated in the NIWTP will not change because the PKC Pond water will effectively be replaced by pit decant water. Attachment 2 (Figure 4-3) from the 2014-2016 AEMP Re-evaluation report shows the annual loading of TDS to LDG from the NIWTP. In recent years, TDS loads from the NIWTP to LDG have varied between 3,000,000 – 4, 000,000 kg/year and TDS loads from the NIWTP to LDG have been assessed at a rate as high as 7,900,000 kg/year (Golder 2015 Jay Project Compendium of Supplemental Water Quality Modelling). In a typical year, 300,000 kg of TDS is directed to the NIWTP via the PKC, or about 10% of the total annual load from the NIWTP to LDG. The expected volume of excess slurry water and overall pit decant water (including groundwater contributions) throughout the operational phase of the PKMW project are listed in Table 2-2a through 2-2i of the Summary Impact Statement. Excess PK slurry water is expected to range between 200,000 and 3,000,000 m3 annually. Currently the Process circuit recycles about 3,000,000 m3 of water per year from the PKC and North Inlet and this rate is expected to continue for the remaining life of mine. For this reason the PKMW TDS load to the NIWTP is expected to remain similar to current PKC rates during the Operational phase of the project. Post-closure predicted total average annual TDS loads from the pit lakes to LDG (through the breaches) over the 100 year simulation are 1,814 kg/year (A418 Scenario 2a) and 5,951 kg/year (A418 Scenario 3a). Predicted total annual TDS loads from all post-closure site runoff to Lac de Gras is predicted to be 1,880,004 kg/year. In general, TDS loads to LDG are not expected to change as a result of the PKMW project during Operations, and will constitute a minor increase to the overall TDS load to LDG post-closure (<1%).
12	Congruence with Extant Technical Guidance -	**Comment** Section 3.2.4 of the Summary Impact Statement (SIS) states: "The characterization of residual effects is based on	**July 4:** The environmental assessment of the PKMW Project has been prepared to meet the requirements of the Mackenzie Valley Resource Management Act and to facilitate a decision by the Mackenzie Valley Environmental Impact Review Board on the significance of impacts of the PKMW Project on the environment, including the impact of accidents or

	assessment methodology	methods used in the 1998 Comprehensive Study (DDMI, 1998) to maintain consistency of the assessment of this modification of the mine operation with the original assessment of the Diavik Mine as a whole" (DDMI 2019). The definition of significant environmental effects uses that of what Canada set out in the Comprehensive Study Report (1999) to "provide consistency with the previous assessment and because of the consultation with regulators, indigenous groups, and communities that has taken place for the PKMW Project and for the AEMP" (DDMI 2019, Section 4.1.6). However, other aspects of the environmental assessment use more recent science (i.e. water quality benchmarks in Section 4.1.5 and ecological thresholds in Table 4-3 of the SIS). At minimum, current legislation applicable to the project area should be the basis for how an effects assessment is conducted. As the project area is legislated by the Mackenzie Valley Resource Management Act (MVRMA), the Mackenzie Valley Environmental Impact Review Board's March 2004 Environmental Impact Assessment Guidelines should be used as guidance. Typically, the terms of reference for an environmental assessment includes additional direction and guidance from the Review Board on effects assessment. The scope of assessment (PR #40) includes several references to cumulative impacts, but does not provide additional guidance. In the absence of this additional guidance for EA1819-01, DDMI could reference recent interim technical guidance (CEAA, 2018a, b) from the Canadian Environmental Assessment Agency. The GNWT recognizes that the guidance is not written for the MVRMA and that the Review Board may request additional information from DDMI. The GNWT recognizes that the Review Board may also choose to provide its own guidance on this topic. The GNWT notes that the Review Board has issued several of their own IRs to Diavik (posted June 20, 2019) relate to effects assessment and cumulative effects assessment methodology. The GNWT has not reviewed these IR's in any detail and is available to discuss and refine this IR as required. **Recommendation**	malfunctions, as well as the cumulative impacts of the PKMW Project combined with other developments in the vicinity of the Project. Environmental assessment methods used to develop the Supplementary Impact Statement, described in Section 3.2.4, use a framework developed by Stantec that has been used in environmental assessments under the Canadian Environmental Assessment Act, 2012 (CEAA 2012), Nunavut Planning and Project Assessment Act, MVRMA and Inuvialuit Final Agreement. These environmental assessment methods are based on a structured approach that takes a reviewer through the steps that: identify potential effects, assess and characterize those effects following the application of mitigation meaures; identify and assess cumulative effects; and, finally assess the significance of residual Project and cumulative effects on the environment. These methods are fundamentally unchanged from those used by DDMI in its 1998 Comprehensive Study, which was developed to meet the requirements of the former (prior to 2012) Canadian Environmental Assessment Act. These methods are also consistent with CEAA's 2018 guidance, in that reasoned argumentation is used to apply relevant standards, guidelines and objectives to establish a definition or limit of significance for a specific environmental effect. Notably, previous decisions by regulators in respect of significance (e.g,. CEAA's Comprehensive Study Report, 1999) and currently applicable benchmarks (e.g, AEMP) where applicable, are directly applied in the assessment. The SIS also notes the limitations of applying a single definition of significance to effects on cultural use. DDMI believes that its method remains consistent with federal guidelines.

		1. The GNWT requests DDMI tabulate how the methods used in the 1998-99 Comprehensive Study (DDMI, 1998 and Canada, 1999) compare with current methods for environmental effects assessment (CEAA, 2018a) and cumulative effects assessment (CEAA, 2018b). 2. The GNWT requests that DDMI describe why these newer assessment methods, values and procedures would not apply to the project.	
13	Significance Thresholds	**Comment** The significance thresholds presented in the SIS (Table 4-3) have not been exhaustively reviewed at this time. However, it is noted that DDMI proposes to use a deprecated zinc (Zn) CCME water quality guideline to set the significance threshold. In the Snap Lake Effluent Quality Criteria Report for Closure and Post-closure, Golder (2019) recently proposed use of the draft CCME water quality guideline (WQG) for the protection of aquatic life (CCME 2018) because it incorporates both the effects of pH, dissolved organic carbon and hardness and uses more recent data than the previous CCME Zn WQG. It is the GNWT's opinion that DDMI should review significance thresholds and adopt the most recent CCME and/or provincial WQGs when assessing water quality impacts. **Recommendation** The GNWT requests DDMI review jurisdictional significance thresholds and comment if they will adopt the most recent CCME and/or provincial WQGs when assessing water quality impacts. This should be accompanied by updated conclusions regarding water quality changes attributable to the Project.	**July 4:** The AEMP benchmarks used to evaluate predicted water quality were developed by Golder in 2017. Since that time, the only guideline that has changed is an update for zinc in the CCME water quality guideline for protection of aquatic life (in draft status now). Please see response to IR 3, which discusses implications of using this lower zinc guideline (i.e., zinc would be identified as resulting in a high magnitude effect for scenario A21 3a for Project and cumulative effects). This change would not change the conclusions regarding water quality, as that situation has already been identified for scenario A21 3a based on predictions for other parameters.
14	Selected Water Quality Model	**Comment** Given an established pit lake morphometry, the wind sheltering coefficient (that has been found to be a key driver of stability in some cases (Noren, 2003; Huang and Liu; 2008; Rangel-Peraza et al. 2016) was shown by DDMI to not greatly affect the CE-QUAL W2 water quality predictions. This was also true of other one-at-a-time sensitivity analyses conducted by DDMI. Thus, in the absence of large inputs of physical energy (tectonic or pit wall failure) and using the current modelling approach, the long-term persistence of meromixis in the proposed pit lakes is a function of water quality input volumes, concentrations and input levels (i.e. depths). During the review process, DDMI suggested that ground water inputs would be negligible once the pit was filled. Therefore, for fixed consolidation parameters (currently being assessed) and a given volume of PK to deposit, practical long-term mitigation of potential impacts is limited to controlling the volume of groundwater that fills	**July 4:** DDMI is not aware that there is an accepted standard for Environmental Assessment or a known GNWT requirement that water quality predictions must be corroborated using a second model. If this was required as an accepted standard for Environmental Assessment then the MVEIRB would have made DDMI aware of this requirement in their Initial information request of April 18, 2019 and allowed time in the work plan for this significant work to be completed. MVEIRB had reviewed the existing modelling methods (Golder 2018) and no IRs were made for corroborative modelling and no time was allowed in any of the work plans issued to date by either the WLWB or the MVEIRB for this work. If duplicate modelling was a known GNWT requirement there would have been an established precedent and the GNWT would have made this requirement known to DDMI during the first submission of review comments on the water quality modelling results December 18, 2018 or at a very minimum in response to the January 23, 2019 WLWB IR#15 request to all Parties (including the GNWT): "To identify what additional information, if any, is necessary to inform the preliminary screening determination of the Amendment Application. If any, please provide rationale for why this information is needed." The GNWT did not advise DDMI of this requirement for corroborative modelling despite the numerous opportunities and request. DDMI is not aware of an established precedent requiring two separate water quality models to corroborate results. Further, if the GNWT had sufficient concerns about the water quality modelling and the importance of corroborative modelling they could have commissioned at expert to conduct independent pit lake modelling any time. For the reasons stated

			the pit lake prior to breaching the dikes or, the choice of pits in which to deposit PK or extra fine processed kimberlite (EFPK). All predictions regarding pit lake stability and water quality in the mixolimnion, and ultimately, statements regarding potential environmental effects for the mine rely on outputs from a single model (CE-QUAL W2). In review of the project, the GNWT has concerns associated with this model that include: 1. Rationalization for Model Selection: There are many models that could be used to asses pit lake stability. The preliminary rationalization provided to date discusses use of the model elsewhere but does not include discussions of similar model predictions that have been validated. There are various existing paradigms for choosing a water quality model that could be used to optimally choose a model (US EPA, 2009; Vandenberg et al., 2011; Mateus et al, 2018). General classes of models are more suitable for some applications. US EPA (2009) refers to this as "application niche uncertainty". For example, for 2-dimensional physical and chemical modelling, Vandenberg et al. (2011) state that "Laterally-averaged models (such as CE-QUAL W2) are applicable mostly to long and narrow lakes" (as opposed to deep and small pit lakes). As noted by US EPA (2009), "The project team should gain model acceptance before applying the model to decision making to avoid confusion and potential re-work". 2. Congruence between Model Strengths and Reviewer Requirements: Mateus et al. (2018) include the criterion that reviewer / end-user requirements should be considering when selecting models. One key element of model utility is the ability to address realistic variation in model parameters simultaneously. As noted by the Proponent, the one-at-time perturbations currently used, have limitations in assessing the full effect of related model parameters. Due to the reliance on model output, one important reviewer criterion is the ability of a model to use stochastic inputs with realistic run times. 3. Model Inputs: Model inputs drive model outputs and some key model input data were not available for the proof-of-concept modelling conducted to date. A set of PK consolidation model parameters are currently being estimated and would be helpful in understanding potential pore water volume and composition loads to the pit lake. To the best of the GNWT's knowledge, those inputs have not been used in the PKMW Project EA. Furthermore, it is not	above, DDMI finds the GNWT request to be unreasonable and has therefore not undertaken the requested corroborative modelling.

		clear when results from the Diavik Fine Tailings Consolidation and Release Water Characterization Study being conducted by the University of Alberta will be available. The current worst-case scenario estimates may not necessarily be "worst case" estimates. For example, in the event that expressed pore water is lower in volume and/or analyte concentrations (i.e. "better") than expected, upsets in meromixis may occur more frequently (albeit with better water quality and less associated risk) due to the lower density gradient. As noted by the Review Board (MVEIRB 2019b) "Placement of processed kimberlite in the pits and underground mine workings would be permanent and irreversible". The PKMW Project proposal is based on preliminary results from a single model with a very limited rationalization for selection. **Recommendation** 1. Given the importance of conclusions reached using this model and the irreversibility of PK and EPK placement, the GNWT requests DDMI corroborate model results using another model. It would be beneficial if this model was selected through an objective selection process. 2. The GNWT requests that model inputs include the results of the PK consolidation study if at all possible.	
15	Cumulative Effects Assessment	**Comment** The Review Board (MVEIRB 2019c) states in the Draft Scoping Document that one consideration in the decision to proceed with an EA is that "the process has also not fully considered cumulative effects of the proposed activities in combination with other existing or planned projects in the area". This topic was raised during the water licence process that directly preceded the EA. The proponent responded that the requisite Lac de Gras water quality model had not yet been constructed and/or parameterized. The GNWT feels that this activity should be expedited by using the existing Lac de Gras water quality model built by DDMI's consultant (Golder) and used in the previous Ekati Diamond Mine Jay Pit Licence EA and water licence application. For DDMI's PKMW Project, the GNWT recommended that the EA scope include water quality modelling for assessing cumulative effects of the proposed activities on Lac de Gras to better inform the EA (MVEIRB, 2019a, GNWT Comment	**July 4:** The GNWT recommends that DDMI use the existing water quality model used in the previous Ekati Diamond Mine Jay Pit License EA and water license application to consider cumulative effects of the proposed activities in combination with other existing or planned projects in the area. DDMI confirms that the water quality modelling results for cumulative effects included in Tables B-7, B-8 and B-9 of the SIS (PR#53) utilized the results from the Ekati Diamond Mine Jay Pit water quality model. Specifically the "Updated Assessment Case" YEAR 23 was used in support of the Water License Process as described in Golder Associates Ltd. 2015. Jay Project Compendium of Supplemental Water Quality Modelling. Prepared for Dominion Diamond Ekati Corporation. Yellowknife, NT, Canada. April 2015. DDMI notes that YEAR 23 includes the operational discharge to Lac de Gras from the North Inlet Water Treatment Plan (NIWTP) at its maximum permitted limit. As noted in MVEIRB-40 for TDS, DDMI expects that the YEAR 23 modelling results from the Jay Project represents a worst case closure condition that would more than account for the additional pathways noted by GNWT. For the information of the GNWT and MVEIRB, water quality modelling of post-closure site runoff conditions and possible receiving water concentrations are being prepared for a December 2019 submission as required by the WLWB for CRP V4.1.

8). Section 4.5 of DDMI's SIS discusses cumulative environmental effects on water quality. The statement is made that "No cumulative effects are anticipated to interact with water quality during the post-closure phase of the PKMW Project for A418 and A154, given that the dikes will not be breached until water quality meets AEMP benchmarks". However, this statement does not consider the possibility of unanticipated mixing causing interactions with missing exposure pathways from the Diavik mine. Some of these missing exposure pathways are:

- "outlet water quality/quantity that is not adequate for release into Lac de Gras" (DDMI, 2017 Section 5.2.6.6);
- "seepage water quality/quantity that is not adequate for release into Lac de Gras" (DDMI, 2017 Section 5.2.6.6). Note that some North Country Rock Pile waste rock storage area closure criteria (Ag, Cu, Ni and Zn) were not considered achievable (DDMI, 2017 Appendix V).
- "total suspended particles and deposition/quality measurements of any dust generated from the closed PKC" (DDMI, 2017 Section 5.2.6.7); and
- additional deposition of (contaminants of potential concern) COPCs via dust and erosion due to closure activities (i.e. removal of infrastructure) that may be occurring simultaneously with dike breaching. The statement also omits the A21 pit lake where the chemocline is less stable than the other two pit lakes due to "shallower depth of water cover in A21 relative to A418 and A154" (Section 4.4.1.3 of the SIS).

The GNWT recognizes that the Review Board may choose to provide its own guidance on this topic.

The GNWT notes that the Review Board has issued several of their own IRs to Diavik (posted June 20, 2019) relate to effects assessment and cumulative effects assessment methodology. The GNWT has not reviewed these IR's in any detail and is available to discuss and refine this IR as required.

Recommendation To better inform the EA process, the GNWT requests DDMI revise the cumulative effects assessment in the SIS to include the whole project and take into account all mine components and closure activities. This revised cumulative effects assessment should:

		1. at a mimimum, meet recent federal guidance regarding assessment of potential cumulative effects under the Canadian Environmental Assessment Act, 2012 (CEAA 2018b), which is considered by the GNWT to be a minimum best management practice for effects assessments in the absence of guidance specific to this EA from the Review Board; 2. include missing exposure pathways discussed above; and, 3. consider the interaction between an upset of the chemocline and COPC loads from the missing exposure pathways.	
16	Risk Assessment	**Comment** In the Reasons for Decision to order an Environmental Assessment MVEIRB (2019b) notes that: "The 1999 CEAA Comprehensive Study did not assess the placing of processed kimberlite in the pits and underground mine workings, including: whether doing this is acceptable, what the related effects may be, what the acceptable level of risk to Lac de Gras and other valued components is, and how to mitigate potential impacts." During the preceding water licence process, reviewers discussed a risk assessment to quantify how an upset of meromixis would affect water quality in the vicinity of the pit lake if the Ekati Jay Pit were operating and, in consideration of Diavik waste rock storage area losses into Lac de Gras via seepage. DDMI discussed the effect of a breakdown in pit lake stratification on water quality within the pit lake under various scenarios but deferred a more complete risk assessment that includes effects within Lac de Gras and cumulative effects to the Closure and Reclamation Plan. The GNWT had recommended that the EA scope include a risk assessment to quantify how an upset of meromixis would affect water quality in the pit lake and in the vicinity of the pit lake to better inform the EA (MVEIRB, 2019a, GNWT Comment 9). The GNWT notes that DDMI did not conduct such a risk assessment. However, after review of the additional evidence provided by DDMI, GNWT's recommendation to conduct a risk assessment could be waived if: 1. Those exposure pathways discussed in the GNWT's requests discussed herein are included in a cumulative effects assessment, that, 2. Combined with the results of a model selected through an objective selection process (as discussed in the GNWT comments on model selection, herein) that corroborates current model predictions under the same scenarios, and 3. Demonstrates that exceedances of suitably chosen benchmarks (as discussed in the GNWT's comments on significance thresholds, herein) are of limited duration, effect and geographic scale. **Recommendation** The GNWT requests DDMI include a risk	**July 4:** DDMI has quantified how an upset of meromixis would affect water quality in the pit lake. This was done for each of the three mine areas and each of three scenarios. The quantified pit lake results are shown in Table B-4, B-5 and B-6 of The Summary Impact Statement (SIS) (PR#53). The potential effects in the vicinity of the pit lakes are also assessed within the Accidents and Malfunctions sections of the SIS (PR#53). At the Technical Session, DDMI's Geotechnical Engineer explained that filling the underground mine voids in A418 with PK material would improve pit wall stability in the lower sections of the mine and that filling the open-pit with water would eliminate wall pore-water pressure improving pit wall stability. A pit wall failure of sufficient magnitude to fully mix the A418 pit lake was described as very rare. This was also described in DDMI's response to WLWB IR#5 (PR#16). DDMI has not quantified effects of this unlikely upset condition in combination with cumulative effects from other foreseeable projects as this would not be a reasonable assessment case. It is DDMI's understanding that it is most common for Accidents and Malfunctions to be assessed on a project specific basis within an Environmental Assessment. If required by the MVEIRB, DDMI could calculate fully mixed pit lake concentrations for the cumulative assessment scenarios shown in PR#53 Tables B-7, B-8 and B-9 but again cautions that these conditions would not represent a reasonable assessment case.

		assessment to quantify how an upset of meromixis would affect water quality in the pit lake and in the vicinity of the pit lake. However, as outlined in the comments for this request, GNWT would be satisfied with the omission of an updated risk assessment if the additional evidence listed herein is provided by DDMI.	
17	Mitigating Potential Impacts	**Comment** A potential mitigation option is to avoid placement of PK and/or EFPK into the A21 pit due to the elevated risk of adverse water quality (Section 4.5.2.3 of the SIS) due to "the breakdown of meromixis and full mixing in A21 which is a result of the shallower depth of water cover in A21 relative to A418 and A154" (Section 4.4.1.3). **Recommendation** 1) The GNWT requests DDMI discuss why the A21 pit is being considered for the deposition of PK and EFPK; and reasonable and practical alternatives to depositing of PK and EFPK into the A21 pit. 2) The GNWT requests that DDMI describe the capacity of A154 and A418 to store PK and EFPK and whether any additional storage is required.	**July 4:** 1) DDMI has included an assessment of PK deposition to A21 to provide a complete evaluation of all foreseeable options. As evaluated in the Summary Impact Statement, A21 scenario 2a and 4a demonstrated no residual Project or cumulative effects on the aquatic environment within the pit lakes during closure and post-closure. For pit lake A21 scenario 3a modelling predicts an adverse high magnitude effect of moderate duration within the PDA during closure and post-closure. Based on the modelling and the significance definition developed by CEAA (1999), with application of mitigation and environmental protection measures, significant adverse effects on water quality are not anticipated for the A21 pit lake for all scenarios of PK deposition modelled. 2) Figure 2-3 and 2-4 of the Summary Impact Statement demonstrate that both the A418 and A154 mine workings have sufficient storage capacity to contain all modelled FPK and EFPK while maintaining a fresh water cover in excess of 100m. A need for storage in addition to these mine workings is not expected, however in the event the A21 mine becomes available before either the A418 or A154 mine, that option may be preferred.
18	Natural stabilization of water in pit lakes	**Comment** It is not clear how "natural stabilization of water in pit lakes; monitoring of water quality in pit lakes prior to reconnection to Lac de Gras" (Table 4-5 of the SIS) could lead to a change in the water quality of Lac de Gras. **Recommendation** The GNWT requests DDMI describe the pathway by which natural stabilization of water in pit lakes could occur.	**July 4:** It is unclear what is being requested. At project closure, water quality (its physical and chemical characteristics) in the pit lakes will stabilize as, and after, pits are filled with water from Lac de Gras. Stabilization of water quality is intended to evolve from a fully mixed condition at the start of pit infilling, to a condition where there is stratification (layers) of water with different chemical and physical characteristics. This is presented in the water quality models (SIS, Appendix B). The stabilization of water quality during closure is not project activity per se, so it is represented in project-interactions tables as the project activity of monitoring of the water quality during this natural stabilization. During the time when water in pit lakes stabilizes naturally, VCs may interact with this water, as is assessed in sections 6, 7 and 8 of the SIS.
19	Adequate mixing	**Comment** In Section 4.5.2.2 of the SIS, DDMI (2019) states "Openings of sufficient size will be made within the dike walls to allow adequate mixing and incorporate the pit lake back into Lac de Gras, to facilitate the recolonization of aquatic life". **Recommendation** The GNWT requests DDMI define "adequate mixing" and the criteria used to determine the size and number of the openings and when adequate mixing is achieved.	**July 4:** The term "adequate mixing" was used as a general description and was not intended to imply that mixing has been specifically designed. The breach size and number are minimums as defined by the Department of Fisheries and Oceans under the former Navigable Waters Protection Act Part 1 Section 5(1) on August 3, 2000. DDMI has undertaken an initial assessment of impact/benefit of larger dike breaches but concluded that the pit lake water quality was not sensitive to a larger breach size (Golder 2018). No further analysis has been conducted to consider mixing conditions with a smaller dike breach. Final breach sizes and numbers will be determined through review and approval of the Final Closure Plan.
20	Monitoring	**Comment** In Section 4.5.2.2, DDMI (2019) suggests that monitoring water quality within the pit lakes after breaching the dikes comprises mitigation for cumulative effects. This statement is confusing to the GNWT based on the definition of Mitigation and Cumulative Effects. **Recommendation** The GNWT requests DDMI discuss how water	**July 4:** Correction noted. Monitoring will be used to confirm that pit water quality meets criteria for interconnection with Lac de Gras before, and after breaching dykes to help to identify whether additional mitigation is required .

		quality monitoring constitutes mitigation for cumulative effects after the dike is breached. DDMI should remove or correct this statement.	
21	COPCs	**Comment** In Section 4.5.2.3 of the SIS, narrative statements regarding cumulative effects appear to use the sum of a maximum predicted COPC over a 100-year period at a given pit lake depth and predictions from the Ekati Jay Pit Lac de Gras water quality model. **Recommendation** The GNWT requests DDMI confirm that this is the case and also discuss: 1. Whether the maximum COPC concentration includes an overturn of meromixis scenario for all the pit lakes; 2. What Jay Pit Lac de Gras model prediction nodes were used; and, 3. The list of Jay Pit Lac de Gras model prediction COPCs.	**July 4:** DDMI confirms that the cumulative effects summarized in Section 4.5.2.4 of the SIS (RP#53) are based on the maximum predicted results from a 100 year simulation where the assumed water quality in Lac de Gras is a predicted from the Ekati Jay Pit Lac de Gras model. The analysis in Section 4.5.2.4 does not include an overturn of meromixis scenario. This Scenario is evaluated under required Accidents and Malfunctions in Section 4.4.3. The Jay Pit Lac de Gras model from the "Updated Assessment Case" YEAR 23 used in support of the Water License Process as described in Golder Associates Ltd. 2015. Jay Project Compendium of Supplemental Water Quality Modelling. Prepared for Dominion Diamond Ekati Corporation. Yellowknife, NT, Canada. April 2015. This scenario is considered a worst-case condition for Lac de Gras as it assumes an operations discharge from Diavik equivalent to the maximum allowable by DDMI's Water License. For the cumulative effects assessment this is expected to cause a greater COPC loading rates and higher COPC concentrations in Lac de Gras than would be expected post-closure particularly in proximity to the three potential pit lakes. Post-closure the COPC loading from the NIWTP would be reduced to zero whereas the scenario used for the cumulative effects assessment assumed the maximum NIWTP loading allowable by the Water License. The COPC from the Jay Pit Lac de Gras model are listed in the far right columns of SIS Table B-3 (PR#53) Maximum predicted Lac de Gras results at MF3-1 and MF3-2 were assumed for cumulative effects modelling of A418 and A154 whereas maximum predicted results at MF3-3 and MF3-4 were assumed for A21.
22	References	**Comment** Canada. 1999. Comprehensive Study Report, Diavik Diamonds Project, June 1999. PR#29 CCME (Canadian Council for Ministers of the Environment). 2018. Scientific Criteria Document for The Development of the Canadian Water Quality Guidelines for the Protection of Aquatic Life – Zinc. PN 1580. CEAA (Canadian Environmental Assessment Agency). 2018a. Determining Whether a Designated Project is Likely to Cause Significant Adverse Environmental Effects under the Canadian Environmental Assessment Act, 2012 Interim Technical Guidance March 2018, Version 1. CEAA (Canadian Environmental Assessment Agency). 2018b. Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 Interim Technical Guidance March 2018, Version 2. DDMI (Diavik Diamond Mines Inc.). 1998. Diavik Diamonds Project: Environmental Assessment Overview.	

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Lutsel K'e Dene First Nation - Chief or Wildlife, Lands and Environment: Lauren King (Ray Griffith)

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
1	Loading sources to pits	**Comment** Water quality modelling results do not incorporate potential loading from pit walls or groundwater inflows. **Recommendation** Provide data on projected groundwater inflows and how this will likely effect water quality in the pit lakes at closure. Revise water quality models to account for projected groundwater inflows.	**July 4:** Groundwater inflows were evaluated as sensitivity scenario 9 as described in PR#12 with results in PR#7. Please also see response to MVEIRB#27. Potential loading from pit walls were evaluated as sensitivity scenario 8-b as described in PR#12 with results in PR#7.
2	Loading sources to pits	**Comment** Water quality modelling results do not consider a potential pool of water remaining on top of the PK at the initiation of pit filling combined with potential loading from pit walls and groundwater. These scenarios were considered as separate events. There are no predications of conditions of combined events. **Recommendation** Revise water quality modelling to assess the effects of PK consolidation and porewater chemistry with potential loading from pit walls and groundwater.	**July 4:** The sensitivity analysis described in PR#12 with results in PR#7 consider water quality predictions separately for a scenario with additional loadings from pit walls and groundwater. Predicted water quality was not sensitive to either input so it would also not be sensitive to both inputs combined. The sensitivity analysis results were discussed at the WLWB Technical Sessions and informed the definitions for Scenarios 2a, 3a and 4a that were used as the basis for the Summary Impact Statement (SIS) (PR#53).
3	Loading sources to pits	**Comment** The sensitivity analysis for rates of pore water release from the PK is based on slower rates of release rather then worse case scenario. **Recommendation** Revise water quality modelling to assess worse case scenario events using the poorest pore water quality parameters.	**July 4:** The pore water release volumes/rates used in the "Development Case" for the initial modelling (Golder 2018 – PR#11) were considered to be the maximum plausible and are significantly greater than assumed for Scenarios 2a, 3A and 4a and the basis for the Summary Impact Statement (PR#53). Lower rates were tested in the sensitivity analysis as reviewers were interested in determining if a lower rate would negatively impact meromixis.
4	Loading sources to pits	**Comment** The sensitivity analysis considerd groundwater input of 177,647 m3 during pit filling. This number is low compared to previous modelling. **Recommendation** Clearly explain why comparatively low	**July 4:** Scenario 4a was defined at the WLWB Technical Session and assumes there would be 15m of decant water above the settled PK at the time the mine workings were to be filled with water from Lac de Gras and that this water would fully mix during filling. The 15m of decant water was assumed to have developed through the final years of

		groundwater input level was used for the sensitivity analysis rather then higher levels. Revise the sensitivity model to assess worse case scenario.	operations through an accumulation of PK slurry/pore water and groundwater inflow. In A418 this 15m of initial decant water represents a volume of around 1,040,632 m3. This would represent a worst case volume of lower quality water during pit filling.
5	PK pore water	**Comment** DDMI relies on "fresh PK slurry" values rather then the more adverse conditions that could occur. Contaminant concentrations for this assumption are much lower than in previous modelling. This approach likely under estimates the pore water concentraions in deposited PK. **Recommendation** Explain and justify why fresh PK slurry value for PK pore water was used in water quality modelling. Revise water quality modelling to assess worse case scenarios using PK pore water with the highest concentrations of contaminates.	**July 4:** DDMI considers the "Development Case" scenario described in Golder (2018) (PR#11) to be the worst case scenario for both PK pore water volume and concentration of contaminants. Table B-2 of the Summary Impact Statement (SIS)(PR#53) compares the various available sources of PK pore water. These include: 6. in situ PKC Beach Pore Water – all beach samples 7. in situ PKC Beach Pore Water – unsaturated samples only 8. in situ PKC Beach Pore Water – saturated samples only 9. in situ Slimes sampled from the PKC Barge 10. "Fresh" PK Slurry Highest concentrations of contaminants would be expected from #2 where the PK material would have had years of weathering exposure compared with #3 and #4 where PK was stored in saturated conditions limiting the extent of weathering. Lowest concentrations of contaminants would be expected from #5 where water has been in contact with PK material for a relatively limited time. These samples were directly from the PK slurry as it was being released to the PKC. The "Development Case" (Golder (2018)) assumed a water chemistry based on all samples (#1) as this was expected to provide a reasonable maximum pore water concentration covering both direct deposition of PK material and re-depositing of EFPK (slimes) from the PKC. At the WLWB Technical Sessions the suggestion was rather than lumping all the PK samples together (i.e. #1 which was understood to be possibly too worst-case) to sort the results based on sample type to better reflect pore water from a) PK deposited directly to mine workings and b) EFPK re-deposited from the PKC. At the time of the Technical Sessions PK slurry data was not considered. DDMI selected the PK slurry data (#5) as being the most representative of pore water from PK directly deposited to mine workings recognizing the limited sample size(n=3). Pore water quality from the slimes sampled from the PKC Barge (#5) were selected to represent EFPK pore water. Consolidation and pore water testing underway at the University of Alberta are expected to provide more definitive estimates of pore water chemistry when they are complete later in 2019. A brief review of an initial series of preliminary results from the University of Alberta generally support the use of PK slurry data is appropriate. For example PK slurry data for sulphate used in the SIS modelling ranged from 59-329 mg/L and chloride ranged from 33-86 mg/L (SIS Table B-2) compared with initial UofA results with sulphate concentrations ranging from 159-185 mg/L and chloride concentrations ranging from 96-103 mg/L.
6	PK density	**Comment** Density of PK material **Recommendation** Explain and justify the PK density used in the water quality modelling.	**July 4:** It is assumed the reference is to the PK consolidation assumptions used in the water quality modelling and described in Golder (2018) Section 2.2.3 (PR#11). The change in PK density over time after it is deposited in the mine workings is what is represented in Figure 2 (Golder 2018) and referred to as consolidation. Figure 2 is a theoretical representation of expected consolidation. Specific consolidation testing is underway at the University of Alberta to measure actual consolidation rates. Consolidation rates are needed for water quality modelling as the PK consolidation rate determines the pore water release rate and the change in PK density from the PK slurry to final deposited PK determines the total volume of PK pore water released and is also shown in Figure 2. DDMI has recognized the uncertainty in consolidation and addressed this in the assumptions used for various water quality modelling scenarios. The "Development Case" assumed a very large pore water release volume (worst-case) and the sensitivity analysis and subsequent SIS scenarios included what were considered to be more representative scenarios. It is DDMI's expectation that these results bracket the upper range of pore water release volumes.

7	Water quality monitoring in pits and underground mine workings	**Comment** Ongoing monitoring and reporting to improve predications **Recommendation** Explain how actual performance of PK disposal into pit(s) be used to calibrate and refine models to better predict possible future performance and conditions in pits containing PK? How often will models be updated?	**July 4:** Actual performance of PK disposal into pits will be monitored using a number of methods towards an objective of measuring the quality and quantity of generated decant water from the time deposition in mine workings begins until it is complete. Over the same time the PK solids level will be monitored to get an understanding of the settled PK density at the time the deposition is complete. This information will be used to provide a final estimate of the expected pore water release rate and pore water quality that will be released into the pit lake initially during filling and on an ongoing basis post-closure. DDMI anticipates updating the model late in 2024 to get a best estimate of future performance prior to filling the pit with lake water. After filling proceeds DDMI will rely on monitoring of actual conditions rather than modelling to evaluate pit lake performance.
8	Water quality monitoring in pits and underground mine workings	**Comment** Ongoing monitoring and reporting to improve predications **Recommendation** Will DDMI conduct the proposed characterizaton of PK consolidation and release water study be completed, and, if so, when will it be complete?	**July 4:** The consolidation and release water study is currently being completed by the University of Alberta and DDMI anticipates final results by the end of 2019. If DDMI's proposal to deposit PK into mine workings is approved by the MVEIRB and the WLWB then the next step for DDMI will be to complete the engineering design and deposition planning. This will include more specific water quality modelling using update information, including the results from the University of Alberta research, to predict expected pit lake conditions prior to proceeding with PK deposition. As shown in the response to MVEIRB#17 (Table 6) DDMI anticipates updating the water quality modelling later in 2020 about a year in advance of planned PK deposition.
9	Closure and post-closure monitoring	**Comment** Frequency of monitoring activities **Recommendation** Better explain how often DDMI will monitor water quality in the pits and Lac de Gras during closure and post-closure phases and what event(s) will trigger monitoring and possibly management actions.	**July 4:** Please refer to DDMI's Response to EMAB-IR#15 and EMAB-IR#20.
10	Flooding pit(s)	**Comment** It is unclear how the pits will be filled with water from Lac de Gras **Recommendation** Clearly explain, in as much detail as possible, how pits be filled with water. Elaborate on how DDMI will minimize disturbing the PK upon flooding. Clearly explain what the minimum depth of porewater needed to minimize disturbing the PK material below. And explain how will DDMI measure the depth of the porewater.	**July 4:** A detailed description of how the pits will be filled with water is provided in Section 2.4.3 of the Summary Impact Statement. In general, a pipeline system will be installed at the top of the dike to pump/syphon water from Lac de Gras into each of the pits to infill the remainder of the mine workings void with water up to the level of Lac de Gras. This infilling will occur over a period of six months to two years continuously. DDMI anticipates that floodwater energy from infilling the mine workings will be dissipated (e.g. dispersed onto boulder material or a barge) to reduce re-suspension of settled PK material. In addition, DDMI anticipates leaving between 5 – 15 m of pore water on the PK surface prior to flooding to further minimize suspension of settled PK material. The depth of pore water will be measured directly from the pond surface. The exact filling plan will be determined during the final design phase of the PKMW Project. Groundwater will also continue to naturally seep into the mine workings. The estimated groundwater inflow is expected to comprise less than 10% of total infill water.
11	Water quality modelling - nitrogenous substances	**Comment** Values for nitrate, nitrite, and ammonia for water quality modelling **Recommendation** Clarify what the values for nitrate, nitrite, and ammonia from Dominion Diamond Mine's Beartooth pit nitrogen monitoring results are based on (e.g., number of samples, range of concentrations, etc.).	**July 4:** The values for nitrate, nitrite and ammonia from Dominion Diamond Mine's Beartooth monitoring are the median from 8 samples collected October 16 2016 from a depth profile over 25 m of water. Nitrate concentrations ranged from 15.0-16.8 mg/L; nitrite ranged from 0.55-0.62 mg/L and ammonia ranged from 1.41-1.46 mg/L.
12	Water quality modelling - dissolved oxygen	**Comment** In the event of a sudden mixing event, conditions in the pit lake(s) will change relatively rapidly and more rapidly than natural decreases in DO that commonly occurs in deep areas of lakes over the course of the ice-cover season. A more sudden	**July 4:** Please see the response provided in EMAB-18.

		change may inhibit the ability for fish to egress the area. **Recommendation** Provide a mass-balance estimate of potentially fully mixed DO concentrations in surface waters in pit lake(s). The exercise should assume anoxic conditions in the monimolimnion and a reasonable estimate of concentrations in the overlying waters, including reasonsable assumptions regarding stratification and oxygen depth profiles.	
13	Water quality monitoring - dissolved oxygen	**Comment** Monitoring DO **Recommendation** Clearly explain how DO will be monitored during closure.	**July 4:** Dissolved Oxygen will be monitored directly using a YSI DSSPro submersible field meter, or similar product, during sampling events.
14	Biological monitoring in pit lakes	**Comment** Monitoring fish movement at post-closure phase to ensure fish are not affected by low DO levels **Recommendation** Clearly explain how fish movement be monitored/studied during post-closure and for how long. If DO levels are too low to support fish, explain how will pit lakes be disconnected from Lac de Gras.	**July 4:** 1) DDMI does not believe it is appropriate to define fish passage monitoring techniques or success criteria at this time, and suggests that this information can be finalized through updates to the Final Closure Plan. In general, DDMI suggests that the design criteria for the breaches focus on facilitating the recolonization of aquatic life through adequate breach depths and widths that allow continuous water flow throughout the year, without having specific fish usage requirements. Please also see response to EMAB-IR#22. 2) If monitoring reveals that pit water quality does not meet AEMP benchmarks (DO, etc.) in the top 40m an investigation will be triggered. In situ treatment options will be evaluated and if ineffective the breaches will be closed to isolate the pit lake from Lac de Gras. Isolation will occur through placement of rocky material in the breaches using heavy equipment. This material will prevent passage of fish while maintaining a hydraulic connection to allow for passive pit lake water level management.
15	Assessment of water quality	**Comment** Background surface water concentrations in Lac de Gras are based on average observed concentrations at the nearest AEMP monitoring locations for each pit. **Recommendation** Explain and justify why background surface water concentrations are based on an average rather then AEMP SNP closest to the mine. This would provide the worse case scenarion. Revise water quality modelling to assess worse case scenario.	**July 4:** Background surface water quality used in the project modelling is based on the average water quality from the nearest Aquatic Effects Monitoring Program sample locations to each pit lake. Lake water quality is not based on average background concentrations, or reference conditions in Lac de Gras. The current method is considered to be the most realistic and accurate scenario. Cumulative effects were also modelled using the same model, substituting current AEMP water quality with assessed the cumulative effects water quality in Lac de Gras from the Ekati Jay Project (Golder 2015, included peak Diavik + Ekati + Jay Project impact on Lac de Gras) which would be considered the worst-case scenario.
16	SIS, Sensitivity scenarios, p.53	**Comment** Ten sensitivity scenarios were performed for A418 by changing one model input per simulation. It was assumed general findings of the sensitivity analyses would also apply to A514 and A21. **Recommendation** Explain why sensitivity scenarios were not performed for A154 and A21 and clarify why sensitivity analyses for A418 would apply for the other pit lakes. Perform sensitivty analyses for A514 and A21.	**July 4:** Sensitivity scenarios were not undertaken for A154 and A21 for the following reasons: • A418 is the preferred location of PK to mine workings and is the most likely to be implemented if approved; • The same model and modelling approach was used with each of the three pit lakes so the sensitivity of the model is expected to be similar. • The objective was to determine the relative sensitivity of key model input variables to assist in determining a focus for further model refinement – as was done at the WLWB Technical Session. Adding 20 model simulations would have created an overwhelming amount of information that was unlikely to have changed the outcome.
17	SIS, p. 54-55	**Comment** During closure, there is the potential for increased exposure to chemical contaminants for wildlife as a result of ingestion of drinking water from the top section of the pit lake(s). **Recommendation** Explain what mitigation meaures DDMI will take to reduce wildlifes exposure to chemical contaminates in the top sections of the pit lake(s) during closure / filling of pits, when AEMP benchmarks are likely to be exceeded.	**July 4:** DDMI acknowledges the potential for wildlife to encroach on the pits/mine workings during the operations and closure phases of the PK to Mine Workings. To minimize wildlife interactions with the mine workings during operations, DDMI will implement the existing wildlife, monitoring and management procedures for Diavik, which include the following measures: 1. Monitoring/tracking of wildlife presence and/or proximity to the mine workings. 2. Training all site personnel to record and/or report incidental sittings of wildlife, including birds, in the general area of the mine workings

			during operations. 3. Use of wildlife deterrence techniques such as truck horns, bear bangers, 12Ga cracker shells, 12Ga bean bags, scarecrows, decoy foxes and falcons, noise makers (Wetland Wailer Mk IV), and hanging screens down the high walls of the pits. DDMI plans to implement the following additional mitigations to reduce potential effects on wildlife during closure of the PK to Mine Workings Project: 1. Removal of any observed wildlife from pit/dike area before infilling. 2. Monitoring area pit area for approaching wildlife during infilling. 3. Employing deterrents such as herding as required. 4. Excavating ramps into the pit walls that will remain as a shoreline.
18	SIS, p. 56	**Comment** The modelling indicates that high concentrations of TDS in the bottom later may break down after approximately 50 years for A21 as a result of the shallower depth of water cover for A21 **Recommendation** Explain why a shallower depth of water cover would be considered for A21 if meromixis is predicted to breakdown in approximately 50 years. Explain why a deeper water cover is not being proposed by DDMI.	**July 4:** DDMI is not proposing that the water cover be shallower for A21. Golder (2018) provided an initial estimate of the minimum water cover depth (PR#11) in response to specific WLWB IRs. Golder (2018) recommended 50m minimum water cover depth for all mine areas based on preliminary modelling. Golder (2018) provided an initial estimate of the minimum water cover depth (PR#11). These were provided in response to specific WLWB IRs. DDMI advised that the 50m minimum water cover depths were initial estimates based on preliminary modelling that would be updated in the future and submitted for final regulatory approval if DDMI's proposal to amend the Water License for PK to mine workings is approved. The scenarios modelled for A21 in Golder (2018) did not result in a break-down of meromixis as referenced and it was these modelling assumptions that were used to make the initial estimates of minimum water cover depth. The referenced A21 modelling where meromixis was observed to break-down was conducted after Golder (2018) and using different input assumptions.
19	SIS, Cumulative effects, p. 73	**Comment** Reconnecting pit lake(s) with Lac de Gras. **Recommendation** Explain how long pit lakes A418, A154 and A21 will be monitored at closure and post-closure phases to demonstrate/prove acceptable water quality standards are met. Water quality standards should also be based traditional knowledge (TK) parameters, before potentially reconnecting with Lac de Gra. Explain how long AEMP benchmarks and other standards will be consecutively met before reconnecting with Lac de Gras. Explain what specific events would warrant a longer closure and post-closure monitoring periods.	**July 4:** For information on pit lake monitoring during the operations, closure and post-closure phase including reconnection criteria, please refer to the DDMI's Response to EMAB-IR#15 and EMAB-IR#20. As part of ongoing Closure Planning, DDMI intends to engage with communities and the Diavik Traditional Knowledge Panel to identify if any parameters other than water quality should be considered before reconnecting the pit lakes to Lac de Gras. DDMI suggests the exact criteria, including the duration of monitoring prior to breaching, be finalized during the Water License Amendment phase of the PKMW Project.
20	SIS, Visual monitoring by Traditional Knowledge, p. 78	**Comment** "Visual monitoring by Traditional Knowledge" is casually referred to in this section. DDMI provides vitally no details regarding how TK will be utilized to monitor pit lakes at closure and post-closure. It is unclear why the application of TK would be limited to "visual monitoring." **Recommendation** Please elaborate on how Traditional Knowledge will be used for environmental and social monitoring during operation, closure and post-closure. In LKDFN's view, conveneing once or twice a year for one or two days will not result in the meaningful incorporation in TK throughout the life of the mine. LKDFN recommends that DDMI initaite a program, similar to Ni hadi Xa at Gahcho Kue Diamond Mine, to have TK holders monitor the mine on a regular basis in a structured manner.	**July 4:** DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users view the safety, quality, and health of Lac de Gras. DDMI appreciates LKDFN's recommendation regarding incorporation of TK in monitoring programs for the PK to Mine Workings and looks forward to ongoing collaboration between DDMI and LKDFN during the current Review and during final design and project execution, including consideration of TK Holders involvement in the implementation of project monitoring programs during construction, operation, closure and post-closure phases of the PK to Mine Workings Project.
21	SIS, Existing conditions for surface water	**Comment** Existing conditions of surface water quality is based on an outdated study (e.g., environmental effects report, fish and water, 1998) and flow data from the Water Survey of Canada. Surface water quality could have been effected by minnig in the	**July 4:** Surface water quality in Lac de Gras is monitored twice a year every year since 1996 through the Aquatic Effects Monitoring Program (AEMP). Results are submitted each year to the WLWB for approval and distributed to all parties for review and comment.

