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August 1, 2019

Re: EA1819-01 – Diavik Diamond Mines Inc. – Depositing Processed Kimberlite into Pits and Underground. Intervention.

Dear Ms. Fairbairn,

The Deninu Kue First Nation (DKFN) is pleased to provide the following intervention regarding the proposal by Diavik Diamond Mine Inc. (Diavik) to put and store processed kimberlite in pits and underground mine workings and its potential adverse impact on people and the environment. Should you require any clarification on our response please contact our technical advisor, Dr. Marc d'Entremont, at mdentremont@lgl.com or 250-656-0127.

Sincerely,

for/ Subchief Frank Lafferty
Chief Louis Balsillie

cc. Richard Simon, DKFN Resource Management Coordinator
Dr. Marc d'Entremont, LGL Limited (DKFN Technical Advisor)

Depositing Processed Kimberlite in Pits and Underground Diavik Diamond Mines Inc. (EA1819-01)



Intervention

Submitted to Mackenzie Valley Review Board

Prepared for



Deninu Kue First Nation
Fort Resolution, NT

Prepared by

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Cover photos:

From left to right: Diavik Diamond Mine, barrenground caribou, fish tasting, processed kimberlite facility.

Executive Summary

Diavik Diamond Mines Inc. (DDMI) is proposing to store processed kimberlite in open pits and underground areas of the Diavik Diamond Mine as part of the mine closure and reclamation. Freshwater from Lac de Gras will be added over top of the processed kimberlite in the pits to create a deep pit lake that will cause stable layers of water to form naturally, isolating the processed kimberlite. The Mackenzie Valley Environmental Impact Review Board concluded that these activities might be a cause of significant adverse effects on the environment and public concern. Therefore, DDMI was to conduct an environmental assessment to consider potential impacts 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 Deninu Kue First Nation (DKFN) is participating in the environmental assessment review as an Intervener since the project is within the current and traditional socio-economic use areas as identified in the DKFN Ethnohistory Report (Vanden Berg 2012). The area north of Great Slave Lake is home to an abundant amount of wildlife, fish and plants that have meaningful and spiritual use to the DKFN. The project area has been used by the DKFN since time immemorial for hunting, fishing, trapping and gathering. The DKFN has contracted LGL Limited to conduct a technical review of the Summary Impact Statement, and supporting documents, submitted by DDMI. This Intervention report provides the results of this review and focuses on issues and concerns regarding consultation, water quality, fish and fish habitat and caribou.

For water quality, DDMI predicted a neutral effects of negligible magnitude for most modelling scenarios, other than one scenario where a potential adverse effects on Lac de Gras at pit A21 could occur. Although, in making these prediction, DDMI concluded the issues of concern related to the deposition of extra fine processed kimberlite (EFPK) would be the same as for the deposition of fine processed kimberlite (FPK). We disagree with this conclusion, since the sedimentation rate and resuspension potential of particles in the water column is driven primarily by particle size, shape, and density. Therefore, the assumption that EFPK and FPK will behave similarity with respect to settleability and resuspension potential has not been validated and the accuracy of the water quality model in predicting settleability and resuspension potential is in question. We recommend that a third-party review of the water quality model be conducted to identify areas of improvement prior to decision on the environmental assessment.

The water quality residual effects characterization section described the potential effects, pathways, and measurable parameters as a result of the PKMW project; however, this section did not include sufficient detail to provide a conceptual understanding of how the project may result in changes to water quality. In addition, the application of significance thresholds within the top 40 m of surface water likely underestimates the available habitat in the pit lakes for aquatic life, including fish. Finally, an ecologically relevant total dissolved solids threshold should be included. Therefore, we also recommend:

- DDMI develop a conceptual site model that includes primary release mechanisms of contaminants, secondary/tertiary release, transport, and uptake mechanisms; and exposure

pathways that can be used to communicate the components of the residual effects assessment and demonstrate a comprehensive understanding of the system;

- DDMI conduct a literature search and/or supporting study (e.g., using analogous pit lakes) to identify an evidence-based depth threshold to define the euphotic zones for the proposed pit lakes; and
- The Aquatic Effects Monitoring Program threshold of 500 mg/L be validated through a suite of toxicity tests prior to characterizing residual effects.

