



Scope of the Environmental Assessment and Reasons for Decision

Depositing Processed Kimberlite in Pits and Underground

Environmental Assessment 1819-01

Diavik Diamond Mines Inc.

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Mackenzie Valley Environmental Impact Review Board

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1 INTRODUCTION

1.1 Overview

The Mackenzie Valley Environmental Impact Review Board (the Review Board) is conducting an environmental assessment on Diavik Diamond Mines Inc.'s (Diavik's) proposed changes to long-term processed kimberlite storage at the mine. This proposal is described in Diavik's application to the Wek'èezhì Land and Water Board (WLWB) to amend its water licence (W2015L2-0001) (PR#5). In its water licence amendment application, Diavik requests approval of the option to put processed kimberlite, a mine waste, into the pits and underground mine workings² in addition to storing it in the existing and approved processed kimberlite containment facility. At closure, the processed kimberlite in the pits would be covered with freshwater from Lac de Gras. Consistent with the current interim closure and reclamation plan (PR#8), once water quality inside the pit lakes is deemed to be safe for fish and aquatic life, Diavik will breach the dykes around the pits, reconnecting them to Lac de Gras.

1.2 Purpose

This document briefly describes the Review Board's proposed environmental assessment and activities to date. The main purpose of this document is to describe the scope of this environmental assessment and to provide reasons for the Review Board's determinations on scope.

Due to the limited scale of the development, the environmental assessment process for this project is a variation of the process outlined within the Review Board's *Environmental Impact Assessment Guidelines*. In determining the scope of this environmental assessment, the Review Board considered information provided by Diavik in its water licence amendment application and the regulatory review process that followed, along with additional information submitted by Diavik and parties during the scoping phase (PR#34 and PR#37).

1.3 Background

Part H of Diavik's water licence W2015L2-0001³ describes conditions applying to water and waste management at the Diavik Diamond Mine. Schedule 6 item 2 of this water licence

¹ 'PR#' refers to the public registry number of the document on the Review Board's public registry: <http://reviewboard.ca/registry/ea1819-01>

² The Review Board notes that A21 does not contain underground mine workings.

³ See water licence W2015L2-0001 <http://registry.mvlwb.ca/Documents/W2015L2-0001/Diavik%20->

requires Diavik to submit a *Processed Kimberlite Containment Facility Plan*⁴ which outlines the management of wastes, including processed kimberlite from the processing plant. Under this plan, processed kimberlite and other processing plant wastes are deposited to the existing processed kimberlite containment facility for long term storage.

The processed kimberlite containment facility has already been modified six times to raise the height of the dam in order to increase storage. Without further modifications to the processed kimberlite containment facility, it will be full in 2021, meaning there will not be enough processed kimberlite storage for the remainder of mine life. After considering several processed kimberlite storage options, Diavik determined that its preferred option would be to complete a partial dam raise in the processed kimberlite containment facility and to deposit processed kimberlite into pits and underground mine workings.

Diavik prefers this option because of space limitations on the East Island, increased costs of the other alternatives, and the prediction that there will be reduced environmental impacts from the preferred option, among other factors (PR#13 slides 8-9/144). In June of 2018, Diavik applied to the WLWB to amend the water licence to permit the deposition of processed kimberlite into the pits and underground mine workings. Figure 1 shows an aerial view of the mine, including the three open pits (A418, A154, A21) where Diavik is proposing to deposit and store processed kimberlite.

[%20Water%20Licence%20-%20Schedule%201,%20Schedule%206%20and%20SNP%20Updates%20-%20Jun%2013_18.pdf](#)

⁴ See the processed kimberlite containment facility Plan version 4.1 online at [http://registry.mvlwb.ca/Documents/W2015L2-0001/Diavik%20-%20processed kimberlite containment facility%20Facility%20Plan%20-%20Version%204.1%20-%20Jun%2011_18.pdf](http://registry.mvlwb.ca/Documents/W2015L2-0001/Diavik%20-%20processed%20kimberlite%20containment%20Facility%20Plan%20-%20Version%204.1%20-%20Jun%2011_18.pdf)



Figure 1 Diavik Diamond Mine Site Plan (from PR#5)

1.4 Referral to Environmental Assessment

The Review Board carefully considered evidence submitted to the WLWB by Diavik and others about the licence amendment proposal from June 2018 to February 2019, as well as the 1999 *Comprehensive Study Report* (PR#29) for the Diavik Diamond Project prepared under the *Canadian Environmental Assessment Act*. The Review Board's *Reasons for Decision to order an Environmental Assessment* (PR#2) for Diavik's proposed activities include the following findings:⁵