	quality, methods, p. 82	area and not captured in these studies. **Recommendation** Clarify whether or not there are other existing studies that could be used to establish existing conditions for surface water quality. If not, how will DDMI assess surface water quality before closure phase	
22	Filling of pit lakes	**Comment** If the pit lakes are not reconnected to Lac de Gras, it is unclear what the ecological or biological benefits of filling the pit lakes with water from Lac de Gras, instead of allowing them to fill naturally. **Recommendation** If the pit lakes are not reconnected with Lac de Gras, explain the ecological and biological benefits and drawbacks to filling them with water from Lac de Gras. Explain/model how allowing the pit lakes to naturally fill with water would effect the establishment of a state of meromixis.	**July 4:** To be clear the approved closure plan for the mine areas is to reconnect the areas with Lac de Gras. This is the closure plan that was originally assessed in the Comprehensive Study and is the basis for many of the conditions in Diavik's Fisheries Authorization and Navigable Waters Protection Act approval. DDMI has not proposed a development option where fish or people are prohibited from accessing the mine areas. DDMI is unlikely to deposit PK into a mine working if the expected result would be water conditions that were unsuitable for fish or fish habitat due to the deposited PK. Not connecting pit lakes with Lac de Gras has only been described by DDMI as a contingency option if for some reason water quality in a pit lake ends up being substantially worse than expected and connecting the pit lake would present an unjustified risk to Lac de Gras. The reason for filling the pit lakes with Lac de Gras water rather than allowing them to naturally fill with ground water is the higher quality of the water in Lac de Gras.
23	SIS, 6.4.2.3, p. 107	**Comment** Establishment of fish communities in pit lakes after dikes are breached **Recommendation** Explain how long will it likely take for sediment and detritus to accumillate and a plankton community to colonize the pit lakes.	**July 4:** Plankton will immediately colonize the pit lakes with incoming water from LDG during the filling of the pit lakes. Sedimentation rates in northern lakes such as Lac de Gras are low (Peramaki and Stone 2005; Crann et al. 2015), which is expected to result in slow accumulation of fine sediments and detritus in the pit lakes. The length of the period of accumulation to achieve a layer of sediments of a certain thickness, or a certain concentration of total organic carbon, cannot be accurately estimated based on available information. References: Crann C, Patterson T, Macumber A, Galloway J, Roe H, Blaauw M, Swindles G, Falck H. 2015. Sediment accumulation rates in subarctic lakes: Insights into age-depth modeling from 22 dated lake records from the Northwest Territories, Canada. Quaternary Geochronology. 27: 131-144. Peramaki L, Stone M. 2005. Fluxes of As, Cu, Hg and Pb in lake sediments in the Coppermine River basin: Implications for planning and management of northern aquatic ecosystems. 15th International Northern Research Basins Symposium and Workshop. Lulea to Kvikkjokk, Sweden – 29 Aug to 2 Sept 2015.
24	SIS, 7.0, Assessment of potential effects on wildlife and wildlife habitat, p. 131-2	**Comment** The SIS summarizes data for the Bathurst caribou herd, including ENRs GPS collar data for the last 20 years and DDMIs annual wildlife monitoring reports. The SIS states that, "…the presence of mining activity within and adjacent to Lac de Gras has had little influence on the large-scale movement and distribution of the Bathurst caribou herd in the region" (p. 132). **Recommendation** Before the mine and others existed, 100,000s of Bathurst caribou would migrate through the area. Based on documented observations, Bathurst caribou herd went from 100,000 to 1-85 in the area in and around the mine. Explain how the presence of mining activities, specifically Diavik Diamond Mine, in the Lac de Gras has had little influence on the movement and distribution of the Bathurst caribou population. Provide empirical evidence to support your claim or remove it from the SIS.	**July 4:** The sentence in question describes large-scale movement and distribution. There is evidence of smaller-scale change in movement and distribution (Golder 2011, 2018; Boulanger et al. 2012) in the area surrounding the Diavik and Ekati mines and that caribou have avoided the use of East Island once Diavik Mine was constructed (e.g. DDMI 2003) as predicted. This has all been documented in the Wildlife Monitoring Program reports but these are small-scale changes with no demonstrated demographic consequence at the population level. There is empirical evidence in the scientific literature to support that Diavik (and Ekati) have had little influence on the large-scale movement and distribution of Bathurst caribou. The decline of the Bathurst caribou herd began between the mid-1980s and early-1990s and before the Diavik and Ekati mines were constructed (see Virgl et al. 2017). Other circumpolar barren-ground caribou herds have been in recent declines (Vors and Boyce 2009) including herds with and without development in their annual ranges. Thus, herd declines cannot be explicitly assigned as changes from development. These studies also show that barren-ground caribou populations fluctuate over long periods of time, so declines or low abundance is nothing new but part of natural population cycling. Virgl et al. (2017) showed that post-calving and autumn seasonal ranges sizes have decreased during the current decline phase of Bathurst caribou, which is consistent with reduced herd abundance during population cycles (Bergerud et al.

			1984; Heard and Calef 1986; Valkenburg and Davis 1986; Messier et al. 1988; Bergerud et al. 2008). Virgl et al. (2017) also demonstrated that Bathurst caribou seasonal range fidelity has not changed during the current decline phase of Bathurst caribou, so caribou are able to use the same areas through time even when migrating through the Lac de Gras region where the Diavik and Ekati mines are located. That the abundance, distribution or timing of caribou present in the area around Diavik Mine during a decline phase would change is consistent with natural patterns observed at the herd scale and supported by studies in caribou ecology. References Bergerud, A. T., Jakimchuk, R. D., and Carruthers, D. R. 1984. The Buffalo of the North: Caribou (Rangifer tarandus) and Human Developments. Arctic, 37:7 -22. Bergerud, A.T., Luttich, S.N. and Camps, L. 2008. The Return of Caribou to Ungava. McGill-Queens University Press., Montreal, QC, Canada. Boulanger J, Poole KG, Gunn A, and Wierzchowski J. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou and diamond mine case study. Wildlife Biology 18:164-179. DDMI (Diavik Diamond Mines (2012) Inc. 2003 Wildlife Monitoring Report. Yellowknife, NWT. Golder. 2011. Analysis of Environmental Effects from the Diavik Diamond Mine on Wildlife in the Lac de Gras Region. Prepared for Diavik Diamond Mines Inc., Yellowknife, NWT, Canada. Heard, D. C., and Calef, G. W. 1986. Population Dynamics of the Kaminuriak Caribou Herd, 1968 - 1985. Rangifer, Spec. Issue No. 1. pp. 159-166. Messier, F., Huot, J., LeHenaff, D., and Luttich, S. 1988. Demography of the George River Caribou Herd: Evidence of Population Regulation by Forage Exploitation and Range Expansion. Arctic, 41:279 - 287. Valkenburg, P., and Davis, J. L. 1986. Calving distribution of Alaska's Steese-Fortymile caribou herd: a case of infidelity? Rangifer Spec. Issue No. 1. pp. 315-323. Virgl, J.A., Rettie, W.J., and Coulton, D.W. 2017. Spatial and temporal changes in seasonal range attributes in a declining barren-ground caribou herd. Rangifer 37:32-46. Vors, L.S. and Boyce, M.S. 2009. Global declines of caribou and reindeer. Global Change Biology 15: 2626–2633. https://doi.org/10.1111/j.1365-2486.2009.01974.x
25	SIS, 7.3.3, Change in mortality risk, p. 136	**Comment** Barren-ground caribou herds **Recommendation** Clearly explain how caribou and other wildlife will be deterred from falling into the pit lakes.	**July 4:** DDMI acknowledges the potential for wildlife to encroach on the pits/mine workings during the operations and closure phases of the PK to Mine Workings. To minimize wildlife interactions with the mine workings/pits during operations, DDMI will implement the following wildlife monitoring and management procedures which have proven effective for the Diavik project: 1. Monitoring/tracking of wildlife presence and/or proximity to the mine workings. 2. Training all site personnel to record and/or report incidental sittings of wildlife, including birds, in the general area of the mine workings during operations. 3. Employing deterrents such as herding as required. 4. Excavating ramps into the pit walls that will remain as a shoreline. 5. Use of wildlife deterrence techniques such as truck horns, bear bangers, 12Ga cracker shells, 12Ga bean bags, scarecrows, decoy foxes and falcons, noise makers (Wetland Wailer Mk IV), and hanging screens down the high walls of the pits. DDMI will also implement its caribou monitoring and management program which includes caribou advisories that trigger levels of action related to reduction in the intensity of site activities up to cessation/stoppage, depending on established thresholds for caribou presence on the East Island.
26	SIS, 7.4.2.2., Mitigation, p. 138	**Comment** Minimizing caribou and other wildlifes exposure to pit lakes before stablization has occurred **Recommendation** Please clarify which methods will be used to deter caribou and other wildlife from drinking from the pit lakes before stabilization.	**July 4:** Please see DDMI's response to LKDFN IR#25.
27	SIS, 8.0,	**Comment** TK panel sessions	**July 4:** As noted, DDMI hosted a TK Panel in May 2018 to explore the various options for

	Assessment of potential effects on cultural use, p. 147	**Recommendation** Explain whether or not Traditional Knowledge Holders at any of the TK Panel Sessions were asked how depositing PK into mine working would potentially affect cultural uses and/or users of the area. Explain why.	handling processed kimberlite on-site though operations and closure, including the option to deposit PK into mine workings. The participants got to "see with their own eyes" the open pit and underground mining areas proposed for PK deposition. The TK Panel included participants from LKDFN and the other four (4) Indigenous groups that are signatories to the Participation Agreement for Diavik. During the session, participants discussed and shared TK on the link between key environmental resources (wildlife, fish, and water) and traditional /cultural use practices and provided recommended mitigation measures for potential impacts to these key environmental resources to DDMI. Recommendations provided by the TK Panel session participants has informed the conceptual design of the PK to Mine Workings Project. DDMI looks forward to ongoing collaboration with LKDFN, the other PA groups, and other interested Indigenous groups during the current Review and during final design and project execution.
28	SIS, 8.0, Assessment of potential effects on cultural use, p. 147	**Comment** TK panel sessions **Recommendation** Explain specifically how recommendations from the TK Panel Sessions are or are not used to inform closure and post-closure activities. Explain how recommendations from the TK Panel Sessions inform the management of the mine activities, specifically as they relate to this proposed project. Explain how recommendations are tracked and report on.	**July 4:** Since 2011, DDMI has hosted a number of TK Panel sessions, at least once a year, to appropriately and meaningfully consider TK in operations, environmental management and monitoring as well as closure planning of the Diavik Diamond Mine. DDMI has hosted 12 such sessions to date. The 11th session in May 2018 focused on the proposal to deposit PK in the mine-out pits and underground mine workings. Recommendations from the TK Panel during each session are recorded by DDMI staff and consultants and presented in TK Panel Session Reports, which are made available to participants, the LKDFN and the other four (4) PA Groups. During each subsequent TK Panel session, participants typically revisit the list of session topics carried out to date and discuss DDMI's implementation and/or consideration of previous TK Panel recommendations, and suggest future TK Panel topics.
29	SIS, 8.0 Assessment of potentual effects on cultural use, 8.1.2, p. 147	**Comment** How the proposed PKMW project may affect cultural uses/users. **Recommendation** LKDFN recommends that change in quality of traditional resources should also be evaluated in the SIS. As such, provide effect pathways and measurable parameters and units of measurement for this potential environment effect.	**July 4:** Change of quality of traditional resources is considered within the potential environmental effect "Change in availability of resources for cultural use" identified in Section 8.1.3. DDMI recognizes that cultural use is dependent on many factors, including the availability of healthy and accessible traditional lands and resources. The assessment of Cultural Use undertaken in SIS considers change in the distribution, diversity and abundance of traditionally used resources, as well as how traditional land users perceive the safety, quality, and health of Lac de Gras, where that information has been provided by Indigenous groups, as required by MVEIRB's Final Scope and Reasons for Decision. The effects pathways and measurable parameters for "change in availability of resources for cultural use" are provided in Table 8-1 of the SIS, and are reproduced here in a list form, for convenience. Potential Environmental Effect • Change in availability of resources for cultural use Effect Pathways: • Loss or alteration to traditionally used animal or fish species • Loss or alteration of habitat supporting traditionally used animal or fish species • Loss or alteration to availability of drinking water • Alteration of ecosystem health which could affect the availability of traditional resources • Perceived change in value of availability of traditional resources for cultural use Measurable Parameter(s) and Units of Measurement: • Change in availability of hunted species (information provided by wildlife) • Change in availability of fish species (information provided by fisheries) • Change in availability of drinking water (information provided by water quality) • Identification of change in resource from communities of traditional users The Effects Pathways as defined encompass potential effects on the quality of traditional resources. Examples of this include; • Loss or alteration of traditionally used animals and fish could result from ingestion of contaminated water through changes in pit lake water quality. • Loss of fish could occur through a change in the suitability of the pit lakes for fish and reduction in total fish habitat. • Potentially affected Indigenous groups could identify

			perceived change in value of availability of traditional resources for cultural use. The measurable parameters similarly may take account of changes in quality of resources, where that information is provided by Indigenous groups. For clarification, loss or alteration of traditionally used species, as described above, may include a change in Indigenous harvesting practices related to a decline in the quality of animals, plants or fish. Where available, information about the quality of resources was included in the cultural use assessment. Participants in the TK Panel Sessions noted that healthy caribou herds are a prime concern for Indigenous groups; caribou are important for cultural, spiritual, and economic well-being as well as for subsistence purposes. TK Panel Session Participants reported that caribou are sensitive to noise, dust and pollution, and stress changes the taste of meat. TK Panel Session Participants also expressed concern about hunting in the area after mine closure and wondered if eating caribou from the area could make people sick or cause cancer. Participants in the AEMP TK Study stated they observed more cysts and worms in fish caught in Lac de Gras and that this may be a result of effects from the mine.TK Panel Session Participants also reported that the fish and water in Lac de Gras adjacent to the Diavik Mine is good and better than expected, particularly given the proximity to industrial activity. DDMI acknowledges that appropriate conditions for current use entail more than the availability of traditional resources and that Indigenous groups may choose not to pursue cultural use activities near the mine site for a variety of personal, practical, aesthetic, and spiritual reasons. As stated in Section 8.8 of the SIS, DDMI will continue to engage with potentially affected Indigenous groups through the TK Panel Sessions and other engagement activities to better understand Indigenous perceptions about the safety, quality, and health of Lac de Gras and identify practical strategies to address these concerns.
30	SIS, S. 8.3.2.2, Mitigation, p. 165	**Comment** Fish and fish habitat monitoring for mitigating change in availability of traditional resources **Recommendation** As previously stated, TK parameters should be used - in addition to scientific parameters - when monitoring and evaluating impacts on traditional use. Explain how TK parameters will be developed and used to evaluate fish and fish habitat as well as water quality.	**July 4:** DDMI has been and will continue to work with the TK Panel to identify and/or develop TK parameters for monitoring and evaluating fish, fish habitat and water quality. An example to date has been the TK approach to evaluating fish as part of the AEMP.
31	SIS, S. 8.3	**Comment** Impacts on caribou from ingesting water containing contaminates above AEMP benchmarks, as modelled in A21 scenario 3a. **Recommendation** Explain what the effects would be on caribou if exposed to contaminated water based on A21 scenario 3a when AEMP benchmarks are exceeded.	**July 4:** In scenario A21 3a, no AEMP benchmark exceedances are predicted for surface waters, where caribou and other wildlife would have access to the water. There are exceedances predicted for deeper water (40 m depth) for nitrite, nitrate, and molybdenum (and zinc using the draft CCME guideline for protection of aquatic life); however, wildlife would not be in contact with water at this depth. In scenario A21 4a, nitrite is predicted to be 3% higher than the AEMP benchmark in surface water. Water quality guidelines for protection of aquatic life are typically more protective than those for drinking water for humans, wildlife, or livestock, given that aquatic species inhabit the water continually. This is the case for nitrite, with the guidelines set at 0.06 mg/L for aquatic life, 1 mg/L for humans, and 10 mg/L for livestock. There are no CCME guidelines for wildlife, but the BC guidelines recommended using the drinking water guideline of 1 mg/L. No adverse effects to wildlife would be expected.
32	SIS, S. 8.8, Summary of commitments, p. 175	**Comment** "DDMI will continue to engage with potentially affected Indigenous proups through the TK Panel Sessions and other engagement activities to better understand Indigenous perceptions abou the safety, quality, and health of Lac de Gras and identify practical strategies to addres these concerns."	**July 4:** DDMI has and continues to engage with the five (5) PA groups, including LKDFN during the Review of the PK to Mine Workings. DDMI commits to continue with this engagement during all phases of project implementation. During DDMI-hosted TK Panel sessions, participants, selected from the PA Groups, discuss DDMI's implementation and/or consideration of TK Panel recommendations for Diavik. DDMI notes that the scope

		Recommendation In LKDFN's opinion, the TK Panel Sessions once or twice are year are insufficient to obtain TK based on long-term observations in and around the mine. Instead, DDMI should hire TK holders to monitor the mine during operation, closure and post-closure phases. The Ni Hadi Xa monitoring program at Gahcho Kue Diamone Mine can be used as a model for DDMI. Clearly explain what is meant by "other engagement activities" and how recommends from the TK Panel Sessions and "other engagement activities" are applied over the life of the mine.	of the current Review is limited to proposed activities associated with deposition of PK to mine workings i.e., the previously approved Diavik Diamond Mine Project, is not part of the scope of the current Review.
33	General	**Comment** None **Recommendation** Explain if pit lakes containing PK are not connected to Lac de Gras by breaching dikes, how PK contaminated water could effect the surrounding environment or other bodies of water.	**July 4:** If pit lakes containing PK are not connected to Lac de Gras by breaching the dikes, they will need to be altered to allow a hydraulic connection between the pit lake and Lac de Gras such that it prevents passage of fish while maintaining passive water leve equalization. In this case, pit lake surface water potentially affected by PK will not be accessible to fish from Lac de Gras, however there will be a distributed connection to Lac de Gras which may result in locally elevated concentrations near the dike. Concentrations would be expected to remain below AEMP benchmarks within Lac de Gras and any potential areas above AEMP benchmarks would remain localized to the pit lake area where access would be limited to wildlife or people using the pit lake water.
34	10.2, Cumulative effects, p. 181	**Comment** Water withdrawal from Lac de Gras has the potential to interact cumulatively with withdrawal from Ekati Diamond Mine **Recommendation** Explanin how DDMI will coordinate with Ekati Mine to ensure water withdrawal to fill pits at both mines that is protective of the aquatic environment in Lac de Gras.	**July 4:** As part of ongoing Closure Planning and prior to flooding the mine workings, withdrawal rates for the PKMW Project that are protective of the aquatic environment will be established in discussion with regulators. When determining withdrawal rates protective of aquatic life, DDMI will include all approved water withdrawal from Lac de Gras by Ekati to ensure the cumulative rate remains adequately protective.
35	Caribou and other wildlife	**Comment** The additional pipeline will further inhabit caribou and other wildlife movement through the site **Recommendation** Explain how this will be mitigated.	**July 4:** As part of the assessment of potential impacts on wildlife from the PK to Mine Workings Project, DDMI identified potential environmental effects, effects pathways, and measurable parameters for identified environmental effects. DDMI assessed the potential for the project to alter or block movement of wildlife, including caribou, due to physical barriers such as proposed PK slurry pipelines. DDMI concludes that although the construction and operation of the PK slurry pipeline might have the potential to temporarily alter wildlife, including caribou, movement within the mine footprint, the potential effects are predicted to be negligible based on the presence of existing mine infrastructure, the lack of suitable caribou habitat and the relatively small number of caribou that use East Island during spring and fall migration. Measures proposed to mitigate the potential for alteration of wildlife, including caribou, movement within the project site include the following: 1. Installing above-ground pipelines to parallel existing infrastructure generally at heights below 0.5 m or above 2 m (bottom of pipe) and furnish pipelines with within the 0.5 to 2 m range with granular ramps at least 20 m and spaced at strategic locations to facilitate passage of caribou and other large wildlife. 2. Temporarily suspending construction activities when caribou safety is threatened and using appropriate herding techniques to remove caribou from hazardous areas before resuming activities. Please refer to DDMI's responses to MVEIRB IR#51 for additional proposed caribou protection measures.
36	Additonal pipelines	**Comment** Capacity of existing drainage control and collection system **Recommendation** Explain the capacity of the existing drainage control and collection system. Specifically, whether or not the existing system has the capacity to isolate potential spills from additional pipelines.	**July 4:** The Drainage Control and Collection System consists of a network of ditches and ponds with the purpose to intercept and collect runoff and seepage waters from various areas of the site prior to entering the receiving environment. Collection ponds are designed to hold, without discharge to the environment, 100% of a 1 in 100 year return period freshet occurring over an 8 day period. System design storage capacities along potential PKMW pipeline routes range between 26,500 to 54,000 m3 and new PKMW

			pipelines will follow the route of current pipelines and generally remain within the catchment of the current system. Should an uncontrolled release of PK occur outside the system, DDMI would treat this as a spill and it would be reported and cleaned up in accordance with the most recently approved Contingency Plan.
37	General	**Comment** Meromixis breakdown **Recommendation** Consider worst case scenario during post closure - all the pit lakes eventually become fully mixe, including beartooth and jay pit lakes at Ekati Diamond mine. Model the impact this would have on the water quality, fish and fish habitat, and traditional uses this would have on the Lac de Gras watershed.	**July 4:** It is DDMI's understanding that the appropriate Environmental Assessment methodology for Accidents and Malfunctions is to assess effects on a project specific rather than cumulative basis. Given that the event that might cause meromixis to break down in the pit lake has been defined as rare, it would be unreasonable to consider and assess multiple rare events occurring at the same time.
38	SIS, 4.9, p. 78	**Comment** The assessment of potential effects of the PKMW project on cultural uses is predicated on information regarding traditional land use contained in the 1998 Comprehensive Study Report. **Recommendation** The LKDFN did not provide traditional land use information for the initial EA. As such, TLU data is incomplete. Explain how effects on cultural use will be evaluated for the LKDFN.	**July 4:** As noted in Section 8.0 of the SIS, DDMI recognizes that the area around Lac de Gras was and continues to be highly valued by Indigenous groups for cultural and traditional uses. Potential effects on cultural use, including use by Lutsel K'e Dene First Nation, has been evaluated in the Cultural Use assessment, which adopted a conservative approach and assumed that that cultural use activities have the potential to occur within the RAA, even if the Indigenous groups did not specifically identify cultural use activities or site-specific uses as occurring there. As noted in Section 8.3.1 of the SIS, the assessment of potential effects of the PKMW Project on Cultural Use considers information regarding Indigenous groups and TLU provided in the 1998 Comprehensive Study, information shared by Indigenous participants in the DDMI TK Panel Reports, information contained in other TK reports and studies commissioned by DDMI, and a review of publicly available literature containing information about cultural use by potentially affected Indigenous groups. Sources consulted that contained information about Lutsel K'e Dene First Nation TLU included: - Parlee, B. and Lutsel K'e First Nation. 1997. Community Based Monitoring in the Slave Geological Province. Annual Report. - De Beers. 2012. Gahcho Kue´ Project; Environmental Impact Statement. Submitted to the Mackenzie Valley Environmental Impact Review Board. 2012 EIS supplemental information submission. - Golder. 2014. Traditional Land Use and Traditional Knowledge Baseline report for the Jay Project. Prepared for Dominion Diamond Ekati Corporation. - Weitzner, Viviane. 2006. "Dealing Full Force": Lutsel K'e Dene First Nation's Experience Negotiating with Mining Companies. The North-South institute and Lutsel K'e Dene First Nation. These sources are not specific to the PKMW Project, but have been consulted to deepen DDMI's understanding of the nature and context of cultural use by Lutsel K'e Dene First Nation in the region. DDMI acknowledges that TK is the intellectual property of Indigenous groups and knowledge holders; DDMI is committed to protecting the confidentiality of TK and respects the terms of use for each of the documents reviewed. Confidential TK studies or those stipulating one-time use were excluded from the review of publicly available documents. DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about Lutsel K'e Dene First Nation TLU in the area of Lac de Gras.
Mackenzie Valley Environmental Impact Review Board: Kate Mansfield			
ID	**Topic**	**Reviewer Comment/Recommendation**	**Proponent Response**
1	Summary	**Comment** In order for parties to craft relevant and focused	**May 10:** The requested Summary Impact Report (SIS) will be submitted separately by

	Impact Statement	information requests, the Review Board requires Diavik to submit a Summary Impact Statement. **Recommendation** Please see attachment for guidance on the Summary Impact Statement.	May 16, 2019, as it took more time/effort to prepare this document to meet requirements of the Mackenzie Valley Environmental Impact Review Board. The SIS will include detailed modelling results for the transport, deposition, and storage of processed kimberlite (PK), including extra fine processed kimberlite (EFPK) from the Processed Kimberlite Containment Facility, in A418, A154, and A21 mine workings based on scenarios 2a, 3a, and 4a (see Table 1, Page 7 of the DDMI Response to MVEIRB IRs Document [attached]). **June 20:** The requested Summary Impact Report (SIS) will be submitted separately by May 16, 2019, as it took more time/effort to prepare this document to meet requirements of the Mackenzie Valley Environmental Impact Review Board. The SIS will include detailed modelling results for the transport, deposition, and storage of processed kimberlite (PK), including extra fine processed kimberlite (EFPK) from the Processed Kimberlite Containment Facility, in A418, A154, and A21 mine workings based on scenarios 2a, 3a, and 4a (see Table 1, Page 7 of the DDMI Response to MVEIRB IRs Document [attached]).
2	Project description	**Comment** Diavik has applied for the option to put processed kimberlite in any or all of the pits and underground mine workings. The Review Board notes that A21 does not have underground mine workings but A48 and A514 do have underground mine workings. **Recommendation** 1. Considering the current mine plan and existing processed kimberlite storage requirements, please describe any circumstance under which Diavik would store processed kimberlite in more than one pit and associated mine workings. 2. If Diavik might store processed kimberlite in more than one pit and associated mine workings, please provide an assessment of the effects of doing so on the valued components and the worst-case scenario predictions.	**May 10:** 1. DDMI is seeking approval for the deposition of processed kimberlite (PK) into any combination of the three (3) mine workings (A418, A154 and A21). Based on the current mine plan, A418 is the preferred and likely option and A154 and A21 are alternates, subject to availability and changes to the mine plan. It is also plausible that, given coincident availability, deposition to a combination of mine workings would produce the lowest net effect on the water quality of Lac de Gras. An allowance for multiple mine workings may also be valuable if additional processing occurs beyond the currently defined resource (>5 Mm3) and / or additional PK is available for transfer from the Processed Kimberlite Containment (PKC) Facility to Mine Workings. These options, should they become available, would be evaluated in detail and permitted as part of ongoing closure planning. 2. Detailed modelling results of PK deposition scenarios were completed independently for the A418, A154 and A21 mine workings. Results demonstrate that surface water quality in each of the flooded pits remained below the Aquatic Effects Monitoring Program (AEMP) benchmarks for the duration of all model scenarios, with the exception of nitrite in the A21 Mine Working (discussion on nitrite was included in DDMI's response to the Wek'èezh?i Land and Water Board Technical Session IR-5). If water quality in each of the individual mine workings remained below AEMP benchmarks then any concurrent multi-pit release of pit water to Lac de Gras (LDG) would likely also result in LDG water quality below AEMP benchmarks. Please refer to the Summary Impact Statement for a comprehensive effects assessment for all valued components included in the Mackenzie Valley Environmental Impact Review Board's Scope of Assessment for the Processed Kimberlite to Mine Workings Proposal. **June 20:** 1. DDMI is seeking approval for the deposition of processed kimberlite (PK) into any combination of the three (3) mine workings (A418, A154 and A21). Based on the current mine plan, A418 is the preferred and likely option and A154 and A21 are alternates, subject to availability and changes to the mine plan. It is also plausible that, given coincident availability, deposition to a combination of mine workings would produce the lowest net effect on the water quality of Lac de Gras. An allowance for multiple mine workings may also be valuable if additional processing occurs beyond the currently defined resource (>5 Mm3) and / or additional PK is available for transfer from the Processed Kimberlite Containment (PKC) Facility to Mine Workings. These options, should they become available, would be evaluated in detail and permitted as part of ongoing closure planning. 2. Detailed modelling results of PK deposition scenarios were completed independently for the A418, A154 and A21 mine workings. Results demonstrate that surface water quality in each of the flooded pits remained below the Aquatic Effects Monitoring Program (AEMP) benchmarks for the duration of all model

			scenarios, with the exception of nitrite in the A21 Mine Working (discussion on nitrite was included in DDMI's response to the Wek'èezh?i Land and Water Board Technical Session IR-5). If water quality in each of the individual mine workings remained below AEMP benchmarks then any concurrent multi-pit release of pit water to Lac de Gras (LDG) would likely also result in LDG water quality below AEMP benchmarks. Please refer to the Summary Impact Statement for a comprehensive effects assessment for all valued components included in the Mackenzie Valley Environmental Impact Review Board's Scope of Assessment for the Processed Kimberlite to Mine Workings Proposal.
3	Re-mining the Processed Kimberlite Containment Facility and transporting extra fine processed kimberlite from the Processed Kimberlite Containment Facility to mine workings	**Comment** During the Wek'èezhi`i Land and Water Board process and the environmental assessment process, Diavik provided different statements about re-mining the (existing) Processed Kimberlite Containment Facility. During much of the Land and Water Board process, re-mining of the Processed Kimberlite Containment Facility and transporting extra fine processed kimberlite from the Processed Kimberlite Containment Facility to mine workings was considered part of the project and was included in modelling and studies. Most recently, in the online review comments during scoping for this environmental assessment, Diavik stated "…that the scope of development should not include the re-mining of processed kimberlite from the Processed Kimberlite Containment Facility". Re-mining the processed kimberlite containment facility has not been included in the scope of development for this environmental assessment. **Recommendation** How does Diavik's current plan to not re-mine the existing Processed Kimberlite Containment Facility affect the models, effects assessment, or alternatives assessment that Diavik has provided to date?	**May 10:** As explained in DDMI Letter of May 2, 2019 to the Mackenzie Valley Environmental Impact Review Board (MVEIRB), while re-mining of the Processed Kimberlite Containment (PKC) Facility is not an activity being considered within the scope of development, the scope of assessment and water quality modelling consider deposition of processed kimberlite (PK) regardless of source and explicitly include the PKC Facility as one of the sources (Scenario 3a). As part of the Summary Impact Statement to be submitted to the MVEIRB on May 16, 2019 in response to the MVEIRB's Information Request #1, DDMI has assessed the significance of effects and impacts to valued components from the transport, deposition, and storage of PK from all sources (including processed kimberlite from the PKC Facility) in the mine workings. Studies conducted by DDMI to support the design of the Project, including water quality modelling, likely operational conditions during deposition and storage of PK, environmental effects assessments, and alternatives analysis, have been informed by plans to transport and deposit PK from both the processing plant and the PKC Facility to mine workings on site. This assessment should support the MVEIRB in its Review of aspects of the Proposal associated with the transport, deposition and storage of PK in pits and underground mine workings. DDMI plans to continue to evaluate feasibility of activities associated with the removal of processed kimberlite from the PKC Facility as part of ongoing operations and closure planning. The feasibility study associated with the removal of processed kimberlite from the PKC Facility will be advanced once conceptual approval for the transport and storage of PK in mine workings is received from regulatory bodies, including MVEIRB and the Wek'èezh?i Land and Water Board, and would include an assessment of the preferred timing for removal of this material, in addition to evaluating PKC Facility design and closure considerations. DDMI will formally engage with stakeholders, including applicable regulatory bodies, regarding this option in the future. **June 20:** As explained in DDMI Letter of May 2, 2019 to the Mackenzie Valley Environmental Impact Review Board (MVEIRB), while re-mining of the Processed Kimberlite Containment (PKC) Facility is not an activity being considered within the scope of development, the scope of assessment and water quality modelling consider deposition of processed kimberlite (PK) regardless of source and explicitly include the PKC Facility as one of the sources (Scenario 3a). As part of the Summary Impact Statement to be submitted to the MVEIRB on May 16, 2019 in response to the MVEIRB's Information Request #1, DDMI has assessed the significance of effects and impacts to valued components from the transport, deposition, and storage of PK from all sources (including processed kimberlite from the PKC Facility) in the mine workings. Studies conducted by DDMI to support the design of the Project, including water quality modelling, likely operational conditions during deposition and storage of PK, environmental effects assessments, and alternatives analysis, have been informed by plans to transport and deposit PK from both the processing plant and the PKC Facility to mine workings on site. This assessment should support the MVEIRB in its Review of aspects of the Proposal associated with the transport, deposition and storage of PK in pits and underground mine

			workings. DDMI plans to continue to evaluate feasibility of activities associated with the removal of processed kimberlite from the PKC Facility as part of ongoing operations and closure planning. The feasibility study associated with the removal of processed kimberlite from the PKC Facility will be advanced once conceptual approval for the transport and storage of PK in mine workings is received from regulatory bodies, including MVEIRB and the Wek'èezh?i Land and Water Board, and would include an assessment of the preferred timing for removal of this material, in addition to evaluating PKC Facility design and closure considerations. DDMI will formally engage with stakeholders, including applicable regulatory bodies, regarding this option in the future.
4	Updates to monitoring, management, and closure and reclamation plans	**Comment** Based on the proposed changes to processed kimberlite storage, updates will be required to (at minimum) the Waste Management Plan, the Interim Closure and Reclamation Plan, and the Contingency Plan. Other plans and programs may also be affected by the proposal to put processed kimberlite into the pits and mine workings. **Recommendation** 1. Please identify all monitoring, management, and other plans that will require updates based on the proposal to put processed kimberlite into the pits and mine workings. 2. Please describe the changes that are required to each of these plans and programs.	**May 10:** 1. Monitoring Plan Updates: a. Surveillance Network Plan (SNP) during Operations b. Aquatic Effects Monitoring Plan (AEMP) and post closure site monitoring Management Plan Updates: a. Processed Kimberlite Containment Plan: Processed Kimberlite Containment Facility and Mine Workings (formerly the Processed Kimberlite Containment Facility Plan) b. Water Management Plan and Site Water Balance c. Contingency Plan d. Closure and Reclamation Plan e. Waste Management Plan 2. Monitoring Plan Updates: a. A new SNP station 1645-88 will be proposed based on the schedule in Table 2 (see Page 11 of the DDMI Response to MVEIRB IRs Document [attached]). b. AEMP and post closure site monitoring. Details on DDMI's post-closure monitoring program are presented in Appendix 1 the DDMI Response to MVEIRB IRs Document (attached). Management Plan Updates: a. Processed Kimberlite Containment Plan: Processed Kimberlite Containment Facility and Mine Workings (formerly the Processed Kimberlite Containment Facility Plan) – updated to include the following additional information: • a description, including maps to scale, of the locations of all monitoring stations within the Mine Workings, as well as discharge locations to and from the Mine Workings. The description should include the sampling protocols for each station; • a description of the management and scheduling of all Processed Kimberlite (PK) deposition within the Mine Workings; • stage-volume curves and water, solids and ice balance calculations showing life expectancy of the Mine Workings, as applicable • any operational and/or structural Modifications which may be implemented that will affect the management of the Mine Workings and associated wastewater operations; • a description of the methods that will be used to determine the volume in cubic metres of PK disposed of in the Mine Workings as well as the volumes disposed in, or relocated from, the Processed Kimberlite Containment Facility on an annual basis; and • a description of the procedures that will be used to characterize the consolidation properties and pore water quality of the processed kimberlite within the Mine Workings. b. Water Management Plan and Site Water Balance: updated to reflect operational water management shift from using the PKC as a source and sink for process water to the mine workings. There will be no change to the current single point of mine water discharge. All water will be treated at the North Inlet Water Treatment Plant (NIWTP) prior to entering Lac de Gras (LDG). Net impact to site water balance would be a modest decrease in gross transfers as underground mine dewatering demand decreases as mine workings are backfilled with PK. c. Contingency Plan - Administrative updates limited to updating Table 2: Summary of Environmental Risks, Management Actions & Contingencies to include the additional risk to pit lake water quality and the related risk management and contingencies identified in the PK to Mine Working pit lake modelling. d. Waste Management Plan – Administrative updates limited to identifying the location of additional PK mineral waste storage locations (Mine Workings). e. Closure and Reclamation Plan – Update to reflect closure considerations and monitoring requirements resulting from the disposal of PK in Mine Workings. The entire response to MVEIRB IR#4

			is also presented in the DDMI Response to MVEIRB IRs, Pages 10 to 13). **June 20:** 1. Monitoring Plan Updates: a. Surveillance Network Plan (SNP) during Operations b. Aquatic Effects Monitoring Plan (AEMP) and post closure site monitoring Management Plan Updates: a. Processed Kimberlite Containment Plan: Processed Kimberlite Containment Facility and Mine Workings (formerly the Processed Kimberlite Containment Facility Plan) b. Water Management Plan and Site Water Balance c. Contingency Plan d. Closure and Reclamation Plan e. Waste Management Plan 2. Monitoring Plan Updates: a. A new SNP station 1645-88 will be proposed based on the schedule in Table 2 (see Page 11 of the DDMI Response to MVEIRB IRs Document [attached]). b. AEMP and post closure site monitoring. Details on DDMI's post-closure monitoring program are presented in Appendix 1 the DDMI Response to MVEIRB IRs Document (attached). Management Plan Updates: a. Processed Kimberlite Containment Plan: Processed Kimberlite Containment Facility and Mine Workings (formerly the Processed Kimberlite Containment Facility Plan) – updated to include the following additional information: • a description, including maps to scale, of the locations of all monitoring stations within the Mine Workings, as well as discharge locations to and from the Mine Workings. The description should include the sampling protocols for each station; • a description of the management and scheduling of all Processed Kimberlite (PK) deposition within the Mine Workings; • stage-volume curves and water, solids and ice balance calculations showing life expectancy of the Mine Workings, as applicable • any operational and/or structural Modifications which may be implemented that will affect the management of the Mine Workings and associated wastewater operations; • a description of the methods that will be used to determine the volume in cubic metres of PK disposed of in the Mine Workings as well as the volumes disposed in, or relocated from, the Processed Kimberlite Containment Facility on an annual basis; and • a description of the procedures that will be used to characterize the consolidation properties and pore water quality of the processed kimberlite within the Mine Workings. b. Water Management Plan and Site Water Balance: updated to reflect operational water management shift from using the PKC as a source and sink for process water to the mine workings. There will be no change to the current single point of mine water discharge. All water will be treated at the North Inlet Water Treatment Plant (NIWTP) prior to entering Lac de Gras (LDG). Net impact to site water balance would be a modest decrease in gross transfers as underground mine dewatering demand decreases as mine workings are backfilled with PK. c. Contingency Plan - Administrative updates limited to updating Table 2: Summary of Environmental Risks, Management Actions & Contingencies to include the additional risk to pit lake water quality and the related risk management and contingencies identified in the PK to Mine Working pit lake modelling. d. Waste Management Plan – Administrative updates limited to identifying the location of additional PK mineral waste storage locations (Mine Workings). e. Closure and Reclamation Plan – Update to reflect closure considerations and monitoring requirements resulting from the disposal of PK in Mine Workings. The entire response to MVEIRB IR#4 is also presented in the DDMI Response to MVEIRB IRs, Pages 10 to 13).
5	Lessons learned and Ekati experience	**Comment** One of the reasons for the environmental assessment of this project was its use of new and untested technology in an ecologically and culturally sensitive area. Diavik mentioned that the Ekati Mine is disposing of processed kimberlite in pits at their mine (PR#34 p5). More details on the Ekati or other relevant projects would provide valuable comparative information. **Recommendation**	**May 10:** 1. DDMI has engaged with Dominion regarding their plans for depositing processed kimberlite (PK) in mine workings. The primary focus of this engagment has been with regard to regulatory requirements for PK deposition in the Panda and Koala Pits as this was proceeding at the same time as Diavik's Water License Ammendment application. The expert analysis and modelling Dominion had completed was to address their final Water License conditions that would allow PK deposition to proceed. The Wek'èezh?i Land and Water Board (WLWB) amended the Ekati Water License W2012L2-0001 to allow the deposit and storage of PK in the Panda and Koala pits in May 2017 Ekat