Potential impacts under certain modelling scenarios indicate possibility for fish exposure to contaminants, since stratification cannot be maintained in the A21 pit over the long term (>50 years) and contaminant levels will be above the Aquatic Effects Monitoring Program benchmarks under two of three modelling scenarios. As such, pit A21 should not be an option for processed kimberlite deposition and subsequent fish habitat creation due to uncertainty of adverse effects on fish and fish habitat. Also, the breaching of the dikes around the pits has the potential to disturb the stratification of the pit lakes. There is the potential for localized significant effects from the potential contaminant migration upwards in the water column, which could expose fish, plankton and benthic invertebrates in the immediate vicinity to potentially harmful levels. We recommend DDMI should clearly state the methods to be used to breach the dikes that ensures destratification does not occur. A proactive contingency plan should also be developed, which includes detailed monitoring, to ensure that breaching is ceased prior to water quality parameter exceeding thresholds.

In its scope of decision, the Review Board noted that 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. DDMI concluded that since there would be negligible impacts to water quality, there would be negligible impacts to caribou health. Although, in making this prediction DDMI used the same significance criteria that was used in the original Diavik Diamond Project environmental assessment in 1998. This simple, linear approach taken and the use of assessment evaluation criteria from over 20 years ago, does not demonstrate careful consideration of the issues. Since the original environmental assessment for the Diavik Diamond Project, additional guidance has become available for assessing environmental effects to species at risk, where the assessment of residual effects should consider whether such effects may intensify or aggravate known threats to wildlife species. Further, determining whether residual effects are significant can be guided by an examination of whether project activities would exceed thresholds. For context, management thresholds are included in the Bathurst caribou range plan that are informed by traditional knowledge, caribou biology, societal risk tolerance and are reflective of the precautionary decision making for Bathurst herd management.

The DKFN remains committed to working with the Review Board and DDMI on the successful resolution of concerns and looks forward to discussing these further.

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1. Introduction

Diavik Diamond Mines Inc. (DDMI) operates the Diavik Mine on the shore of Lac de Gras in the Northwest Territories. Since 2003, DDMI has been mining kimberlite rock from open pits and from underground mine tunnels that are deep under the lake surface of Lac de Gras. Crushing and washing with water are used to separate diamonds from the kimberlite ore in a method called “processing”. Larger pieces of processed kimberlite ore are hauled by truck to the Processed Kimberlite Containment (PKC) Facility. Finer processed kimberlite is mixed with water and also stored in the PKC Facility. The PKC Facility does not have enough space to store all of the processed kimberlite expected to be produced over the remaining life of the mine because the mine plan for Diavik, including the amount of processed kimberlite produced, was adjusted/ revised at various stages of operations as the mining team gained a better understanding of the kimberlite orebodies within the project footprint.

In June 2018, DDMI applied to the Wek’èezhìi Land and Water Board to amend its water licence to allow processed kimberlite to be deposited in mined out open pits and underground mine workings prior to refilling the open pits with water and reconnecting them to Lac de Gras at closure. During the review of the application, the Mackenzie Valley Environmental Impact Review Board decided the application needed to go through an environmental assessment, which would allow a more thorough evaluation of public concerns and the potential effects of the project on the environment.

1.1 Deninu Kue First Nation

On July 25, 1900, Dene forefathers negotiated and concluded a Treaty with the Crown. While the Akaitcho Dene First Nations (herein “ADFNs”) consider this a standalone treaty, it is known as an adhesion to Treaty No. 8 by the Crown. Chiefs from four ADFNs signed the Treaty with the Crown at Deninu Kue (also known as Fort Resolution) in the Northwest Territories. These First Nations were the Deninu Kue First Nation, the Yellowknives Dene First Nation - Dettah, the Lutsel K’e First Nation, and the Yellowknives Dene First Nation – Ndilo. The traditional territories of the four First Nations together comprise Akaitcho Territory, which encompasses an area greater than that covered by Treaty No. 8. The ADFNs occupied and continue to occupy territory to the north, east and south of Great Slave Lake. Some of that territory is outside the boundaries described in the written version of Treaty No. 8.

The ADFNs, including Deninu Kue First Nation (DKFN), assert outstanding Aboriginal rights and title in and to their traditional territory. To be considered with this is also their assertion that the Treaty of 1900 was merely a “peace and friendship” treaty, rather than a “land surrender” treaty. These assertions are supported by the decision of Justice Morrow in the case of *Re Paulette and Registrar of Land Titles* (No. 2) (1973) 42 D.L.R. (3rd) 8. This case dealt with the validity of a caveat filed by 16 Chiefs from the Mackenzie Valley on behalf of their First Nations to protect their claim to Aboriginal title over their traditional territories. Justice Morrow heard extensive evidence throughout the Mackenzie Valley from the various communities on, among other matters, whether the First Nations had ceded or surrendered their Aboriginal title to the lands in issue upon entering into Treaties No. 8 and 11. The Court concluded that the First Nations had an arguable case that the treaties were not effective instruments to terminate their Aboriginal rights or title. Although Justice Morrow’s decision was

overtaken on other grounds dealing with the ability to place a caveat on unpatented Crown land, his findings of fact were not rejected by the higher courts.