- The *Comprehensive Study Report* did not assess placing and storing processed kimberlite in the pits and mine workings. It therefore did not assess the acceptability of these activities to local and traditional users of the area, what the impacts of the activities might be to valued ecosystem components or how to mitigate these potential impacts;

⁵ For a full explanation of the Review Board's reasons for referral, please refer to the *Reasons for Decision to order an Environmental Assessment* online at: http://reviewboard.ca/upload/project_document/environmental_assessment1819-01%20-%20Reasons%20for%20Decision%20on%20referral%20to%20environmental_assessment%20-%20Diavik%20processed_kimberlite%20to%20Pits%20and%20Underground-%20Feb%2025_2019.pdf

- Placement of processed kimberlite in the pits and mine workings would be permanent and irreversible;
- Restoring the pits to productive fish habitat within Lac de Gras was part of the Canadian Environmental Assessment Agency decision;
- Lac de Gras has high cultural and ecological value;
- Placing processed kimberlite in the pits and mine workings could jeopardize the approved plan to reconnect the pit lakes to Lac de Gras after the mine closes;
- Using a relatively new technology (meromixis for processed kimberlite containment) in an untested setting (in a large, deep, culturally important, cold climate lake such as Lac de Gras) carries inherent and previously unassessed risks; and
- The Diavik mine area is in an important migration corridor for Bathurst caribou and activities in this corridor should be carefully considered due to the current vulnerable state of the herd.

The Review Board notes the opinions expressed by parties and by Diavik that depositing processed kimberlite into the pits and mine workings might be a preferred option for long term waste storage and closure. The Review Board also notes that the *Comprehensive Study Report* identified aspects of mine development which could be re-evaluated if more information became available. One of these options was the use of processed kimberlite as underground backfill to reduce the long-term mitigation requirements of the processed kimberlite containment facility.

The Review Board nonetheless decided that the proposed change to the project set out in the water licence amendment creates the potential for new, previously unassessed impacts. The Review Board is of the view that these impacts should be fully considered through an environmental assessment so that they can be identified and mitigated appropriately.

Based on these considerations, the Review Board concluded that the proposed activities might be a cause of significant adverse impacts on the environment. The Board also noted that the closure objectives of the 1999 Canadian Environmental Assessment Agency *Comprehensive Study Report*, including reconnecting the pits with Lac de Gras at closure, were partly intended to address public concern. Diavik's ability to achieve these closure objectives might be affected by the new proposed activities. The Review Board therefore found that the new activities might be a cause of public concern. For these reasons, the Review Board used its authority under subsection 126(3) of the *Act* to order an environmental assessment of these activities, despite the fact that the WLWB had not yet completed a preliminary screening process.

1.5 Legal Context

In accordance with s. 115 of the *Act*, the Review Board must conduct its environmental assessment of the proposed development with regard for the protection of the environment from significant adverse impacts, and the protection of the social, cultural, and economic well-being of Mackenzie Valley residents and communities. Section 114(c) of the *Act* further requires the Review Board to ensure that concerns of Indigenous people and the general public are considered.

2 SCOPE CONSIDERATIONS

This section sets out the scope of development and the scope of assessment that the Review Board determined for this environmental assessment and provides a rationale for these determinations.

2.1 Scope of Development

Under s. 117(1) of the *Act*, the Review Board must determine the scope of development for every environmental assessment it conducts. The scope of a development includes all the physical works and activities required for the project to proceed. For this environmental assessment, the scope of development is based on Diavik's water licence amendment application and the public review that followed, as well as the Review Board scoping process. This includes:

- transporting, depositing, and storing processed kimberlite into pits and underground mine workings, and
- closing and reclaiming any mine infrastructure related to the transport, deposition and storage of processed kimberlite in pits and underground mine workings.

The Review Board has decided that the scope of development will include all three pits and underground mine workings. Diavik requested that the Review Board consider all three pits and underground mine workings as part of the scope of development for this environmental assessment. The Review Board received feedback from several parties on which pits and underground mine workings to include. Some parties recommended explicitly including all three pits and underground mine workings in the scope of development, while others discussed the lack of information related to the A154 and A21 pits and underground mine workings and concluded that either more information was required or that only the most studied pit and

underground mine workings (that is, A418) should be included. The Review Board expects that party concerns regarding any lack of information related to the A154 and A21 pits and underground mine workings can be addressed through information requests and the environmental assessment process.