				1. Please provide further information describing the fine processed kimberlite disposal to mined out pits at Ekati. 2. What is the expected and observed water quality in the pits used for processed kimberlite storage at Ekati? 3. How well do the results to date agree with the modelled estimates? 4. Please provide a summary of results and lessons learned from any other mines that have used similar approaches (such as meromixis) to contain processed kimberlite or other mine wastes.	Water License Amendment Decision conditional on Part H Condition 2(c) requiring a revised Wastewater and Processed Kimberlite Management Plan (WPKMP) and Condition 33 requiring a Panda and Kola Deposition Study (Deposition Study). In January 2019 the WLWB approved submissions for both conditions and supported the deposition of processed kimberlite in the Panda and Koala open pits WLWB Approval - PK Deposition - Panda Koala. The Deposition Study approved by the WLWB included water quality modelling and the determination of a minimum freshwater cap depth PK Deposition Study - Panda Koala. DDMI reviewed the modelling approach taken by Dominion to address the final Water License conditions for a Deposition Study and decided to employ the same modelling approach to support the Water License application. While DDMI did not expect this level of detailed modelling would be required to support the amendment application, it was reasonable to assume it would likely be required to address a new future Water License condition so it would be proactive to begin this modelling work. DDMI retained the same expert water quality modelers from Golder Associates as Dominion and used the same mathematical models for consistency with what was approved by the WLWB and familiar to reviewers. The modelling work was designed to be phased with the initial preliminary modelling being conducted with the best available model input information at this time, including information from Ekati. A second phase of water quality modelling would be conducted prior to any deposition and submitted for final Water License approvals with updated model input information. The preliminary water quality modelling Diavik has conducted to date in support of the Environmental Assessment and Water License amendment application is more extensive than the modelling conducted to support the final approvals by the WLWB to allow deposition to proceed in the Panda and Koala open pits. In addition to considering the regulatory process followed by Dominion, DDMI was also aware that Dominion has already completed PK deposition into the Beartooth Pit. Ekati began depositing PK into Beartooth Pit in 2013 as shown in the Figure 1 (see Page 15 of the DDMI Response to MVEIRB IRs Document [attached]) provided by Dominion Diamonds. The Beartooth information was reviewed with Dominion to determine if there was information and/or learnings from this that would be applicable to Diavik. Dominion advised that water quality predictions for Beartooth were provided to the WLWB in the form of a Technical Memorandum (Golder 17 January 2018 Ekati- Pit Lake Closure Water Quality Modelling) included with Ekati's 2017 Annual Closure and Reclamation Progress Report Dominion 2017 Progress Report. DDMI did not consider this older water quality modelling when developing the modelling approach for Diavik. The most helpful information was the water quality monitoring information for the surface water that accumulated on top of the deposited PK within the Beartooth Pit. These monitoring results are not indicative of final surface water conditions as the freshwater cap had not yet been added to create the final pit lake. The water quality information was helpful however to confirm/supplement information regarding potential pore water quality. The water quality modelling of the Panda and Koala Pits assumed pore water quality was the same as the measured water quality from the Beartooth Pit. Table 3 (see Page 17 of the DDMI Response to MVEIRB IRs Document [attached]) summarizes the Beartooth Pit monitoring data, also used to represent pore water quality in final modelling of the Panda and Koala Pits, compared with the model input assumptions used most recently by Diavik for Scenarios 2a, 3a and 4a. The Beartooth Pit results are generally within the range of pore water conditions measured at Diavik with the exception of chloride. DDMI understands that the higher chloride levels at Beartooth are primarily related to groundwater that had accumulated in the pit bottom prior to PK deposition. DDMI would like to acknowledge the support from Dominion staff

and openness with sharing relevant Ekati information. 2. Expected water quality for the Beartooth Pit is provided by Dominion in Technical Memorandum (Golder 17 January 2018 Ekati - Pit Lake Closure Water Quality Modelling) included with Ekati's 2017 Annual Closure and Reclamation Progress Report. Dominion 2017 Progress Report. Expected water quality for the Panda and Kola Pits are included in the Panda and Koala Deposition Study PK Deposition Study - Panda Koala. Observed water quality in the Beartooth Pit, before addition of a freshwater cap, are summarized above in Table 3. There are no observed water quality data for the Panda or Koala Pits as PK deposition is only just proceeding. 3. DDMI has only briefly reviewed the original predictions of water quality for the Beartooth Pit to compare with monitoring data. A direct comparison of predicted and measured water quality is not appropriate because we understand that measured Beartooth water quality represents mostly accumulated PK slurry and pore water before a freshwater cap whereas the predictions represent conditions after a freshwater cap has been placed. The DDMI and Dominion pit lakes are expected to have very different water quality because of the location and resulting water balance for the respective pit lakes. Whereas Dominion's pit lakes will be located on land and will receive a large proportion of drainage from waste rock, DDMI's pit lakes will be located within Lac de Gras and the water balance will be driven by exchange with the lake. Therefore, in the long-term, the water quality in each pit lake will tend to resemble the water quality of its respective sources. 4. DDMI has considered the plans for and actual implementation of PK deposition to mine workings at Ekati as described above. DDMI will continue to follow and learn from these applications particularly if/when we move into engineering and deposition design. A summary of learnings to date from Ekati include: • Use of completed mine workings for PK deposition is practical at Ekati. • Deposition of PK into mine workings at Ekati is supported and has been approved by the WLWB. • The water quality modelling approach applied to the Panda and Koala Pits and the results obtained were approved by the WLWB. Learning was to use a similar approach where appropriate to maintain regulatory/reviewer familiarity and consistency. • Dominion concluded that a final water cover depth of 30 m was required compared with DDMI's preliminary determination of 50 m. • From a practical perspective DDMI learned about challenges/importance of considering pit access when designing the specifics of the deposition plan. • Accumulated PK pore water in the Beartooth Pit is generally similar to what DDMI anticipates for Diavik PK pore water. • Nitrite results for Beartooth, combined with limited nitrogen data for Diavik PK have resulted in DDMI placing a greater emphasis on nitrogen forms in ongoing PK test work than the previous approach of focusing on geochemistry. More broadly, the following is a general summary around the use of mine workings for storage of mine waste materials. This summary is based on a literature review of over 180 pit lakes from around the world representing the majority of published case studies globally (Golder 2017; Vandenberg and McCullough 2018, McCullough et al. 2018). DDMI found the Global Pit Lake Literature Review (Golder 2017) to be particularly useful to the the question of DDMI's pit lakes and the document is quoted extensively below, with minor re-wording for project-specific relevance. The review evaluated the risks and benefits of incorporating various mine wastes into pit lakes at mine closure, and found that the practice generally provides the following benefits: • moderation of peak flows and low flows, • reduced need for above-ground tailings storage facilities, • prevention of accidental releases, • long-term geophysical and geochemical stability, • prevention of acid and metalliferous drainage (AMD), • hydrogeological containment, • sediment trapping, and • water treatment, which may be passive or semi-passive (i.e., requiring occasional intervention). In contrast, the practice carries two main potential

risks, namely: • the creation or increase of legacy liability if improperly planned or if conditions and mine waste characteristics are not well understood, and • the creation a different environment compared to pre-development (which is almost always a foregone conclusion once an open-pit mine is initiated). Given that some pit lakes have become case studies in degraded environmental legacies, such as the superfund site Berkeley Pit Lake (Gammons 2006, 2009), a focus of the literature review was to understand which factors had led to the creation of successful versus unsuccessful pit lakes. Since few pit lakes fit these binary categories, success was defined where the pit lake: • met its intended purpose such as fish and wildlife habitat, aquaculture, drinking water, recreation, water treatment, or other uses desired by stakeholders; and/or, • had been certified for relinquishment by regulators. The term unsuccessful applies to pit lakes that: • have long-term water quality issues, requiring indefinite water treatment or artificial containment; • did not meet regulatory requirements; and/or • are not following a deliberately planned trajectory toward meeting regulatory requirements. Notably, the inclusion or exclusion of tailings from pit lakes was not a major differentiator in terms of successful outcomes globally. There are both successful and unsuccessful examples of pit lakes with and without tailings, and success or failure was determined by other factors. A common theme associated with successful pit lakes is adherence to the following practices: • study and understand the regulatory, social and environmental aspects as early in the mine life as possible, then manage appropriately; with monitoring demonstrating objective achievement and feeding back into a pre-developed adaptive management plan; and • attain a detailed knowledge of mine pit construction and waste materials, and incorporate that knowledge into a comprehensive mine closure plan that identifies the most appropriate method of treating and storing each waste stream, and that is developed in advance of mining and adaptively managed throughout operations. A common theme associated with unsuccessful pit lake case studies encountered in the case studies is: • mining began before regulatory standards required a full closure plan, and before mine waste characterization and predictive modelling approaches became industry standards. The literature review concluded that there were three (3) primary lessons for operators that are considering future placement of mine waste inside mine workings: • Early planning is key – few closure management options exist at completion of a mine void, particularly so in the context of a largely completed overall mine site. Development of successful pit lakes typically entailed strategically identifying factors that are critical their success, then incorporating those factors into adaptive closure planning, well in advance of 'Rubicon' moments of mine development. • Problematic geochemistry must be understood and managed – most unsuccessful pit lake closures resulted from misunderstood and/or mismanaged enriched geochemistry within the pit void shell or in-pit waste materials, or by altering the conditions (e.g., redox, moisture) to which mine waste is exposed without understanding the implications of those alterations. A common outcome of this misunderstanding or mismanagement is AMD leading to low pH and elevated metal concentrations and salinity. • Holistic planning views the pit lake as one part of a larger closure landscape – successful pit lake closures were typically well-planned in advance and in consideration of other post-mining landform elements across the closure landscape. Holistic planning may improve overall mine closure outcomes (reduced risk and liability) at the expense of reduced pit lake success. DDMI considers the present state of planning and management of the pit lakes appropriate for the stage of the mining (i.e., pre-closure). For example, DDMI has a good working knowledge of the materials to be placed in the pit, and is working with the University of Alberta, in-house experts and consultants to close remaining knowledge gaps. The timelines to address the

remaining knowledge gaps are shorter than the timelines to place materials in the pits, so there is adequate time to adapt plans if detailed information indicates a need to do so. Additionally, DDMI is considering the placement of materials in the pit as part of holistic mine closure planning, meaning that while there is always a non-zero level of risk associated with mine closure, the overall level of residual risk is lowest with the materials in the pits under tens of meters of water, as opposed to on land in any sort of terrestrial landform. The entire response to MVEIRB IR#5 is also presented in the DDMI Response to MVEIRB IRs, Pages 13 to 22). References Gammons CH, Duaime TE. 2006. Long term changes in the limnology and geochemistry of the Berkeley pit lake, Butte, Montana. Mine Water and the Environment. 25(2):76-85. Gammons CH. 2009. Subaqueous oxidation of pyrite in pit lakes. In, Mine Pit Lakes: Characteristics, Predictive Modeling, and Sustainability Chap. 12. In: Castendyk, D. & Eary, T. Society for Mining, Metallurgy, and Exploration SME, Colorado, USA, 137-145pp. Golder. 2017. Literature Review of Global Pit Lakes. Available at: https://www.cosia.ca/sites/default/files/attachments/Literature Review of Global Pit Lakes_0.pdf 91 pp. Calgary, Canada. **June 20:** 1. DDMI has engaged with Dominion regarding their plans for depositing processed kimberlite (PK) in mine workings. The primary focus of this engagment has been with regard to regulatory requirements for PK deposition in the Panda and Koala Pits as this was proceeding at the same time as Diavik's Water License Ammendment application. The expert analysis and modelling Dominion had completed was to address their final Water License conditions that would allow PK deposition to proceed. The Wek'èezh?i Land and Water Board (WLWB) amended the Ekati Water License W2012L2-0001 to allow the deposit and storage of PK in the Panda and Koala pits in May 2017 Ekati Water License Amendment Decision conditional on Part H Condition 2(c) requiring a revised Wastewater and Processed Kimberlite Management Plan (WPKMP) and Condition 33 requiring a Panda and Kola Deposition Study (Deposition Study). In January 2019 the WLWB approved submissions for both conditions and supported the deposition of processed kimberlite in the Panda and Koala open pits WLWB Approval - PK Deposition - Panda Koala. The Deposition Study approved by the WLWB included water quality modelling and the determination of a minimum freshwater cap depth PK Deposition Study - Panda Koala. DDMI reviewed the modelling approach taken by Dominion to address the final Water License conditions for a Deposition Study and decided to employ the same modelling approach to support the Water License application. While DDMI did not expect this level of detailed modelling would be required to support the amendment application, it was reasonable to assume it would likely be required to address a new future Water License condition so it would be proactive to begin this modelling work. DDMI retained the same expert water quality modelers from Golder Associates as Dominion and used the same mathematical models for consistency with what was approved by the WLWB and familiar to reviewers. The modelling work was designed to be phased with the initial preliminary modelling being conducted with the best available model input information at this time, including information from Ekati. A second phase of water quality modelling would be conducted prior to any deposition and submitted for final Water License approvals with updated model input information. The preliminary water quality modelling Diavik has conducted to date in support of the Environmental Assessment and Water License amendment application is more extensive than the modelling conducted to support the final approvals by the WLWB to allow deposition to proceed in the Panda and Koala open pits. In addition to considering the regulatory process followed by Dominion, DDMI was also aware that Dominion has already completed PK deposition into the Beartooth Pit. Ekati began depositing PK into Beartooth Pit in 2013 as shown in the Figure 1 (see Page

15 of the DDMI Response to MVEIRB IRs Document [attached]) provided by Dominion Diamonds. The Beartooth information was reviewed with Dominion to determine if there was information and/or learnings from this that would be applicable to Diavik. Dominion advised that water quality predictions for Beartooth were provided to the WLWB in the form of a Technical Memorandum (Golder 17 January 2018 Ekati- Pit Lake Closure Water Quality Modelling) included with Ekati's 2017 Annual Closure and Reclamation Progress Report Dominion 2017 Progress Report. DDMI did not consider this older water quality modelling when developing the modelling approach for Diavik. The most helpful information was the water quality monitoring information for the surface water that accumulated on top of the deposited PK within the Beartooth Pit. These monitoring results are not indicative of final surface water conditions as the freshwater cap had not yet been added to create the final pit lake. The water quality information was helpful however to confirm/supplement information regarding potential pore water quality. The water quality modelling of the Panda and Koala Pits assumed pore water quality was the same as the measured water quality from the Beartooth Pit. Table 3 (see Page 17 of the DDMI Response to MVEIRB IRs Document [attached]) summarizes the Beartooth Pit monitoring data, also used to represent pore water quality in final modelling of the Panda and Koala Pits, compared with the model input assumptions used most recently by Diavik for Scenarios 2a, 3a and 4a. The Beartooth Pit results are generally within the range of pore water conditions measured at Diavik with the exception of chloride. DDMI understands that the higher chloride levels at Beartooth are primarily related to groundwater that had accumulated in the pit bottom prior to PK deposition. DDMI would like to acknowledge the support from Dominion staff and openness with sharing relevant Ekati information. 2. Expected water quality for the Beartooth Pit is provided by Dominion in Technical Memorandum (Golder 17 January 2018 Ekati - Pit Lake Closure Water Quality Modelling) included with Ekati's 2017 Annual Closure and Reclamation Progress Report. Dominion 2017 Progress Report. Expected water quality for the Panda and Kola Pits are included in the Panda and Koala Deposition Study PK Deposition Study - Panda Koala. Observed water quality in the Beartooth Pit, before addition of a freshwater cap, are summarized above in Table 3. There are no observed water quality data for the Panda or Koala Pits as PK deposition is only just proceeding. 3. DDMI has only briefly reviewed the original predictions of water quality for the Beartooth Pit to compare with monitoring data. A direct comparison of predicted and measured water quality is not appropriate because we understand that measured Beartooth water quality represents mostly accumulated PK slurry and pore water before a freshwater cap whereas the predictions represent conditions after a freshwater cap has been placed. The DDMI and Dominion pit lakes are expected to have very different water quality because of the location and resulting water balance for the respective pit lakes. Whereas Dominion's pit lakes will be located on land and will receive a large proportion of drainage from waste rock, DDMI's pit lakes will be located within Lac de Gras and the water balance will be driven by exchange with the lake. Therefore, in the long-term, the water quality in each pit lake will tend to resemble the water quality of its respective sources. 4. DDMI has considered the plans for and actual implementation of PK deposition to mine workings at Ekati as described above. DDMI will continue to follow and learn from these applications particularly if/when we move into engineering and deposition design. A summary of learnings to date from Ekati include: • Use of completed mine workings for PK deposition is practical at Ekati. • Deposition of PK into mine workings at Ekati is supported and has been approved by the WLWB. • The water quality modelling approach applied to the Panda and Koala Pits and the results obtained were approved by the WLWB. Learning was

to use a similar approach where appropriate to maintain regulatory/reviewer familiarity and consistency. • Dominion concluded that a final water cover depth of 30 m was required compared with DDMI's preliminary determination of 50 m. • From a practical perspective DDMI learned about challenges/importance of considering pit access when designing the specifics of the deposition plan. • Accumulated PK pore water in the Beartooth Pit is generally similar to what DDMI anticipates for Diavik PK pore water. • Nitrite results for Beartooth, combined with limited nitrogen data for Diavik PK have resulted in DDMI placing a greater emphasis on nitrogen forms in ongoing PK test work than the previous approach of focusing on geochemistry. More broadly, the following is a general summary around the use of mine workings for storage of mine waste materials. This summary is based on a literature review of over 180 pit lakes from around the world representing the majority of published case studies globally (Golder 2017; Vandenberg and McCullough 2018, McCullough et al. 2018). DDMI found the Global Pit Lake Literature Review (Golder 2017) to be particularly useful to the the question of DDMI's pit lakes and the document is quoted extensively below, with minor re-wording for project-specific relevance. The review evaluated the risks and benefits of incorporating various mine wastes into pit lakes at mine closure, and found that the practice generally provides the following benefits: • moderation of peak flows and low flows, • reduced need for above-ground tailings storage facilities, • prevention of accidental releases, • long-term geophysical and geochemical stability, • prevention of acid and metalliferous drainage (AMD), • hydrogeological containment, • sediment trapping, and • water treatment, which may be passive or semi-passive (i.e., requiring occasional intervention). In contrast, the practice carries two main potential risks, namely: • the creation or increase of legacy liability if improperly planned or if conditions and mine waste characteristics are not well understood, and • the creation a different environment compared to pre-development (which is almost always a foregone conclusion once an open-pit mine is initiated). Given that some pit lakes have become case studies in degraded environmental legacies, such as the superfund site Berkeley Pit Lake (Gammons 2006, 2009), a focus of the literature review was to understand which factors had led to the creation of successful versus unsuccessful pit lakes. Since few pit lakes fit these binary categories, success was defined where the pit lake: • met its intended purpose such as fish and wildlife habitat, aquaculture, drinking water, recreation, water treatment, or other uses desired by stakeholders; and/or, • had been certified for relinquishment by regulators. The term unsuccessful applies to pit lakes that: • have long-term water quality issues, requiring indefinite water treatment or artificial containment; • did not meet regulatory requirements; and/or • are not following a deliberately planned trajectory toward meeting regulatory requirements. Notably, the inclusion or exclusion of tailings from pit lakes was not a major differentiator in terms of successful outcomes globally. There are both successful and unsuccessful examples of pit lakes with and without tailings, and success or failure was determined by other factors. A common theme associated with successful pit lakes is adherence to the following practices: • study and understand the regulatory, social and environmental aspects as early in the mine life as possible, then manage appropriately; with monitoring demonstrating objective achievement and feeding back into a pre-developed adaptive management plan; and • attain a detailed knowledge of mine pit construction and waste materials, and incorporate that knowledge into a comprehensive mine closure plan that identifies the most appropriate method of treating and storing each waste stream, and that is developed in advance of mining and adaptively managed throughout operations. A common theme associated with unsuccessful pit lake case studies encountered in the case studies is: • mining began

			before regulatory standards required a full closure plan, and before mine waste characterization and predictive modelling approaches became industry standards. The literature review concluded that there were three (3) primary lessons for operators that are considering future placement of mine waste inside mine workings: • Early planning is key – few closure management options exist at completion of a mine void, particularly so in the context of a largely completed overall mine site. Development of successful pit lakes typically entailed strategically identifying factors that are critical their success, then incorporating those factors into adaptive closure planning, well in advance of 'Rubicon' moments of mine development. • Problematic geochemistry must be understood and managed – most unsuccessful pit lake closures resulted from misunderstood and/or mismanaged enriched geochemistry within the pit void shell or in-pit waste materials, or by altering the conditions (e.g., redox, moisture) to which mine waste is exposed without understanding the implications of those alterations. A common outcome of this misunderstanding or mismanagement is AMD leading to low pH and elevated metal concentrations and salinity. • Holistic planning views the pit lake as one part of a larger closure landscape – successful pit lake closures were typically well-planned in advance and in consideration of other post-mining landform elements across the closure landscape. Holistic planning may improve overall mine closure outcomes (reduced risk and liability) at the expense of reduced pit lake success. DDMI considers the present state of planning and management of the pit lakes appropriate for the stage of the mining (i.e., pre-closure). For example, DDMI has a good working knowledge of the materials to be placed in the pit, and is working with the University of Alberta, in-house experts and consultants to close remaining knowledge gaps. The timelines to address the remaining knowledge gaps are shorter than the timelines to place materials in the pits, so there is adequate time to adapt plans if detailed information indicates a need to do so. Additionally, DDMI is considering the placement of materials in the pit as part of holistic mine closure planning, meaning that while there is always a non-zero level of risk associated with mine closure, the overall level of residual risk is lowest with the materials in the pits under tens of meters of water, as opposed to on land in any sort of terrestrial landform. The entire response to MVEIRB IR#5 is also presented in the DDMI Response to MVEIRB IRs, Pages 13 to 22). References Gammons CH, Duaime TE. 2006. Long term changes in the limnology and geochemistry of the Berkeley pit lake, Butte, Montana. Mine Water and the Environment. 25(2):76-85. Gammons CH. 2009. Subaqueous oxidation of pyrite in pit lakes. In, Mine Pit Lakes: Characteristics, Predictive Modeling, and Sustainability Chap. 12. In: Castendyk, D. & Eary, T. Society for Mining, Metallurgy, and Exploration SME, Colorado, USA, 137-145pp. Golder. 2017. Literature Review of Global Pit Lakes. Available at: https://www.cosia.ca/sites/default/files/attachments/Literature Review of Global Pit Lakes_0.pdf 91 pp. Calgary, Canada.
6	Project alternatives	**Comment** Diavik has identified that two of the key disadvantages of its Option 1, a traditional dam raise, are footprint restrictions and limited closure options (PR#5 PDF p30). The preferred option includes both a dam raise and depositing processed kimberlite into mine workings. Diavik has also requested that re-mining the existing Processed Kimberlite Containment Facility be removed from the scope of development for this project. **Recommendation** Considering that Option 1 is permitted and feasible, how are the space constraints enough of a disadvantage to make this option unacceptable?	**May 10:** Lateral space constraints, an inability to expand the Processed Kimberlite Containment (PKC) Facility footprint outwards, result in a design focused on vertical expansion through traditional dam raises. While this type of expansion is permitted and technically feasible, the result is a taller land based PKC Facility, which will need to be managed into closure. DDMI considers the option of permanent subaqeous disposal of processed kimberlite in mine workings to be beneficial when compared to any land based storage option. This technical judgement exists regardless of the option between dam expansions which focus on unconstrained outward or constrained upward expansion. The original mine plan in 1999 did not identify that completed mine workings would be available for the purpose of deposition of processed kimberlite (PK). The mine plan has evolved over time and in 2017 DDMI identified an opportunity to consider the A418 mine

			workings for processed kimberlite disposal starting in 2022. The concept of PK deposition in mine workings was discussed during the 1999 Environmental Assessment for the Diavik Diamond Mine Project and the Responsible Authorities at the time recommended that Diavik pursue "…opportunities to use processed kimberlite as underground backfill to reduce the long term mitigation requirements of the PKC facility" (Comprehensive Study Report pg 54). While an additional dam raise is acceptable, DDMI is challenging the status quo and following through with the recommendation from the Responsible Authorities in the persuit of management options which present a lower risk and more permanent disposal solution. **June 20:** Lateral space constraints, an inability to expand the Processed Kimberlite Containment (PKC) Facility footprint outwards, result in a design focused on vertical expansion through traditional dam raises. While this type of expansion is permitted and technically feasible, the result is a taller land based PKC Facility, which will need to be managed into closure. DDMI considers the option of permanent subaqeous disposal of processed kimberlite in mine workings to be beneficial when compared to any land based storage option. This technical judgement exists regardless of the option between dam expansions which focus on unconstrained outward or constrained upward expansion. The original mine plan in 1999 did not identify that completed mine workings would be available for the purpose of deposition of processed kimberlite (PK). The mine plan has evolved over time and in 2017 DDMI identified an opportunity to consider the A418 mine workings for processed kimberlite disposal starting in 2022. The concept of PK deposition in mine workings was discussed during the 1999 Environmental Assessment for the Diavik Diamond Mine Project and the Responsible Authorities at the time recommended that Diavik pursue "…opportunities to use processed kimberlite as underground backfill to reduce the long term mitigation requirements of the PKC facility" (Comprehensive Study Report pg 54). While an additional dam raise is acceptable, DDMI is challenging the status quo and following through with the recommendation from the Responsible Authorities in the persuit of management options which present a lower risk and more permanent disposal solution.
7	Environmental risks of the existing Processed Kimberlite Containment Facility	**Comment** Diavik states that depositing processed kimberlite in pits "[r]educes environmental risks related to PK storage" and addresses concerns regarding the long-term stability and environmental risks of the Processed Kimberlite Containment Facility (PR#13 PDF p9, 13). In 1999, the EA was approved with a conclusion of no significant adverse effects related to long term disposal of processed kimberlite in the Processed Kimberlite Containment Facility (PR#29). **Recommendation** 1. Please describe the concerns relating to long-term stability and environmental risks associated with continued or expanded processed kimberlite storage in the Processed Kimberlite Containment Facility. 2. Have these risks changed since the 1999 environmental assessment? 3. Are the environmental risks in question solely linked to increasing dam height of the Processed Kimberlite Containment Facility to accommodate processed kimberlite storage requirements for the remainder of mine life? If not, please describe additional risks that need to be managed.	**May 10:** 1. DDMI has received approval for designs involving dam raises to enable storage of all PK on-land in the Processed Kimberlite Containment (PKC) Facility. These designs can be constructed, operated and closed safely or they would not have been proposed or approved. Having said that, storage of processed kimberlite (PK) on-land was not the preferred storage option from a technical perspective. DDMI identified that from a geochemical and closure perspective the better option would be to store PK below Lac de Gras (see Comprehensive Study Report Section 4.3.1 Alternative #3). For these same geochemical and closure reasons, storage of PK in mine workings is beneficial to storage on-land. DDMI has identified technical closure challenges that have resulted from the decision to store PK on-land. In addition to general geochemical (water quality) concerns, DDMI has identified a closure challenge with the extra fine processed kimberlite or EFPK (also referred to as "slimes") fraction of PK that accumulates in the center of the PKC Facility. EFPK has the consistency of toothpaste that would likely not be safe for people or wildlife if it was accessible post-closoure. DDMI's preferred closure option, and the one that is approved by the WLWB, is to mainatin a pond over the EFPK post-closure ("wet-cover option") such that people and wildlife would not come into direct contact with the EFPK. The identified uncertainty with this closure option is the ability to maintain a pond given current seepage rates from the facility. If PK deposition into mine workings is permitted, DDMI would be able to commence closure of the PKC Facility several years sooner. This would start with dewatering the facility to allow further development of frozen conditions reducing seepage to improve expected ability to maintain a closure

			4. How much processed kimberlite is in the Processed Kimberlite Containment Facility now?	pond. An alternative to the wet-cover option is to remove some or all of the EFPK from the PKC Facility and instead of a closure pond leave the facility in a dry but stable surface ("dry-cover" option). If PK deposition into mine workings is permitted, it would enable consideration of a dry-cover option because the EFPK could be disposed of in the mine workings. Without the option to dispose of PK in the mine workings, there is no other practical location to store EFPK that has been removed from the PKC Facility. 2. The geochemical and closure risks with on-land storage of processed kimberlite identified in the 1999 environmental assessment remain. See 1 above. 3. Please see 1 above. 4. There are currently about 33.4 Mt of processed kimberlite, both coarse and fine fractions, in the PKC Facility. **June 20:** 1. DDMI has received approval for designs involving dam raises to enable storage of all PK on-land in the Processed Kimberlite Containment (PKC) Facility. These designs can be constructed, operated and closed safely or they would not have been proposed or approved. Having said that, storage of processed kimberlite (PK) on-land was not the preferred storage option from a technical perspective. DDMI identified that from a geochemical and closure perspective the better option would be to store PK below Lac de Gras (see Comprehensive Study Report Section 4.3.1 Alternative #3). For these same geochemical and closure reasons, storage of PK in mine workings is beneficial to storage on-land. DDMI has identified technical closure challenges that have resulted from the decision to store PK on-land. In addition to general geochemical (water quality) concerns, DDMI has identified a closure challenge with the extra fine processed kimberlite or EFPK (also referred to as "slimes") fraction of PK that accumulates in the center of the PKC Facility. EFPK has the consistency of toothpaste that would likely not be safe for people or wildlife if it was accessible post-closoure. DDMI's preferred closure option, and the one that is approved by the WLWB, is to mainatin a pond over the EFPK post-closure ("wet-cover option") such that people and wildlife would not come into direct contact with the EFPK. The identified uncertainty with this closure option is the ability to maintain a pond given current seepage rates from the facility. If PK deposition into mine workings is permitted, DDMI would be able to commence closure of the PKC Facility several years sooner. This would start with dewatering the facility to allow further development of frozen conditions reducing seepage to improve expected ability to maintain a closure pond. An alternative to the wet-cover option is to remove some or all of the EFPK from the PKC Facility and instead of a closure pond leave the facility in a dry but stable surface ("dry-cover" option). If PK deposition into mine workings is permitted, it would enable consideration of a dry-cover option because the EFPK could be disposed of in the mine workings. Without the option to dispose of PK in the mine workings, there is no other practical location to store EFPK that has been removed from the PKC Facility. 2. The geochemical and closure risks with on-land storage of processed kimberlite identified in the 1999 environmental assessment remain. See 1 above. 3. Please see 1 above. 4. There are currently about 33.4 Mt of processed kimberlite, both coarse and fine fractions, in the PKC Facility.
8	Volume of processed kimberlite to be deposited	**Comment** Diavik described a scenario for "maximum possible PK deposition – for example A418 – 23.9 Mt vs current concept of 4.1 Mt" (PR#13 PDF p84). **Recommendation** 1. What is the source of the additional 19.8 million tonnes of processed kimberlite referenced in the "maximum PK deposition scenario"?	**May 10:** 1. The 23.9 Mt processed kimberlite mass used in the initial model scenarios was selected as an extreme worst-case mass of processed kimberlite (PK) deposion to simulate the corresponding worst-case effect to pit water quality. The current mine plan does not identify any conceivable scenario where 23.9 Mt of PK would be deposited into a mine working. Subsequent 'realistic' model scenarios evaluated the depostion of 4 Mt (5 Mm3) (Scenarios 2a and 4a) of fine processed kimberlite (FPK) or 4 Mt of FPK overlain by 4 Mm3 of extra fine processed kimberlite (EFPK) (3a) in each of the A418, A154 and A21 Mine Working. These results will be presented in detail in the Summary Impact Statement. 2. Deposition of PK exceeding the modelled 4 Mt of FPK and 4 Mt of EFPK may occur if

		2. When would the additional processed kimberlite be placed and how does this influence the Closure Plan for the site? 3. Please describe the depth of the freshwater cap on the A418 pit if all 23.9 MT of PK were to be deposited there.	additional mineral processing occurs beyond the currently defined mineral resource and / or additional PK is available for transfer from the PKC Facility to Mine Workings. Based on the results of pit lake modelling to date, a 50 m water cap is sufficient to establish stable meromixis and maintain surface and 40 m depth water quality below Aquatic Effects Monitoring Program (AEMP) benchmarks under expected conditions. The depostion of additional PK would be permitted as part of ongoing closure planning including updates to the Plan. 3. As described, the 23.9 Mt deposition scenario is not considered to be likely. If this mass of PK were deposited in the A418 mine working, the post PK consolidation water cap thickness would be roughtly 60m. Model results presented in the Water License Amendment Technical Session IRs suggest this is an adequate water cap thickness to maintain surface water quality in the A418 pit lake below AEMP Benchmarks. **June 20:** 1. The 23.9 Mt processed kimberlite mass used in the initial model scenarios was selected as an extreme worst-case mass of processed kimberlite (PK) deposion to simulate the corresponding worst-case effect to pit water quality. The current mine plan does not identify any conceivable scenario where 23.9 Mt of PK would be deposited into a mine working. Subsequent 'realistic' model scenarios evaluated the depostion of 4 Mt (5 Mm3) (Scenarios 2a and 4a) of fine processed kimberlite (FPK) or 4 Mt of FPK overlain by 4 Mm3 of extra fine processed kimberlite (EFPK) (3a) in each of the A418, A154 and A21 Mine Working. These results will be presented in detail in the Summary Impact Statement. 2. Deposition of PK exceeding the modelled 4 Mt of FPK and 4 Mt of EFPK may occur if additional mineral processing occurs beyond the currently defined mineral resource and / or additional PK is available for transfer from the PKC Facility to Mine Workings. Based on the results of pit lake modelling to date, a 50 m water cap is sufficient to establish stable meromixis and maintain surface and 40 m depth water quality below Aquatic Effects Monitoring Program (AEMP) benchmarks under expected conditions. The depostion of additional PK would be permitted as part of ongoing closure planning including updates to the Plan. 3. As described, the 23.9 Mt deposition scenario is not considered to be likely. If this mass of PK were deposited in the A418 mine working, the post PK consolidation water cap thickness would be roughtly 60m. Model results presented in the Water License Amendment Technical Session IRs suggest this is an adequate water cap thickness to maintain surface water quality in the A418 pit lake below AEMP Benchmarks.
9	Potential impacts associated with not re-connecting the pit lakes to Lac de Gras	**Comment** During the first round of information requests on the water licence amendment application process, the Wek'èezhìı Land and Water Board asked Diavik: "If reconnection is not possible, how would this affect future use of the flooded pits?" (PR#22, WLWB IR-18(4)). Diavik's response was that, if reconnection was not possible, "...this area would no longer be available as fish habitat. In addition, this area would no longer be navigable by boat via Lac de Gras". The scope of assessment for this environmental assessment (EA) includes, but is not limited to, consideration of impacts to traditional use of the area and wildlife. **Recommendation** 1. Please describe any additional potential impacts of not re-connecting the pits to Lac de Gras during closure, given the scope of assessment for this EA. 2. Please describe what mitigation options are available to Diavik to minimize any additional potential impacts	**May 10:** 1. The 1998 Environmental Assessment Report – Fish and Water (DDMI 1998), associated with the the environmental review of the the original Diavik Diamond Mine Project, evaluated the impact of habitat loss in Section 6.4.7. During operations when the fish habitat within all of the dike areas were assumed to be lost from Lac de Gras, this was considered to have a "negligible" effect , with respect to magnitude, based on the determination tha fish habitat loss would represent less than 1% of available fish habitat in Lac de Gras. If reconnection of all three dikes was not preferred, as posed in Question 1, then the magnitude of potential effects would be classified as "negligible" (see DDMI 1998 Table 6-48) and the extent would be regional. What would change would be the duration of this effect. The original environmental assessment assumed reconnection and as such classified the habitat loss as "mid-term" duration to reflect that the loss would only occur during the period of operations. If reconnection was not possible, the duration would change from "mid-term" to "long-term" (see Comprehensive Study Report [CSR] Table 2-1 for summary of duration definitions). In summary, not re-connecting any of the dike areas with Lac de Gras would change the effects classification from mid-term duration of negligible magnitude to a long-term duration with a negligible magnitude, both at a regional scale. Applying the CSR definitions of significance (CSR Section 2.4.3) would conclude that not reconnecting the dike areas with Lac de Gras would not cause a

		associated with not reconnecting the pit(s) containing processed kimberlite to Lac de Gras. 3. Please describe the implications of not reconnecting the pit lakes on the approved DFO *No Net Loss Plan* and how those habitat losses would be mitigated.	significant adverse effect. 2. Current water quality modelling does not suggest there is a significant risk of pit lake water quality preventing reconnection to Lac de Gras. If reconnection is not possible, this area would no longer be available as fish habitat. Possible contingency measures that would be considered if water quality in the pits does not reach established criteria includes the evaluation of insitu treatment options. Mine workings would not be reconnected to Lac de Gras until established criteria are met. Please refer to the Summary Impact Statement for a more comprehensive effects assessment. 3. The compensation plan developed with Fisheries and Oceans Canada (DFO) to address the "No Net Loss" policy that existed in 1998 is based on re-connecting the dike areas. An alternative compensation plan would need to be developed with DFO and communities, and for DFO approval, if the preference was to not re-connect the pit lakes to Lac de Gras. **June 20:** 1. The 1998 Environmental Assessment Report – Fish and Water (DDMI 1998), associated with the the environmental review of the the original Diavik Diamond Mine Project, evaluated the impact of habitat loss in Section 6.4.7. During operations when the fish habitat within all of the dike areas were assumed to be lost from Lac de Gras, this was considered to have a "negligible" effect , with respect to magnitude, based on the determination tha fish habitat loss would represent less than 1% of available fish habitat in Lac de Gras. If reconnection of all three dikes was not preferred, as posed in Question 1, then the magnitude of potential effects would be classified as "negligible" (see DDMI 1998 Table 6-48) and the extent would be regional. What would change would be the duration of this effect. The original environmental assessment assumed reconnection and as such classified the habitat loss as "mid-term" duration to reflect that the loss would only occur during the period of operations. If reconnection was not possible, the duration would change from "mid-term" to "long-term" (see Comprehensive Study Report [CSR] Table 2-1 for summary of duration definitions). In summary, not re-connecting any of the dike areas with Lac de Gras would change the effects classification from mid-term duration of negligible magnitude to a long-term duration with a negligible magnitude, both at a regional scale. Applying the CSR definitions of significance (CSR Section 2.4.3) would conclude that not reconnecting the dike areas with Lac de Gras would not cause a significant adverse effect. 2. Current water quality modelling does not suggest there is a significant risk of pit lake water quality preventing reconnection to Lac de Gras. If reconnection is not possible, this area would no longer be available as fish habitat. Possible contingency measures that would be considered if water quality in the pits does not reach established criteria includes the evaluation of insitu treatment options. Mine workings would not be reconnected to Lac de Gras until established criteria are met. Please refer to the Summary Impact Statement for a more comprehensive effects assessment. 3. The compensation plan developed with Fisheries and Oceans Canada (DFO) to address the "No Net Loss" policy that existed in 1998 is based on re-connecting the dike areas. An alternative compensation plan would need to be developed with DFO and communities, and for DFO approval, if the preference was to not re-connect the pit lakes to Lac de Gras.
10	Establishing re-connection criteria	**Comment** Diavik was asked what it would do if more processed kimberlite than expected is produced or if water quality is worse than predicted. Diavik responded that a possible contingency option is to establish criteria for reconnection (PR#22, WLWB IR-16). This may result in a temporary or permanent loss of fish habitat, should these re-connection criteria not be met. **Recommendation**	**May 10:** 1. The experience of developing pit lakes in other regions has established that flow-through pit lakes tend to produce better water quality than isolated or 'terminal' pit lakes. For example, this has been a key learning from Australia coal mine pit lakes (McCullough et al. 2013, 2015) and Alberta oil sands pit lakes (Wylynko and Hrynyshyn 2012). In closing mine pit lakes, the question then becomes 'when' to re-connect pit lakes with the receiving environment. AEMP Benchmarks are potential criteria for deciding when to re-connect the pit lakes with Lac de Gras. References McCullough CD, Marchand G, Unseld J. Mine closure of pit lakes as terminal sinks: best available practice when

			1. Please describe potential criteria for deciding whether to re-connect the pit lakes with Lac de Gras. 2. Please describe, in Diavik's view, what kind of processes would be used to establish, monitor, and ensure compliance with these criteria.		options are limited. Mine Water and the Environment. 2013 Dec 1;32(4):302-13. McCullough, C. and Schultze, M., 2015, April. Riverine Flow-Through of Mine Pit Lakes: Improving both Mine Pit Lake and River Water Quality Values. In Proceedings of the 10th International Conference on Acid Rock Drainage and IMWA Annual Conference, Santiago, Chile (pp. 21-24). Wylynko, D., and J. Hrynyshyn, editors. 2012. End Pit Lakes Guidance Document 2012. West Hawk Associates Inc. 2. In DDMI's view, reconnection criteria would be established by the Wek'èezh?i Land and Water Board (WLWB) through the review/approval of Diavik's Closure and Reclamation Plan. Once a pit has been filled, DDMI would monitor water quality following an established Surveillance Network Program (SNP). The SNP monitoring proposed by DDMI both during operations and to demonstrate compliance with a reconnection criterion, were described in response to ECCC-5 of December 18, 2018 at the preliminary screening stage of the Water Licence Amendment process for the Processed Kimberlite to Mine Workings Proposal. This response was included as Attachment # 4 of DDMI's January 8, 2019 submission to the WLWB and is presented in Table 4-1 (see Page 29 of the DDMI Response to MVEIRB IRs Document [attached]). Water quality monitoring results at the 2 m, 20 m and 40 m depths from each of the 5 locations at SNP 1645-88 would be compared with the reconnection criteria. If all results are below criteria then DDMI would seek approval from the Inspector to breach the dike and reconnect the pit lake with Lac de Gras. If water quality results for some parameters exceed closure criteria then DDMI would conduct a risk assessment. The results of the risk assessment could be used to request approval of a modified reconnection criteria. This approach of establishing closure criteria by first applying recognized standards, like AEMP benchmark, and then only proceeding to a risk assessment if a recognized standard is exceeded or expected to be exceeded is DDMI's understanding of the WLWB direction of December 17, 2018 with regard to the development of closure water quality criteria. The entire response to MVEIRB IR#10 is also presented in the DDMI Response to MVEIRB IRs, Pages 27 to 30). **June 20:** 1. The experience of developing pit lakes in other regions has established that flow-through pit lakes tend to produce better water quality than isolated or 'terminal' pit lakes. For example, this has been a key learning from Australia coal mine pit lakes (McCullough et al. 2013, 2015) and Alberta oil sands pit lakes (Wylynko and Hrynyshyn 2012). In closing mine pit lakes, the question then becomes 'when' to re-connect pit lakes with the receiving environment. AEMP Benchmarks are potential criteria for deciding when to re-connect the pit lakes with Lac de Gras. References McCullough CD, Marchand G, Unseld J. Mine closure of pit lakes as terminal sinks: best available practice when options are limited. Mine Water and the Environment. 2013 Dec 1;32(4):302-13. McCullough, C. and Schultze, M., 2015, April. Riverine Flow-Through of Mine Pit Lakes: Improving both Mine Pit Lake and River Water Quality Values. In Proceedings of the 10th International Conference on Acid Rock Drainage and IMWA Annual Conference, Santiago, Chile (pp. 21-24). Wylynko, D., and J. Hrynyshyn, editors. 2012. End Pit Lakes Guidance Document 2012. West Hawk Associates Inc. 2. In DDMI's view, reconnection criteria would be established by the Wek'èezh?i Land and Water Board (WLWB) through the review/approval of Diavik's Closure and Reclamation Plan. Once a pit has been filled, DDMI would monitor water quality following an established Surveillance Network Program (SNP). The SNP monitoring proposed by DDMI both during operations and to demonstrate compliance with a reconnection criterion, were described in response to ECCC-5 of December 18, 2018 at the preliminary screening stage of the Water Licence Amendment process for the Processed Kimberlite to Mine Workings Proposal. This response was included as Attachment # 4 of DDMI's January 8, 2019 submission to the