Specific activities or infrastructure that are not considered as part of the proposed development include:

- re-mining the processed kimberlite containment facility, including the removal and deposition of slimes from the processed kimberlite containment facility into pits and underground mine workings;⁶
- the partial dam raise that Diavik plans to complete to accommodate processed kimberlite storage requirements until processed kimberlite storage in the pits and underground mine workings is possible; and,
- activities and infrastructure associated with the approved and existing Diavik Mine that are not affected by or necessary for the transport, deposition, and storage of processed kimberlite in pits and underground mine workings.

Re-mining the processed kimberlite containment facility has been removed from the scope of development in response to Diavik's request during scoping that it not be considered as part of the proposed activities and in consideration of Diavik's acknowledgement that further evaluation of the feasibility and practicality of this activity is required (PR#16). Since re-mining the processed kimberlite containment facility has been removed from the scope of development, the Review Board will not consider any potential corresponding benefits of this activity, including benefits to the closure options of the processed kimberlite storage facility.

The partial dam raise is not included within the scope of development for this environmental assessment since it has already been approved by the WLWB. Similarly, existing mine activities and infrastructure were considered in the *Comprehensive Study Report* and approved by the WLWB. However, as described in s. 114(2) of the *Act*, the Review Board will consider and may rely on any assessments previously carried out in respect of these activities and infrastructure.

2.2 Scope of Assessment

The scope of assessment defines which issues the Review Board will examine in the environmental assessment. Requirements for the scope of the assessment are outlined in s. 117 (2) of the *Act* and are elaborated on in this section. In determining the scope of

assessment, the Review Board considered information from Diavik's water licence amendment application and public review process that followed, as well as the Review Board's scoping process (including the in-person scoping meeting and the comments and recommendations received on the Online Review System).

The Review Board is interested in understanding the interactive and additive nature of potential effects of the proposed activities. The Review Board believes that three important questions that need to be answered in this environmental assessment are as follows:

1. Is storing processed kimberlite in pits and underground mine workings likely to be safe for the environment and acceptable to parties, including traditional users of the Lac de Gras area?
2. If processed kimberlite is stored in pits and underground mine workings, under what conditions, if any, should the pits be reconnected with Lac de Gras?
3. How might changes to water quality resulting from reconnection to Lac de Gras affect the cultural use of the Lac de Gras area, fish and fish habitat or wildlife after closure?

In order to answer these questions, this environmental assessment must consider potential impacts of Diavik's proposed activities on:

- water quality and quantity;
- cultural use of the area;
- fish and fish habitat; and
- other wildlife (specifically caribou, aquatic and migratory birds, and species at risk).

The Review Board believes that water quality is a key driver of potential impacts to the other valued components (cultural use of the area, fish and fish habitat, and wildlife) and that focusing on these pathways of effects is important in order to ensure that significant adverse impacts as a result of the project do not occur. The Review Board is particularly concerned about impacts to water quality that may result in impacts to cultural use of the Lac de Gras area.

Specific reasons and additional information for each of the above valued components and additional considerations are provided in the sections below. The Review Board reserves the right to expand the scope of assessment to other valued components not listed here, if new evidence is presented to indicate issues of potential significance.

2.2.1 Water quality and quantity

The Review Board notes and agrees with Diavik's submission that the most direct and obvious potential for effects of the proposed activities is to water quality. Pathways for impacts to water quality could include ongoing diffusion of porewater into the lower layers of the freshwater cap and, eventually, into Lac de Gras, as well as unanticipated mixing events. The Review Board believes that impacts to water quality in Lac de Gras are important due to both its ecological importance and sensitivity as well as its past, present, and future use for traditional and cultural activities. The main outflow of Lac de Gras is the Coppermine River. Any and all potential impacts on water quality in the Coppermine River, including the potential for cumulative impacts, will be carefully considered in this environmental assessment.

Diavik has indicated that the preferred rate and timing for re-filling the pits and mine workings at closure may be linked to the decision to put processed kimberlite into the pits and underground mine workings. For example, Diavik might fill the pits and underground mine workings more rapidly than they would otherwise to minimize groundwater seepage. Depending on the rate and timing for re-filling, there may be impacts on the hydrology and water level of Lac de Gras and connected waterbodies. Based on the recent environmental assessment of the Ekati Jay Project⁷, the Review Board understands the cultural and ecological significance of the Narrows that connect Lac de Gras with Lac du Sauvage. Accordingly, the Review Board will consider any potential impacts of the project on water levels in Lac de Gras and connected waterbodies including the Narrows.

2.2.2 Cultural use of the area

The Review Board notes evidence provided in the *Comprehensive Study Report* and the recent Ekati Jay project environmental assessment, as well as feedback received during the scoping phase for this environmental assessment, that Lac de Gras was and continues to be highly valued by Indigenous groups for cultural and traditional uses. Activities that may affect how traditional land users perceive the safety, quality, and health of Lac de Gras need to be carefully considered, because perceptions can change how an area is used. Actual or perceived effects to Lac de Gras that affect how people use the area must be identified and assessed so that, if necessary, impacts may be mitigated appropriately.