			WLWB and is presented in Table 4-1 (see Page 29 of the DDMI Response to MVEIRB IRs Document [attached]). Water quality monitoring results at the 2 m, 20 m and 40 m depths from each of the 5 locations at SNP 1645-88 would be compared with the reconnection criteria. If all results are below criteria then DDMI would seek approval from the Inspector to breach the dike and reconnect the pit lake with Lac de Gras. If water quality results for some parameters exceed closure criteria then DDMI would conduct a risk assessment. The results of the risk assessment could be used to request approval of a modified reconnection criteria. This approach of establishing closure criteria by first applying recognized standards, like AEMP benchmark, and then only proceeding to a risk assessment if a recognized standard is exceeded or expected to be exceeded is DDMI's understanding of the WLWB direction of December 17, 2018 with regard to the development of closure water quality criteria. The entire response to MVEIRB IR#10 is also presented in the DDMI Response to MVEIRB IRs, Pages 27 to 30).
11	Consideration of climate change	**Comment** Diavik conducted a sensitivity analysis to investigate the sensitivity of model predictions to various factors including air temperature and windspeed. Diavik's baseline field investigations show that permafrost extends 240m below East Island, decreasing at the margins of Lac de Gras, and that permafrost is considered impermeable (from Diavik's response to GNWT-ENR IR#5 PR#23). **Recommendation** Please describe if and how future permafrost conditions may affect pit wall stability, the stability of meromixis, groundwater inflow and/or water quality predictions in the pit lake and Lac de Gras.	**May 10:** All three mines (A154, A418 and A21) have been developed behind water retention dikes to enable mining in areas that were originally under Lac de Gras and so largely not within permafrost. As a result, the mine workings are similarly not within permafrost with the exception of a few localized zones. This general lack of permafrost will remain in the future below the planned pit lakes. Beyond existing conditions, future reduced permafrost from filling pits with freshwater will be factored into the closure geotechnical analysis but is not expected to be a driving factor in pit lake geotechnical stability, stability of meromixis, groundwater inflow and/or water quality predictions in the pit lake and Lac de Gras **June 20:** All three mines (A154, A418 and A21) have been developed behind water retention dikes to enable mining in areas that were originally under Lac de Gras and so largely not within permafrost. As a result, the mine workings are similarly not within permafrost with the exception of a few localized zones. This general lack of permafrost will remain in the future below the planned pit lakes. Beyond existing conditions, future reduced permafrost from filling pits with freshwater will be factored into the closure geotechnical analysis but is not expected to be a driving factor in pit lake geotechnical stability, stability of meromixis, groundwater inflow and/or water quality predictions in the pit lake and Lac de Gras
12	Water quality modelling time frame	**Comment** Much of the detailed water quality modelling done to date has looked at a 100-year timeframe. However, ongoing diffusion of porewater towards the surface of the lake water might be expected after this point in time. Diavik performed a sensitivity analysis for the base case of pit A418 (PR#16 PDF p7). The base case assumes a water cap depth of 150 m, deposited processed kimberlite volume of 5,000,000 m3, pore water chemistry of 350 mg/L of total dissolved solids, and a reclaim pond depth of 5 m depth. **Recommendation** 1. For the base case, when would pit lake water quality reach a point of equilibrium or stasis? 2. For the base case, what are the expected concentrations of contaminants of potential concern in the surface waters of the pit lake at this point of equilibrium? 3. If the freshwater cap was only 50 m (the minimum committed to by Diavik), how would this affect the time required to reach equilibrium?	**May 10:** 1. Pit lakes are dynamic systems that will respond to natural and anthropogenic factors, and strictly speaking, they will never reach a state of equilibrium (a balance of all competing influences or reactions) or stasis (standing still or unchanging). Over time, anthropogenic factors will decline while natural process will become more dominant. Therefore, for the purposes of this question, the state of equilibrium or stasis has been defined as the time when the main anthropogenic and natural factors begin to balance. Specifically, DDMI has defined this equilibrium point as the point where the predicted total mass of tracer in the water column reaches a maximum. This is the point where the mass of constituent that is being added to the pit lake from processed kimberlite (PK) pore water release is equal to the mass of constituent loss from the pit lake through the dike breaches. For A418 Scenario-2a this occurs at year 91 of the simulation. 2. Table 5 shows the constituent concentrations for A418 Scenario 2a Year 91. 3. DDMI suggests considering the A21 results for Scenario 2a (85 m freshwater cap) to assess the effect of freshwater cap depth on time to reach equilibrium. An equilibrium is reached sooner (at Year 15) at A21 with a 85 m freshwater cap compared to Year 91 for the 158 m freshwater cap for A418 as shown in the figures 2 and 3 (see Page 33 of the DDMI Response to MVEIRB IRs Document [attached]). This difference is because with a shallower freshwater cap constituent mass loss rate from the pit lake through the dike breaches is greater with

		4. If the freshwater cap was only 50 m, what would the expected concentrations of contaminants of potential concern in the surface waters of the pit lake be at the point of equilibrium?	a shallower (85 m) freshwater cap compared with a deeper (158 m) freshwater cap. 4. Table 5 (see Page 32 of the DDMI Response to MVEIRB IRs Document [attached]) the constituent concentrations for A21 Scenario 2a - Year 15. The entire response to MVEIRB IR#12 is also presented in the DDMI Response to MVEIRB IRs, Pages 30 to 33). **June 20:** 1. Pit lakes are dynamic systems that will respond to natural and anthropogenic factors, and strictly speaking, they will never reach a state of equilibrium (a balance of all competing influences or reactions) or stasis (standing still or unchanging). Over time, anthropogenic factors will decline while natural process will become more dominant. Therefore, for the purposes of this question, the state of equilibrium or stasis has been defined as the time when the main anthropogenic and natural factors begin to balance. Specifically, DDMI has defined this equilibrium point as the point where the predicted total mass of tracer in the water column reaches a maximum. This is the point where the mass of constituent that is being added to the pit lake from processed kimberlite (PK) pore water release is equal to the mass of constituent loss from the pit lake through the dike breaches. For A418 Scenario-2a this occurs at year 91 of the simulation. 2. Table 5 shows the constituent concentrations for A418 Scenario 2a Year 91. 3. DDMI suggests considering the A21 results for Scenario 2a (85 m freshwater cap) to assess the effect of freshwater cap depth on time to reach equilibrium. An equilibrium is reached sooner (at Year 15) at A21 with a 85 m freshwater cap compared to Year 91 for the 158 m freshwater cap for A418 as shown in the figures 2 and 3 (see Page 33 of the DDMI Response to MVEIRB IRs Document [attached]). This difference is because with a shallower freshwater cap constituent mass loss rate from the pit lake through the dike breaches is greater with a shallower (85 m) freshwater cap compared with a deeper (158 m) freshwater cap. 4. Table 5 (see Page 32 of the DDMI Response to MVEIRB IRs Document [attached]) the constituent concentrations for A21 Scenario 2a - Year 15. The entire response to MVEIRB IR#12 is also presented in the DDMI Response to MVEIRB IRs, Pages 30 to 33).
13	Freshwater cap depth	**Comment** Diavik modelled the base case using a 150 m freshwater cap and modelled 20 m and 50 m freshwater caps scenarios (PR#16; PR#11). Diavik committed to using a freshwater cap of a minimum 50 m depth (PR#16, response to IR#15). **Recommendation** 1. Please describe the likelihood of Diavik using a freshwater cap of less than 150 m and what factors might influence this decision. 2. Please describe the minimum freshwater cap depth to establish and stabilize meromixis. 3. If different than above, please provide a minimum depth of the freshwater cap necessary to prevent the exceedance of Aquatic Effects Monitoring Program benchmarks and Canadian Council of Ministers of the Environment guidelines in surface waters if a mixing event occurs.	**May 10:** 1. There is a likelihood that a freshwater cap would be less than 150 m. For example the A418 Scenarion 3a and all A21 Scenarios (2a, 3a and 4a) have freshwater caps less than 150 m. For A418 Scenario 3a, the freshwater cap depth is 111 m and for A21 Scenarion 3a the freshwater cap depth is 51 m. The factors that might influence this decision to have a freshwater cap of less than 150 m would include but not be limited to: • mine working area used; • volume of processed kimberlite (PK) deposited – in particular volume of extra fine processed kimberlite (EFPK) from the Processed Kimberlite Containment (PKC) Facility; and • results from porewater monitoring during PK deposition. 2. DDMI has determined that a 50 m freshwater cap is adequate to establish and stabilize meromixis as described in DDMI response to WLWB IR-1 (November 2018) and Golder (2018) (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) during the preliminary screening stage of the Water Licence Amendment process for the Processed Kimberlite to Mine Workings Proposal. This determination was based on maintaining surface and 40 m depth water quality below AEMP benchmarks under expected conditions. This is the depth of freshwater cap required to establish and stabilize meromixis. This determination did not include a requirement for AEMP benchmarks to be achieved for a theoretical fully-mixed scenario. 3. As discussed in response to MVEIRB IR#16, a deeper freshwater cap does not necessarily reduce the maximum surface water quality constituent concentration under an unanticipated mixing event. The comparison discussed in MVEIRB IR#16 notes that fully mixed concentrations are lower in A21 with an 85 m freshwater cap compared to a 158 m freshwater cap in A418. This is because constituent mass loss rate through the dike breaches is expected to be higher for a shallow freshwater cap resulting in lower concentrations for an

			unanticipated mixing event. It is DDMI's opinion that the depth of the freshwater cap should be based on requirement to establish and stabilize meromixis over expected water quality for a theoretical mixing event. **June 20:** 1. There is a likelihood that a freshwater cap would be less than 150 m. For example the A418 Scenarion 3a and all A21 Scenarios (2a, 3a and 4a) have freshwater caps less than 150 m. For A418 Scenario 3a, the freshwater cap depth is 111 m and for A21 Scenarion 3a the freshwater cap depth is 51 m. The factors that might influence this decision to have a freshwater cap of less than 150 m would include but not be limited to: • mine working area used; • volume of processed kimberlite (PK) deposited – in particular volume of extra fine processed kimberlite (EFPK) from the Processed Kimberlite Containment (PKC) Facility; and • results from porewater monitoring during PK deposition. 2. DDMI has determined that a 50 m freshwater cap is adequate to establish and stabilize meromixis as described in DDMI response to WLWB IR-1 (November 2018) and Golder (2018) (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) during the preliminary screening stage of the Water Licence Amendment process for the Processed Kimberlite to Mine Workings Proposal. This determination was based on maintaining surface and 40 m depth water quality below AEMP benchmarks under expected conditions. This is the depth of freshwater cap required to establish and stabilize meromixis. This determination did not include a requirement for AEMP benchmarks to be achieved for a theoretical fully-mixed scenario. 3. As discussed in response to MVEIRB IR#16, a deeper freshwater cap does not necessarily reduce the maximum surface water quality constituent concentration under an unanticipated mixing event. The comparison discussed in MVEIRB IR#16 notes that fully mixed concentrations are lower in A21 with an 85 m freshwater cap compared to a 158 m freshwater cap in A418. This is because constituent mass loss rate through the dike breaches is expected to be higher for a shallow freshwater cap resulting in lower concentrations for an unanticipated mixing event. It is DDMI's opinion that the depth of the freshwater cap should be based on requirement to establish and stabilize meromixis over expected water quality for a theoretical mixing event.
14	Worst-case scenarios for water quality	**Comment** Diavik said that its modelling "…demonstrates the worst-case conditions…" for storage of processed kimberlite in the mine workings (PR#37, ORS comment 12) **Recommendation** 1. Please describe which modelling scenarios Diavik considers to be worst-case type scenarios (low-probability, high-consequence scenarios). 2. Please describe the risk (likelihood and consequence) of the worst-case type scenarios.	**May 10:** 1. The modelling scenarios originally assessed by DDMI and documented in Golder (2018) (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) are considered by DDMI as worst-case type scenarios. These modelling scenarios are considered worst-case type because they include larger amounts of pore water release than are likely. For example DDMI expects around 2.0 Mm3 of porewater to be release over 200 years as a base case (A418 Scenarion 2a) compared with the volumes assumed in Golder (2018) as follows: • 11.3Mm3 over 200 years in A418; • 11.3Mm3 over 200 years in A21; and • 21.1Mm3 over 200 years in A154. The Golder (2018) (see Appendix 2) modelling scenarios also assumed observed pore water quality from the Processed Kimberlite Containment (PKC) Facility that included results from unsaturated/weathered processed kimberlite (PK) material. This pore water generally contained higher concentrations of parameters of potential concern. These worst-case modelling scenarios described above were then made even less likely by also assuming that a theoretical, unanticipated, full mixing event will occur as described in Golder (2018) 2. DDMI does not anticipate a reasonable likelihood that pore water release volumes of 21.3 or 11.3Mm3 would occur. Golder (2018) demonstrates that even in these worst-case conditions Aquatic Effects Monitoring Program (AEMP). Benchmarks are achieved for the Development Cases. It is possible that some of the PK pore water could have water chemistry that is influenced by unsaturated/weathered PK in cases where the source of PK is the PKC Facility (all 3a Scenarios). Golder (2018) demonstrates that even in these worst-case conditions AEMP Benchmarks are achieved for the Development Cases. DDMI does

			not anticipate a reasonable likelihood that the accident/malfunction scenario of a pit-lake fully mixing would occur. Golder (2018) Table 3 (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) indicates that if the combination of unlikely large pore water volumes, higher than expected pore water quality and a theoretical, unanticipated mixing event occurred that AEMP benchmarks would likley be exceeded for several parameters in all development cases. Applying the CSR definitions of significance (CSR Section 2.4.3) would conclude that this single-event would not be classified as a significant adverse effect. Please see the Summary Impact Statement for a more comprehensive effects assessment. DDMI would like to emphasize that the unanticipated mixing event presented in Golder (2018) and described above was for an extreme worst case scenario and that updated modelling presented within the Summary Impact Statement describes more realistic risks (likelihood and consequence) for accident/malfunction scenarios. **June 20:** 1. The modelling scenarios originally assessed by DDMI and documented in Golder (2018) (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) are considered by DDMI as worst-case type scenarios. These modelling scenarios are considered worst-case type because they include larger amounts of pore water release than are likely. For example DDMI expects around 2.0 Mm3 of porewater to be release over 200 years as a base case (A418 Scenarion 2a) compared with the volumes assumed in Golder (2018) as follows: • 11.3Mm3 over 200 years in A418; • 11.3Mm3 over 200 years in A21; and • 21.1Mm3 over 200 years in A154. The Golder (2018) (see Appendix 2) modelling scenarios also assumed observed pore water quality from the Processed Kimberlite Containment (PKC) Facility that included results from unsaturated/weathered processed kimberlite (PK) material. This pore water generally contained higher concentrations of parameters of potential concern. These worst-case modelling scenarios described above were then made even less likely by also assuming that a theoretical, unanticipated, full mixing event will occur as described in Golder (2018). 2. DDMI does not anticipate a reasonable likelihood that pore water release volumes of 21.3 or 11.3Mm3 would occur. Golder (2018) demonstrates that even in these worst-case conditions Aquatic Effects Monitoring Program (AEMP). Benchmarks are achieved for the Development Cases. It is possible that some of the PK pore water could have water chemistry that is influenced by unsaturated/weathered PK in cases where the source of PK is the PKC Facility (all 3a Scenarios). Golder (2018) demonstrates that even in these worst-case conditions AEMP Benchmarks are achieved for the Development Cases. DDMI does not anticipate a reasonable likelihood that the accident/malfunction scenario of a pit-lake fully mixing would occur. Golder (2018) Table 3 (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) indicates that if the combination of unlikely large pore water volumes, higher than expected pore water quality and a theoretical, unanticipated mixing event occurred that AEMP benchmarks would likley be exceeded for several parameters in all development cases. Applying the CSR definitions of significance (CSR Section 2.4.3) would conclude that this single-event would not be classified as a significant adverse effect. Please see the Summary Impact Statement for a more comprehensive effects assessment. DDMI would like to emphasize that the unanticipated mixing event presented in Golder (2018) and described above was for an extreme worst case scenario and that updated modelling presented within the Summary Impact Statement describes more realistic risks (likelihood and consequence) for accident/malfunction scenarios.
15	Site-specific processed kimberlite	**Comment** Diavik has responded to some information requests (PR#11: ENR3, ENR4, ENR 12, ENR14, WLWB1, WLWB5 WLWB18, WLWB22) with commitments:	**May 10:** 1. It is DDMI's understanding that the sensitivity analysis completed by Golder in January 2019 when combined with the additional model scneraios agreed to at the Wek'èezh?i Land and Water Board (WLWB) Technical Session cover the range of concerns

	characteristics and model predictions	• to further studies that are to be completed by the University of Alberta (e.g. processed kimberlite consolidation) in late 2019, and • to additional modelling to be carried out in 2020 as part of the processed kimberlite *Operating Plan* or to inform the *Closure and Reclamation Plan*. The Review Board seeks to understand key outstanding uncertainties and how Diavik plans to address these uncertainties. **Recommendation** 1. Do the sensitivity analyses completed by Golder in January 2019 cover the range of concerns and uncertainties raised by Parties in their information requests and the range of potential outcomes of the site-specific processed kimberlite testing being undertaken by the University of Alberta? 2. Does Diavik plan to repeat any of the pit modelling if results of the University of Alberta studies differ from the inputs used for existing models? 3. What is Diavik's level of confidence in the existing model results and how they may be influenced by the outcome of the University of Alberta studies?	and uncertainties raised by Parties. WLWB provided opportunity for all Parties to request additional information requests (IRs) following the Technical Session. No Party requested additional sensitivity analysis. 2. DDMI has consistently advised that the modelling work presented to date is preliminary and intended to address information requirements for the Preliminary Environmantal Screening (now Environmental Assessment) and the Water License Amendment Application. DDMI plans to conduct additional modelling in the future to reflect updated information, including results from the University of Alberta studies. DDMI expects to submit updated modelling results in support of revised management plans and designs that we anticipate being required as a condition of an ammended water license. 3. DDMI has a high level of confidence in conclusions drawn from the collection of modelling results to date. Our view is supported by modelling and water quality experts who have conducted and advised DDMI, the conservative nature of the modelling structure, the worst-case of model input assumptions (as noted in MVEIRB IR#14) and the model sensitivity analysis. We expect results from the University of Alberta to confirm that the pore water quality conditions applied in Golder (2018) are towards the upper end of what might be expected in the future from anticipated processed kimberlite (PK) sources. Despite this confidence, if this project receives Environmental Assessment and Water License Ammendment approval work will continue to verify these conclusions with additional modelling and monitoring programs **June 20:** 1. It is DDMI's understanding that the sensitivity analysis completed by Golder in January 2019 when combined with the additional model scneraios agreed to at the Wek'èezh?i Land and Water Board (WLWB) Technical Session cover the range of concerns and uncertainties raised by Parties. WLWB provided opportunity for all Parties to request additional information requests (IRs) following the Technical Session. No Party requested additional sensitivity analysis. 2. DDMI has consistently advised that the modelling work presented to date is preliminary and intended to address information requirements for the Preliminary Environmantal Screening (now Environmental Assessment) and the Water License Amendment Application. DDMI plans to conduct additional modelling in the future to reflect updated information, including results from the University of Alberta studies. DDMI expects to submit updated modelling results in support of revised management plans and designs that we anticipate being required as a condition of an ammended water license. 3. DDMI has a high level of confidence in conclusions drawn from the collection of modelling results to date. Our view is supported by modelling and water quality experts who have conducted and advised DDMI, the conservative nature of the modelling structure, the worst-case of model input assumptions (as noted in MVEIRB IR#14) and the model sensitivity analysis. We expect results from the University of Alberta to confirm that the pore water quality conditions applied in Golder (2018) are towards the upper end of what might be expected in the future from anticipated processed kimberlite (PK) sources. Despite this confidence, if this project receives Environmental Assessment and Water License Ammendment approval work will continue to verify these conclusions with additional modelling and monitoring programs
16	Surface water chemistry	**Comment** Diavik has modelled an unlikely destratification event at year 100 as a result of a pit wall collapse great enough to mix the entire 150 m deep water column. Under this scenario, Diavik has identified several AEMP benchmark exceedances, but concluded that these exceedances are "…unlikely to pose a risk to early life stages of fish…" (PR#13 PDF p118). **Recommendation**	**May 10:** 1. For the three (3) scenarios modelled for A418 following the Wek'èezhi`ì Land and Water Board (WLWB) Technical Session as part of the Water Licence Amendment process for the Processed Kimberlite to Mine Workings Proposal, the maximum fully mixed concentration would occur before 100 years. Likewise, modelling of nine (9) scenarios that are presented in the Summary Impact Statement (SIS) demonstrates that the maximum fully mixed concentration also occurs within the first 100 years. Before or after 100 years fully mixed constituent concentrations would be lower in all scenarios. DDMI notes that for a few parameters in each of the modelled scenarios the maximum

		1. Would an unanticipated mixing event before or after year 100 yield different effects to water quality? If so, please describe. 2. Would an unanticipated mixing event with a 50m water column yield different effects to water quality? If so, please describe. 3. Please describe any potential scenarios that would result in a greater disturbance to the pit lake (that is, full water column turnover and resuspension of processed kimberlite). 4. How does the threshold of "…unlikely to pose a risk to early life stages of fish" relate to existing or potential reconnection criteria?	fully mixed concentration is at Year 0. 2. An unanticipated mixing event could yield different water quality results with a 50m freshwater cap compared with a 150m freshwater cap. A shallower freshwater cap allows more constituent mass to leave the pit lake than a deeper water cap. This is shown below by comparing A418 and A21 tracer results for Scenario 2a. An unanticipated mixing event within the first 10-30 years in A21 would yield a higher constituent concentration than if it occurred in A418. The converse is true if the unanticipated mixing event occurred in the final 10-30 years. 3. A greater disturbance to the pit lake could occur if PK was re-suspended as well as water being fully mixing. Golder (2018) (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) determined than re-suspension of PK material is prevented with a freshwater cap as shallow as 20m. If resuspension did occur, it would only exist for a short-term duration. 4. The evaluation of Accidents and Malfunctions (i.e. an unanticipated mixing event) is assumed to occur after the dikes have been breached and the pit-lakes reconnected with Lac de Gras so the reconnection criteria would not apply. The residual environmental effects from this single-event elevated water quality conditons would be classified as short-term duration, high magnitude but likely limited to the local assessment area and reversible (See Summary Impact Statement for Effects Classification descriptions). **June 20:** 1. For the three (3) scenarios modelled for A418 following the Wek'èezhì`i Land and Water Board (WLWB) Technical Session as part of the Water Licence Amendment process for the Processed Kimberlite to Mine Workings Proposal, the maximum fully mixed concentration would occur before 100 years. Likewise, modelling of nine (9) scenarios that are presented in the Summary Impact Statement (SIS) demonstrates that the maximum fully mixed concentration also occurs within the first 100 years. Before or after 100 years fully mixed constituent concentrations would be lower in all scenarios. DDMI notes that for a few parameters in each of the modelled scenarios the maximum fully mixed concentration is at Year 0. 2. An unanticipated mixing event could yield different water quality results with a 50m freshwater cap compared with a 150m freshwater cap. A shallower freshwater cap allows more constituent mass to leave the pit lake than a deeper water cap. This is shown below by comparing A418 and A21 tracer results for Scenario 2a. An unanticipated mixing event within the first 10-30 years in A21 would yield a higher constituent concentration than if it occurred in A418. The converse is true if the unanticipated mixing event occurred in the final 10-30 years. 3. A greater disturbance to the pit lake could occur if PK was re-suspended as well as water being fully mixing. Golder (2018) (see Appendix 2 of the DDMI Response to MVEIRB IRs Document [attached]) determined than re-suspension of PK material is prevented with a freshwater cap as shallow as 20m. If resuspension did occur, it would only exist for a short-term duration. 4. The evaluation of Accidents and Malfunctions (i.e. an unanticipated mixing event) is assumed to occur after the dikes have been breached and the pit-lakes reconnected with Lac de Gras so the reconnection criteria would not apply. The residual environmental effects from this single-event elevated water quality conditons would be classified as short-term duration, high magnitude but likely limited to the local assessment area and reversible (See Summary Impact Statement for Effects Classification descriptions).
17	Water quality modelling	**Comment** Most modelling and studies to date have focused on A418, but Diavik is requesting permission to put processed kimberlite in A154 and A21. These pits have different characteristics, including different shape, size and hydrogeology, including faults (e.g., Lyndon's fault in A154) (PR#5 PDF p41). **Recommendation**	**May 10:** 1. Comparing the modelling results for A418, A21 and A154 indicates that size and shape do influence water quality results as shown in the figures 4, 5, and 6 (see Page 40 to 41 of the the DDMI Response to MVEIRB IRs Document [attached]). Surface water tracer concentrations are lower in A154 compared with A418 due to a greater pit volume. A21 surface water tracer concentrations are higher – particularly initially – compared with A418 due to smaller pit volumes. Tracer concentrations remain longer, particularly in the

1. In what ways could the shape, size and individual hydrogeology characteristics of the A154 and A21 pits alter or affect water quality modelling results?
2. Describe the additional modelling work that would be required if A154 or A21 pits and mine workings were used for processed kimberlite storage instead of, or in addition to, A418.

bottom water, in A418 and A154 compared to A21. Most the pore water tracer leaves the A21 pit lakes within about 60 years. 2. Pit lake water quality modelling has now been completed for all three mine areas for a range of scenarios. As previously indicated this modelling is preliminary and intended to be indicative of expected pit lake water quality conditions to support requirements of an Environmental Assessment and Water License Amendment. Additional pit lake water quality modelling is planned to support future Water License submissions and will be specific to: • the planned processed kimberlite (PK) deposition location (A418, A154, A21), • the planned PK source (direct from process plant and/or removed from the Processed Kimberlite Containment [PKC] Facility), • planned PK volumes, • updated PK pore water chemistry and consolidation information, and • planned closure approach. DDMI's ongoing closure planning also includes modelling to predict post-closure water quality conditions in Lac de Gras resulting from: • elimination of the treated mine water discharge, • re-establishment of natural drainage routes for runoff from the east island, • runoff/seepage anticipated post-closure for waste rock storage areas, PKC Facility, site infrastructure and undisturbed areas; and • exchange of water with the pit lakes established in the three dike areas. DDMI provided a "Studies and Report Schedule" in response to the Wek'èezh?i Land and Water Board (WLWB) Technical Session IR-11. This has been revised and re-organized in Table 6 (see Page 43 of the DDMI Response to MVEIRB IRs Document [attached]) to reflect anticipated current Environmental Assessment/Water License Amendment approval timelines and expected future Water License submission requirements for WLWB approval. The entire response to MVEIRB IR#17 is also presented in the DDMI Response to MVEIRB IRs, Pages 40 to 43).
June 20: 1. Comparing the modelling results for A418, A21 and A154 indicates that size and shape do influence water quality results as shown in the figures 4, 5, and 6 (see Page 40 to 41 of the the DDMI Response to MVEIRB IRs Document [attached]). Surface water tracer concentrations are lower in A154 compared with A418 due to a greater pit volume. A21 surface water tracer concentrations are higher – particularly initially – compared with A418 due to smaller pit volumes. Tracer concentrations remain longer, particularly in the bottom water, in A418 and A154 compared to A21. Most the pore water tracer leaves the A21 pit lakes within about 60 years. 2. Pit lake water quality modelling has now been completed for all three mine areas for a range of scenarios. As previously indicated this modelling is preliminary and intended to be indicative of expected pit lake water quality conditions to support requirements of an Environmental Assessment and Water License Amendment. Additional pit lake water quality modelling is planned to support future Water License submissions and will be specific to: • the planned processed kimberlite (PK) deposition location (A418, A154, A21), • the planned PK source (direct from process plant and/or removed from the Processed Kimberlite Containment [PKC] Facility), • planned PK volumes, • updated PK pore water chemistry and consolidation information, and • planned closure approach. DDMI's ongoing closure planning also includes modelling to predict post-closure water quality conditions in Lac de Gras resulting from: • elimination of the treated mine water discharge, • re-establishment of natural drainage routes for runoff from the east island, • runoff/seepage anticipated post-closure for waste rock storage areas, PKC Facility, site infrastructure and undisturbed areas; and • exchange of water with the pit lakes established in the three dike areas. DDMI provided a "Studies and Report Schedule" in response to the Wek'èezh?i Land and Water Board (WLWB) Technical Session IR-11. This has been revised and re-organized in Table 6 (see Page 43 of the DDMI Response to MVEIRB IRs Document [attached]) to reflect anticipated current Environmental Assessment/Water License Amendment approval timelines and expected

			future Water License submission requirements for WLWB approval. The entire response to MVEIRB IR#17 is also presented in the DDMI Response to MVEIRB IRs, Pages 40 to 43).
18	Oxygen predictions for refilled pits	**Comment** Information requests ENR-3 and EMAB-30 from PR#23 speak to the composition of processed kimberlite and effect of fine processed kimberlite on dissolved oxygen status in the pits. In the absence of data on oxygen status or oxygen demand from processed kimberlite it is difficult to make predictions on oxygen status in the pits at closure and post closure. One might expect both chemical and nitrogenous oxygen demand from processed kimberlite, though biological oxygen demand appears less likely. **Recommendation** Please provide an analysis of: 1. oxygen status in processed kimberlite pore water in the existing Processed Kimberlite Containment Facility, and 2. total oxygen demand in fine processed kimberlite and processed kimberlite at the time of deposition.	**May 10:** 1. Neither biological oxygen demand (BOD) nor chemical oxygen demand (COD) has been measured in the Processed Kimberlite Containment (PKC) Facility field investigations. However, dissolved oxygen (DO) was measured in 2011 and dissolved organic carbon (DOC) and redox potential (Eh) were measured in 2009, 2010 and 2011 in some pore water samples collected from the saturated zone of the PKC beach and from the water column and pore water of the fine processed kimberlite (FPK) beneath the barge. It should be noted that because the PKC also receives sewage, a source of organic carbon that is not present in the process circuit, caution should be applied to any comparison between the in situ measurements and any in-pit/underground or other direct deposition model. Pore water samples collected in 2011 from piezometers installed within saturated FPK on the PKC beach and the water column beneath the barge were anlayzed for DO using the Hach AccuVac Method 8166. Concentrations of DO in the three saturated beach FPK were 1.9, 4.4 and 5.8 mg/L at depths of 1.69, 2.65 and 3.83 m, respectively. Concentrations in the water column/FPK pore water beneath the barge were 0.9, 3.4, 2.1, 5.3, and 3.6 mg/L at depths of 10, 20, 30, 40, and 55 ft, respectively. Concentrations of DOC typically ranged from 2.0 – 7.8 mg/L in pore water from saturated zones of the PKC beach, however shallower samples recorded concentrations between 16.7 and 41.4 mg/L. Samples collected in the water column and FPK pore water beneath the barge typically had much higher DOC concentrations in the more shallow samples (>35 ft deep; typically 35 – 630 mg/L) compared to the deeper samples (40- 75 ft deep; typically 3.3 – 6.9 m/L). The DOC in the PKC facility is likely related to sewage inputs. Nitrogen isotopic ratios (d15N-NO3 + d18O-NO3) measured from the PKC pond water and FPK pore water beneath the barge had signatures typical of sewage discharge. Measurements of redox potential (Eh) in the water column and FPK pore water beneath the barge in 2009, 2010 and 2011, were typically 350-450 mV, including instances where concentrations of DOC were elevated. The lowest measured Eh value was 197 mV, suggesting mildly reduced conditions, at the deepest location measured beneath the barge (65 ft; 20 m) in 2009. Samples from this depth had measurements >350 mV in the subsequent sample years. Slurry discharge sampled in 2013 measured 351 mV. Measurements of Eh from saturated zones (n=21) in the FPK beach were more variable and typically lower than beneath the barge, with a range of -110.5 to 546.0 mV, but with values commonly between -85 and -46 mV; these values suggest the measured beach pore water was more reducing than the pore water from the FPK beneath the barge that were covered with a water cap. The dynamic nature of the water levels, sewage discharge, and slurry deposition confound interpretation. The decomposition of organic matter occurs through a series of microbially-mediated reactions which liberate energy from the oxidation of organic molecules. In the decomposition process, microbial assemblages will preferentially utilize electron acceptors in order of their free energy yield. In the presence of dissolved oxygen, aerobic bacteria will utilize O2 as a terminal electron acceptor since this redox reaction affords the greatest free energy. However, where the rate of O2 consumption exceeds the rate of re-supply, oxygen will become depleted and other secondary oxidants will be utilized. These, in order of their free energy yield, include nitrate, Mn4+-oxides (e.g. MnO2), Fe3+-oxides (e.g. Fe(OH3)), sulphate (SO42-), and carbon dioxide (CO2) (see Figure 7, Page 46, of the DDMI Response to MVEIRB IRs Document [attached]). Next to oxygen, nitrate yields the greatest free energy, such that once oxygen is depleted, microbes will preferentially use nitrate as a terminal electron acceptor in the decomposition of organic matter. Nitrate concentrations in the bottom of

the pit lake are predicted to be elevated which means there is a source of relatively high energy yield electron acceptors. 2. To obtain information about COD and BOD of the fine processed kimberlite (FPK), DDMI collected FPK slurry directly from the process circuit on April 24, 2019. The FPK solids were analysed for total organic carbon (TOC) and the supernatant (i.e. process water) was measured for TOC, BOD and COD. The TOC of the FPK solids was 0.36%. The BOD of the process water was 6.1 mg/L, the COD was 26 mg/L and the TOC was 3.7 mg/L. It should be noted that the Process Plant reclaims water from the PKC facility, and, as noted above, sewage is discharged to the PKC facility and may be contributing organic carbon to the water used in ore processing. The entire response to MVEIRB IR#18 is also presented in the DDMI Response to MVEIRB IRs, Pages 44 to 46).
June 20: 1. Neither biological oxygen demand (BOD) nor chemical oxygen demand (COD) has been measured in the Processed Kimberlite Containment (PKC) Facility field investigations. However, dissolved oxygen (DO) was measured in 2011 and dissolved organic carbon (DOC) and redox potential (Eh) were measured in 2009, 2010 and 2011 in some pore water samples collected from the saturated zone of the PKC beach and from the water column and pore water of the fine processed kimberlite (FPK) beneath the barge. It should be noted that because the PKC also receives sewage, a source of organic carbon that is not present in the process circuit, caution should be applied to any comparison between the in situ measurements and any in-pit/underground or other direct deposition model. Pore water samples collected in 2011 from piezometers installed within saturated FPK on the PKC beach and the water column beneath the barge were anlayzed for DO using the Hach AccuVac Method 8166. Concentrations of DO in the three saturated beach FPK were 1.9, 4.4 and 5.8 mg/L at depths of 1.69, 2.65 and 3.83 m, respectively. Concentrations in the water column/FPK pore water beneath the barge were 0.9, 3.4, 2.1, 5.3, and 3.6 mg/L at depths of 10, 20, 30, 40, and 55 ft, respectively. Concentrations of DOC typically ranged from 2.0 – 7.8 mg/L in pore water from saturated zones of the PKC beach, however shallower samples recorded concentrations between 16.7 and 41.4 mg/L. Samples collected in the water column and FPK pore water beneath the barge typically had much higher DOC concentrations in the more shallow samples (>35 ft deep; typically 35 – 630 mg/L) compared to the deeper samples (40- 75 ft deep; typically 3.3 – 6.9 m/L). The DOC in the PKC facility is likely related to sewage inputs. Nitrogen isotopic ratios (d15N-NO3 + d18O-NO3) measured from the PKC pond water and FPK pore water beneath the barge had signatures typical of sewage discharge. Measurements of redox potential (Eh) in the water column and FPK pore water beneath the barge in 2009, 2010 and 2011, were typically 350-450 mV, including instances where concentrations of DOC were elevated. The lowest measured Eh value was 197 mV, suggesting mildly reduced conditions, at the deepest location measured beneath the barge (65 ft; 20 m) in 2009. Samples from this depth had measurements >350 mV in the subsequent sample years. Slurry discharge sampled in 2013 measured 351 mV. Measurements of Eh from saturated zones (n=21) in the FPK beach were more variable and typically lower than beneath the barge, with a range of -110.5 to 546.0 mV, but with values commonly between -85 and -46 mV; these values suggest the measured beach pore water was more reducing than the pore water from the FPK beneath the barge that were covered with a water cap. The dynamic nature of the water levels, sewage discharge, and slurry deposition confound interpretation. The decomposition of organic matter occurs through a series of microbially-mediated reactions which liberate energy from the oxidation of organic molecules. In the decomposition process, microbial assemblages will preferentially utilize electron acceptors in order of their free energy yield. In the presence of dissolved oxygen, aerobic bacteria will utilize O2 as a terminal electron acceptor since

			this redox reaction affords the greatest free energy. However, where the rate of O2 consumption exceeds the rate of re-supply, oxygen will become depleted and other secondary oxidants will be utilized. These, in order of their free energy yield, include nitrate, Mn4+-oxides (e.g. MnO2), Fe3+-oxides (e.g. Fe(OH3)), sulphate (SO42-), and carbon dioxide (CO2) (see Figure 7, Page 46, of the DDMI Response to MVEIRB IRs Document [attached]). Next to oxygen, nitrate yields the greatest free energy, such that once oxygen is depleted, microbes will preferentially use nitrate as a terminal electron acceptor in the decomposition of organic matter. Nitrate concentrations in the bottom of the pit lake are predicted to be elevated which means there is a source of relatively high energy yield electron acceptors. 2. To obtain information about COD and BOD of the fine processed kimberlite (FPK), DDMI collected FPK slurry directly from the process circuit on April 24, 2019. The FPK solids were analysed for total organic carbon (TOC) and the supernatant (i.e. process water) was measured for TOC, BOD and COD. The TOC of the FPK solids was 0.36%. The BOD of the process water was 6.1 mg/L, the COD was 26 mg/L and the TOC was 3.7 mg/L. It should be noted that the Process Plant reclaims water from the PKC facility, and, as noted above, sewage is discharged to the PKC facility and may be contributing organic carbon to the water used in ore processing. The entire response to MVEIRB IR#18 is also presented in the DDMI Response to MVEIRB IRs, Pages 44 to 46).
19	Fresh processed kimberlite vs beach processed kimberlite pore water	**Comment** The Golder modelling report used pore water constituent concentrations from beach pore water samples for modelling (PR#11 PDF p13, Scenario 1a, Section 2.2.4.2 Table 1). Diavik later modified Scenario 1a by using pore water constituent concentrations derived from "fresh" processed kimberlite (at the time of deposition) for modelling (PR#16, IR5). However, for 27 of 35 constituents, concentrations in "fresh" processed kimberlite were substantially (up to 2 orders of magnitude) lower than in the beach pore water. The fine processed kimberlite will consolidate and exclude pore water over time. **Recommendation** 1. Please comment on the difference between results obtained using the two sources of pore water and which concentrations are most likely. 2. Which pore water inputs (fresh vs. beach) are the more likely and more conservative values to use?	**May 10:** 1. The sensitivity of A418 model results to the pore water chemistry was considered in response to a request from EMAB (EMAB-14) with results presented at the Wek'èezh?i Land and Water Board (WLWB) Technical Session. Sensitivity cases 7a increased pore water total dissolved solids (TDS) from 3504 mg/L to 6150 mg/L and 7b reduced TDS from 3504 mg/L to 346 mg/L. Predicted surface water quality was only slightly changed (decrease from 17 mg/L to 16 mg/L) when the TDS in the pore water was reduced (Sensitivity case 7b below). There was no change to the surface water quality from increasing the pore water TDS (Sensitivity case 7a below). Predicted bottom water quality was demonstrated to be very sensitive to the pore water quality. As shown in Table 7 (see Page 48 of the the DDMI Response to MVEIRB IRs Document [attached]) for Sensitivity Cases 7a and 7b, predicted water quality at the bottom of the pit lake is expected to be very similar to the assumed pore water quality. Separate from the sensitivity analysis, model results have been presented using different pore water quality. Golder (2018) (see Appendix 2 of the the DDMI Response to MVEIRB IRs Document [attached]) assumed pore water quality that was equal to the average measured pore water chemistry from studies conducted in the PKC Facility. These were expected to provide an upper end estimate of pore water quality because the results reflected weathered PK and PK that was not in a saturated condition. Both of these factors would be expected to generally increase constituent concentrations. The difference between saturated and unsaturated PKC beach pore water is shown in Table 8 (see (age 49 of the the DDMI Response to MVEIRB IRs Document [attached]). The profile used in Golder (2018) is shown in Table 8 as "In-situ PKC Beach Pore Water". At the Wek'èezh?i Land and Water Board Technical Session, discussion occurred around how representative this pore water would be of PK that would likely be disposed in mine workings. To address this DDMI developed two new pore water profiles to represent the two PK materials most likely to be deposited in mine workings, one for PK that is deposited directly from the process plant ("Fresh PK" in Table 8) and one that represents extra fine processed kimberlite (EFPK or "slimes") from the PKC Facility ('In situ Slimes Sampled from PKC barge" in Table 8). In the opinion of DDMI, the two profiles are based on the most representative data available. Both will be updated based on the results from the consolidation testing at the University of Alberta once they are available later in 2019. 2.

			The “Fresh PK” pore water profile is more likely than the “In-situ PKC Beach Pore Water” profile to represent PK that is being deposited directly from the process plant. The “In-situ PKC Beach Pore Water” profile would be more conservative and may a substantial overestimate. DDMI does acknowledge that the sample size for the “Fresh PK” is small and because the PK has not been in solution for very long, the constituent concentrations may be slightly underestimated. Again this uncertainty should be reduced with the University of Alberta. The entire response to MVEIRB IR#19 is also presented in the DDMI Response to MVEIRB IRs, Pages 47 to 49). **June 20:** 1. The sensitivity of A418 model results to the pore water chemistry was considered in response to a request from EMAB (EMAB-14) with results presented at the Wek’èezh?i Land and Water Board (WLWB) Technical Session. Sensitivity cases 7a increased pore water total dissolved solids (TDS) from 3504 mg/L to 6150 mg/L and 7b reduced TDS from 3504 mg/L to 346 mg/L. Predicted surface water quality was only slightly changed (decrease from 17 mg/L to 16 mg/L) when the TDS in the pore water was reduced (Sensitivity case 7b below). There was no change to the surface water quality from increasing the pore water TDS (Sensitivity case 7a below). Predicted bottom water quality was demonstrated to be very sensitive to the pore water quality. As shown in Table 7 (see Page 48 of the the DDMI Response to MVEIRB IRs Document [attached]) for Sensitivity Cases 7a and 7b, predicted water quality at the bottom of the pit lake is expected to be very similar to the assumed pore water quality. Separate from the sensitivity analysis, model results have been presented using different pore water quality. Golder (2018) (see Appendix 2 of the the DDMI Response to MVEIRB IRs Document [attached]) assumed pore water quality that was equal to the average measured pore water chemistry from studies conducted in the PKC Facility. These were expected to provide an upper end estimate of pore water quality because the results reflected weathered PK and PK that was not in a saturated condition. Both of these factors would be expected to generally increase constituent concentrations. The difference between saturated and unsaturated PKC beach pore water is shown in Table 8 (see (age 49 of the the DDMI Response to MVEIRB IRs Document [attached]). The profile used in Golder (2018) is shown in Table 8 as “In-situ PKC Beach Pore Water”. At the Wek’èezh?i Land and Water Board Technical Session, discussion occurred around how representative this pore water would be of PK that would likely be disposed in mine workings. To address this DDMI developed two new pore water profiles to represent the two PK materials most likely to be deposited in mine workings, one for PK that is deposited directly from the process plant (“Fresh PK” in Table 8) and one that represents extra fine processed kimberlite (EFPK or “slimes”) from the PKC Facility (‘In situ Slimes Sampled from PKC barge” in Table 8). In the opinion of DDMI, the two profiles are based on the most representative data available. Both will be updated based on the results from the consolidation testing at the University of Alberta once they are available later in 2019. 2. The “Fresh PK” pore water profile is more likely than the “In-situ PKC Beach Pore Water” profile to represent PK that is being deposited directly from the process plant. The “In-situ PKC Beach Pore Water” profile would be more conservative and may a substantial overestimate. DDMI does acknowledge that the sample size for the “Fresh PK” is small and because the PK has not been in solution for very long, the constituent concentrations may be slightly underestimated. Again this uncertainty should be reduced with the University of Alberta. The entire response to MVEIRB IR#19 is also presented in the DDMI Response to MVEIRB IRs, Pages 47 to 49).
20	Sulphate in Pit Water	**Comment** Diavik provides predicted maximum concentrations in the surface waters of A418 after 100 years and compares the results to AEMP Benchmarks (PR#16, attachment 3). Sulfur concentrations	**May 10:** 1. DDMI notes that the units in the referenced predicted maximum concentrations in the surface waters of A418 after 100 years were incorrectly identified as mg/L. The predicted maximum concentration of sulfur in the surface waters of A418 is

		of 1601 mg/L are predicted, and no benchmark is presented. Sulfur will oxidize to sulphate, and concentrations will exceed the Province of British Columbia hardness-dependent water quality objective for sulphate, which ranges from 128 mg/L in very soft (<30 mg/L) water to 429 mg/L in hard water (250 mg/L). Caribou will have access to the pit and the Canadian Council of Ministers of the Environment (CCME) provides a guideline of 1000 mg/L for livestock (although none for wildlife). **Recommendation** 1. Please provide an assessment of the potential for sulphate toxicity to aquatic life in the pit waters and wildlife consuming pit waters. 2. Please provide an assessment of potential aesthetic effects to water in Lac de Gras and the pit lake.	1601 ug/L, or 1.601 mg/L. Assuming all sulfur oxidized to sulphate, the concentration will remain 25 times below the more stringent Province of British Columbia hardness-dependent water quality objective for sulphate in very soft water. Therefore, there is negligible risk for sulphate toxicity to aquatic life in the pits or wildlife consuming pit water. 2. At a sulfur concentration of 1.6 mg/L there is no expected aesthetic effect to the water in the pit lake, or Lac de Gras. **June 20:** 1. DDMI notes that the units in the referenced predicted maximum concentrations in the surface waters of A418 after 100 years were incorrectly identified as mg/L. The predicted maximum concentration of sulfur in the surface waters of A418 is 1601 ug/L, or 1.601 mg/L. Assuming all sulfur oxidized to sulphate, the concentration will remain 25 times below the more stringent Province of British Columbia hardness-dependent water quality objective for sulphate in very soft water. Therefore, there is negligible risk for sulphate toxicity to aquatic life in the pits or wildlife consuming pit water. 2. At a sulfur concentration of 1.6 mg/L there is no expected aesthetic effect to the water in the pit lake, or Lac de Gras.
21	Toxicity of fine processed kimberlite	**Comment** In its application package, Diavik refers to "Updates to Monitoring and Management Plans to include…. Summary of toxicity studies done to date and upcoming studies" (PR#5 PDF p68). Diavik later stated that toxicity testing with processed kimberlite pore water showed no toxicity to fish and variable response to benthic invertebrates near processed kimberlite sediment (PR#13, p119). **Recommendation** Please provide a summary of all toxicity testing results for fine processed kimberlite and processed kimberlite pore water to fish and invertebrates.	**May 10:** DDMI regularly completes toxicity testing of water released to Lac de Gras as a condition of Water License W2015LS-0001. The water submitted for toxicity testing is from SNP 1645-18 and 1645-18B and is a mixture of underground and surface mine water, water pumped from the PKC Pond and collected site runoff. PKC Pond water quality is monitored regularly at SNP 1645-16 and reported monthly (see for example August 2018 SNP Report). PKC Pond water is a mix that includes both "Fresh PK Pore Water" and "In-situ PK Beach Pore Water" that are described in response to MVEIRB IR-19. PKC Pond water is pumped to the North Inlet seasonally and influences the concentrations of the water treated at the North Inlet Water Treatment Plant and released to Lac de Gras as shown for potassium in Figure 4-9 (see Page 52 of the DDMI Response to MVEIRB IRs Document [attached]) (from the 2014-2016 AEMP Re-Evaluation Report 2014-2016 AEMP Re-Evaluation Report). Potassium concentrations in the treated discharge water (1645-18 and 1645-18B) increase seasonally from around 5 mg/L to around 25 mg/L primarily due to water pumped from the PKC Pond. PKC pond water can have potassium levels of 150 mg/L (see for example August 2018 SNP Report) so is not dissimilar to PK Pore Water (see Table 8 MVIRB IR#19). Water currently discharged to Lac de Gras at 1645-18/18B contains water quality constituents of PK pore water (such as potassium) with similar or higher concentration than modelled in post PK to Mine Working pit lake surface water. For example, predicted potassium results are shown in Figure 9 (see Page 53 of the DDMI Response to MVEIRB IRs Document [attached]) for A418 Scenario 3a. See Pages 51 to 59 of of the DDMI Response to MVEIRB IRs Document [attached] for DDMI's full response to MVEIRB IR#21, including tables of toxicity testing results for effluent from the North Inlet Water Treatment Plant. **June 20:** DDMI regularly completes toxicity testing of water released to Lac de Gras as a condition of Water License W2015LS-0001. The water submitted for toxicity testing is from SNP 1645-18 and 1645-18B and is a mixture of underground and surface mine water, water pumped from the PKC Pond and collected site runoff. PKC Pond water quality is monitored regularly at SNP 1645-16 and reported monthly (see for example August 2018 SNP Report). PKC Pond water is a mix that includes both "Fresh PK Pore Water" and "In-situ PK Beach Pore Water" that are described in response to MVEIRB IR-19. PKC Pond water is pumped to the North Inlet seasonally and influences the concentrations of the water treated at the North Inlet Water Treatment Plant and released to Lac de Gras as shown for potassium in Figure 4-9 (see Page 52 of the DDMI Response to MVEIRB IRs Document [attached]) (from the 2014-

			2016 AEMP Re-Evaluation Report 2014-2016 AEMP Re-Evaluation Report). Potassium concentrations in the treated discharge water (1645-18 and 1645-18B) increase seasonally from around 5 mg/L to around 25 mg/L primarily due to water pumped from the PKC Pond. PKC pond water can have potassium levels of 150 mg/L (see for example August 2018 SNP Report) so is not dissimilar to PK Pore Water (see Table 8 MVIRB IR#19). Water currently discharged to Lac de Gras at 1645-18/18B contains water quality constituents of PK pore water (such as potassium) with similar or higher concentration than modelled in post PK to Mine Working pit lake surface water. For example, predicted potassium results are shown in Figure 9 (see Page 53 of the DDMI Response to MVEIRB IRs Document [attached]) for A418 Scenario 3a. See Pages 51 to 59 of of the DDMI Response to MVEIRB IRs Document [attached] for DDMI's full response to MVEIRB IR#21, including tables of toxicity testing results for effluent from the North Inlet Water Treatment Plant.
22	Processed kimberlite consolidation in a partially filled pit	**Comment** Estimates of pore water exclusion presented during the technical meeting appear to have been derived assuming that the pits are full of processed kimberlite (PR#13, PDF p42-43). Consolidation should increase with the weight of processed kimberlite. In other words, a full pit will compress more pore water from processed kimberlite at deeper lower depths. However, Diavik does not plan to fill the pits with processed kimberlite. This will change the estimates of pore water volume, and hence water quality, in the refilled pit. **Recommendation** 1. Please confirm if the estimate of processed kimberlite consolidation and pore water exclusion corresponds to a pit filled with processed kimberlite to within 150m of the top over the four-year planned infill period. 2. If not, please comment on how this may change the modelled estimates of water quality.	**May 10:** 1. Yes the pore water release rates used in the modelling scenarions for the Wek'èezh?i Land and Water Board (WLWB) Technical Session IR-5 were scaled down to represent a smaller volume of processed kimberlite (PK). For example, for A418 Scenario 2a the 5 Mm3 of deposited PK over four (4) years is estimated to fills the pit/underground to the 258m elevation. The requested 5m of decant water brings the level of the top of the decant water to the 263m elevation. With a Lac de Gras water level of 416m this allows for a 150m (actually 153m) deep freshwater cap. In the modelling the pore water from consolidation is not assumed to start until the freshwater cap is placed – a conservative simplification. The time-series of pore water volume released in the A418-2a modelling is the sclaed down by a factor of 0.17 from the release curve (see Page 61 of of the DDMI Response to MVEIRB IRs Document [attached]) from Figure 2 in Golder (2018) (see Appendix 2 of the of the DDMI Response to MVEIRB IRs Document [attached]) to account for the lesser amount of PK. 2. Please see response to 1 above. The entire response to MVEIRB IR#22 is also presented in the DDMI Response to MVEIRB IRs, Pages 60 to 61). **June 20:** 1. Yes the pore water release rates used in the modelling scenarions for the Wek'èezh?i Land and Water Board (WLWB) Technical Session IR-5 were scaled down to represent a smaller volume of processed kimberlite (PK). For example, for A418 Scenario 2a the 5 Mm3 of deposited PK over four (4) years is estimated to fills the pit/underground to the 258m elevation. The requested 5m of decant water brings the level of the top of the decant water to the 263m elevation. With a Lac de Gras water level of 416m this allows for a 150m (actually 153m) deep freshwater cap. In the modelling the pore water from consolidation is not assumed to start until the freshwater cap is placed – a conservative simplification. The time-series of pore water volume released in the A418-2a modelling is the sclaed down by a factor of 0.17 from the release curve (see Page 61 of of the DDMI Response to MVEIRB IRs Document [attached]) from Figure 2 in Golder (2018) (see Appendix 2 of the of the DDMI Response to MVEIRB IRs Document [attached]) to account for the lesser amount of PK. 2. Please see response to 1 above. The entire response to MVEIRB IR#22 is also presented in the DDMI Response to MVEIRB IRs, Pages 60 to 61).
23	Impacts to hydrology	**Comment** Diavik indicated that additional detail on the anticipated time required to backfill the pits could be found in V4.0 of the Interim Closure and Reclamation Plan, Appendix X-7.1 and X-7.2 (PR#23, GNWT-ENR IR#6). These documents offer a range of backfilling rates spanning 6 months to 2 years. Diavik has elsewhere indicated that the pits will be "rapidly filled", partially in order to minimize groundwater inputs (PR#11, PDF p19). Closure objectives	**May 10:** 1. DDMI has developed a range of pit filling design options that allow for freshwater cap fill rates ranging from 6 months to 2 years as shown in Table 4 (see Page 62 of the DDMI Response to MVEIRB IRs Document [attached]) from Appendix X-7.2 of Closure and Reclamation Plan, Version 4.0. A "rapid fill" would be 6 months. 2. The closure planning basis has been to fill at a high flow rate (6 months) once filling commences and this is not materially changed if processed kimberlite (PK) is deposited in mine workings. The volume of freshwater required would be at least 5Mm3 less if PK is deposited

		M6 and M7 relate to maintaining pit fill rates that maintain water levels and protect fish and fish habitat in Lac de Gras and the Coppermine River, respectively (PR#8 p297).
		Recommendation
		1. Please define the timeline implicit in a decision to "rapidly fill" the pits at closure.
		2. Does putting processed kimberlite in the pits and underground mine workings change the considerations (such as rate and timing) for backfilling the pits at closure? If so, how?
		3. If yes, please identify any and all potential impacts to:
		  ○ the hydrology of Lac de Gras, the Narrows between Lac du Sauvage and Lac de Gras, and the outflow to the Coppermine River and
		  ○ fish or fish habitat in Lac de Gras, the Narrows between Lac du Sauvage and Lac de Gras, and the outflow to the Coppermine River.
		4. Please discuss if and how putting processed kimberlite into pits and underground mine workings will affect Diavik's ability to meet closure objectives M6 and M7.
			compared with the current closure plan because part of the mine void that would have required filling with freshwater would have already been filled with PK. Timing of filling with the freshwater cover could be delayed if it proves preferable to bring extra fine processed kimberlite (EFPK) from the PKC and it takes more time to complete the EFPK removal. 3. Depositing PK in mine workings would not impact on hydrology, fish or fish habitat in Lac de Gras, the Narrows between Lac du Sauvage and Lac de Gras, or the outflow to the Coppermine River. 4. Depositing PK into mine pits and underground workings will not materially affect Diavik's ability to meet closure objectives M6 and M7. Depositing PK into mine pits and underground workings would reduce the amount of Lac de Gras water required for filling by at least 5Mm3 as this volume would now be filled with PK. The entire response to MVEIRB IR#23 is also presented in the DDMI Response to MVEIRB IRs, Pages 61 to 63). **June 20:** 1. DDMI has developed a range of pit filling design options that allow for freshwater cap fill rates ranging from 6 months to 2 years as shown in Table 4 (see Page 62 of the DDMI Response to MVEIRB IRs Document [attached]) from Appendix X-7.2 of Closure and Reclamation Plan, Version 4.0. A "rapid fill" would be 6 months. 2. The closure planning basis has been to fill at a high flow rate (6 months) once filling commences and this is not materially changed if processed kimberlite (PK) is deposited in mine workings. The volume of freshwater required would be at least 5Mm3 less if PK is deposited compared with the current closure plan because part of the mine void that would have required filling with freshwater would have already been filled with PK. Timing of filling with the freshwater cover could be delayed if it proves preferable to bring extra fine processed kimberlite (EFPK) from the PKC and it takes more time to complete the EFPK removal. 3. Depositing PK in mine workings would not impact on hydrology, fish or fish habitat in Lac de Gras, the Narrows between Lac du Sauvage and Lac de Gras, or the outflow to the Coppermine River. 4. Depositing PK into mine pits and underground workings will not materially affect Diavik's ability to meet closure objectives M6 and M7. Depositing PK into mine pits and underground workings would reduce the amount of Lac de Gras water required for filling by at least 5Mm3 as this volume would now be filled with PK. The entire response to MVEIRB IR#23 is also presented in the DDMI Response to MVEIRB IRs, Pages 61 to 63).

24	Rate of pit Infilling with water and fine processed kimberlite disturbance	**Comment** Diavik provided details on how the rate of freshwater input to the pits at closure may influence density stratification (PR#11, response to EMAB IR#5; PR#13 slides 79-83). Based on Diavik's information, it appears that a substantial layer of high-density groundwater or excluded pore water is required prior to refilling in order to set up and maintain meromixis. The Review Board questions whether substantial hydraulic head and associated energy input may accompany the initial stages of pit infilling. This could induce mixing of the low-density fresh water with the higher density mine water, thus preventing the desired degree of stratification and meromixis. **Recommendation** 1. Please describe how stratification will be set up and maintained during infilling with Lac de Gras water if the turbulence associated with the inflow disturbs the higher density layer? 2. How will Diavik monitor the resuspension of fine processed kimberlite during the pit refilling?	**May 10:** 1. Water quality modelling of A418 Scenario 2a (shown in Figure on Page 64 of the the DDMI Response to MVEIRB IRs Document [attached]) for example assumes a 5m deep layer of decant pore water over the deposited PK when the infilling with the freshwater cap begins. It is also assumed for these scenarios that the turbulence associated with the inflow would fully mix the higher density decant pore water layer with the freshwater cap. The initial full mixing of the higher density decant pore water with the infilled freashwater cap is shown below where the initial TDS concentration (Year 2028) in the surface, 40 m depth and bottom are all around 25 mg/L. Over the first few years the higher density bottom layer establishes supporting a stable meromixis. 2. Water quality monitoring during the short period of active infilling will not be practical/safe or necessary as the mine area will remain separated from Lac de Gras by the water retention dikes. Once the water level of the freshwater cap and Lac de Gras are equal, monitoring would commence as described in response to MVEIRB IR#10 above. 3. A two-year period is planned between when the infilling of the freshwater cap is complete and before the dike breaches are excavated. This period is designed to allow for settling of any re-suspended material and to monitor water quality to confirm that it is acceptable for reconnection with Lac de Gras. This approach is expected to mitigate any adverse effects from initial resuspension. The entire response to MVEIRB IR#24 is also presented in the DDMI Response to MVEIRB IRs, Pages 63 to 64). **June 20:** 1. Water quality modelling of

		3. How will Diavik mitigate any adverse effects of resuspension?	A418 Scenario 2a (shown in Figure on Page 64 of the the DDMI Response to MVEIRB IRs Document [attached]) for example assumes a 5m deep layer of decant pore water over the deposited PK when the infilling with the freshwater cap begins. It is also assumed for these scenarios that the turbulence associated with the inflow would fully mix the higher density decant pore water layer with the freshwater cap. The initial full mixing of the higher density decant pore water with the infilled freashwater cap is shown below where the initial TDS concentration (Year 2028) in the surface, 40 m depth and bottom are all around 25 mg/L. Over the first few years the higher density bottom layer establishes supporting a stable meromixis. 2. Water quality monitoring during the short period of active infilling will not be practical/safe or necessary as the mine area will remain separated from Lac de Gras by the water retention dikes. Once the water level of the freshwater cap and Lac de Gras are equal, monitoring would commence as described in response to MVEIRB IR#10 above. 3. A two-year period is planned between when the infilling of the freshwater cap is complete and before the dike breaches are excavated. This period is designed to allow for settling of any re-suspended material and to monitor water quality to confirm that it is acceptable for reconnection with Lac de Gras. This approach is expected to mitigate any adverse effects from initial resuspension. The entire response to MVEIRB IR#24 is also presented in the DDMI Response to MVEIRB IRs, Pages 63 to 64).
25	Groundwater inflow to A418	**Comment** Diavik provided estimated decant volumes as a function of inputs of fine processed kimberlite slurry and groundwater to A418 (PR#16, IR#1). The volume of groundwater inflow is the same in each of the four years of the analysis. One would expect that groundwater input would decrease as the pit is filled and hydraulic head in the pit increases. **Recommendation** Please explain why Diavik considered the groundwater inputs to be constant for the four years of fine processed kimberlite infill to A418.	**May 10:** During the four (4) years of processed kimberlite depostion in A418 the groundwater inputs would be expected to gradually reduce as the water level within the mine workings increases. In the simplified analysis Diavik has conservatively assumed groundwater inputs have remained constant over the four years. This conservative assumption results in an over-estimate of the amount of decant water that would need to be managed during operations. The operational treatment capacity of the North Inlet Water Treatment Plant is 33 Mm3/year, or 131 Mm3 between 2022 and 2025 (period of potential PK filling). The expected reduction of groundwater inflow would have a negligdible impact on the site water balance and would remain within the treatment capacity of the plant. **June 20:** During the four (4) years of processed kimberlite depostion in A418 the groundwater inputs would be expected to gradually reduce as the water level within the mine workings increases. In the simplified analysis Diavik has conservatively assumed groundwater inputs have remained constant over the four years. This conservative assumption results in an over-estimate of the amount of decant water that would need to be managed during operations. The operational treatment capacity of the North Inlet Water Treatment Plant is 33 Mm3/year, or 131 Mm3 between 2022 and 2025 (period of potential PK filling). The expected reduction of groundwater inflow would have a negligdible impact on the site water balance and would remain within the treatment capacity of the plant.
26	Treated Sewage	**Comment** Diavik's response to Review Board IR#18 indicates that, in addition to processed kimberlite, the PK containment facility also receives treated sewage. In the SIS, Diavik points out that Lac de Gras monitoring has shown signs of nutrient enrichment from the Diavik mine (PR#53 p96). **Recommendation** 1. Please confirm if sewage is part of the PK slurry that is transported to the PK containment facility from the processing plant, or if treated sewage is transported separately to the PK containment facility.	**July 4:** To clarify, untreated sewage is not part of the PK slurry. Treated water from the Diavik Sewage Treatment Plant (STP) is part of the PK slurry that is transported to the PKC Facility from the Processing Plant. Likewise this treated water would form a part of the PK slurry sent to the mine workings. Parameters of potential concern related to treated sewage are nutrients such as total nitrogen and phosphorus. Diavik has always used treated water from the STP in the Process circuit and thus this impact is already considered in the Operations impact on Lac de Gras (LDG) through the Aquatic Effects Monitoring Program. In a typical year, STP loading to the PK slurry circuit is 21 kg of phosphorus and 490 kg of nitrogen. In comparison, typical loading from the NIWTP to LDG is 300 kg of phosphorus and 40,000 kg of nitrogen. Regarding the PKMW project: a)

		2. What parameters of potential concern would be associated with any sewage in the materials that are deposited in the pits and underground? 3. Please describe if and how: a. the impacts of depositing and storing treated sewage in pits and underground has been considered to date, b. treated sewage that is stored in the pits could cause or contribute to nutrient enrichment in the pit lake(s) or Lac de Gras, and c. existing or planned monitoring will capture any changes in water quality due to sewage. 4. Are there any other substances (other than PK and treated sewage) that Diavik would transport to and store in the pits and underground? If so, please describe and identify any associated impacts.	The impacts of treated sewage has been included in the data used for PKMW analysis to date. b) Incorporating treated sewage may lead to a minor increase in nutrient enrichment in the pit lakes. To date, PKMW modelling included this impact and has not identified any concern. c) All existing monitoring will capture changes in water quality due to treated sewage. d) There are no other substances Diavik intends to transport and store in the mine workings. For more information explaining the limited effect of nutrient loading to LDG from the PKMW Project please see response to NSMA-IR#5.
27	Hydrogeology of the pits: faults – IR17 follow-up	**Comment** Review Board IR#17 asked about the different characteristics of each pit, and how the shape, size, and hydrogeology, including faults, could affect water quality modelling results. Diavik responded by talking about the differences the modelling showed between the pits but did not specifically address the question of faults. Some of Diavik's documents mention faults in the pits (for example, Lyndon's fault in PR#5 PDF p41). **Recommendation** 1. Could faults affect the suitability or effectiveness of the three pits to store PK? 2. Please describe how inflow from a fault could alter: a) the proportion of groundwater in the pit at closure, and b) the development and maintenance of meromixis.	**July 4:** Each of the three mine areas (A154, A418 and A21) have somewhat different hydrogeological characteristics (including faults) that influence the groundwater inflow rates during operations when the open-pit and underground mine workings are dewatered. Once the mine workings have been filled with water and become pit lakes there will be little to no further groundwater inflows and hydrogeological characteristics would have little relevance. Water will be siphoned from Lac de Gras to fill the mine workings at closure. During pit filling groundwater will also seep into the mine workings. At the start of filling the groundwater inflow rate will be the same as during operations and then the rate will decline to zero once the water level reaches the surface elevation of Lac de Gras. The proportion of groundwater in the pit lake will be determined more by the planned fill rate (slower fill rate results in a higher proportion of groundwater) and the amount of decant water left at the bottom of the pit prior to the start of filling. Both of these factors can be controlled to a large extent and determined during the final closure design. DDMI evaluated the impact of groundwater inflow on meromixis in ICRP 3.2 (PR#8). The results are summarized in relation to this application in response to WLWB Review comments EMAB-5 January 8, 2019 EMAB-5 (PR#23). In summary while hydrogeological characteristics of each mine area is unique and will be factored into any final PK deposition and closure design they would not be a significant determinant of which mine area was preferred for PK deposition. Preference will be largely driven by availability which currently favors A418.
28	Processed kimberlite deposition and decant volumes	**Comment** In Tables 2-2a to 2-2i of the Summary Impact Statement (PR#53 p15-18) it appears that the total settled volume of FPK was assumed. From there it appears that the annual settled volume of PK and presumably, the total FPK slurry volume deposited, were back calculated from this number. These numbers don't resemble the values of expected PK to be produced over the life of Mine in Table 4 from the water licence amendment	**July 4:** 1) The settled volume, or consolidation, of FPK is based on a best estimate using data available from the PKC Facility. The volume was scaled slightly (<5%) to match the modelled PK volume of 5,000,000 m3. Overall this volume estimate is expected to be very conservative (see EMAB-IR#13). Results from ongoing consolidation testing will be used to inform updates to PK density and consolidation estimates that will be incorporated into model updates during the detailed design phase of the project. 2) DDMI intends to reclaim water from the mine workings for use in the Process to reduce fresh water usage.

		application (PR#5 PDF p32). **Recommendation** 1. Why weren't actual predicted slurry or PK volumes used tables 2-2a to 2-2i? 2. Why does Diavik expect the need to reclaim water every year, including in the early years when there may not be a reclaim pond? 3. Why does Diavik anticipate removal of the same amount (316,803 m3) of supernatant water each year? 4. In Table 2-2b, why is there 4,858,343 m3 supernatant water in 2022, but only 660,591 m3 in 2023 if Diavik will only decant 2,063,052m3 that year? 5. Please describe Diavik's confidence that 25,000,000 m3 of extra-fine PK will compress down to 5,000,000 m3. Is the 20,000,000 m3 difference porewater?	If reclaiming water from the mine working is not practical in the early years of PK deposition, reclaim water will be diverted from the North Inlet. 3) The referenced values of 'Supernatant Water Overlying PK Surface' refer to the volume of water overlying the PK to maintain either a 5m or 15m water cover under different deposition scenarios (2a, 3a, 4a). 4) The 25 Mm3 of EFPK slurry and resulting 5 Mm3 settled volume are best estimates based on current observations from the PKC Facility. The difference of 20 Mm3 is water that is a combination of supernatant pore water and added process water used to help facilitate the transport of material in a pipeline (to create a slurry). The upcoming studies EFPK Removal from PKC – Feasibility Assessment and PKC Closure Options Assessment – Dry Cover vs Wet Cover in H1 2021 will inform updates to these estimates that will be incorporated into model updates during the detailed design phase of the project.
29	Properties of fine PK and extra-fine PK (Follow up to IRs 3 and 19)	**Comment** Under Diavik's proposed development, fine PK from the process plant will be stored in the pits. Diavik is also considering putting extra-fine processed kimberlite (slimes) from the PK containment facility into the pits. Regarding the deposition of extra fine PK from the PK containment facility, Diavik states that "…the issues of concern related to this optional activity are the same as for deposition of FPK to mine workings…" (PR#53 p 28). One of the assumptions of Diavik's modelling is that "consolidation of PK is conceptual and based on estimates of the material properties of PK and average porewater chemistry". (PR#53 p 52) However, there are both physical (grain size) and chemical (see response to IR19) differences in these two sources of PK. **Recommendation** 1. In what ways (chemical or physical) are a) extra-fine PK from the containment facility and b) fine PK from the processing plant different from one another? 2. Describe if and how the differences between the two sources of PK could affect the deposition and consolidation plan. 3. What estimates of material properties and average porewater chemistry were used for fine PK and extra-fine PK for consolidation modeling? 4. Does any of the lab testing to date show the potential for exothermic reactions from deposited PK that might alter the thermal stability of the pits?	**July 4:** FPK and EFPK pore water chemistry are provided in the SIS Appendix B, Table B-2 and are based on field samples of FPK and EFPK. These pore water chemistry differences have already been considered in the modelling and assessment. For this assessment consolidation rates for EFPK and FPK were considered equivalent . DDMI would like to emphasize that Operational FPK contains EFPK material. In the PKC, EFPK is naturally segregated from FPK along the beaches where differential settling creates a grain size gradient providing the opportunity to handle the different size fractions separately. This phenomenon is not expected to occur during mine workings deposition. Results from ongoing consolidation testing will be used to inform updates to PK density and consolidation estimates that will be incorporated into model updates during the detailed design phase of the project. To date, no lab testing or modelling suggests the potential for exothermic reactions from deposited PK that might alter the thermal stability of the pits.
30	Water quality modelling if the pits are not reconnected	**Comment** Diavik's modelling and responses to Review Board information requests assumes that the pit lakes will, at some point, be reconnected to Lac de Gras. For example, in response to Board IR#12 about water	**July 4:** To be clear the approved closure plan for the mine areas is a reconnection with Lac de Gras. This is the closure plan that was originally assessed in the Comprehensive Study and is the basis for many of the conditions in Diavik's Fisheries Authorization and Navigable Waters Protection Act approval. DDMI has not proposed a development option where fish or people are prohibited from accessing the mine areas. In particular DDMI is

	(follow up to IRs 12, 13 and 16)	quality reaching equilibrium, Diavik's definition of equilibrium is the "point where the mass of constituent that is being added to the pit lake from processed kimberlite (PK) pore water release is equal to the mass of constituent loss from the pit lake through the dike breaches". If the pits are not reconnected for some reason, this definition of equilibrium becomes untenable. In response to Board IR#13 about the effects of the freshwater cap depth on water quality concentrations, Diavik points out that the "constituent mass loss rate through the dike breaches is expected to be higher for a shallow freshwater cap resulting in lower concentrations for an unanticipated mixing event". Similarly, in response to Board IR#16 about unlikely destratification events and the effect of different water column depths, Diavik reiterated that "[a] shallower freshwater cap allows more constituent mass to leave the pit lake than a deeper water cap." The proposed activity (that is, storing processed kimberlite in the pits and underground) may challenge both the desirability and feasibility of the assumption that the pit lake(s) will be reconnected to Lac de Gras for two reasons: 1. Diavik has stated that pits will not be reconnected if water quality targets are not met. 2. The Review Board is exploring the acceptability, from a cultural use perspective, of reconnecting the pits. **Recommendation** Assuming the pit lakes are not reconnected to Lac de Gras, please provide: 1. water quality predictions for the pit lakes for each deposition scenario (2a, 3a and 4a), 2. an assessment of effects to water quality, fish and fish habitat, wildlife, and cultural use, 3. a description of how the assumptions used in modelling would change (for example, the assumption that groundwater inflow, volume and mass is negligible relative to exchange with Lac de Gras), and 4. a description of adaptive management techniques Diavik would employ to improve pit lake water, if AEMP benchmarks are exceeded. 5. a response to Review Board IR#12 questions 1-4 for a no-reconnection scenario in each pit.	unlikely to deposit PK into a mine working if the expected result would be water conditions that were unsuitable for fish or fish habitat. DDMI has not determined that conditions would likely be unsuitable for fish or fish habitat. In fact the Department of Fisheries and Oceans has confirmed that estimated water quality in an A418 pit lake, with deposited PK is acceptable. On March 13, 2019 DDMI submitted to the Department of Fisheries and Oceans for review and acceptance estimates of water quality for the A418 pit lake (that included PK deposition) as required under Section 6.6 of Fisheries Authorization SC98001. DFO provided written confirmation that DDMI may continue with compensation works on April 2, 2019. DFO did not indicate any concerns with expected water quality conditions with regard to fish or fish habitat but did include a the caveat that either the MVEIRB or WLWB processes could have an outcome against reconnecting the A418 pit to Lac de Gras that would nullify DDMI's compensation efforts of placing waste rock in the A418 dike area toward the goal of fish habitat creation. DDMI recognizes that the MVEIRB has issued IR to re-consider connection of pit lakes with Lac de Gras and that this re-consideration applies to scenarios with and without deposited PK. DDMI will fully consider all responses but currently our view is that the evidence supports a connection. It is unclear why the MVEIRB would request the analysis of a hypothetical condition that does not form part of DDMI's application. Further it is necessary that this hypothetical condition be properly defined. In not cutting the required minimum 30m wide by 2m deep breaches in each of the 3 dikes, fish and boats would be prohibited for using the pit lake area. This would hypothetically be possible and even acceptable to DDMI provided permission is granted from DFO for authorizations and approvals already granted under both the Fisheries Act and Navigable Waters Protection Act, Approval would also be required from the WLWB under the existing Water License for a change to the closure plan. If the decision is to not construct fish and boat passageways through the dikes then a method will have to be developed to enable a hydrologic connectivity between the pit lakes and Lac de Gras. This will be required so that the pit lake water levels can rise and fall with the rise and fall of Lac de Gras water levels. Without this connectivity the dike structures cannot be closed and would have to be retained in perpetuity as engineered water retaining structures. The hydrologic connectivity could in concept be obtained with for example a series of fractures to the water retaining plastic concrete wall that forms the core of each dike. Given that hydrologic connectivity would be necessary, even in the hypothetical condition that reconnecting fish and boat passageways are not excavated, DDMI would expect water quality conditions to remain largely the same with or without the reconnecting passage ways. This is because the water exchange back and forth between the pit lakes and Lac de Gras will have to be similar with or without the passageway. On this basis we would predict water quality for the pit lakes to be comparable to those already provided for scenarios 2a, 3a and 4a. There would be no change to the assessment of effects on water quality. The effects of fish and fish habitat would be marginally greater due to the inability for fish to access the pit lakes and we would expect a marginal increase in effects to cultural use due to the inability to access the pit lakes by boat from Lac de Gras. No new modelling was conducted so there have been no new modelling assumptions. The adaptive management techniques that DDMI could employ if AEMP benchmarks are exceeded are described in Diavik's closure plan as closure contingencies. The proposed methods would be used after pit filling but before excavating a dike breach or creating a hydrologic connectivity. In summary these include: • aerial application of lime, alum or a synthetic polymer to assist in clarifying mine area pool water to achieve acceptable water quality before dike breaching; • surface water extraction from mine area with treatment in

		6. if and how a no-reconnection scenario would change Diavik's answers to IRs #13 and #16, particularly regarding a) the effects of the freshwater cap depth on water quality and b) the water quality under the worst-case scenario or an unanticipated mixing event.	the NIWTP and simultaneous replacement with water from Lac de Gras. • longer time frames for pool areas to clarify before breaching dikes. The responses to MVEIRB IR#12 would remain the same in this hypothetical scenario. The responses to MVEIRB IR#13 and #16 would remain the same in this hypothetical scenario.
31	Re-isolating pit lakes	**Comment** Diavik makes a commitment in the SIS (PR#53 p78) to close the breaches or isolate the pit lake from Lac de Gras if water quality is later determined to pose a risk to water quality, fish and fish habitat, caribou, humans or cultural land uses. **Recommendation** 1. Please describe how Diavik would close the dike breaches, or otherwise isolate the pit lake(s) from Lac de Gras once the dikes have already been breached. 2. Please describe what mechanisms would determine if the pit lake(s) should be re-isolated from Lac de Gras. 3. Please describe how Diavik would carry out these activities once closure and reclamation activities at the site have ceased (for example, if they were required 50 years in the future when meromixis in the A21 pit lake is expected to break down).	**July 4:** In concept DDMI could isolate the pit lake from Lac de Gras by backfilling the excavated breach with excavated rock. DDMI expects this action could come about as a response to an assessment of monitoring results that concluded conditions within the pit lake would remain unsuitable for fish or fish habitat as determined by assessing conditions against established closure criteria and an analysis of expected future conditions. If this occurred 50 years in the future when no equipment or operators were available at site, the equipment and operators would need to be mobilized. Backfill material would likely be excavated from the surface of adjacent remaining sections of dike or the east island.
32	Commitments table	**Comment** In making its determination for this EA, the Review Board will consider any and all commitments made by Diavik to mitigate potential adverse impacts of the project. **Recommendation** Please provide a comprehensive table of all commitments that Diavik is making to minimize and mitigate adverse impacts of the project.	**July 4:** Refer to Attachment 5 for a table of DDMI's commitments presented in the Summary Impact Statement for the Processed Kimberlite to Mine Workings Project Proposal.
33	Destratification of a pit due to accidents or malfunction	**Comment** Diavik describes that if an accident or malfunction occurs that causes the pit lake to destratify (that is, meromixis failure), the AEMP benchmark for nitrite would be exceeded for A418 scenario 3a and A21 scenario 4a (PR#53 p116). **Recommendation** 1. Does Diavik anticipate that meromixis would reform after a destratification event, for all pits and scenarios? If so, how long would this take? 2. If there are pits or scenarios where meromixis would not reform: a) Would any exceedances be long-term if meromixis breaks down?	**July 4:** The timing would depend on a number of factors, but it appears that, as long as some pore water continues to be expressed upward into the pit lake, the long-term conditions presented previously would re-establish. For example, the long-term behaviour of Pit A418 was evaluated considering a hypothetical turnover event at the worst-case time period (year 47 for Scenario 3A). Beyond this time, the amount of mass in pore water being expressed upward is smaller than the amount of mass diffusing out of the pit lake to Lac de Gras. Even at this time of diminished pore water expression, meromixis is predicted to re-establish within a year, then gradually become deeper until reaching what appears to be a stable elevation (about 60-m deep) for that pit after about a decade (Figure 2 in Attachment 6). In the very far future, the pore water being expressed from the tailings will decline to effectively zero. If an unanticipated mixing event occurs, the lake is unlikely to re-stratify (based on the results of modelling the whole pit lake with no PK). However, by this time, since there will be no upward movement of mass, there will also be no continued mass loading to Lac de Gras. In terms of exceedances, no additional water quality benchmark exceedances would occur beyond the one (nitrite) that has been considered to occur initially upon turnover. There is far more exchange with Lac de Gras than upward mass transfer, so the surface water would

		b) What does this mean for the water quality of that pit and the effects assessments included in the Summary Impact Statement?	be flushed much more rapidly that it could accumulate due to continued upward mass transfer during the year or two while meromixis re-establishes. For the reasons listed above, the conclusions of the SIS remain unchanged.
34	A21 meromixis stability	**Comment** According to the Summary Impact Statement, meromixis in the A21 pit may not be stable and may break down around year 50 (PR#53 p56). Under some model scenarios (3a and 4a), a breakdown in meromixis in A21 would result in some AEMP benchmark exceedances at surface and mid-depths. Under the current mine plan, both A418 and A154 pits would be available for PK deposition before A21. A21 also has the smallest storage potential of the three pits, due to its small size. **Recommendation** Given the issues with storing PK in A21, please provide additional rationale for why A21 should also be considered as a potential PK storage location.	**July 4:** DDMI continues to advise that A418 is the preferred location at this time for PK deposition to mine workings if this proposal is approved. For a number of reasons, including those noted by the MVEIRB, A21 is the least preferred, at this time. We believe it is prudent to continue to consider all feasible options to provide the maximum practical flexibility. Limiting the deposition location option to only the preferred A418 could result in an inability to adapt to changes in mine plans because of the long lead times inherent in permitting processes. Continuing to model multiple pits also improves understanding of systems dynamics leading to increased confidence in final results. For these reasons DDMI believes it is premature to remove A21 as an option for PK deposition. If the PK to mine workings proposal is approved by the MVEIRB and WLWB, DDMI will advance only a specific scope (including location) to detailed planning and design for final review and WLWB approval. Please see also response to MVEIRB#39
35	Total dissolved solids and maintaining meromixis	**Comment** Diavik indicates that for pits A418 and A154, modelling shows that the high concentration of total dissolved solids (TDS) in the bottom layer will maintain meromixis over the 100-year timeframe of modelling (PR#53 p56). However, in pit A21, the TDS of the bottom water layers will decline after 50 years and Diavik predicts that meromixis will break down. It is unclear why Figure 4-4 does not show a corresponding increase in surface water TDS as meromixis breaks down. In Figures 4.2 to 4.4, only pit A418 shows a response in the top layer to changes in TDS in the 40m and bottom TDS concentrations. **Recommendation** 1. Will meromixis eventually break down in A154 and A418 pits as well? If so, when? 2. What is the fate of the bottom water TDS when meromixis breaks down? 3. Does Diavik expect an increase in surface water TDS when meromixis breaks down? a) What would the concentration of TDS be in the pit lake and in Lac de Gras? b) Are there any potential effects to fish and fish habitat, wildlife, and cultural use?	**July 4:** Permanent vertical stratification has been observed in natural lakes and is termed meromixis (Wetzel 2001). Similar to other open pit mining operations where materials are disposed in in pit lakes under water caps (McCullough et al. 2018), changes to water quality in receiving waters are minimized if the overlying water cap becomes vertically stratified. This process has been successfully applied as a mitigation in other mine closure projects (Pelletier et al. 2009; McCullough et al. 2018). Relative to natural lakes, pit lakes tend to be more likely to become meromictic (Castendyk and Eary 2009) because they are deeper (requiring more energy to mix vertically), have smaller surface areas (reducing wind fetch and wind mixing) and often have saline inputs at depth (from groundwater intrusion or backfilled mine materials). All three of these factors contribute to the stability of meromixis. Meromixis can arise from lake geometry, natural or anthropogenic inputs, or combinations thereof. It differs from seasonal stratification that is ubiquitous in temperate lakes, whereby thermal inputs set up density gradients in the summer and winter, but the lake turns over once or twice a year when the lake becomes isothermal (Wetzel 2001). Meromictic lakes have at least two distinct layers that are not seasonal. Although meromictic lakes maintain at least two vertical layers, the isolation of chemicals within each layer is not absolute. Chemical mass is pulled downward by gravity, keeping it within the lower, denser layer. However, it is also diffused upward by chemical diffusion, which is a slow and often inconsequential process, and by turbulent mixing at the interface, which varies depending on the lake characteristics. Owing to the complexity of the processes involved, numerical models provide the most reliable estimates of the amount of mass that will be transported upward, and the resulting changes to water quality in overlying and downstream environments. Meromixis is condition where a surface mixolimnion is distinct from a lower monoliminion. Meromixis is enhanced by differences in water chemistry (chemocline). As noted above a chemocline should not be viewed as a perfect impermeable barrier. Unless there is a continuous supply of dissolved elements to the monolimnion that is greater than the loss rate across the chemocline then the chemocline gradient will gradually decrease over time. With the pit lakes the only modelled source of dissolved elements to the monolimnion is the PK pore water (a conservative modelling simplification of reality) and this source is expected to gradually reduce to zero over time as the PK consolidates. Visually extrapolating from the 100 year simulations this chemocline breakdown could occur in 200-500 years depending on the

			pit lake (A154 or A418) and the scenario. TDS concentrations would be expected to be remain low (< 20 mg/L) within in the pit lake surface water and Lac de Gras generally. These levels of TDS would not be expected to cause effects to fish, fish habitat, wildlife or cultural use. References: McCullough, C, Schultze, M. and Vandenberg, J. 2018 Realising Successful Beneficial End Uses for Pit Lakes. Mine Closure. September 4-7, 2018. Leipzig, Germany. Pelletier, C.A., Wen, M.E. and Poling, G.W., 2009, Flooding pit lakes with surface water, in Castendyk, D.N. and Eary, L.E., eds., Mine Pit Lakes: Characteristics, Predictive Modelling, and Sustainability: Society for Mining, Metallurgy, and Exploration, Inc., Littleton, Colorado, p. 187-202. Wetzel, R.G. 2001. Limnology: lake and river ecosystems. gulf professional publishing. Hamblin, P.F., Stevens, C.L. and Lawrence, G.A., 1999. Simulation of vertical transport in mining pit lake. Journal of Hydraulic Engineering, 125(10), pp.1029-1038. Castendyk, D.N. and Eary, L.E. eds., 2009. Mine pit lakes: characteristics, predictive modeling, and sustainability (Vol. 3). SME.
36	A21 constituent concentration fluctuation	**Comment** Diavik predicts that after closure, the water quality constituents will decrease quickly in A418 and A154 and very quickly in A21 (PR#53 p60). However, further down the page, the text indicates for each scenario in A21 that there will be an increase in concentration for several years after closure, followed by a decrease or fluctuation in concentration. **Recommendation** 1. Please explain the reasons for the observed increases and fluctuations in A21 water quality over the period of 10-70 years post-closure, as shown in Figures B16 and B17. 2. Please explain why these results differ from those presented in the Nov. 6 IR response to the WLWB (PR#11).	**July 4:** The observed increases and fluctuations in A21 pit water quality over the modelled period in the SIS were a result of a shallow water cover scenario which resulted in the breakdown of meromixis. The SIS results are somewhat different from November 6 IR response to the WLWB (PR#11) because they consider different water cover depths. In the November modelling, water cover depths were set at 150m, 50m and 20m, while the SIS modelling considered more realistic 85m and 51m water covers.
37	Commitment – deposition scenario that meets AEMP benchmarks in the top 40 m	**Comment** The SIS appears to contain conflicting statements about the risks associated with putting PK into A21, and the likelihood of reconnecting this pit to Lac de Gras. For example: • "Scenarios 3a and 4a of A21 will not interact cumulatively with other projects, as they don't meet the criteria for reconnecting to Lac de Gras" (p181) • "Modelling results for pit lake A21 scenario 4a predict an adverse effect of negligible magnitude within the PDA during closure and post-closure. Given that negligible adverse effects to the pit lake are anticipated, it is expected there will be no adverse effects to Lac de Gras." (p68) • "Post-closure effects are not assessed for scenario A21-4a because the pit lake would not meet the criteria for reconnection to Lac de Gras" (p139)	**July 4:** The effects on water quality have been assessed in Section 4.0 for the nine proposed scenarios. One AEMP benchmark exceedance (nitrite 3% higher than benchmark, 0.062 mg/L) is predicted at surface in A21 Scenario 4a and only before consideration of the modifying effect of the chloride ion. At or below 40m depth AEMP benchmarks are exceeded for one or more parameter in Scenario 3a and 4a. The residual effects are summarized for the nine scenarios in Table 4-10 for Project activities and in Table 4-12 for cumulative effects (i.e., all scenarios were assessed, regardless of whether predictions met the AEMP benchmarks). The comments referred to in this IR are related to the DDMI commitment to only pursue final regulatory approvals (i.e. approval required as any condition of an amended Water License) for deposition scenarios that are predicted to achieve surface water quality that meets approved closure criteria for reconnection with Lac de Gras. DDMI has proposed AEMP benchmarks as closure criteria or criteria based on the results of a detailed Risk Assessment (CRP V4.0). Please see also response to MVEIRB#10.