⁷ Please see the Jay Project Report of Environmental Assessment here:
http://reviewboard.ca/upload/project_document/EA1314-01_Report_of_Environmental_Assesment_and_Reasons_for_Decision.PDF

The Review Board acknowledges and agrees with the importance of working with Indigenous groups and Elders to understand and mitigate any potential impacts to the cultural use of the Lac de Gras area, including from any actual or perceived effects to water quality and quantity, fish and fish habitat, and wildlife.

2.2.3 Fish and Fish habitat

Since changes to water quality are the most likely impact of the proposed activities, the Review Board finds that potential impacts to fish and fish habitat associated with the proposed activities must also be examined through this environmental assessment. The Review Board agrees with the Environmental Monitoring Advisory Board that potential impacts to fish and fish habitat of not reconnecting the pit lakes to Lac de Gras should also be considered. The Review Board believes that impacts to fish and fish habitat are important due the inherent value of fish as well as the importance of past, present and future traditional fish harvesting in Lac de Gras.

2.2.4 Wildlife

The *Comprehensive Study Report* noted concern from Indigenous parties that caribou might drink and be affected by contaminated water associated with the Diavik Mine. The Review Board believes that storing processed kimberlite in the pit and underground mine workings, and the potential for effects to water quality in the pit lakes prior to reconnection with Lac de Gras, may add to the original concerns of Indigenous parties. Given the diminished and precarious state of the Bathurst caribou herd, any potential impact of the proposed activities on the herd should be carefully considered and mitigated.

In addition to concerns about caribou, the Review Board has responsibilities under Section 79 of the *Species at Risk Act* to consider any potential impacts on species at risk. The Review Board identified some of the species it believes may need to be considered in its recent letter to Environment and Climate Change Canada (PR#30). For example, peregrine falcon could potentially nest in the pits prior to flooding, and waterfowl could use the flooded, processed kimberlite-filled pits. These and other pathways of effect should be examined through the environmental assessment process to understand potential impacts and mitigate adverse effects.

2.2.5 Additional considerations from the Act

In addition to the above issues, the Act s. 117(2) requires that all environmental assessments must be consider:

- cumulative effects,
- alternative means of carrying out the proposed activities including the impact on the environment of these alternatives, and
- accidents and malfunctions.

Cumulative Effects

Paragraph 117(2)(a) of the Act requires the Review Board to consider cumulative effects. Cumulative effects are the combined effects of the development in combination with other past, present, and reasonably foreseeable future human activities and natural processes. For this assessment the consideration of cumulative effects will include, at a minimum, the effects of the project in combination with the effects of the past, present, and future activities at the Diavik and Ekati mines. The Review Board supports Diavik's proposal to base its cumulative effects assessment for this environmental assessment using the cumulative effects assessment conducted for the Jay Project. However, the Review Board notes that the onus is on the developer to conduct its cumulative effects assessment using the best and most up to date information available.

The geographic and temporal scope of assessment for cumulative effects may differ from those described for project specific impacts to valued components. The onus is on the developer to conduct a cumulative effects assessment that is sufficiently broad in temporal and geographic scope to address cumulative effects to all valued components and supported by evidence. The Review Board has identified that impacts to water quality and quantity is a key pathway of impacts to other valued components for this environmental assessment. Therefore, the Review Board expects the geographic and temporal scope of assessment for water quality and quantity, in particular, to reflect this importance.

Alternatives Means

Diavik examined four different options for processed kimberlite storage including (PR#5):

1. Additional dam raises (of more than 5m): To date, Diavik has completed six dam raises. Each dam raise involves adding to the footprint of the dam by adding to the foundation. Diavik determined that this option is constrained by lack of space on the east and west sides of the processed kimberlite containment facility.
2. Deposition of processed kimberlite in pits and no dam raise: Diavik looked at whether it could speed up mining in the A418 pit so that it would be available in 2021 when the processed kimberlite containment facility was full. Diavik determined it could not speed up mining in A418 fast enough for it to be available by 2021.
3. Additional onsite storage: Diavik investigated using the onsite collection ponds or the north inlet but determined there was not enough room in either for the predicted amount of processed kimberlite and that it did not want to lose the existing functionality of those locations.
4. Deposition of processed kimberlite in pits and a dam raise: The preferred option. A 5m dam raise with deposition in the pit and mine workings of A418 beginning in 2021.

The Review Board will consider these, and any other technically and economically feasible alternative means of carrying out project activities, in its assessment of alternative means.