		• "Potential cumulative effects to fish and other aquatic biota are not expected to occur due to potential changes in Lac de Gras water quality scenarios involving…scenarios 2a and 3a of A21 because all water quality parameters in the upper 40 m of the pit will meet AEMP benchmarks" (p181) In order to reduce the potential for effects to fish and fish habitat in Lac de Gras and the Coppermine River, Diavik has said that it will "Select a deposition scenario that predicts water quality in the pit lake(s) meets AEMP benchmarks in the top 40m" (PR#53 p120). **Recommendation** 1. Please confirm what deposition scenarios for A21 may result in AEMP benchmarks exceedances at surface and 40m. 2. Please confirm Diavik's commitment to only pursue deposition scenarios that predict no AEMP benchmark exceedances in the pit lakes. 3. If these scenarios may not meet the requirements for reconnection, please describe how they were considered in the assessment of effects to valued ecosystem components.	
38	University of Alberta Studies	**Comment** The Review Board understands that there are outstanding questions regarding the chemistry and settling characteristics of PK that the University of Alberta studies will address. The Review Board wishes to clarify the state of this work. **Recommendation** 1. Which of the U of A studies have been completed? 2. For any completed studies, how were the results incorporated into the SIS? 3. For any uncompleted studies, how and when will the results be used to update modelling and check assumptions? 4. Do the sensitivity analyses completed by Diavik for the SIS cover the range of potential outcomes from the U of A studies? 5. What is the potential that the study outcomes may substantially change SIS predictions for a) consolidation of FPK or b) chemistry of FPK or pore water?	**July 4:** Currently none of the U of A studies are complete. Results from ongoing consolidation testing will be used to inform updates to PK chemistry, density and consolidation estimates that will be incorporated into model updates during the detailed design phase of the project. The February 2019 sensitivity analysis completed in DDMI's Response to WLWB IRs re: Water Licence W2015L2-0001 Amendment Request for the Deposition of Processed Kimberlite to Mine Workings are expected to cover the potential outcomes of the U of A studies. It is considered unlikely that the study outcome will substantially change SIS predictions.
39	Modelling calibration	**Comment** Page 52 of the Summary Impact Statement (PR#53) says "[c]alibration of the model is not yet possible as the pit lake	**July 4:** To clarify the original text, the modelling completed for Diavik used the calibrated rates from the Lac du Sauvage calibration, and it used a model set up that was consistent

does not currently exist; however, rates and constants from previous model calibrations in the region were applied and are consistent with the model set up for the Jay Project (DDEC 2014) at the Ekati Mine and the pit lakes at the Gahcho Kue Project (DeBeers 2012; Vandenberg et al. 2015)." The Review Board notes that this is problematic, since the other pit lakes are not yet filled and therefore cannot have been used to calibrate models. It would be more accurate to say they followed the same assumptions as previous models. "Calibration" is not an accurate description of the model setup and implies a level of certainty that may not be warranted.

Recommendation

1. If the model is not calibrated, please describe Diavik's confidence in the modelling.
2. Please describe:

    a) the rates and constants used in the modelling, and

    b) the rationale for why those rates and constants were selected.

with the Ekati and Gahcho Kue projects. Additional detail about the calibration is provided below. The phrase "model calibration in the region" in the Summary Impact Statement (PR#53) refers to the calibration of CEQUAL-W2 (W2) model for the Lac du Sauvage (Dominion Diamond 2014; Appendix 8G). As part of the Jay Project a W2 model of Lac du Sauvage (LdS) was developed and calibrated to observed temperature conditions (2003-2013) to obtain estimates of hydrodynamic parameters. The W2 calibration was carried out to match the time series and vertical profiles of simulated and observed temperature for Lac du Sauvage under pre-project conditions. Hydrodynamic parameters were also adjusted to produce a reasonable match of ice cover periods and annual evaporation rates in the range of observations (Dominion Diamond 2014). Because Jay and Misery pit lakes did not exist, the calibrated hydrodynamic parameters were then applied to the pit lake models (Dominion Diamond 2014). The Diavik modelling followed this same approach to applying calibrated parameters, where available. Even though the model was not calibrated, the general conclusions drawn from the model have a reasonably high level of confidence. The conclusions are based primarily on physical processes, and previous experience with calibrating physical models shows that calibration tends to change predictions by a difference in degree rather than a difference in kind. For example, it is likely that if calibration data were available, the depth to which mixing occurs would differ in an uncalibrated model by a few metres, and the water temperature would vary by up to one degree Celsius, but it would not change the overall behaviour of the water circulation nor the overall concentrations of surface water – except again by degree rather than by kind. In the absence of calibration, a sensitivity analysis is often used to test the potential effects of a range of possible inputs on the outcomes or predictions (Vandenberg et al. 2016) of a given model scenario. The analysis can indicate whether any consequential changes would occur in the event that a given calibration parameter required adjustment. While not definitive, such an analysis provides confidence in the original predictions if the tested parameter values cover a range of reasonable and plausible conditions. Even with calibration, assessment of project effects has some inherent uncertainty associated with data, methods and the predictive nature of the assessment. Accuracy of the model predictions is affected by model structure, solution schemes, data inputs and calibration or parameter estimation (Beck 1987). Similarly, uncertainty exists in the biological responses to these predictions because not every dose, condition, species, or age can be tested. These uncertainties were mitigated by incorporating conservative assumptions (i.e., where present data or information are incomplete). The following sections describe the reasons why there is a high level of confidence in the model predictions and expectation that the pit lakes will be able to provide a healthy, productive aquatic ecosystem. Modelling Software: Uncertainty related to model structure and solution schemes is considered negligible since the water quality models are based on proven equations and solutions. The W2 model has established a well-recognized reputation as an effective and practical modelling tool for lake and reservoir hydrodynamics and water quality, and has been used extensively worldwide to simulate the potential performance of natural and constructed lakes, including mine pit lakes (Cole and Wells 2008; Castendyk and Eary 2009; Castendyk et al. 2015). Several examples of W2 model application in NWT, Canada, to assess vertical stratification potential of pit lakes, are: • Tuzo and Hearne Pit lakes (De Beers 2012, Vandenberg et al. 2015, Golder 2018a) • Misery and Jay Pit lakes (Dominion Diamond 2014 and 2017) • Panda, Koala and Koala North (Golder 2018b) Conservative Assumptions: Inputs and parameters that affect the accuracy of water quality predictions in the pit lakes are not known with certainty. The uncertainty stemming from these sources is addressed by using

conservative assumptions for water quality model inputs and parameters that reduce the likelihood that predictions will be underestimated; for example: • Nutrient cycling processes (e.g., nutrient uptake and transformation, phytoplankton production, senescence, decay and settling) were not incorporated in the water quality modelling. Therefore, predictions of phosphorus and nitrogen species and their spatial and temporal extent are considered conservative, because biological processes tend to remove nutrients from the water column by the mechanisms mentioned above. • The water quality constituents, particularly the metals, were treated as conservative elements, in which there was no accounting for chemical transformation • Static bathymetry, which results in overestimation of mixing potential of the pit lake and concentrations along the vertical column because it does not account for narrow, deepening lake beds that would, in reality, keep more mass beneath the chemocline. The conservative assumptions describe above will likely lead to overestimates of predicted concentrations, resulting in an additional level of protection for the environment wherever management decisions are based on these results. Sensitivity Analysis: Another level of confidence in model predictions was added by the sensitivity analysis which was completed (Golder 2019) to assess the sensitivity of the hydrodynamic model results to several variables, including: inflow from local mine area; groundwater inflows during the filling period; wind sheltering coefficient; extreme wind events; potential changes in future environmental conditions (warming air temperature); pore water chemistry; model initial conditions; maximum vertical eddy viscosity; and consolidation rate or process kimberlite (PK) pore water release rate. Results of this analysis showed that under all plausible scenarios, there are small changes to the transport of constituents and long-term mixing, and the pit lake remains stratified over the long-term. This sensitivity analysis provides additional confidence in the original predictions, recognizing that they are preliminary and subject to additional vertical mixing imposed by the model's structure. By extension, the water quality results presented based on this hydrodynamic model are thought to be reasonably accurate, and likely conservative. Response to part a) Default model parameters were used, with some exceptions (see Table 1: List of calibration parameters in Attachment 7). Response to part b) The hydrodynamic parameters were adopted from the calibrated model for LdS, which are believed to be the best estimates for the region. Lac de Gras (LdG) and LdS are in the same climate and watersheds and are interconnected. The wind sheltering coefficient, albedo and coefficient of ice-water heat exchange are believed to be the same between the two systems being modelled (LdS and pit lakes). The sediment temperature was increased to represent replacement of PK at the bottom of the pit lakes, assuming that a warmer sediment temperature represented a more accurate or at least a more conservative estimate with respect to potential for generating convection currents. Maximum eddy viscosity was tested through the sensitivity analysis and shown that model results and conclusions are not sensitive to this parameter. References: Beck, B. 1987. Water Quality Modeling: a Review of the Analysis of Uncertainty. Water Resources Research. 23. 8. p. 1393-1442. Castendyk, D.N. and Eary, L.E. eds., 2009. Mine pit lakes: characteristics, predictive modeling, and sustainability (Vol. 3). SME. Castendyk, D. N., L. S. Balistrieri, C. Gammons, and N. Tucci. 2015. Modeling and management of pit lake water chemistry 2: Case studies. Applied Geochemistry 57:289–307. Cole, T.M. and Wells, S.A. 2008. CE-QUAL-W2: A Two-Dimensional, Laterally Averaged, Hydrodynamic and Water Quality Model, Version 3.6. User Manual. August 2008. De Beers Canada Inc. (De Beers). 2012. Environmental Impact Statement Supplemental Information Submission for the Gahcho Kué Project. Submitted to the Mackenzie Valley Environmental Impact Review Board, Yellowknife, NWT, Canada. April

			2012. Dominion Diamond (Dominion Diamond Ekati Corporation;). 2014. Developer's Assessment Report for the Jay Project. Prepared by Golder Associates Ltd., October 2014. Yellowknife, NWT, Canada. Golder Associates Ltd. (Golder). 2017. Ekati Mine – Misery Underground Water Quality Model Updates. Submitted to Dominion Diamond Ekati Corporation. August 2017. Golder Associates Ltd. (Golder) 2018a. Gahcho Kué Mine - Water Quality Model Updates. Submitted to De Beers Canada Inc., March 2018. Golder Associates Ltd. (Golder) 2018b. Ekati Mine – Supernatant Water Quality Modelling of Panda, Koala, and Koala North Pit Lakes at Closure. Submitted to Dominion Diamond Ekati. August 2018. Golder. 2019. Pit Lake Water Quality Modelling A418, A154 & A21 Pit Lakes. Power Point Slides. January 16, 2019. Vandenberg, J.A., M. Herrell, J.W. Faithful, A.M. Snow, J. Lacrampe, C. Bieber, S. Dayyani and V. Chisholm. 2015. Multiple Modeling Approach for the Aquatic Effects Assessment of a Proposed Northern Diamond Mine Development. Mine Water and Environment, http://dx.doi.org/10.1007/s10230-015-0337-5 (2015), 1-9. Vandenberg, J., K. Salzsauler, and S. Donald. 2016. Best Practices Checklist for Modelling Mine Waters. International Mine Water Association Annual Conference. Liepzig, Germany.
40	Water quality in Lac de Gras at closure	**Comment** Diavik predicts that there will be no adverse effects on Lac de Gras under the A418 and A154 scenarios (PR#53 p68). Considering there are existing and currently measurable changes throughout Lac de Gras from TDS during current operations, the Review Board is unsure what is driving this conclusion. **Recommendation** 1. How does final water quality in Lac de Gras post-closure compare to current water quality? 2. Will it be better (lower Cl and TDS) than what is currently being exhibited? 3. Please provide results for Lac de Gras post-closure to support this conclusion.	**July 4:** Current TDS conditions in Lac de Gras, particularly the eastern portion are influenced by the discharge from Diavik's North Inlet Water Treatment Plant. Annual TDS loadings to Lac de Gras have typically been in the range of 3,000,0000 to 4,000,000 kg/y (see Figure 4-3 in Attachment 2) and have been assessed as high as 7,911,401 kg/y for 2023 (Jay Project EA). With mine closure (starting in 2025) the NIWTP discharge will be eliminated as will the TDS loading. Post-closure TDS loadings from pit lakes where PK material has been deposited are estimated to be on average 1,814 kg/y (A418 Scenario 2a) and 5,951 kg/y (A418 Scenario 3a) over the 100 year model simulation. Additionally DDMI estimates total post-closure runoff from the east island of 1,880,004 kg/y (DDMI 2019 in preparation). In total DDMI is currently estimating a 37-76% reduction in TDS loading to Lac de Gras post-closure that is expected to result in a measureable reduction in Lac de Gras TDS levels.
41	Understanding baseline water quality exceedances	**Comment** Table 4-4 shows the AEMP benchmarks, the 1996 baseline water quality, and the 2018 AEMP water quality values. For several of the metals (for example, iron, zinc, chromium, copper), the maximum baseline water quality values are greater than the maximum 2018 AEMP water quality values. **Recommendation** Please discuss why some of the maximum 1999 baseline concentrations are higher than the maximum values observed in 2018.	**July 4:** The anomalous results noted by the reviewer are likely caused by data quality issues and/or analytical errors affecting the 1996 baseline water quality dataset. Quality control (QC) issues have been previously identified with the baseline and early operational monitoring data for Lac de Gras (see Golder 2011, 2016, 2019a), with certain parameters (including those noted by the reviewer) and years affected. Previous studies have found that the early data are typically more variable compared to recent data (Golder 2011, 2016, 2019a), and that numerous data points from the early monitoring period are unrealistically high compared to recent data and to approved "reference conditions" for Lac de Gras, as defined in the AEMP Reference Conditions Report (Golder 2019b). These data quality issues likely reflect improvements to analytical techniques (e.g., analytical detection limits, sensitivity of standard methods), refinements to the AEMP design, and improvements to quality assurance (QA) and QC procedures over the years. In addition, when generating the data ranges shown in Table 4-4, the raw 1996 water quality data were used, and an outlier screening process was not applied to identify and screen out anomalous results or likely errors. References: Golder. 2011. Diavik Diamond Mine – 2007 to 2010 AEMP Summary Report. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. July 2011. Golder. 2016. 2011 to 2013 Aquatic Effects Re-evaluation Report Version 3.2 for the Diavik Diamond Mine, Northwest Territories. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. June 2016.

			Golder. 2019a. 2014 to 2016 Aquatic Effects Re-evaluation Report for the Diavik Diamond Mine, Northwest Territories Version 1.1. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. June 2019. Golder. 2019b. AEMP Reference Conditions Report, Version 1.4. Prepared for Diavik Diamond Mines (2012) Inc. Yellowknife, NT, Canada. June 2019.
42	Significance thresholds for water quality parameters	**Comment** In table 4-3, Diavik does not provide significance threshold for pH, DO, TDS, alkalinity, TSS or turbidity because they were not included in modeling (PR#53 p44). The Review Board does not consider this an acceptable reason to not provide Diavik's significance threshold. **Recommendation** Please provide significance thresholds and rationale for all parameters that may change due to the proposed project, including TDS, DO, pH, turbidity, and TSS.	**July 4:** A revised table 4-3 is included as Attachment 4
43	Significance threshold for zinc	**Comment** The Canadian Water Quality Guideline (CWQG) for zinc has recently been lowered from the 30ug/L to 7 ug/L. Diavik has indicated that it will continue to use 30 ug/L for consistency with the AEMP (PR#53 p45). **Recommendation** 1. Will Diavik update the zinc guidelines in the next AEMP review? 2. Please provide additional rationale for not revising the significance thresholds for zinc given change in the CWQG. 3. Would using the 7 ug/L water quality guideline for determining the significance of water quality changes affect Diavik's significance finding?	**July 4:** DDMI reviews CCME water quality guidelines for the protection of aquatic life and Health Canada's guidelines for Canadian drinking water quality to inform revisions to the AEMP Benchmarks within the AEMP Design every three years. DDMI does not think it is critical to update AEMP Benchmarks more frequently than this. Based on a review of SIS model results, the predicted maximum concentrations in the surface water (top section and at 40m) in A154 (scenario 2a, 3a, 41), A418 (scenario 2a, 3a, 4a) and A21 (scenario 2a, 4a) remain below the 7 ug/L Zinc value, therefor a benchmark update would not change the significance finding. The only exception is A21 scenario 3a, which slightly exceeded 7 ug/L Zinc, however this scenario already had benchmark exceedances for nitrate, cadmium and molybdenum, therefor not changing the significance finding overall. Overall for the pit lake A21 scenario 3a modelling predicts an adverse high magnitude effect of moderate duration within the PDA during closure and post-closure. Based on the modelling and the significance definition developed by CEAA (1999), with application of mitigation and environmental protection measures, significant adverse effects on water quality are not anticipated for the A21 pit lake for all scenarios of PK deposition modelled. These conclusions would not change based on an updated Zinc benchmark. DDMI does note that A21-3a is still considered the least favourable deposition scenario.
44	Acceptability of cumulative effects on water quality	**Comment** Diavik concludes that there will be no significant cumulative adverse effects on water quality and that "cumulative changes in water quality are not anticipated to affect traditional use of the land including aquatic life, caribou and Indigenous people and is anticipated to be acceptable for future generations" (PR#53 p77). **Recommendation** 1. Please describe why Diavik anticipates that any cumulative changes from this project, in combination with ongoing impacts from the existing Ekati and Diavik mines, will be acceptable to future generations of Indigenous traditional users of the land. 2. Please describe whether Diavik has established a framework for determining acceptability of changes related to water quality and cultural use.	**July 4:** DDMI's assessment of the potential effects of the PK to Mine Workings Project on cultural use, assumes that cultural use by Indigenous groups depends on the health and abundance of traditionally harvested species and the continued availability of and access to traditional use sites and areas. Hence, as part of the assessment of potential impacts to cultural use, DDMI assessed how the Project may result in a change in availability of traditional resources and/or a change in access to resources and areas for cultural use. To evaluate the potential for the Project to result in these changes to cultural use, DDMI focused on the potential for impacts to key resources (water quality, fish and fish habitat, and wildlife) of value to traditional activities and practices such as hunting, trapping, fishing and navigation. DDMI assessed the potential for project-specific residual impacts to these key resources to interact cumulatively with residual impacts to these same resources from other land use activities in the region and predicted that the project-specific residual effects are unlikely to interact cumulatively with residual environmental effects from other projects (past, present, and reasonably foreseeable). This is because the PK to Mine Workings Project is predicted to only have negligible effects on these key resources and, therefore, cultural use. DDMI has a high level of confidence in conclusions that project-specific and cumulative effects will not pose a threat to the long-term persistence and viability of species relied upon for cultural use in the region, or change

			fish habitat that would result in loss of access to fishing areas for cultural use. Although DDMI has high level of confidence in the conclusions regarding the potential for project-specific and cumulative impacts to cultural use, DDMI acknowledges that perceptions are difficult to quantify. Indigenous groups may still choose not to pursue cultural use activities near the mine site post-closure for a variety of personal, practical, aesthetic, and spiritual reasons with or without implementation of the PK to Mine Workings Project.
45	Follow up and Monitoring: continuing AEMP	**Comment** Diavik indicates that it will continue the AEMP in Lac de Gras, which includes fish health and fish tissue monitoring at discrete intervals (PR#53 p77). **Recommendation** 1. Please describe if any additional AEMP monitoring is required to detect potential effects of the project on fish, including fish behavior, presence/absence, access to spawning or deeper water habitat, palatability, tissue sampling for large bodied fish, etc. as a result of the presence of PK when the pits are reconnected to Lac de Gras 2. If no changes are proposed/required, please provide rationale to support this position.	**July 4:** Please also see response to EMAB #22 and GNWT #2. At this time, it is not anticipated that additional AEMP monitoring will be required to detect potential effects of the project on fish as a result of presence of PK in the pits when they are reconnected to Lac de Gras. The additional monitoring programs in the No Net Loss Plan (NNLP) will verify the effectiveness of fish habitat compensation constructed in the pits. While these NNLP monitoring programs do not specifically address monitoring potential effects on fish (i.e., behavior, presence/absence, palatability, tissue sampling in large bodied fish), they will provide information on fish access to the pit lake habitat. Fish presence/absence and tissue chemistry will continue to be addressed through the existing AEMP. Sampling for biological components of the aquatic ecosystem is proposed to occur once every three years for three cycles (i.e., nine years) after the dikes have been breached (DDMI 2017). However, the AEMP Design Plan will continue to be updated every three years, or as required by the Water Licence. As part of the update, an AEMP Re-evaluation will also be required. If the findings of the re-evaluation indicate that additional AEMP monitoring is required to detect unanticipated mine-related effects during closure or post-closure, additional monitoring will be proposed at that time. References: Diavik Diamond Mines (2012) Inc. (DDMI). 2017. Closure and Reclamation Plan Version 4. April 2017.
46	Fisheries Act Authorization Compensation Plan options	**Comment** WLWB IR-18(4) from the first round of information requests on the water licence amendment application (PR#22) process asked Diavik: "If reconnection is not possible, how would this affect future use of the flooded pits?". Diavik's response was that, if reconnection was not possible, "this area would no longer be available as fish habitat. In addition, this area would no longer be navigable by boat via Lac de Gras." In the first round of Review Board information requests, Diavik indicated that it would develop an "alternative compensation plan" to address permanent habitat loss if the pit lakes could not be reconnected to Lac de Gras (IR#9). Diavik should demonstrate to the Review Board that there are practical, feasible, and appropriate options available to compensate for habitat loss in order for this to be accepted as mitigation. **Recommendation** Please describe specific activities Diavik would propose in an alternative compensation plan to address permanent habitat loss in Lac de Gras if reconnection is not possible or desirable.	**July 4:** To be clear the approved closure plan for the mine areas is to reconnect the areas with Lac de Gras. This is the closure plan that was originally assesse din the Comprehensive Study and is the basis for many of the conditions in Diavik's Fisheries Authorization. DDMI has not proposed a development option where fish or people are prohibited from accessing the mine areas. In particular DDMI is unlikely to deposit PK into a mine working if the expected result would be water conditions that were unsuitable for fish or fish habitat. DDMI has no indication that expected conditions would likely be unsuitable for fish or fish habitat. In fact the Department of Fisheries and Oceans has confirmed that estimated water quality in an A418 pit lake with deposited PK is acceptable. On March 13, 2019 DDMI submitted to the Department of Fisheries and Oceans for review and acceptance estimates of water quality for the A418 pit lake (that included PK deposition) as required under Section 6.6 of Fisheries Authorization SC98001. DFO provided written confirmation that DDMI may continue with compensation works on April 2, 2019. DFO did include a the caveat that either the MVEIRB or WLWB processes could have an outcome against reconnecting the A418 pit to Lac de Gras that would nullify DDMI's compensation efforts of placing waste rock in the A418 dike area toward the goal of fish habitat creation. DDMI has not developed alternative compensation plans If for some reason DDMI was not permitted to allow fish access to the pit lakes, DDMI would work with DFO and in consultation with Indigenous communities to determine alternative compensation approaches that are practical, feasible and appropriate. If this becomes necessary it is likely that off-site compensation approaches will need to be considered as it is very possible that there are no appropriate alternatives within Lac de Gras.
47	Mercury levels in fish	**Comment** Diavik identifies that the CCME guideline for mercury levels that are safe for animals to eat is 0.033 ug/g and that the	**July 4:** The mercury concentrations being discussed are from the 2018 Traditional Knowledge study and can't be scientifically or reliably compared to baseline scientific

		baseline concentrations in large-bodied fish in Lac de Gras in 1997 were already higher than that – ranging from a mean of 0.045 to 0.182 (PR#53 p100). In 2018, measured concentrations had risen to 0.227ug/g. **Recommendation** 1. Please explain if Diavik believes the observed increase in mercury concentrations in Lac de Gras to be a mine effect. 2. Is there any way in which processed kimberlite in the pits could interact with and increase mercury levels in fish? If so, please describe the potential effects.	data for Lac de Gras. The purpose of the scientific component of the AEMP is to monitor effects on aquatic life and it has not identified an observed increase in fish mercury concentrations in Lac de Gras caused by the mine. Traditional Knowledge Camp participants used TK to determined how, where, when and why to collect fish selected for metals analysis. Inclement weather and camp participant safety factored heavily into decision-making. Accordingly, most fish were caught off the dock in a small shallow bay and quickly processed. It was possible to set one net, from which additional lake trout were selected for analysis. Overall the method of selecting and sampling fish did not follow a scientific method and for this reason the data can't be compared with other scientific datasets. For more information on the AEMP fish sampling and response plans, please see the DDMI Response to GNWT-IR#2.
48	Measurable parameters for zooplankton and benthic invertebrates	**Comment** Diavik indicates that a potential change in fish mortality could occur as a result of a change in the plankton or benthic communities that fish depend on for food. However, Table 6-1 does not include any measurable parameters for zooplankton and benthic invertebrates (PR#53 p89). **Recommendation** Please describe how Diavik will measure changes in zooplankton and benthic invertebrates that could impact fish.	**July 4:** Measurable parameters for zooplankton and benthic invertebrates were not included in Table 6.1 because they are not final end-point receptors for monitoring potential effects of the Project on fish and fish habitat. Instead, it is DDMI's position that any indirect effects to fish from changes in the zooplankton or benthic invertebrates communities colonizing the pits or in Lac du Gras would be detected by the measurable parameters proposed for the sentinel fish species.
49	Potential for destratification event during ice cover	**Comment** Diavik discusses a scenario in which nitrite concentrations could exceed AEMP standards (but not exceed CCME guidelines) and concludes that there would only be an effect under extended periods of calm conditions immediately after a destratification event (PR#53 p116). Diavik points out that extended periods of calm winds and waves on Lac de Gras are very rare and the likelihood of this occurring is low. On pg.67 of the SIS, Diavik also sates that wind generated currents would help to re-oxygenate surface waters in the event of a destratification event that causes a reduction in oxygen levels at the surface. However, Lac de Gras is covered in ice for up to eight months of the year. During ice-cover, the effects of wind and wave action would be very low or non-existent. **Recommendation** 1. How has Diavik considered the likelihood and potential impacts of a destratification event during the ice-cover season? 2. How would this affect Diavik's significance determination and assumptions?	**July 4:** Specific consideration of a destratification event under ice cover does not change the assumptions or conclusions of the assessment. Dispersal by wind generated currents is one of three factors that help to mitigate the potential effects of elevated nitrite that could result from destratification. Potential water quality effects related to an unanticipated destratification event (due to rockfall within a pit) are discussed in Section 4.4.3.2 of the SIS (page 70 of 192). In the event of destratification, an increase in nitrite concentrations to above the AEMP benchmarks is predicted for Pit A21 for scenario 4a (maximum of 0.062 mg/L, 3% higher than the benchmark) and for A418 for scenarios 2a, 3, and 4a (maximum of 0.076 mg/L, 26% higher than the benchmark). No other benchmark exceedances are identified for A418, A154, or A21 for the three scenarios and the range of modelled parameters. Outside of the pits, concentrations would be expected to be diluted in the surrounding waters of Lac de Gras. In Section 6.4.5.2, it is concluded that "No significant effect to fish or other aquatic biota in Lac de Gras would be expected to occur due to elevated nitrite concentrations in pit lakes during a destratification event. This is because: 1) the predicted nitrite concentrations in the pit lakes are relatively close to the aquatic effects benchmark and below the maximum nitrite guideline for the protection of freshwater biota; 2) the volume of water in Lac de Gras is many orders of magnitude greater than the volume of water in the pit lakes and nitrite concentrations would be quickly diluted; and 3) the wind generated currents on Lac de Gras would be expected to quickly disperse water entering the lake from the pit lakes. Further confidence in this assessment is provided by the conservative assumptions used in the model (Golder 2019)." British Columbia provides a maximum nitrite guideline of 0.12 mg/L for water with a mean chloride concentration of 2 to 4 mg/L (3 mg/L for Lac de Gras). Under ice, it could take longer for nitrite to be converted to nitrate (modeling indicates a likely half-life for nitrite conversion of approximately one month under a range of long-term environmental conditions) and for pit lake water to mix with surrounding lake waters. However, even under this condition, nitrite concentrations would not be expected to result in toxicity to aquatic life, given that predicted concentrations are relatively close to the aquatic effects benchmark, below the maximum nitrite guideline for

			protection of freshwater biota, and within the safety margins used to derive the guidelines and dilution into Lac de Gras would rapidly reduce nitrite concentrations. Furthermore, it is anticipated that fish would be able to move out of the pit into Lac de Gras, where concentrations would be lower than within the pit.
50	Baseline conditions for Bathurst caribou	**Comment** In Section 7.2.2, Diavik describes existing conditions for barren-ground caribou states that the Bathurst population has decreased by more than half from 20,000 in 2015 to 8,000 2018. However, taking a longer view, the Bathurst population has in fact declined ~96% in the last 30 years (see draft Bathurst caribou herd range plan pp3 /) The Review Board notes that • The recent Jay project EA acknowledged longer term trends of caribou populations. • The drastic decline in the Bathurst population is one of the reasons why the Review Board included impacts to barren-ground caribou in the scope of assessment for this project. **Recommendation** 1. Why did Diavik choose 2015 as the starting point (baseline) for assessing impacts to caribou populations, rather than the 1990s baseline population when Diavik mine was first proposed and built?' 2. Would using the 1990s population data as a baseline change Diavik's effects assessment?	**July 4:** The Summary Impact Statement (DDMI 2019) did not choose 2015 as the starting point (baseline) for assessing the impacts on caribou or any other wildlife species. The reference to 2015 as stated in Section 7.2.2. provided recent context that the Bathurst caribou population has decreased by more than half since 2015, declining from approximately 20,000 to about 8,200 individuals in 2018. It is recognized that between 1996 and 2015, the Bathurst caribou herd has declined from approximately 349,000 to 20,000 animals (Virgl et al. 2017). Overall, baseline conditions are assessed as the current conditions prior to any activities considered to be part of the PKMW Project (those activities not currently authorized or previously assessed as part of Diavik Mine operations as a whole). In the case of caribou, DDMI was aware of the declining Bathurst population, and this was considered in the assessment of baseline conditions. Using the 1990s population data as a baseline would not change the results of the assessment. The assessment does not attempt to predict Project-related changes in population size due to the number of other factors known to affect caribou populations (e.g., predation). References DDMI (Diavik Diamond Mines Inc.). 2019. Summary Impact Statement: Processed Kimberlite to Mine Workings Project. Diavik Diamond Mines Inc., dated May 17, 2019 Virgl, J.A., W.J. Rettie, and D.W. Coulton. 2017. Spatial and temporal changes in seasonal range attributes in a declining barren-ground caribou herd. Rangifer 37: 31-46. Accessed May 1, 2019. https://doi.org/10.7557/2.37.1.4115
51	Monitoring and mitigating potential impacts to caribou	**Comment** In SIS section 7.3.2 Diavik indicates that it will temporarily suspend construction or mining activity when caribou safety is threatened and use appropriate herding techniques to remove caribou from hazardous areas before resuming activities. In its summary of commitments, Diavik states that "wildlife deterrent techniques will be implemented as required to reduce interactions with contaminants, if necessary". **Recommendation** 1. Please describe what preventative mitigations Diavik will use to ensure that caribou or other wildlife do not interact with contaminants, particularly prior to pit in-filling. 2. Please provide more detail about Diavik's existing caribou and wildlife management plans, including: a) thresholds for suspending construction activities and employing deterrent techniques when caribou are in the area,	**July 4:** To mitigate impacts to caribou through potential interaction with pits/mine workings during the construction and operations phases, DDMI will implement its existing Standard Operating Procedures (SOP) for the management of caribou at site. The SOP provides guidelines for moving caribou from the dikes surrounding the pits as well as other hazardous areas at the Diavik site. The approach in the SOP is to encourage caribou to leave known and potentially hazardous sites and situations for their protection, using procedures that will not harass or cause adverse behavioural responses by caribou that may lead to impacts through aggravated stress or injury. DDMI implements caribou advisories as part of a caribou monitoring program to assemble information of caribou occurrence in the region, when caribou are near or approaching the Diavik site and when caribou are on the East Island. The Caribou Monitoring Program provides the following notifications to DDMI site personnel: • No Concern (Green): The notification issued to Diavik site managers that no caribou or fewer than 1000 caribou are present on the East Island. • Caribou Advisory (Yellow): The notification issued to Diavik site managers that between 100 and 1000 caribou are present on the East Island. Temporary road closure and various management actions may be required; technical procedures may be implemented, including modification, careful control or stoppage of traffic, construction and operation activities. • Caribou Alert (Red): The notification issued to Diavik site managers that over 1000 caribou are present on the East Island. Temporary road closure or management actions may be required; technical procedures may be implemented, including modification, careful stoppage of traffic, construction and operation activities. Caribou herding procedures are to be applied when caribou move onto the dikes of the

		b) the specific activities that will be employed to herd caribou, and c) how Diavik determines when activities can be resumed.	mine pits, either traveling over land or by swimming to the dike. Any number of caribou present on the mining dikes will trigger caribou herding action by DDMI personnel. DDMI's caribou herding procedures to avoid interaction with the pit/mine workings areas are as follows: • Use a combination of a small truck and/or foot patrol as most appropriate for the local situation and terrain. The direction of herding is informed by the location of the caribou and the safest escape routes for caribou. • Personnel coordinating the caribou herding maintain communication with supervisors of operations with the pit/mine workings areas to facilitate modification of operations including temporary cessation of operations until the personnel coordinating the caribou herding announce the "All Clear" at the completion of the caribou herding procedures. • Herding by vehicle and on foot entail approaching caribou at a slow speed (less than 5 km/hr for vehicles) and stopping when caribou show an alarmed response. Observations of caribou behavior will provide cues on when to proceed. DDMI personnel are to ensure that herding does not stimulate a very alarmed-panic escape response. DDMI notes that there have been no recorded caribou interaction with the pits/mine workings area at Diavik to date. In addition to the caribou-specific procedures, DDMI will implement the following wildlife monitoring and management procedures To minimize wildlife interactions with the mine workings/pits during construction and operations: 1. Monitoring/tracking of wildlife presence and/or proximity to the mine workings. 2. Training all site personnel to record and/or report incidental sittings of wildlife, including birds, in the general area of the mine workings during operations. 3. Employing deterrents such as herding as required. 4. Excavating ramps into the pit walls that will remain as a shoreline. 5. Use of wildlife deterrence techniques such as truck horns, bear bangers, 12Ga cracker shells, 12Ga bean bags, scarecrows, decoy foxes and falcons, noise makers (Wetland Wailer Mk IV), and hanging screens down the high walls of the pits.
52	Rationale for geographic scope	**Comment** Diavik used the spatial boundaries from the 1998 CEAA Comprehensive Study, which included a project development area, a rectangular local assessment area, and a rectangular regional assessment area. In the Review Board's Reasons for Decision on scope (PR#40), the Board determined that the geographic scope for wildlife will include the Lac de Gras area and any places where cumulative effects impact the populations that may encounter the project. **Recommendation** Please provide rationale for using CEAA spatial boundaries (a rectangle) for cumulative effects when the Review Board's *Reasons for Decision on Scope* required the geographic scope should to include any places where cumulative impacts could occur to the same population (for example, seasonal range boundaries).	**July 4:** The activities considered to be part of the PKMW Project include infrastructure and activities not currently authorized or previously assessed as part of Diavik Mine operations as a whole. The rationale for using the same spatial boundaries as the 1998 Comprehensive Study was to provide a consistent basis to apply the same residual effects criteria as discussed in Section 3.2.4 of the Summary Impact Statement (SIS), which states: "The characterization of residual effects is based on methods used in the 1998 Comprehensive Study (DDMI 1998) to maintain consistency of the assessment of this modification of the mine operation with the original assessment of the Diavik Mine as a whole" (DDMI 2019). As stated in Section 7.5 of the SIS (DDMI 2019), "there are no project residual effects that are likely to interact cumulatively with residual environmental effects from other physical activities" and "further assessment of cumulative effects is therefore not warranted because the PKMW Project's negligible effect on wildlife health does not interact cumulatively with other projects or activities". DDMI's conclusions on cumulative effects to wildlife using a larger regional assessment area would be unchanged. References DDMI (Diavik Diamond Mines Inc.). 1998. Environmental Effects Report, Wildlife. Report prepared by Axys Environmental Consulting Ltd and Penner and Associates Ltd DDMI. 2019. Summary Impact Statement: Processed Kimberlite to Mine Workings Project. Diavik Diamond Mines Inc., dated May 17, 2019
53	Section 7.1.1 – Bird species at risk and species of conservation concern	**Comment** The letter from ECCC (PR#48) in response to the Review Board's SARA notification letter (PR#30) indicates the project may affect the bank and barn swallow or their critical habitat. In its SIS, Diavik indicates that there is limited potential for the bank and barn swallow to occur within the RAA and therefore	**July 4:** Based on the Canadian breeding range distributions described in their respective COSEWIC reports, neither the barn swallow (Hirundo rustica) or the bank swallow (Riparia riparia) are expected to regularly occur in the area of the Diavik Mine (COSEWIC 2011, COSEWIC 2013, Government of the Northwest Territories 2018). North of the treeline, the barn swallow can occur rarely and sporadically, but it is considered a vagrant in Nunavut

		does not discuss potential effects to these species. While it is true that habitat suitability may be limited due to the current mining activity, the habitat may become suitable after mine closure (P#53 p122). **Recommendation** 1. Please provide rationale for why the bank swallow and barn swallow are unlikely to occur within the RAA after mine closure and are therefore unlikely to interact with the project. 2. If these species or the species listed as conservation concerns on p122 may find the site suitable after mine closure, please conduct an assessment of effects for these species.	(COSEWIC 2011). Since neither of these species are expected to occur in the PKMW Project area, before or after mine closure, an assessment of potential PKMW Project effects was unnecessary. References COSEWIC. 2013. COSEWIC assessment and status report on the Bank Swallow Riparia riparia in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 48 pp. Available: www.registrelep-sararegistry.gc.ca/default_e.cfm COSEWIC. 2011. COSEWIC assessment and status report on the Barn Swallow Hirundo rustica in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. ix + 37 pp. Available: https://www.sararegistry.gc.ca/virtual_sara/files/cosewic/sr_barn_swallow_0911_eng.pdf Government of the Northwest Territories. 2018. Species at Risk in the Northwest Territories 2018. Department of Environment and Natural Resources, Yellowknife, NT. 110 pp. Accessed April 30, 2019. https://www.nwtspeciesatrisk.ca/sites/default/files/speciesatriskinthenwt_english_2018.pdf
54	Interactions between wildlife and PK in pits	**Comment** In its assessment of changes to health of wildlife, Diavik states that there is no potential for the project to affect wildlife health during construction and operation because the FPK will be transported to mine workings via pipeline. Once mining activity stops wildlife may return to the area of the pits. There is the potential for wildlife to enter the pits and interact with processed kimberlite or reclaim water prior to and during filling the pit with water from Lac de Gras. **Recommendation** 1. Please provide an assessment of effects to wildlife associated with direct interactions with processed kimberlite or reclaim water in the pits prior to in-filling. 2. What actions will Diavik take during this period to prevent exposure of wildlife to contaminants?	**July 4:** DDMI acknowledges the potential for wildlife to encroach on the pits/mine workings during the construction and operations phases of the PK to Mine Workings. To minimize wildlife interactions with the mine workings during these phases, DDMI will implement the existing wildlife, monitoring and management procedures for Diavik, which include the following measures: 1. Monitoring/tracking of wildlife presence and/or proximity to the mine workings. 2. Training all site personnel to record and/or report incidental sittings of wildlife, including birds, in the general area of the mine workings during operations. 3. Use of wildlife deterrence techniques such as truck horns, bear bangers, 12Ga cracker shells, 12Ga bean bags, scarecrows, decoy foxes and falcons, noise makers (Wetland Wailer Mk IV), and hanging screens down the high walls of the pits. 4. Employing herding techniques, if required, especially for caribou. DDMI notes that there have been no recorded caribou interaction with the pits/mine workings area at Diavik to date. DDMI is of the opinion that with the implementation of the aforementioned wildlife protection measures, and its proposed mitigation measures for potential impacts to resources relied on by wildlife, including water quality, the residual adverse project-specific and cumulative impacts to wildlife will not be significant.
55	Effects of not-reconnecting pits on cultural use	**Comment** Diavik's effects assessment relies on the pits being reconnected to Lac de Gras and the contaminants in the water in the pits being diluted into the larger lake. If AEMP benchmarks are not met, the pits will not be reconnected. In addition, the pits may not be reconnected for other reasons including cultural values or the wishes of Indigenous communities who use Lac de Gras now and will continue to do so in the future. Water in the pits will remain isolated from Lac de Gras, possibly over the long term, and will not benefit from dilution as assumed. **Recommendation** If AEMP benchmarks are not met in the pits and the pits are not reconnected to Lac de Gras, please describe: 1. impacts to cultural use over the long term 2. impacts on drinking water quality and perception of drinking water quality 3. any other major challenges this would pose to Diavik.	**July 4:** If AEMP benchmarks are not met in the pits and the pits are not reconnected to Lac de Gras, there may be a change in fish habitat that would lead to a change in availability of resources (fish) for cultural use and a change in access to fishing areas for cultural use. As noted in Section 6.4.3.2, The pit lakes represent <1% (244ha) of the pre-mine area of Lac de Gras (56,654 ha). The mitigation measure for the scenario where pit lakes are not reconnected to Lac de Gras at closure would be additional habitat offsetting elsewhere in Lac de Gras or the larger region. Additional habitat creation, enhancement, or restoration works would be initiated and developed by DDMI to compensate for habitat losses created by this scenario. To do this, DDMI would need to work with Indigenous Groups and DFO to identify suitable options. Participants in the TK Panel Sessions did not identify specific fishing areas in or near the pit lakes, but indicated that fish are a highly valued traditional resource and Lac de Gras was named as a good source of fish. Indigenous participants in the Aquatic Effects Monitoring Program (AEMP) TK Study were satisfied with the state of the lake, in terms of the quality of its waters and fish and were comfortable drinking water and eating fish that originate there (Thorpe Consulting 2019). TK Panel Session participants expressed concerns about effects of PK on fish and fish habitat and asked for clarification about PK contamination post-closure. The effects on fish habitat resulting from the isolation of mining areas from Lac de Gras

			was assessed in the 1998 Comprehensive Study (DDMI, 1998) as being negligible (less than 1% of the habitat within the regional study area). Long-term exclusion of fish from the pit lakes would be expected to have a negligible effect on the production of fish populations in Lac de Gras. As well, successful habitat offsetting would serve to mitigate the effects to change in availability of resources for cultural use by enhancing fish populations in other areas. Therefore, if the pit lakes are not reconnected there would be very small effects on the availability of resources for current use. Access would be lost to any fishing sites or areas that may be within the pit lakes, but as noted above, this represents a <1% of the of the pre-mine area of Lac de Gras; any fishing sites or areas outside the pit lakes would be unaffected. As noted in Section 8.2.3, TK Panel Session participants identified Lac de Gras as an important water source and stated that the quality of water in Lac de Gras was historically good and continues to be good. TK Panel Session participants expressed concerns about the quality of water within pit lakes post-closure and noted that people were unlikely to consume the water from such affected areas. If the pits are not reconnected to Lac de Gras, it is assumed that Indigenous groups would avoid using the pit lakes for drinking water. DDMI acknowledges that appropriate conditions for current use entail more than the availability of traditional resources and that Indigenous groups may choose not to pursue cultural use activities near the mine site for a variety of personal, practical, aesthetic, and spiritual reasons. As stated in Section 8.8 of the SIS, DDMI will continue to engage with potentially affected Indigenous groups through the TK Panel Sessions and other engagement activities to better understand Indigenous perceptions about the safety, quality, and health of Lac de Gras and identify practical strategies to address these concerns.
56	Effects of water quality on wildlife for pits that are not reconnected to Lac de Gras	**Comment** Section 7.4.2.3 of the Summary Impact Statement reads "[b]ased on the findings of the assessment residual effects to wildlife during closure are predicted to be negligible in magnitude and short term in duration, except for A21 4a which would be medium term in duration if AEMP benchmarks are exceeded for a longer period of time. During post-closure, residual effects are predicted to be negligible for scenarios where pit lakes are able to be reconnected to Lac de Gras. Post-closure effects are not assessed for scenario A21-4a because the pit lake would not meet the criteria for reconnection to Lac de Gras." (PR#53 p139). The Review Board observes that effects on wildlife are not limited to scenarios where the pits are reconnected to Lac de Gras. In fact, if the pits are not reconnected to Lac de Gras because of water quality issues, the potential for impacts on wildlife that use those pits has the potential to be greater due to poorer water quality in the isolated pit lakes. **Recommendation** Please provide an effects assessment of the impacts on wildlife (including barren-ground caribou, migratory birds and waterfowl, and species at risk) for all potential scenarios where the pits are not reconnected to Lac de Gras.	**July 4:** In scenario A21 3a, no Aquatics Effects Monitoring Program (AEMP) benchmark exceedances are predicted for surface waters, where caribou and other wildlife would have access to the water. There are exceedances predicted for deeper water (40 m depth) for nitrite, nitrate, and molybdenum (and zinc using the draft Canadian Council of Ministers of the Environment [CCME] guideline for protection of aquatic life); however, wildlife would not be in contact with water at this depth. In scenario A21 4a, nitrite is predicted to be 3% higher than the AEMP benchmark in surface water. Water quality guidelines for protection of aquatic life are typically more protective than those for drinking water for humans, wildlife, or livestock, given that aquatic species inhabit the water continually. This is the case for nitrite, with the guidelines set at 0.06 mg/L for aquatic life, 1 mg/L for humans, and 10 mg/L for livestock. There are no CCME guidelines for wildlife, but the BC guidelines (British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture Summary Report, March 2018) recommended using the drinking water guideline of 1 mg/L. No adverse effects to wildlife would be are expected with scenario A21 4a.
57	Potential for overlap with Ekati activities	**Comment** In Section 7.7, Diavik states that "Confidence in the assessment of cumulative effects is high because project-specific effects are likely to have a negligible magnitude effect and because there is no potential for temporal overlap between Ekati mine projects and the PKMW Project" (PR#53 p143). The statement	**July 4:** Section 7.7 of the SIS describes the confidence in the assessment of potential project-related effects and cumulative effects specific to wildlife. It is not intended to convey that there are not other projects with overlapping activities. Section 4 (water quality), Section 5 (water quantity), Section 6 (fish and fish habitat) and Section 8 (cultural

		conflicts with other statements in the SIS. For example, in section 8.4, Diavik states "....withdrawal from Lac de Gras has the potential to interact cumulatively with withdrawal from one or more Operations at the Ekati Mine (for example, Sable Pit, Fox Pit)." **Recommendation** Please confirm if there is any expected temporal overlap in project activities or effects with the Ekati project. If so, please describe any cumulative effects as a result of this temporal overlap.	use) discuss other projects with residual effects that have the potential to overlap spatially and temporally with PKMW Project residual effects on those VCs.
58	Pathways of effect for wildlife	**Comment** Diavik's assessment of effects appears to be limited to those effects that the developer determined might be significant. This could mean that effects which may occur, but don't meet the developer's significance benchmark, were not assessed. The SIS uses the same definition for significant adverse effect as the Comprehensive Study Report (PR#29, which is: "an effect that has a high probability of a permanent or long-term effect of high magnitude, within the regional area, that cannot be technically or economically mitigated". The SIS further states that: "**The only potential project effect that could possibly meet this significance definition is a change in wildlife health associated with water quality**, which will be assessed qualitatively/quantitatively based on results of surface water quality modelling and assessment. Surface water quality for wildlife will be assessed against drinking water guidelines for human health and water quality guidelines applicable to fish." (PR#53 p130) **Recommendation** 1. Please clarify whether effects to wildlife may occur that were not assessed because they did not meet the developer's proposed definition of significance. 2. Please clarify and provide justification for using drinking water guidelines for humans and water quality guidelines for fish for assessing effects to wildlife. 3. Please provide Diavik's views on the potential for water quality in the pit lake during operations and closure to affect wildlife through sensory effects such as smell and taste.	**July 4:** The assessment was not limited to the definition of significance. Other potential effects of the PKMW Project on caribou, aquatic and migratory birds, and species at risk, were considered as discussed in Section 7.1.4 of the SIS including change in habitat, change in movement and change in mortality risk (DDMI 2019). The assessment focused on change in wildlife health because there was a potential interaction with the Project (as discussed in section 7.3) and is consistent with the scoping document, which identified water quality as a key concern (MVEIRB 2019). Surface water quality for wildlife was assessed against drinking water guidelines for human health and water quality guidelines applicable to fish because these guidelines are considered both conservative and applicable to wildlife species (Government of Canada 2018, CCME 2019). At closure, when water quality is below AEMP benchmarks, it is unlikely that the smell or taste of pit lake water would result in and avoidance by wildlife. References CCME. 2019. Canadian Water Quality Guidelines for the Protection of Aquatic Life. Available: https://www.ccme.ca/en/resources/canadian_environmental_quality_guidelines/ DDMI. 2019. Summary Impact Statement: Processed Kimberlite to Mine Workings Project. Diavik Diamond Mines Inc., dated May 17, 2019 Government of Canada. 2018. Canadian Drinking Water Guidelines. Available: https://www.canada.ca/en/health-canada/services/environmental-workplace-health/water-quality/drinking-water/canadian-drinking-water-guidelines.html MVEIRB. 2019. Scope of the Environmental Assessment and Reasons for Decision, Depositing Processed Kimberlite in Pits and Underground, Environmental Assessment 1819-01, Diavik Diamond Mines Inc., dated April 18, 2019
59	Commitment: reporting to Indigenous Communities	**Comment** As part of the assessment of effects on water quality, Diavik committed to report findings back to Indigenous communities (PR#53 p78). **Recommendation** Please provide more detail about this reporting, including: 1. what findings would be reported and how often, 2. what communities will be included, 3. how this activity will help mitigate adverse impacts, and 4. if this activity represents a separate reporting activity or would be part of Diavik's reporting activities via the TK panel or other reporting obligations.	**July 4:** DDMI commits to continue to make TK Panel Reports and Wildlife Monitoring Program Reports available to all interested parties. DDMI also submits periodic reports on water quality and fish and fish habitat health to regulatory Boards and agencies who make these reports publically available on their registries. These reports will include AEMP reports and surveillance network station(s) reports that cover the existing Diavik, and the PK to Mine Workings, if approved to proceed. As approvals and permitting of the PK to Mine Workings Project will likely result in an amendment to the existing Water Licence for Diavik, DDMI anticipates that reporting for PK to Mine Workings will be part of existing reporting for the Diavik.

60	Section 8.1.1 Affected communities and groups	**Comment** Diavik defines the term "community" to refer to Indigenous groups in the Tlicho, Akaitcho, and far west Kitikmeot regions. The SIS includes a summary of potential impacts of the project on culture for the communities of: • Behchoko`, Whatì, Gamètì and Wekweètì, in the Tli? cho region • Dettah, Ndilo and Lutsel K'e in the Akaitcho region • Kugluktuk and Bathurst Inlet in the Kitikmeot region • Yellowknife Indigenous groups and communities that have expressed an interest in the Project but are described in the SIS include: • Deninu Kué First Nation • Fort Resolution Metis Council • NWT Metis Nation. These Indigenous groups have applied for and received participant funding from Crown-Indigenous Relations and Northern Affairs Canada to participate in this EA (PR#51). **Recommendation** 1. Please describe how Diavik's proposed activities may affect the Deninu Kué First Nation, Fort Resolution Metis Council, and the NWT Metis Nation. 2. Please describe what mitigations Diavik will employ in order to minimize potential adverse impacts of the project on these groups.	**July 4:** As part of the Environmental Assessment for the PK to Mine Workings, DDMI identified key environmental resources (wildlife, fish, and water), with measurable parameters, that may influence traditional/cultural use and assessed the potential for the Project to impact these resources. DDMI concluded that, with the implementation of proposed measures to mitigate effects to these key resources, the overall impacts of the Project on cultural use are predicted to be negligible in magnitude and not significant. As the PK to Mine Workings overlaps the general area of influence of the existing and approved Diavik Project, DDMI engaged the PA Groups to inform early project design. DDMI has incorporated information from traditional knowledge studies and reports sanctioned by the PA Groups in all components of the effects assessment for the PK to Mine Workings. DDMI welcomes interest in the ongoing PK to Mine Workings Review from other Indigenous communities and groups and looks forward to sharing of traditional knowledge that can inform project design as we advance through the regulatory approvals and permitting processes to project implementation.
61	Mitigating impacts on cultural use due to perceived impacts to Lac de Gras area	**Comment** Diavik concludes that the "project will not result in the long-term loss of availability of traditional resources for cultural use or access to traditional resources or areas, such that cultural use is critically reduced or eliminated within the regional assessment area. As a result, overall effects on cultural use are predicted not to be significant." (PR#53 p174) In a previous section, Diavik notes concerns identified in the TK Panel sessions about "perceived effects of further development on wildlife, birds, fish and water quality" and "hunting in the area after mine closure and wonder[ing] if eating caribou from the area could make people sick…" (PPR#53 p168). The Review Board understands that traditional users of an area where mining has occurred may avoid traditional activities including drinking the water in that area long after mine closure, even if there is no scientific evidence of contamination (ie. Rayrock). (See	**July 4:** As noted in Section 8.4 of the SIS, PKMW Project residual effects on the availability of traditional resources for current use or on access to traditional resources for current use are unlikely to interact cumulatively with residual environmental effects from other physical activities (past, present and reasonably foreseeable). The PKMW Project is predicted to have negligible effects on cultural use during closure and post-closure activities; these effects will not pose a threat to the long-term persistence and viability of species relied upon for cultural use in the RAA, or change fish habitat that would result in loss of access to fishing areas for cultural use. DDMI acknowledges that appropriate conditions for current use entail more than the availability of traditional resources and that Indigenous groups may choose not to pursue cultural use activities near the mine site for a variety of personal, practical, aesthetic, and spiritual reasons. The TK Panel Sessions have been an effective forum for Indigenous groups to bring forward their perceptions about the safety, quality, and health of Lac de Gras. While Indigenous participants in the TK Panel Session did not indicate that they would avoid the Project area post-closure, some participants remarked that the fact that there are four mine operations located in a relatively small area represents a unique situation and expressed concerns about cumulative effects on caribou migration. The wildlife and wildlife habitat assessment concludes that are no cumulative effects on wildlife and wildlife habitat because the PKMW Project has a negligible effect on wildlife and does not interact cumulatively with other projects or activities (Section 7.5). As stated in Section 8.8 of the

		NICO_Report_of_EA_and_Reasons_for_Decision_p46) for more details. The Review Board notes that if Indigenous groups choose to avoid a site, area, or traditional resource due to a perceived effect as a result of this Project, that avoidance reflects a loss of a traditional area or resource. **Recommendation** 1. Please describe how the proposed project will contribute to the cumulative effects from past, current or reasonably foreseeable developments in the Lac de Gras area on cultural use. 2. What specific steps will Diavik take to ensure that the perception of the Lac de Gras area, as it relates to cultural use by Indigenous groups, is not adversely impacted by the project?	SIS, DDMI will continue to engage with potentially affected Indigenous groups through the TK Panel Sessions and other engagement activities to better understand Indigenous perceptions about the safety, quality, and health of Lac de Gras and identify practical strategies to address these concerns.
62	TK Panel	**Comment** Section 3.4, Incorporation of Traditional Knowledge, notes that recent TK Panel sessions addressed the topic of options for processed kimberlite. Diavik references various reports from the TK Panel sessions to support its conclusions in the Cultural Use section of the SIS. The main pathways identified by Diavik that could affect the availability of traditional resources for cultural use include a change in water quality and/or project effects on wildlife or fish and fish habitat relied on for cultural use. Diavik refers to a number of possible mitigation measures generated by the TK Panel sessions including, "sharing information with the TK Panel and involving Indigenous groups in the decision-making, protecting the health and viability of animal and fish populations that may be affected by PKMW Project activities, and monitoring on wildlife, fish and water post-closure." (PR#53 p166). **Recommendation** 1. Please describe the nature of the TK Panel, including which Indigenous groups or organizations have been involved, how the group is structured, its Terms of Reference if applicable, and what the role of the group is in terms of a) what kind of information they are expected to generate and/or b) what kinds of information they are expected to consider • 2. How long will the TK panel be active and funded? • 3. Please submit to the Board the recent TK Panel session documents that considered options for processed kimberlite.	**July 4:** 1. Since 2011, the Traditional Knowledge (TK) Panel has guided DDMI to appropriately and meaningfully consider of Traditional Knowledge (TK) in operations, environmental management and monitoring as well as closure planning at the Diavik Diamond Mine. The TK Panel meets at least once a year to discuss select issues and concerns related to the Diavik Diamond Mine. Each four (4) day session includes visits to the Diavik site, presentations by DDMI staff and consultants followed by discussions on the focus topic and any other incidental topics related to Diavik of interest to the group. The TK Panel was originally developed by the Environmental Monitoring Advisory Board (EMAB) under the Environmental Agreement. The membership is based on the Indigenous Parties who are signatories to the Environmental Agreement. The Panel is coordinated and funded by DDMI Finally, the TK Panel reviews responses from DDMI to recommendations from previous TK Panel sessions and proposes new recommendations for review and consideration by DDMI. This format is the same for each TK Panel session and provides strong consistency, feedback, and communications between the TK Panel members and the DDMI team. 2. DDMI has fully funded and hosted a number of TK Panel sessions, at least once a year from 2011, to appropriately and meaningfully consider TK in operations, environmental management and monitoring as well as closure planning of the Diavik Diamond Mine. TK Panel sessions will continue through operations into closure of the Diavik. DDMI has hosted 12 such sessions to date with the 11th session in May 2018 focused on the proposal to deposit PK in the mine-out pits and underground mine workings. 3. See Appendix X (DDMI Traditional Knowledge Panel Session #11 Options for Processed Kimberlite. 4. EMAB 2012 (Attachment 8), EMAB 2012a (Attachment 9), Thorpe Consulting 2015 (Attachment 10), Thorpe Consulting 2016 (Attachment 11), Thorpe Consulting 2018 (Attachment 12), and Thorpe Consulting 2019 (Attachment 13). 5. DDMI's responses to recommendations from TK Panel sessions are typically presented as a section in the TK Panel Session Reports (see Attachments X, X1, X3, X4, and X5). 6. Recommendations from the TK Panel during each session are recorded by DDMI staff and consultants and presented in TK Panel Session Reports, which are forwarded directly to participants and the five (5) Participation Agreement groups and communities, and also made available to the general public through postings on public registries of regulatory boards such as the Wek' èezhìi Land and Water Board. During each TK Panel session,

		• 4. Please provide the TK Panel session reports referenced in Section 8.1.2, including: EMAB 2012, EMAB 2012a, Thorpe Consulting 2015, Thorpe Consulting 2016, Thorpe Consulting 2018, and Thorpe Consulting 2019. • 5. Please identify the TK panel recommendations that Diavik will implement. • 6. What is Diavik's process for determining which TK panel recommendations it will implement?	participants typically revisit the list of session topics carried out to date and discuss DDMI's implementation and/or consideration of previous TK Panel recommendations, and suggest future TK Panel topics for discussion. DDMI evaluates TK Panel recommendations through various project planning studies, including pre-feasibility and feasibility studies, to evaluate the technical feasibility and economic viability of recommendations, and provides a response, with justification, to each recommendation to the TK Panel and other interested parties. DDMI's responses to recommendations from a TK Panel session are typically presented in the subsequent TK Panel Session Report.

63	Follow up and monitoring: visual monitoring by traditional knowledge	**Comment** Diavik indicates that one aspect of its follow-up and monitoring plan is to include "visual monitoring by Traditional Knowledge" (PR#53 p78). It is unclear if this refers to monitoring in general, or specifically to the development and stability of the chemocline. It is also unclear what this monitoring program would entail, how long and when it would run, who would participate, etc.
		Recommendation
		1. Please describe "visual monitoring by Traditional Knowledge" including more information about:
		  ○ a. what will be monitored and what methods will be used,
		  ○ b. who will do the monitoring,
		  ○ c. what impacts can be monitored and/or mitigated through this approach, and
		  ○ d. how this relates to Traditional Knowledge.
		2. Please provide details about the Traditional Knowledge monitoring components.
			July 4: DDMI wishes to clarify that "visual monitoring by Traditional Knowledge" (as referenced in page 78 of the SIS) refers to general monitoring programs and PK to Mine Workings specific monitoring, informed by TK. For instance, the TK Panel has provided specific recommendations related to the PK to Mine Workings to inform ongoing refinement of the proposed monitoring programs for the Project including the following: • Confirmation of items/equipment that will remain or be removed from underground before flooding or filling the mine with PK/water. • Presence of some TK Panel members at the Diavik site, at least some of the time when the ultra-fine PK is moved from the PKC into the mine workings. • Participation of some TK Panel members in the monitoring of how water behaves when placed on PK. TK Panel members would like to see the PK and water in the mine workings as soon as it is safe to do so and when there is a good visual of the material, as well as at regular intervals afterwards. • Participation of some TK Panel members in the monitoring of the fish habitat within the pits, shoreline modifications (e.g. ramps) for wildlife as well as the stability of the dikes on a regular and ongoing basis. • Participation of some TK Panel members in the monitoring of freeze-up and break-up within the contained areas (i.e. within the dikes) to see if the formation and melting is any different - with a view towards safety for people and wildlife. • Presence of TK Panel members on site to observe wind behaviour on water within the contained pits/dikes and outside the dike areas in Lac de Gras over a period. DDMI is evaluating these and other recommendations from the TK Panel to support the advancement of the design planning and implementation components of the Project.

64	AEMP TK Study goals for closure	**Comment** Diavik states that potential loss of fish habitat could be a pathway to a loss of an area for cultural use and that "to reduce the potential for residual effects on access to fishing areas for cultural use, withdrawal rates that are protective of the aquatic environment will be established in discussion with regulators for the PKMW Project." (PR#53 p170). It also references the goals outlined in the AEMP TK Study which are: 1) "land and water that allows for traditional use" and a 2) "final landscape guided by traditional knowledge." **Recommendation** Please describe how Diavik has considered the goals from the AEMP TK study in planning the closure of the pits.	**July 4:** As noted in the SIS, DDMI acknowledges the two (2) goals identified by Indigenous participants in the AEMP TK Study hosted by DDMI in 2018 (see Attachment #13) i.e. water that allows for traditional use, and final landscape guided by traditional knowledge. These recommended goals are reflected in DDMI's next version of the Interim Closure and Reclamation Plan (version 4.1) to be submitted to the Wek' èezhìi Land and Water Board (WLWB) later in 2019 for review and approval. 1. Land and water that is physically and chemically stable and safe for people, wildlife and aquatic life 2. Land and water that allows for traditional use. 3. Final landscape guided by traditional knowledge. 4. Final landscape guided by pre-development conditions. 5. Final landscape that is neutral to wildlife – being neither a significant attractant nor significant deterrent relative to pre-development conditions. 6. Maximize northern business opportunities during operations and closure. 7. Develop northern capacities during operations and closure for the benefit of the north, post-closure. 8. Final site conditions that do not require a continuous presence of Mine Staff.

North Slave Metis Alliance: Shin Shiga

ID	Topic	Reviewer Comment/Recommendation	Proponent Response

12	General File	**Comment** Attachment to NSMA IR2 **Recommendation**	
1	Section 4.1.5 Residual Effects Characterization, Magnitude Ratings	**Comment** AEMP benchmarks are based off of the lower of the CCME benchmarks developed for the protection of aquatic life (CWQG PAL) or the health of humans who may drink the water (GCDWQ). CCME guidelines are intended to provide protection to aqualitc life and/or human health and are based on scientifically defensible toxicological data used to protect the most sensitive life stages of aquatic organisms and/or human health, and are typically derived from knowledge of the Lowest Observable Effects Level (LOEL) on the most sensitive lifestage, with a ten-fold safety factor applied to the LOEL. Magnitude ratings in the DAR are set at the following criteria: Negligible (<5% above AEMP benchmark); low (5 to 10% above AEMP benchmark); Moderate (10 to 20% above AEMP benchmark; and High (>20% above AEMP benchmark). A significant ratings includes consideration of only the high magnitude rating (>20% above AEMP benchmark). No scientifically defensible rationale has been provided in the description of magnitude for the use of these delineations in concentration. **Recommendation** As CCME benchmarks are designed to be protective, and may pose a risk to aquatic life and/or human health, please provide rationale for defininig magnitude ratings using these criteria (percentages used for each magnitude rating) and why the proponent considers a 20% increase above a CCME guideline as appropriate in defining a significant residual effect.	**July 4:** Please note this correction to the information request: the magnitude rating for negligible is 5% above the AEMP benchmark, not 20%. The high magnitude rating was set at 20%. DDMI recognizes that the AEMP benchmarks (based on CWQG PAL and GCDWG) are higher than baseline levels in Lac de Gras for many parameters, and that effects of the Project would need to result in change from baseline levels before the benchmarks are reached. The magnitude ratings were defined in relation to the water quality guidelines rather than baseline, given that the guidelines represent conservative and scientifically defensible levels above which adverse effects may occur (as noted, a ten-fold safety margin is typically incorporated in the guidelines, providing additional protection). The benchmarks were set for the AEMP, which was developed by Golder in 2017. Since that time, the only CWQG that has changed is a draft guideline for zinc. The magnitude ratings were set qualitatively to provide a framework for examining predicted concentrations and their consequences. Any parameters with predicted concentrations higher than the benchmarks were examined and discussed in the assessment for implications to aquatic and human health. The high magnitude rating was set at 20% above benchmarks to reflect concentrations that could approach the values used to define the threshold (i.e., toxicity values closer to the values used to derive guidelines. The negligible rating was set at 5% above benchmarks to reflect natural variability and accuracy associated with measured concentrations. The low and moderate ratings were set at intervals to reflect increasing concentrations and potential effects.
2	Section 7.1.6 Residual Effects Characteriation Magnitude Ratings	**Comment** Magnitude ratings are set to the following criteria: Negligible: no measureable change in parameter Low: parameter changes by less than 1% from baseline Moderate: parameter changes between 1% and 10% from baseline High: parameter changes by more than 10% from baseline Significance is defined a by a parameter having a High (>10%) magnitude rating. No rationale is provided for the definitions used for magnitude ratings. **Recommendation** Barren ground caribou are currently listed as threatened under the Species at Risk (NWT) Act (GNWT 2018) and assessed as threatened by COSEWIC (2016). While the Bathurst caribou herd that overlaps the PKMW Project is currently not listed under Schedule 1 of SARA, a 10% change to the health of this species would have detrimental population effects. A recent analysis and paper conducted by Zoetica for the NSMA, as part of the discussions on allowable harvest for the Bathurst herd, found that even harvest levels of 1% could have population-level impacts in realistic population and recruitment rate scenarios indicative of the current state of the herd (See Zoetica, 2018; "Draft Bathurst Harvest Discussion Paper", available on request). Given that the Bathurst herd currently appears to require an increase in % change from baseline values for the population to recover, the rating schemes seem inappropriate. Given that caribou are an important ecological, social, and economic species, the magnitude of effect	**July 4:** DDMI recognizes the ecological and social importance of caribou to northern communities. It is also recognized that potential project interactions can result in population-level effects depending on the severity (i.e., magnitude) as well as spatial and temporal scale of effects. PKMW Project effects on wildlife are assessed as changes to wildlife health resulting from changes to water quality. The PKMW Project residual effects on caribou health are predicted to be negligible in magnitude, medium-term in duration, as restricted to the period during pit infilling, following pit lake infilling, prior to and immediately following dike breaching and mixing of pit lake surface water(s) with Lac de Gras. As such, it is reasonable to assume that if there is no measurable change in wildlife health that could affect caribou at an individual or local scale, that there will be no effects at a population level (i.e., no measurable effect on population distribution or abundance in the LAA or RAA). The high magnitude definition used to characterize effects to wildlife represents a conservative approach to assessing a potential change in a measurable parameter from baseline conditions, with moderate, low and negligible ratings set at intervals to reflect decreasing levels of potential Project effects. Changing these criteria would not change the assessment conclusions for wildlife.

		ratings for this species may need to be reconsidered. Please provide rationale for the magnitude definitions used.	
3	Section 4.1.5 Residual Effects Characterization Table 4-3. Revised Ecological Thresholds for Water Quality	**Comment** Water Quality magnitude ratings are set to the following criteria: Negligible (<5% above AEMP benchmark); low (5 to 10% above AEMP benchmark); Moderate (10 to 20% above AEMP benchmark; and High (>20% above AEMP benchmark). A significant ratings includes consideration of only the high magnitude rating (>20% above AEMP benchmark). The guideline for zinc has been reduced from 30 mg/L to 7 mg/L. However, the methodology in the DAR states that the zinc benchmark is kept at 30 mg/L for consistency with previous water quality monitoring. A significant effect would thus occur at a much lower concentration using the lower benchmark. **Recommendation** Please discuss the rationale for keeping the zinc benchmark threshold for the protection of aquatic life at 30 mg/L instead of using the more protective, updated CCME guideline of 7 mg/L. AEMPs should include any updates to water quality guidelines as new information is gathered and changes are made to CCME guidelines. CCME guidelines are updated as increased sensitivites are discovered to provide the best ecological protection available; therefore, the most up to date CCME guidelines should be followed.	**July 4:** A 30 microgram/L (µg/L) zinc benchmark threshold for the protection of aquatic life was used to maintain consistency with the 1998 assessment and the 2017 AEMP. Since submission of the SIS, the zinc predictions for the different scenarios were compared with the updated and draft lower CCME guideline of 7 µg/L. Tables 4-7 through 4-9 provide maximum predicted concentrations for modelled parameters. For A418 (all scenarios), A154 (all scenarios) and A21 (scenarios 2a and 4a), the maximum zinc concentrations range from 0.22 to 2.0 µg/L, below the draft CWQG of 7 µg/L. For A21 scenario 3a, the maximum zinc concentration at the surface (5.4 µg/L) is below the draft CWQG, but the maximum at 40 m depth (17 µg/L) is above the draft CWQG and would be considered a high magnitude, long-term effect on water quality within the Project Development Area (PDA) for Project and cumulative effects. However, this re-evaluation for zinc would not change the outcome of the assessment because A21 3a has already been identified as having this characterization at 40 m depth associated with the predictions for nitrite, nitrate, and molybdenum (higher than AEMP benchmarks by 133%, 37%, and 5%, respectively). It is noted that these effects are predited to occur at 40 m depth, not the upper layers of the water column typically inhabited by fish, and are limited to the PDA.
4	Section 4.4.1 Analytical Assessment Techniques	**Comment** Sensitivity analyses were conducted to increase the confidence in the water quality modelling results and indicated that "increased air temperatures as a result of future climate change are not anticipated to result in a change in pit lake water temperature or water quality predictions." Climate change may have other potential indirect influences on lake systems, including the thaw of permafrost under lakes that can cause chemical, biological and physical changes in lake systems (Drake et al. 2019). In addition, as organic matter is supplied to lakes via permafrost thaws, greenhouse gases such as methane may be released in greater amounts (Sepulveda-Jauregui et al. 2015), and in turn may cause upwelling of nutrients in Arctic lakes,furthering changes in nutrient dynamics within the lake system over time. **Recommendation** Along with the dispersion of lake bottom sediments through the water column, methane upwelling in Arctic lakes as the result of permafrost thaw could have potential effects for the redistribution of PK into the water column, which could in turn have an effect on water quality. Please detail how climate effects such as methane upwelling have been accouted for in the water quality modelling and the measures that will be in place to monitor the potential effects of methane upwelling. Please describe how any water quality issues that may arise post-closure when the pit lakes are reconnected to Lac de Gras will be mitigated.	**July 4:** DDMI appreciates NSMA forwarding copies of Drake et al. (2019) and Sepulveda-Jauregui et al. (2015). While climate effects such as those described in the referenced papers were not included in the water quality modelling, if we understand the observations noted in the papers correctly, an increased geochemical yield and biological productivity in arctic lakes resulting from receding shoreline permafrost could theoretically increase stabilization of the pit lakes. The water quality modelling assumes that the only source of geochemical loading to the benthic waters is PK pore water. The modelling does not include the accumulation and decomposition of in situ and allochthonus sources. These sources would continue to add dissolved elements to the monolimnion of a pit lake helping to maintain a chemocline. If these sources increased over time as a result of climate change, in theory they could contribute to a stronger chemocline. If future water quality in the pit lakes were determined to be harmful to fish and fish habitat a decision could be taken to block the passage way connecting the pit lakes with Lac de Gras and preventing fish from accessing the area. This is recognized as an extreme mitigation that would only be implement if water quality was very different from what is expected.
5	Section 6.3 Project Interactions with	**Comment** Changes in water quality as a result of diamond mining activities have been observed to cause a shift in phytoplankton and rotifer communities in lakes downstream of mining activities (at the	**July 4:** During operations, Lac de Gras has been receiving approximately 1,000 kg/y nitrite, 40,000 kg/y nitrate and 5,000 kg/y ammonia annually (Golder 2018) and has not experienced plankton or benthic invertebrate community composition changes that have

	Fish and Fish Habitat & 6.4 Assessment of Residual Environmental Effects on Fish and Fish Habitat	Ekati mine) and results suggest a possible progression of shifts up the food web (bottom-up progression)(St.-Gelais et al., 2018). Trophic level shifts at Ekati were limited to the phytoplankton and rotifer communities over a 19 year span; and no observed changes in crustacean zooplankton communities were observed. However, the authors suggested that this may be due to phytoplankton concentrations that were under or close to the lowest concentration limit for the expected highly competitive crustacean zooplankton (large, filter-feeding cladocerans) to dominate (St.-Gelais et al., 2018). Lac de Gras is currently considered an oligotrophic lake and levels of Nitrogen in the form of Nitrite and Nitrate are low relative to CCME guidelines (an order of magnitude lower - see Table 4-4 of DAR). While we recognize that the ring dike will not be breached until AEMP benchmarks are met for various forms of nitrogen, concentrations of these parameters in pit water, if close to benchmark concentrations, could have the potential to cause shifts in the N:P ratio of the lake once breached. If Nitrogen is further increased in Lac de Gras relative to baseline, potential changes in community structure could occur with greater potiential effects up the food web. Natural causes of nutrification such as climate change may result in additional changes in community composition of northern lakes, resulting in further changes up the food web. Therefore, even a small increase in nitrogen in Lac de Gras could potentially have indirect effects on fish. **Recommendation** Please discuss how nitrogen (including nitrite) levels will change in the lake following breaching (even if still below the AEMP). For example, since levels are currently very low within the lake, slight additions below the AEMP guidelines may still have the potential to alter the base of the food chain, and higher trophic levels as a consequence. Please discuss how effects of lake nutrification above current values, including under a future climate change scenario, have been considered in the assessment of potential effects to fish and fish habitat during the post-closure phase when ring dikes are breached. Please indicate how changes in community composition up the food web will be monitored post-closure.	been detrimental to the fish population in Lac de Gras. The general pattern of response in Lac de Gras has been one of nutrient enrichment in an area representing greater than 20% of Lac de Gras, with concurrent responses in the plankton and benthic invertebrate communities (as reported through the AEMP). However, the lake has remained oligotrophic (i.e., characterized by low level of productivity) throughout mine operations. Although nutrient exposure has occurred for fish populations in this area, the response in fish has been less than that observed in the plankton and benthic invertebrate communities. These changes have not translated into observable effects in fish (i.e., any effects, if present, are within the range of natural variability). Overall, the observed increases in nutrient concentrations in Lac de Gras and associated changes in plankton and benthic invertebrate community composition have not adversely influenced Slimy Sculpin populations, which continue to be present in the AEMP study areas and appear capable of growth, reproduction, and energy storage (Golder 2018). The predicted annual loading to Lac de Gras from the 100-year modelling of the pit lake has nutrient concentrations below the AEMP benchmark in the pit lakes before the ring dike is breached; the predicted average annual loading from pit lakes is 68 kg/y (A418 Scenario 2a) or 257 kg/y (A418 Scenario 3a) for nitrite, nitrate, and ammonia combined. At these smaller loading rates relative to operational effluent discharge, it is unlikely that changes in the plankton or benthic invertebrate community composition at closure would lead to detrimental effects on the fish community. These predictions do not incorporate the potential effects of climate change. However, given the small magnitude of these predicted loads compared to those during operations, and the lack of adverse effects on fish during operations, it is unlikely that future nitrogen loadings from the pit lakes would interact with the effects of climate change to an extent that would influence the fish community. Changes in plankton and benthic invertebrate community composition and fish health will be monitored in the receiving environment (i.e., Lac de Gras) as part of the AEMP. Sampling for biological components of the aquatic ecosystem (i.e., plankton, benthic invertebrates and fish) is proposed to occur once every three years for three cycles (i.e., nine years) after the dikes have been breached (DDMI 2017). References: Diavik Diamond Mines (2012) Inc. (DDMI). 2017. Closure and Reclamation Plan Version 4. April 2017. Golder (Golder Associates Ltd). 2018. 2014 to 2016 Aquatic Effects Re-evaluation Report Version 1.0. Prepared for Diavik Diamond Mines (2012) Inc., Yellowknife, NT. March 2018.
6	Section 6.2.2	**Comment** The authors of this section of the document note that "some species (e.g., slimy sculpin) are expected to be able to complete all of their life history requirements in the pit lakes once a food supply has been established". Indigenous participants in the AEMP TK Study sessions indicated that "fish go where food and nutrients can grow, and for some species, such as ling cod and sculpin, that can be very deep" (Thorpe Consulting 2018). Studies on slimy sculpin conducted in other areas indicate that slimy sculpin can inhabit depths from 0.5 m to 150 m (Bradbury et al., 1999). When the pit lakes are reconnected with Lac de Gras, and fish habitat is established within these areas, there could be potential for slimy sculpin to access deep waters within these pits (specifically in all three scenarios of A21 and in scenario 3a in A418	**July 4:** While Slimy Sculpin in lakes have been reported to inhabit deeper waters in Canada, as cited by the reviewer in Bradbury et al. (1999), to our knowledge, Slimy Sculpin prefer shallower depths and have more limited mobility in northern locations (Arciszewski et al 2015, Grey et al 2018). Bradbury et al. (1999) reports Northwest Territories (NWT) Slimy Sculpin populations limited to shallow rocky areas of lakes, and purports that temperature appears to be a critical factor determining Slimy Sculpin distribution in deeper water (as well as available habitat). McDonald et al. (1982) specifically indicate that Slimy Sculpin prefer cold, well oxygenated habitats where they feed on benthic invertebrates. Therefore, in Lac de Gras (and the filled pits at closure in particular) Slimy Sculpin would be expected to migrate to deeper waters only if (1) well oxygenated water of adequate temperature, (2) prey items (i.e., benthic invertebrates), and (3) suitable habitat (i.e., rocky or gravel substrate) were all available in the deeper waters of the pit lakes. Such habitat is not expected to exist at depth inside the pit lakes. Oxygen

		(see Table 2-5 for predicted depth of freshwater cap)). The assessment stipulates that the AEMP benchmark and significance threshold concentrations (listed in Table 4-3) pertain to the top 40 m of surface water, as it is anticipated there is limited use of the pit lake by aquatic receptors (i.e., fish) at depth below 40 m (DDMI 2019). **Recommendation** Given that literature from other areas in Canada suggest that slimy sculpin can inhabit areas with depths far greater than 40 m, and given that little appears to be known about the maximum depths inhabited by by slimy sculpin within the NWT, how have water quality effects on slimy sculpin been considered in the deeper (> 40 m) zones of the freshwater cap in the pit lakes? What studies were considered for the establishment of these assumptions?	concentrations are expected to be less in the deeper waters of the pit than in the main basin of Lac de Gras due to limited mixing and established/stable meromixis in the pit lakes (see response to EMAB #18). Benthic invertebrate communities are not expected to establish themselves within the pit lakes with adequate density to support a resident Slimy Sculpin population because of anoxic conditions at depth and an expected lack of suitable habitat for colonization (i.e., steep walls and low sedimentation rates; see response to LKDFN #23). Finally, the preferred habitat for Slimy Sculpin is not expected to be present inside the pit lakes; the walls of the pits will be relatively steep slopes with little opportunity for sedimentation and limited gravel or rocky substrate. A description of the anticipated use of pelagic habitat by both large bodied and small bodied fish was provided in the previous response to EMAB #28 (8 Jan 2019); specifically, Slimy Sculpin are not expected to inhabit deep water (Gray et al. 2005). References: Arciszewski, T., Gray, M.A., Hrenchuk, C., Cott, P.A., Mochnacz, N.J., and Reist, J.D. 2015. Fish life history, diets, and habitat use in the Northwest Territories: freshwater sculpin species. Can. Manuscr. Rep. Fish. Aquat. Sci. 3066: vii + 41 p. Bradbury C, Roberge MM, Minns CK. 1999. Life history characteristics of freshwater fishes occurring in Newfoundland and Labrador, with major emphasis on lake habitat requirements. In: Department of Fisheries and Oceans Canadian Manuscript Report of Fisheries and Aquatic Sciences. Gray M, Munkittrick K, Palace V, Baron C. 2005. Final report: Assessment of Slimy Sculpin (Cottus cognatus) collected from East Island, Lac de Gras, NWT. 30 p. Gray MA, Curry RA, Arciszewski TJ, Munkittrick KR, and Brasfield SM. 2018. The biology and ecology of slimy sculpin: A recipe for effective environmental monitoring. FACETS 3: 103–127. McDonald ME, Cuker BE, Mozley SC. 1982. Distribution, production, and age structure of slimy sculpin in an Arctic lake. Environmental Biology of Fish 7(2):171-176.
7	Section 2.3 PKMW Project - Development Components Activities & Section 2.4 Development Sequence	**Comment** The process of in-pit deposition of tailings is typically conducted either subaerially, such as at the Ekati Mine (EBA 2012), or subaqueously. Subaqueous deposition has the advantage of preventing the development of ice lenses during winter deposition (Frost 1996; Gillespie et al. 2004). Prior to covering of PK in pits with water from Lac DeGras for long term closure, it is unclear which method of deposition is proposed for the Diavik mine. **Recommendation** Please specify the method of tailings deposition (either subaerial or subaqueous) for the Diavik Project and rationale for the method of deposition.	**July 4:** The intended method of tailings deposition will be subaqueous. Post PK slurry deposition, a decant water pool will form over the PK surface as PK particles settle out of suspension. This decant water will primarily be process water with a smaller contribution of pore water. The decant pool will be maintained to minimize the formation and entrapment of ice in the mine working and to facilitate recycling of water in the Process Plant.
8	Section: Plain Language Summary	**Comment** The proponent indicates that "freshwater and porewater layers will not mix under normal conditions, effectively sealing the processed kimberlite deep in the lake." **Recommendation** Please specify all relevant information considered in making these conclusions, and define whether or not climate change has been accounted for under "normal conditions". Please include other effects of climate change beyond changes in water temperature.	**July 4:** In addition to water temperature the other climate change condition evaluated was wind. The sensitivity analysis described in PR#12 with results in PR#7 included four progressively more extreme wind conditions (Scenarios 4a-4d) to determine level at which energy from wind could break down meromixis. The only condition that was identified that had the potential to break down a chemocline and cause full mixing was a large scale underwater slope failure.
9	Section 2.4.3	**Comment** There is no information provided in the application on similar systems wherein a pit lake ring dike/pit lake dam has been breached adjacent to a natural water body, and the effects during the breaching period on the adjacent hydrology and water quality (e.g., mixing). **Recommendation** Please include more information describing the	**July 4:** Please refer to DDMI's Response to NSMA-IR#10 for examples of other breached systems. When breaching the dike, heavy equipment will be used to dig out openings from the dike material. Water quality in Lac de Gras will be monitored and turbidity barriers will be installed to prevent the release of excess suspended sediment as required. The specific process of breaching and monitoring the dikes will be finalized as part of ongoing Closure Planning for the site.