Accidents and Malfunctions

The Review Board will consider potential accidents and malfunctions, their effects and possible mitigation measures. The accident and malfunction of primary concern is the unplanned release of processed kimberlite to Lac de Gras, including unanticipated mixing events. The environmental assessment will consider the potential causes of accidents and malfunctions and the likelihood and consequence of their occurrence. The environmental assessment will also consider mitigation activities Diavik could pursue to minimize the risks of these events.

2.3 Geographic Scope

The geographic scope includes the project footprint and areas beyond it that may be affected by project activities. The geographic scope for each valued component will be appropriate for the characteristics of the valued component.

For cultural use, the geographic scope will include, at minimum, consideration of the potential impacts to all traditional users of the Lac de Gras area.

For water quality and quantity, and fish and fish habitat, the geographic scope will include all downstream water bodies to the point at which project-related impacts are no longer detectable. At a minimum, it will include the project footprint, Lac de Gras, the Narrows between Lac de Gras and Lac du Sauvage, and the outlet of Lac de Gras to the Coppermine River. The Review Board has heard comments from parties that the Coppermine River should be included in the geographic scope of assessment and believes that this scope allows for the assessment of potential impacts of the project on the Coppermine River, if necessary.

For wildlife, the geographic scope will include the Lac de Gras area and any other places where cumulative effects impact the populations that may encounter the project area.

2.4 Temporal Scope

The temporal scope of this environmental assessment will include the entire period when Diavik is conducting any activities related to the project. This temporal scope refers to when *activities* will occur. It does not limit how long a period of *impacts* the Review Board will consider. The Review Board will consider any relevant impacts arising from Diavik's activities related to this proposed project, regardless of whether or not the impacts occur during or after Diavik's activities.

During scoping, the Review Board heard concerns from parties that the temporal scope should extend to when a water quality equilibrium is reached, or should consider the longer time frames outlined in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories*.⁸ The Review Board acknowledges the reasons for these suggestions, and believes that the temporal scope does not preclude consideration of any effects that are caused by the project activities. The Review Board notes that Diavik believes it has examined the worst-case scenario within the 100-year modelling it completed.

The primary focus of this environmental assessment is on closure and post-closure. However, if parties raise concerns about potential impacts of project activities during operations that could lead to significant adverse impacts, these impacts will also be addressed in the environmental assessment.

⁸ Please see these guidelines online at https://glwb.com/sites/default/files/documents/wg/WLWB_5363_Guidelines_Closure_Reclamation_WR.pdf

3 INCORPORATION OF TRADITIONAL KNOWLEDGE

As required by section 115.1 of the *Act*, the Review Board will consider any and all Traditional Knowledge and scientific information submitted by Diavik or parties in this environmental assessment. The Review Board expects Diavik to make all reasonable efforts to assist in the collection of Traditional Knowledge necessary for the Review Board's consideration. Diavik should refer to the Review Board's *Guidelines for Incorporating Traditional Knowledge in Environmental Impact Assessment*. Diavik should continue to work with Indigenous groups and be clear about which Traditional Knowledge reports it plans to use for this project. The Review Board will consider all Traditional Knowledge that has been submitted to date and encourages parties to submit additional Traditional Knowledge that is relevant to the environmental assessment.

4 PUBLIC ENGAGEMENT

Diavik provided a log of engagement activities, including a description of the Traditional Knowledge Panel's recommendations, as part of its amendment application (PR#5). The Review Board will consider Diavik's ongoing engagement with communities, Indigenous groups, other governments, and any other organizations with interests related to areas that might be affected by the Diavik project. The Review Board will further consider whether and how Diavik modifies the project in response to concerns raised during the engagement process.

Indigenous groups, government agencies, and other interested parties will have information useful to the conduct of this environmental assessment. Diavik should make all reasonable efforts to engage with them and resolve issues as they arise. The Review Board expects Diavik to continue to meet with interested groups and to submit to the public record any information from those discussions that may be relevant to the Review Board's decision.⁹

5 CONCLUSION

The Review Board considered the views of parties and the developer when determining the scope of assessment and development. The Review Board is of the opinion that the scope of assessment described above will for a thorough assessment of the most important

⁹ Please see the Meeting Report Template here: <http://reviewboard.ca/file/821/download?token=VtQ0Pnkd>

environmental and cultural issues associated with Diavik’s proposed activities, to reach the best environmental assessment decisions possible.

On behalf of the Mackenzie Valley Environmental Impact Review Board,

A handwritten signature in black ink, appearing to read "JoAnne Deneron".

JoAnne Deneron

Chairperson