		process of breaching the ring dike. Namely, please include any comparable dike/dam breaching operations or models/studies conducted that demonstrate the effects of breaching of a pit lake dike/dam on a natural waterbody, or the hydrology and water quality of the water-filled pits. Please include information on the conditions that were considered during the design of the breaching of the ring dike.	
10	Section 2.4.3; Section 4.1.5 -4.1.6; Maintenance of Miromictic Conditions at Post-Closure	**Comment** During a preliminary review of the literature, we were unable to find similar studies whereby reconnection of a pit lake to a natural waterbody has been sucessfully conducted. **Recommendation** Please provide more information to answer the following questions: 1. What studies were considered in the design of the post-closure reconnection to Lac de Gras? 2. Have there been any long-term studies that indicated the success of such a system and long-terms stability of miromictic conditions after breaching a ring dike/dam? 3. What are the factors driving the decision to breach the ring dike post-closure? 4. Could pit lakes been established and maintained into perpetuity?	**July 4:** Project activities associated with dike removal are outlined in the Closure and Reclamation Plan Section 5.2.1.5. These plans have low uncertainty and are unchanged from the original concept. The following response addresses NSMA IR #9 and IR #10 with regards to information from relevant case studies. Globally, most pit lakes are not re-connected to natural lakes at closure – not because of concern for potential effects to the natural environment, but because the mine pits are excavated below grade in zones of net water deficits, so the steady-state water surface re-establishes at or below the level of the groundwater table, thereby precluding surface outflow (Miller et al. 1996; McCullough 2013; Gammons et al. 2009, Vandenberg and McCullough 2017). Pit lakes that are located in northern climates (with low evapotranspiration) and areas of high levels of precipitation are more likely to be re-connected to the natural environment at closure, because they result in high water levels and net outflow. A similar case study to Diavik is the approved Gahcho Kue project, which is located in a similar environment and consequently will have a similar closure plan with pit lakes re-connected to the existing natural lakes (Vandenberg et al. 2016), although these pit lakes will be filled after Diavik's. An example that includes the specific details of a ring dike are not represented in the literature; however, several pit lakes have been reconnected to the natural environment, and have been successfully reclaimed as valuable fish habitat and recreational lakes. Documented examples of pit lakes that have been re-connected to the natural environment include: • Several coal mine pit lakes in Eastern Alberta (Hildebrand et al. 1982, Brinker 1991), including Sphinx Pit Lake, a well documented example of a pit lake that is reconnected to native bull trout habitat (Brinker et al. 2011) • Lake Kepwari, Australia (McCullough and Schultze 2018), where an accidental reconnection to the natural environment was subsequently deemed beneficial and the connection was kept in place. • Gunnar pit lake, which was connected with no documented closure plan, and the connection was subsequently closed (Muldoon and Schramm 2009). A new closure plan is being developed for Gunnar pit lake. • Owl Creek Mine pit lake, Ontario (Martin et al. 2016, ARCADIS 2015), which was re-connected to downstream Porcupine River. • Many of the 200 iron or pits in Minnesota that have been converted into valuable recreation areas and state parks (Axler et al. 1996; McCullough et al. 2018). • Coal mine pit lakes in the lignite mining region of Germany which have formed lake districts. These lakes are well documented in a compilation by Geller et al. (2012). • Coal mine pit lakes in West Virginia (Miller 2008) and Pennsylvania (Brenner et al. 1987) which have also formed lake districts; these known to exist but are not well documented. These case studies demonstrate that pit lakes, including those containing mine waste, can be successfully integrated into the natural environment – provided that mine closure is well planned; that all relevant physical, chemical and biological conditions are well understood and accounted for; and that closure is implemented according to plans and adaptively managed where necessary. Other relevant lessons from case studies are documented in McCullough et al. (2018) and Vandenberg and McCullough (2017a and 2017b). In terms of processes that are specific to re-connecting the pit lakes to surrounding natural lakes, relevant information is available from fish habitat compensation projects completed as part of compensation or

offset plans for Fisheries Act authorizations. These projects provide well-documented examples of direct connection of a constructed lake to a natural lake with the explicit objective of protecting and enhancing fish habitat. In particular, Muskeg Lake is a constructed, excavated lake that was directly connected to a natural lake via a short connector channel. The creation of Muskeg Lake therefore provides analogous information for the connection of Diavik's pit lakes to Lac de Gras. Muskeg Lake was created as a fish habitat compensation project that was designed to provide productive fish habitats while also augmenting fish habitat in Kearl Lake. Kearl Lake, located in northeast Alberta, is naturally too shallow to maintain sufficient overwintering dissolved oxygen and therefore provides poor overwintering habitat for fish, particularly for more sensitive sport fish. Muskeg Lake was designed to provide deeper overwintering habitat with direct connection to the natural lake. The compensation lake will be constructed and reconnected in three stages that correspond to the progressive habitat disturbance by the adjacent Kearl Oil Sands Project. The first stage was completed and connected to Kearl Lake through a connector channel in 2014, and five years of monitoring data are now available to assess the outcomes related to hydrology, water quality, and fish habitat suitability (Golder 2018). The following monitoring results from the filling and following 5 years are summarized from Golder (2018). Before, during and after the connection of the lakes, water levels were monitored to confirm that the filling process did not result in water levels outside of the natural range of variability. Hydrologic monitoring confirmed that water levels in the lake were within this range during filling, and have remained stable over the past five years. The stable water levels have allowed for the development of productive littoral and riparian zones around the constructed habitat. Water quality monitoring in the constructed lake confirmed that the concentration of all variables (except DO) have stabilized and are now similar to the natural lake. Dissolved oxygen concentrations were not exactly as predicted but are sufficient to maintain "highly suitable" secure overwintering habitat for target fish communities. While flooded terrestrial systems are often subject to increases in total mercury and methylmercury (Bodaly et al. 2007), excavated lakes such as compensation lakes and pit lakes do not contain the necessary labile organic carbon to generate methylmercury. Monitoring in Muskeg Lake confirmed the expected lack of mercury enrichment. Biological monitoring confirmed that macrophyte, zooplankton and phytoplankton communities are developing in Muskeg Lake, with zooplankton richness and biomass comparable to or higher than in the natural lake. Phytoplankton development was variable, with early years below that of the natural lake and more recently above the natural lake. Littoral benthic invertebrate density and richness exceeded that of the natural lake within two years, providing suitable food base foundation for fish. All fish species present in the natural lake have colonized the constructed lake, with abundance and biomass levels of fish in the constructed lake exceeding those in the natural lake within three years of the connection. In addition, the fish community in the natural Lake has also benefited from connection to the secure overwintering habitats provided in the constructed lake. Sport fish, which were previously rare in Kearl Lake, have since become well-established in both Kearl Lake and Muskeg Lake. This case study demonstrates that a constructed, excavated lake can be successfully connected to a natural lake, and that monitoring can be used to confirm the hydrologic, chemical and biological variables of interest. In terms of meromictic conditions, the remaining portion of the ring dike surrounding the pit lake will provide a complete barrier to mixing wherever it is present. The presence of a ring dike provides the same barrier to wind mixing as if the pit lake were located on land with a small amount of momentum transferred through the dike breach openings. This momentum is well represented in

hydrodynamic models, which Diavik has employed to understand potential mixing from Lac de Gras inflow and outflow. The modelling has consistently shown that meromictic conditions will prevail under all envisioned filling strategies, except filling with pure lake water and no PK or other mine waste – in which case meromictic conditions are not required to sequester higher-concentration waters. Several factors support the decision to breach the dike at closure. Two of the closure objectives for the pit (M1. Water quality in the flooded pit and dike area that is similar to Lac de Gras; M3. Enhanced lake-wide fish habitat to offset fish habitat temporarily lost during operations) can only be achieved if the pit lake is connected to Lac de Gras. Breaching the dike aligns with case studies cited above (e.g., Brinker et al. 2011; McCullough and Schultze 2018) that suggest that connecting the pit lake to the natural environment is a preferred closure method, except when pit lake concentrations are so extreme that they must be permanently isolated from the environment, which tends to occur in hot, arid regions such as Nevada (Miller et al. 1996) and Australia (McCullough 2013). The case studies indicate that pit lakes can be established and maintained in perpetuity. The case studies cited above have been connected to the receiving environment, and over time, pit lake water quality nearly universally improves, rather than worsens. There are numerous examples of pit lakes in Alberta that are used as fisheries and recreational waterbodies and are now treated no differently than natural lakes (e.g., Silkstone, Lovett, Pleasure Island, Carburn, East Pit, Black Nugget, Hawrelak, Quarry Lake and others). In summary, pit lake case studies confirm that re-filled pit lakes can be successfully integrated into the natural environment, and compensation lake case studies confirm that constructed lakes can be directly connected to natural lakes to maintain, and even improve, ecological integrity. These case studies provide confidence that Diavik's plans to close the open pits as pit lakes connected to Lac de Gras can be completed successfully in a way that achieves closure objectives. References ARCADIS. 2015. In-pit disposal of reactive mine wastes: approaches, update and case study results. Page 250. Mine Environment Neutral Drainage, Richmond Hill, Canada. Axler, R., C. Larsen, C. Tikkanen, M. McDonald, S. Yokom, and P. Aas. 1996. Water quality issues associated with aquaculture: a case study in mine pit lakes. Water Environment Research 68:995–1011. Bodaly, R. A., W. A. Jansen, A. R. Majewski, R. J. P. Fudge, N. E. Strange, A. J. Derksen, and D. J. Green. 2007. Postimpoundment Time Course of Increased Mercury Concentrations in Fish in Hydroelectric Reservoirs of Northern Manitoba, Canada. Archives of Environmental Contamination and Toxicology 53:379–389. Brenner, F. J., J. Edmunson, M. Werner, and T. McGrath. 1987. Plankton, chlorophyll characteristics and fishery potential of surface coal mine lakes in western Pennsylvania. Pages 147–152 Proceedings of the Pennsylvania Academy of Science. JSTOR. Brinker, C. 1991. Lake creation and development at an Alberta foothills coal mine. Page 14 Proceedings of the 15th Annual British Columbia Mine Reclamation Symposium. The Technical and Research Committee on Reclamation, Kamloops. Brinker, C. J., M. D. Symbaluk, and J. G. Boorman. 2011. Constructing habitat for a sustainable native fisheries in the Sphinx Lake end pit lake system:10. Gammons, C. H., L. N. Harris, J. M. Castro, P. A. Cott, and B. W. Hanna. 2009. Creating Lakes from Open Pit Mines: Processes and Considerations, Emphasis on Northern Environments. Geller, W., editor. 2012. Acidic pit lakes: the legacy of coal and metal surface mines. Springer, Berlin?; New York. Golder. 2018. Kearl Oil Sands Surface Water and Fish Monitoring Plan 2018 Annual Report and Five Year Summary. Prepared for Imperial Oil Resources Ltd. Report 18110625. March 2019. 490pp. Hildebrand, L., L. Noton, and W. Anderson. 1982. Lake development and fish habitat enhancement at Coal Valley, Alberta. Page 83. Martin, J., T. Sulatycky, R. Parker, B. Rodgers, and R. Nicholson. 2016. The Owl Creek Pit Part 1:

			Relocating Mine Rock from Surface Stockpiles to the Pit to Mitigate Acid Drainage. Page 28. Vancouver, Canada. McCullough, C. D., G. Marchand, and J. Unseld. 2013. Mine Closure of Pit Lakes as Terminal Sinks: Best Available Practice When Options are Limited? Mine Water and the Environment 32:302–313. McCullough, C. D., and M. Schultze. 2018. Engineered river flow-through to improve mine pit lake and river values. Science of The Total Environment 640–641:217–231. McCullough, C., M. Schultze, and J. Vandenberg. 2018. Realising beneficial end uses for pit lakes. Page 8. Liepzig, Germany. Miller, D. 2008. Using Aquaculture as a Post-mining Land Use in West Virginia. Mine Water and the Environment 27:122–126. Miller, G. C., W. B. Lyons, and A. Davis. 1996. Understanding the water quality of pit lakes. Environmental Science & Technology 30:118A-123A. Muldoon, J., and L. L. Schramm. 2009. Gunnar Uranium Mine Environmental Remediation: Northern Saskatchewan. Pages 621–632 ASME 2009 12th International Conference on Environmental Remediation and Radioactive Waste Management. American Society of Mechanical Engineers. Vandenberg, J. A., M. Herrell, J. W. Faithful, A. M. Snow, J. Lacrampe, C. Bieber, S. Dayyani, and V. Chisholm. 2016. Multiple Modeling Approach for the Aquatic Effects Assessment of a Proposed Northern Diamond Mine Development. Mine Water and the Environment 35:350–368. Vandenberg, J. A., and C. D. McCullough. 2017a. Key Issues in Mine Closure Planning for Pit Lakes. Pages 175–188 in N. S. Bolan, M. B. Kirkham, and Y. S. Ok, editors. Spoil to Soil. First edition. CRC Press, Taylor & Francis Group 6000 Broken Sound Parkway NW, Suite 300 Boca Raton, FL 33487-2742. Vandenberg, J., and C. McCullough. 2017b. Global review of pit lake case studies. Calgary, Canada.
11	Section 4.4; Section 6.4.	**Comment** Nitrite can be toxic to living organisms (Kroupova et al. 2018). Given that nitrite concentrations are approaching or exceeding water quality benchmarks under several pit scenarios, it is imperative that all potential interaction effects are considered to ensure that levels do not impact species that may come into contact with pit water prior to the breaching of the ring dike (which will occur after water quality guidelines are met). **Recommendation** Considering that significance is dependent on a 20% increase in Nitrite concentration relative to AEMP benchmarks and CCME guidelines, more information is needed on how nitrite affects species that may interact with the pit water (e.g., waterfowl, ungulates). As nitrite may remain close to or below significance levels (20% above AEMP benchmarks), the proponent must ensure the reader that no effects on species interacting with the pit water will occur, and that adequate deterrence mechanisms will be utilized, and monitored for effectiveness, to keep susceptible species away. Please include a brief literature review on the effects of potential, predicted nitrite concentrations on waterfowl and mammals that could access pit water. Please indicate how mitigation measures will be implemented (e.g. will there be continuous monitoring of the pits to deter wildlife). Additionally, please indicate if a risk assessment has been conducted for effects of nitrite on wildlife that may access the pit.	**July 4:** The Canadian Council of Ministers of the Environment (CCME) does not provide a water quality guideline for nitrite-nitrogen for wildlife. However, a CCME water quality guideline of 10 mg/L is available for the protection of livestock for nitrite-nitrogen. It is reasonable to use these guidelines as a surrogate for protection of wildlife because many environmental quality guidelines for the protection of wildlife are based on toxicity studies conducted on livestock. The CCME water quality guideline for nitrite for the protection of livestock is based on the Canadian Water Quality Guidelines published by the Canadian Council of Resource and Environment Minsters (CCREM) in 1987. In swine administered 100 mg/L of nitrite-nitrogen in their drinking water, no adverse effects on body levels of vitamin A or hemoglobin were observed as the result of 105 days of exposure (Seerely et al. as cited in CCREM 1987). In chickens administered up to 200 mg/L of nitrite-nitrogen, no adverse effects were observed (Adams et al 1966 as cited in CCREM 1987). However, in turkeys, nitrite-nitrogen concentrations of 200 mg/L in drinking water suppressed growth compared to concentrations of 50 mg/L nitrite-nitrogen at which adverse health effects were not observed (Adams et al 1966 as cited in CCREM 1987). Concentrations of nitrite-nitrogen measured in Lac de Gras ranged from 0.001 to 0.0084 mg/L between 1996 and 2018. The maximum measured concentration of nitrite in Lac de Gras from 1996 to 2018 is 0.0084 mg/L, which is several orders of magnitude below the CCME water guideline for protection of livestock (10 mg/L) and the effects observed in swine, chickens and turkeys described above (50 – 200 mg/L). The maximum measured concentration of nitrite (0.0084 mg/L) is also below the AEMP effects benchmarks for the protection of aquatic life (0.06 mg/L nitrite-nitrogen) and drinking water (1 mg/L nitrite-nitrogen) (Golder 2019; Golder 2017). The CCME water quality guideline for nitrite-nitrogen for protection of livestock (10 mg/L) is also greater than the AEMP benchmark (for drinking water; 1 mg/L) so adverse health effects to wildlife are not expected at the concentrations referenced. The maximum nitrite concentrations modelled (i.e., the unanticipated mixing event, surface water [top section] and deeper surface water [at 40 m

			below surface]) are reproduced below in Table 1 (see Appendix X) for ease of reference (Golder 2019). Under all scenarios, predicted maximum nitrite concentrations are below the guideline for protection of livestock (10 mg/L), the AEMP benchmark for drinking water (1 mg/L) and observed effects concentrations for swine, chickens and turkeys discussed above (i.e., 50 to 200 mg/L). Therefore, monitoring to deter animals from contact with pit water is not required. A wildlife risk assessment has not been conducted to determine the effects of nitrite on wildlife that may access the pit. References: Canadian Council of Resource and Environment Ministers. 1987. Canadian Water Quality Guidelines. November 2008. Golder Associated Ltd (Golder). 2019. Aquatic Effects Re-Evaluation Report for the Diavik Diamond Mine, Northwest Territories. June 2019. Golder. 2017. Aquatic Effects Monitoring Program Design Plan Version 4.1: Diavik Diamond Mines (2012) Inc. June 2017. Golder. 2019. Summary Impact Statement Water Quality Model Results. Technical Memorandum. Prepared for Diavik Diamond Mines (2012) Inc. Golder Reference No. 19117819-1771-TM-Rev0-4000. 13 May 2019.

Northwest Territory Metis Nation: Ronald Yaworsky

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
1	Cultural Use of the Area	**Comment** The area where the Project takes place is located within an area of shared historical and cultural use amongst a number of aboriginal peoples including the NWTMN. Of primary concern is the accuracy of research used to identify archeological sites and the potential for an inaccurate or incomplete traditional land use study. The Report refers to DDMI Traditional Knowledge Panel Session. The Report indicates that the traditional knowledge was obtained from the following indigenous groups: through the five indigenous groups (Dogrib Treaty 11 Council (Tli?cho Government), Lutsël K'é Dene First Nation, Yellowknives Dene First Nation, North Slave Métis Alliance, Kitikmeot Inuit Association (the "Five Indigenous Groups")). The traditional knowledge of the NWTMN of the area that will be impacted by the Project has not been considered by DDMI. Although the Project will take place within an area that has traditionally been used by the Northwest Territory Métis Nation, DDMI has not consulted or accommodated the NWTMN. **Recommendation** The NWTMN recommends DDMI fund a traditional use study to allow the NWTMN traditional use to be considered.	**July 4:** As the PK to Mine Workings overlaps the general area of influence of the existing and approved Diavik Project, DDMI engaged the PA Groups. DDMI has incorporated information from traditional knowledge studies and reports sanctioned by the PA Groups in all components of the effects assessment for the PK to Mine Workings. DDMI welcomes the NWTMN's interest in the PK to Mine Workings Review and looks forward to sharing of traditional knowledge that can inform project design as we advance through the regulatory approvals and permitting processes to project implementation. DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users perceive the safety, quality, and health of Lac de Gras. DDMI looks forward to working with the NWTMN through the ongoing Review to identify information to support project design development for the PK to Mine Workings including identification of any additional mitigation measures for potential environmental impacts.
2	Wildlife	**Comment** The NWTMN has an aboriginal right to harvest caribou within the area that will be impacted by the Project. As the Report notes "access to healthy caribou herds is a prime concern for Indigenous groups". This is a prime concern for the NWTMN. The NWTMN is concerned about the impact the Project will have on wildlife in the area, specifically caribou as the NWTMN are reliant on the caribou that travel within the vicinity of the Project. Caribou are of particular concern as caribou herds throughout the circumpolar north are experiencing a radical population decline and other development activities including roads have adversely affected caribou that this section does not address the aboriginal	**July 4:** DDMI notes the NWTMN's and other Indigenous groups' concerns about potential for impacts to wildlife, including caribou, from the PK to Mine Workings Project. To minimize wildlife interactions with the mine workings during operations, DDMI will implement the existing wildlife, monitoring and management procedures for Diavik, which include the following measures: 4. Monitoring/tracking of wildlife presence and/or proximity to the mine workings. 5. Training all site personnel to record and/or report incidental sittings of wildlife, including birds, in the general area of the mine workings during operations. 6. Use of wildlife deterrence techniques such as truck horns, bear bangers, 12Ga cracker shells, 12Ga bean bags, scarecrows, decoy foxes and falcons, noise makers (Wetland Wailer Mk IV), and hanging screens down the high walls of the pits. DDMI plans to implement the following additional mitigations to reduce potential effects

		rights of the NWTMN to harvest caribou. **Recommendation** The recommendation is the aboriginal rights of the NWTMN need to be accommodated by DDMI. DDMI must undertake studies and monitoring, and the NWTMN must be involved in the studies and monitoring. DDMI negotiate an accommodation agreement with the NWTMN to address the concerns of the NWTMN.	on wildlife during closure of the PK to Mine Workings Project: 5. Removal of any observed wildlife from pit/dike area before infilling. 6. Monitoring area pit area for approaching wildlife during infilling. 7. Employing deterrents such as herding as required. 8. Excavating ramps into the pit walls that will remain as a shoreline. DDMI intends to continue to implement its robust decision making framework through caribou advisories (see DDMI response to MVEIRB IR#51) to reduce the likelihood of caribou interaction with the pits/mine workings during the construction, operation and closure phases of the Project. DDMI notes that there have been no recorded caribou interaction with the pits/mine workings area at Diavik to date. DDMI understands that MVEIRB has issued Information Requests (IR) to potentially affected Indigenous groups requesting information about cultural use of the Lac de Gras area and perspectives on the PKMW Project. Responses to these IRs may provide additional information about how traditional land users perceive the safety, quality, and health of Lac de Gras. DDMI looks forward to working with the NWTMN through the ongoing Review to identify additional mitigation measures for wildlife to support project design development for the PK to Mine Workings.

Tlicho Government: Tlicho Lands Regulatory

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
15	General File	**Comment** Tlicho 1999 EIS and Recommendations referred to in IR14 **Recommendation**	
16	General File	**Comment** TG IR 14 Refers to this Tlicho Government Report, 1999 **Recommendation**	
1	Closure and Post-Closure - Dykes	**Comment** An elder questioned: "There is a concern about putting the PK in the bottom of the pit and putting fresh water over it. If they break the dyke, there will be water flows and the ice formation plus the ice cracks and supposing there are tremors, what kind of disturbance to the environment may happen in the future?" **Recommendation** Please comment on dyke stability if the pits cannot be re-filled because water quality is not acceptable.	**July 4:** There is no long term scenario where the mine workings will not be refilled with lake water to a level equivalent to Lac de Gras. If the dikes are not breached they will need to be altered to allow a hydraulic connection between the pit lake and Lac de Gras such that it prevents passage of fish while maintaining passive water level equalization. If the pit lakes have an equal water level with Lac de Gras there is no significant dike stability concern.
2	Closure and Post-Closure - Dykes	**Comment** There is a story about the ice versus the rock story. In the springtime when the ice starts melting and flows, it goes down the Coppermine River. Sometimes the ice is 5 ft thick. There is ice in Hay River by the mouth Great Slave Lake, the river is really strong and ice builds up, so in Lac de Gras there are no trees preventing the ice from going on to the land. This is the story of how the ice beat the rock and made a current. The ice when it is moving around could disturb the walls of the dyke and fracture it. When there is leak it could breach the whole dyke and the water in the mine pit could go into Lac de Gras, could be devastation. It has the potential to happen even after our time. Will DDMI security deposit cover that? Who will be responsible after the closure? In addition, the Tlicho Agreement (Section 21.2.5) states "The Tlicho Government has a cause of action against any person in respect of any use of water, deposit of waste or other activity not authorized by law	**July 4:** There is no long term scenario where the mine workings will not be refilled with lake water to a level equivalent to Lac de Gras. Once the pit lake is filled with water, the chance of a pit wall failure of sufficient magnitude to full mix the pit lake is described as very rare. In the unlikely event of this destratification of a pit lake, the only water quality parameter predicted to exceed aquatic effects benchmarks is nitrite and only in two of the nine scenarios modeled: in A418 in scenario-3a and in A21 under scenario-4a (Golder 2019). An uncontrolled rock release causing destratification of pit lakes is assessed for each VC in the SIS in the Accidents and Malfunctions sections.

		which substantially alters the quality, quantity or rate of flow of waters which are on or flow through or are adjacent to Tlicho lands, with such remedies as if the Tlicho Government had riparian rights." As well as Section 21.5.2, "The Wek'e`ezhi`i Land and Water Board shall not authorize a use of water or a deposit of waste anywhere in Wek'e`ezhi`i which, in its opinion, will likely substantially alter the quality, quantity or rate of flow of waters on or flowing through or adjacent to Tlicho lands, when such waters are on or flowing through or adjacent to Tlicho lands, unless the applicant for the authorization has entered into an agreement with the Tlicho Government to compensate the Tlicho First Nation for loss or damage which may be caused by such alteration, or the Board has accepted a referral to resolve a dispute on the compensation under 6.7." Changes to the closure plan most alight with the Tlicho agreement. **Recommendation** Please comment on the stability of the dyke walls and whether further failure after breaching could impact on water quality.	
3	Section 2.4.4, Post Closure	**Comment** An elder commented, "If the water seeps from the pit lakes into Lac de Gras, what will happen 20 years into the future, how long is the monitoring going to take place? How long, how many years? Maybe every year after year?" **Recommendation** The proponent has 100 years as the post-closure timeframe. However, they suggest in 4.1.4.2 that monitoring activities will cease prior to this upon approval of regulators. Please identify further information about the monitoring timeline, and how that timeframe could shift under different scenarios.	**July 4:** Water quality monitoring on site and in Lac de Gras is expected to continue for up to 20 years post-closure. If monitoring results are positive and stable, monitoring frequency may be reduced. If monitoring results are negative and unstable, monitoring frequency may increase. Specific monitoring requirements will be addressed during the Water License Amendment and revised through Closure Plan updates.
4	Section 4.1.6, Significance Definition	**Comment** The rationale supporting this definition is that only after the dykes are breached will fish be able to enter the pit lake, transforming the pit lake into fish habitat. As long as the pit remains a mine working and not fish habitat, it is not reasonable to expect water quality to meet the AEMP benchmarks. This status will continue as long as PK is being deposited in the mine workings, while the pit lake is being filled, and until such time as the water quality in the pit lake is shown to be of acceptable quality, and the dykes are breached. **Recommendation** Please comment on the closure and post closure plans for the pits and the dyke in the event that the water quality does not become acceptable.	**July 4:** To be clear the approved closure plan for the mine areas is to reconnect the areas with Lac de Gras. This is the closure plan that was originally assessed in the Comprehensive Study and is the basis for many of the conditions in Diavik's Fisheries Authorization and Navigable Waters Protection Act approval. DDMI has not proposed a development option where fish or people are prohibited from accessing the mine areas. In particular DDMI is unlikely to deposit PK into a mine working if the expected result would be water conditions that were unsuitable for fish or fish habitat as a result of the deposited PK. DDMI has identified that if water quality in the pit lake became unacceptable either initially after filling or at some point in the future as a result of a break down in meromixis that the contingency plan would be to prohibit Lac de Gras fish from accessing the pit lake. This would be achieved by not excavating the 30 m wide breaches in the dikes or backfilling the breaches if unacceptable water quality occurred later in the mine life. If the dike breaches are not cut a method will have to be developed to enable a hydrologic connectivity between the pit lakes and Lac de Gras so that the pit lake water levels can rise and fall with the rise and fall of Lac de Gras water levels. Without this connectivity the dike structures cannot be closed and would have to be retained in perpetuity as water retaining structures. The hydrologic connectivity could in concept be obtained with for example a series of fractures to the water retaining plastic concrete wall that forms the core of each dike.
5	Section 4.4.3.2 Uncontrolled	**Comment** The proponent suggests that destratification of the pit lake could result in release of contaminants from the pit lakes into	**July 4:** Current monitoring plan is outlined in SIS Section 4.8: Sample PK porewater to confirm constituent concentrations used in model; Monitor the chemocline development

	rock release and destratification of pit lakes, and Section 4.8 Follow-Up and monitoring	Lac de Gras and there is a potential for interaction with wildlife or and/or migratory species. Proponent also lays out monitoring approach in Section 4.8. **Recommendation** Diavik should provide further informationon the monitoring approach. An elder asked: "For the water licence, if they are not going to breach the dyke after the remediation, how often are they going to monitor and what are they going to monitor and what are they going to test? How and what will they monitor (water, wildlife, soil)? How will they monitor the wall of the dyke?" Please provide more detailed follow up and monitoring plan. Current monitoring approach is limited.	and stability prior to breaching dike (Surveillance Network Program) and include visual monitoring by Traditional Knowledge; Monitor water quality in the flooded mine workings following dike breaching; Monitor water quality in Lac de Gras following re-connection of pit lake(s) to Lac de Gras; Adequately size breaches to optimize water circulation within the closure water cap to meet water quality objectives; and Continue the AEMP in Lac de Gras (water quality, sediment, fish and invertebrates within the water and sediment). More explicit monitoring will be identified during the Water License Amendment and revised through Closure Plan updates. DDMI would appreciate guidance during that process on how to best include visual monitoring by Traditional Knowledge.
6	Section 4.8 Follow Up and Monitoring	**Comment** Include visual monitoring by Traditional Knowledge. The Tlicho Agreement Section 22.1.7 states "In exercising their powers, the Mackenzie Valley Environmental Impact Review Board and the Wek'e`ezhi`i Land and Water Board shall consider traditional knowledge as well as other scientific information where such knowledge or information is made available to the Boards." This needs to inform the technical sessions and decision points. **Recommendation** This is a vague statement. The elders need to be continuously informed through the pit infilling with PK, as well as all phases of the flooding of the pit, and then in the determination that the breach is feasible or not feasible. There should be the requirement for technical sessions and working meetings to review these decisions at vital decision points. Please provide further detail on the monitoring approach to be taken.	**July 4:** DDMI intends to engage with communities and the Traditional Knowledge Panel to determine the best approach for visual monitoring by TK. For more information see response to TG-IR#5.
7	Section 4.9, Summary of Commitments	**Comment** Proponent suggests, "will close the breaches or isolate the pit lake from Lac de Gras if water quality is later determined to pose a risk to water quality, fish and fish habitat, caribou, humans or cultural uses." **Recommendation** This is not a specific commitment. What time frame does it refer to? How feasible is this commitment? Can this be achieved?	**July 4:** If closure monitoring identifies a negative trend in pit water quality that will pose an acute or chronic risk to aquatic life in Lac de Gras DDMI is committed to closing the dike breaches. DDMI expects that equipment will be available on site during closure that could be used to close the dike breaches within 1 year of confirming a significant risk to aquatic life. Post-closure monitoring may continue until a positive relationship is identified in the monitoring data. More explicit monitoring requirements will be identified during the Water License Amendment and revised through Closure Plan updates.
8	Section 4.4.1.1, Project Pathways and Section 7	**Comment** During closure, there is the potential for increased exposure to chemical contaminants for the wildlife species considered in this assessment as a result of ingestion of drinking water from the top section of the pit lake prior to and following reconnection. **Recommendation** Are there ways to mitigate the risks to wildlife during the closure phase? One elder asked: "if there are possbile options for creating a fence around the area, or setting up a fibre glass posts that deters wildlife from entering a restricted area. We don't want the kimberlite to be deposited into the mine pit, just the water." Please comment on ways to protect wildlife, reviewed in Section 7, for land animals and for water fowl.	**July 4:** DDMI plans to implement the following mitigations to reduce potential effects on wildlife during closure of the PK to Mine Workings Project: 1. Removal of any observed wildlife from pit/dike area before infilling. 2. Monitoring area pit area for approaching wildlife during infilling. 3. Employing wildlife deterrents such as herding as required. 4. Excavating ramps into the pit walls that will remain as a shoreline. Please refer to DDMI's responses to LKDFN IR#17 and MVEIRB IR#51 for additional information on DDMI's proposed mitigations for potential impacts to wildlife, including caribou and waterfowl.
9	Section 4.4.1.2 Closure and Post-Closure	**Comment** Dyke-breaching if water quality is deemed acceptable, an elder commented, "For the water licence, if they are not going to breach the dyke, what remediation and what will be monitored, how often are they going to monitor and what are they going to	**July 4:** For details on pit lake monitoring and the rationale to breach the dikes see DDMI's Response to EMAB-IR#15. A more detailed list of monitoring activities was provided in DDMI'sr Response to TG-IR#5. Once the pit lake water level is equivalent to Lac de Gras there is no significant dike stability concern (failure likelihood of very rare).

		monitor and what are they going to test? How and what will be monitored (water, wildlife, soil)? How will they monitor the wall of the dyke?" **Recommendation** Please prepare a list of the conditions that will be monitored for, at the decision point that breach is considered, as well as the suggested thresholds that would apply for making the decision to breach or not to breach.	
10	Section 4.1.6, Significance Definition	**Comment** The proponent writes, "The rationale supporting this definition is that only after the dykes are breached will fish be able to enter the pit lake, transforming the pit lake into fish habitat. As long as the pit remains a mine working and not fish habitat, it is not reasonable to expect water quality to meet the AEMP benchmarks. This status will continue as long as PK is being deposited in the mine workings, while the pit lake is being filled, and until such time as the water quality in the pit lake is shown to be of acceptable quality, and the dykes are breached." **Recommendation** What plans are there in the event that the water quality does not become acceptable?	**July 4:** Current water quality modelling does not suggest there is a significant risk of poor pit lake water quality preventing reconnection to Lac de Gras. If reconnection is not possible, this area would no longer be available as fish habitat. Possible contingency measures that would be considered if water quality in the pits does not reach established criteria includes the evaluation of insitu treatment options. Mine workings would not be reconnected to Lac de Gras until established criteria are met, which may result in the need to identify alternate fish habitat compensation efforts.
11	Section 6	**Comment** The issues identified in past TK studies (reviewed in Section 6) identify taste, potential toxicity, respiration, effect on fish at different depths of the pit lakes. Elders have also asked for how turbidity could affect the fish, in the event of a rockfall into the pit. An elder said, "Other thing to consider is the water going into Lac de Gras, is the kimberlite going to go with the water into the Lac de Gras? Are they only going to allow a certain amount of water to be breached into Lac de Gras? I would like to see what kind of chemical is in the kimberlite before it goes into the pit? How long does it take before the water becomes clear? Will the water come clear? How acceptable is the fish going to be, fish cannot live in a lot of turbidity, kimberlite could contribute to that." **Recommendation** The communication needed for the Tlicho Government and for elders to constantly follow the approach taken by the proponent will need to be high at particular points, such as during the first placement of PK, during the pit filling, and at the breach decision point. The TG requests the proponent make clear commitments to communicate at different project junctures.	**July 4:** DDMI intends to communicate monitoring results to the Tlicho Government annually during PKMW pit infilling, specifically before seeking approval for breaching the dikes and annually during post-closure monitoring.
12	Section 6.4.2.2, Mitigation of effects of water quality on fish and other aquatic biota	**Comment** An elder stated, "Not talking only about fish, but the wildlife that travel on the land like caribou. This area is going to be used by widlife crossing the lake and all the way around, when they swim and eat. I never drink any water near a mine, and I don't want to die young. They are breaking the whole thing [referencing the dyke passages], why do they have to break the dyke? I know it's going to be deep, but how high is the water to the top? If we break in [to the dykes], how is it going to be good for any other wildlife around the lake there. Bears eat fish. Other people eat fish over there too. We need to talk among ourselves and see how good it will be and see how other aboriginal people think." **Recommendation** The proponent has identified potential impacts	**July 4:** The five mitigation measures proposed by DDMI in the SIS are intended to promote stratification of the pits so that pore water and fine processed kimbertlite do not mix with fresh surface water and to prevent fish from entering the pits until monitoring in the pits has determined that water quality in the upper portion of the pits is safe for fish and for people eating fish from Lac du Gras once the pit lakes are reconnected with Lac de Gras. It is DDMI's opinion that these mitigations measures address concerns associated with fish health but DDMI is open to discussing other potential measures with the Tlicho Government.

		to fish in closure and post-closure, and these were commented on by elders. There are only five mitigation measures (decant pore water, direct pumped water onto other features; cover pore water with caps; prevent fish from accessing pit lakes; breach the dyke only if monitoring shows water is acceptable). This area appears to be ripe for further mitigations and measures, and should be considered in technical sessions. Tlicho Government requests proponent to generate a more expansive list for potential consideration.	
13	Section 7.4.2.2 Mitigation for Wildlife	**Comment** ICRP, V 3.2 identifies clear mitigations for wildlife. In the event that water quality is not adequate for breaching the dyke, what will occur? **Recommendation** Will DDMI prepare a set of mitigations in the event that the pits are kept un-filled and the dyke is not breached?	**July 4:** There is no long term scenario where the mine workings will not be refilled with lake water to a level equivalent to Lac de Gras. If the pits were kept un-filled this would require power generation, pumping, and water treatment on site in perpetuity. In the event where the mine working is flooded, but the dike is not breached, water quality monitoring would continue and if a significant risk to wildlife is identified fences may be installed around the pit lakes to deter wildlife interaction. More explicit monitoring and mitigation requirements will be identified during the Water License Amendment and revised through Closure Plan updates.
14	Section 6 Water Quality	**Comment** In the 1999 Environmental Assessment of the Proposed Diavik Diamond mine, the prediction was made that, "Water in the PKC will present a greater environmental hazard, and a more challenging prospect for water treatment, than predicted by the company." This prediction was made based on the finding that the kimberline contains abundant fine-grained (smectites) produced from alteration of the rock, and that the rock will weather extremely rapidly and produce additional smectite." **Recommendation** The behaviour of smectite in the water is not clear, and has not been clearly reviewed. a) Diavik should carry out a detailed review of the predictions made in the 1999 Tlicho (Dogrib) EA report and address concerns raised regarding storage and water quality of tailings, with the potential for some clays not to settle. b) Specifically, Diavik should carry out a detailed review as to the impacts of non-settling clays, such as smectite, in kimberlite tailings, and the possible impact of those non-settling clays on water quality.	**July 4:** DDMI has reviewed the report attached to the Tlicho Government submission and is very aware of the presence of smectite clays in the kimberlite rock. In the report prepared by Tony Pearse for the Dogrib Treaty 11 Council in 1999 concern is expressed with regard to the treatability of water due to the presence of fine grained smectite clays (pages 56-62). The concerns raised in the report regarding treatability of PKC water have not materialized and the NIWTP continues to produce a very high quality effluent very low in TSS turbidity. Additionally the non-settling clays identified in the report do in fact settle from the water column even in the very shallow PKC pond. However the smectite clays are a likely contributor to the consolidation challenges with the EFPK (slimes) beneath the PKC pond that are the focus of closure planning for the PKC Facility.

Yellowknives Dene First Nation: Machel Thomas

ID	Topic	Reviewer Comment/Recommendation	Proponent Response
1	General	**Comment** (Submitted after Due Date) The area of Lac de Gras is of high cultural significance to YKDFN and is a a key location for the migration and movement of wildlife, particularly caribou. Cultural values need to be central in determining the significance of effects. Those with the potential to be the most affected should have an important and active role in determining the significance whether "real" or perceived. The SIS did not highlight where such engagement was held. This is important as it provides an avenue for informed consent.	**July 4:** As part of the original Environmental Assessment for Diavik, DDMI established two (2) criteria to identifying potentially impacted communities (Page 81; Section 6.1.1 of the Canadian Environmental Assessment Agency's Comprehensive Study Report for the Diavik Diamond Mine Project [June 1999]): (1) A review submissions/interventions during the federally sanctioned panel review of the Ekati Diamond Mine (which is also within the Lac de Gras watershed), and (2) Receipt of interest to participate in the Diavik EA process directly from specific communities and community groups. The Environmental Agreement and the Socio-Economic Monitoring Agreement for Diavik were informed by identified potentially impacted communities from the Diavik Review and were conditions for federal

		Recommendation DDMI should define its process of selection with indigeous groups, particularly about impacts which might affect our well being and peace of mind. And develop action plans collaboratively.	approval of the Diavik Project. DDMI has and continues to engage with the five (5) PA groups, including YKDFN, during the Review of the PK to Mine Workings. DDMI commits to continue with this engagement during all phases of project implementation. DDMI also welcomes interest in the ongoing PK to Mine Workings Review from other Indigenous groups that are not Parties to the existing Environmental Agreement for Diavik and looks forward to sharing any additional traditional knowledge that can inform project design as we advance through the regulatory approvals and permitting processes to project implementation.
2	General	**Comment** (Submitted after Due Date) While we believe for the purposes of internal planning and project development, TK panel information is quite useful , we do not think the TK information referemce is sufficient to be relied upon in such an huge undertaking. TK knowledge required for a project of such magnitude requires a wider canvas. **Recommendation** DDMI should define its process of selection with indigeous groups, particularly about impacts which might affect our well being and peace of mind. And develop action plans collaboratively.	**July 4:** DDMI notes the WLWB Water Licence Amendment Process and the current MVEIRB Review of the PK to Mine Workings are public processes that provide opportunity for interested parties, including Indigenous groups, to participate in the process. DDMI has acknowledged parties that have demonstrated an interest in the Project to date and looks forward to receiving input from and considering the collaboration with any additional parties with an interest in the Project during the ongoing Review.
3	8.8	**Comment** (Submitted after Due Date) DDMI makes a commitment to understanding indigenous perceptions about the safety, quality and health of Lac De Gras and to identify practical strategies to address these concerns. DDMI has to realise that water quality numbers and scientifically calculated thresholds for quality testing have no context for most indigenous and aboriginal groups who (with wildlife) will be end users of the area at closure. What we covet are processes which involve us from conception to end. Whenever there is a break in our observation of an area, invariably our cultural view of the area will change and consequent transmutation or decay of culture is likely to occur. **Recommendation** We recommend engagement and involvement in the process as without this our fears and adverse perceptions will not be allayed or smoothed over. Additionally we should be involved in the development of "practical Strategies" to which DDMI refer. How does DDMI wish to involve indigenous groups in the process of this project, other than just use our TK?	**July 4:** DDMI acknowledges YKDFN's recommendation and looks forward to ongoing DDMI-YKDFN collaboration through various avenues to ensure that the PK to Mine Workings project design, including mitigate measures and monitoring programs, is informed by TK.