Among other rights, the Treaty of 1900 guaranteed the rights to hunt, fish, trap and gather. Furthermore, it was indisputably promised at the time of the signing of the Treaty that the mode of life of the ADFNs would not be interfered with, that they would be able to continue to exercise their harvesting rights to hunt, fish, trap and gather as they had always done and that they would be entitled to maintain their traditional lifestyle and live as before. The evidence of Elders and other DKFN members confirm that in Akaitcho Territory the lands were used by DKFN for hunting, fishing, trapping and gathering on a regular basis. They have been so used for generations. The trapping provided furs to sell and meat to subsist on. The meat obtained from the hunting and trapping fed many community members and not just the trapper or hunter. Many different types of animals were hunted and trapped. Many different types of fish were caught. Many different types of plants were gathered for various purposes. The DKFN has relied on the lands of its traditional territory for generations to either provide or subsidize the livelihood of its members through the hunting and trapping of wildlife and fishing, in its traditional territory. This reliance continues today. The Treaty rights to hunt, fish, trap and gather provided in the Treaty of 1900, in addition to other rights, do not exist only on paper, but are in use, and an integral part of the tradition and existence of DKFN in its traditional territory. These rights have been exercised by DKFN for generations and continue to be exercised to date.

The DKFN, as part of the ADFNs, is and has been involved in Treaty implementation negotiations with Canada and the GNWT since 1992, involving issues related to land, resources and governance. These negotiations also seek, among other things, to clarify the nature and scope of the harvesting rights of DKFN in Akaitcho Territory. These negotiations are sometimes referred to as the Akaitcho Process and are ongoing. The Aboriginal and Treaty rights which DKFN exercises are part of these continuing negotiations. The Treaty rights of DKFN are established rights, and there is no need to do a strength of claim assessment with respect to these rights.

DKFN has an obligation to its band membership of 915 to ensure that “As long as the sun shines, rivers flow and grass grows” based on its Treaty with the crown, future generations should be also be able to practice their inherent right to hunt, fish, trap and gather in co-existence in its traditional territory. The DKFN have exerted a continued presence in the barren lands north and east of Great Slave Lake and continue to return to the barren lands to hunt, trap, fish, socialize, and pursue other cultural imperatives as their ancestors have done for millennia. Where there is impact and loss, then DKFN must be given the opportunity for reasonable informed consent, consultation and accommodation benefits. This duty is vested with the Crown in its fiduciary obligation to DKFN based on its Treaty and should be addressed within this process.

The Diavik Diamond Mine is within the Akaitcho Territory and the DKFN assert its Aboriginal rights and title within this traditional territory. Since DKFN’s Treaty is asserted as a “peace and friendship” Treaty, rather than a “land surrender” Treaty, the DKFN has acted in good faith in supporting this and other projects in its traditional territory. This support has been enacted because the DKFN recognize the potential benefits to its members from development and progress within the Northwest Territories;

however, this support also comes with the expectation of recognition and accommodation, which for the Diavik Diamond Mine and other projects has been lacking.

1.2 Consultation and Engagement with DKFN

To date, there has been minimal consultation and engagement from DDMI involving the DKFN. For this project DDMI focused its engagement on Indigenous groups that are signatories to the Participation Agreement. DKFN was excluded from this agreement despite the assertion to traditional lands in the project area as stated above. A consultation process that fully respects Aboriginal and treaty rights generally includes:

- Gathering information to test policy proposals;
- Putting forward to DKFN, project proposals that are not finalized;
- Seeking DKFN's opinion on proposals;
- Informing DKFN of all the relevant information upon which those proposals are based;
- Giving DKFN sufficient time to research, consider and respond to the proposal;
- Listening with open mind to what DKFN has to say;
- Being prepared to alter the original proposal to eliminate or minimize impacts upon Aboriginal or treaty rights; and
- Providing feedback both during the consultation process and after the decision process.

As stated above, to date, there has been minimal consultation with DKFN, let alone consultation as outlined above. This lack of consultation is significant, especially in light of the Federal Court of Appeal decision in 2018 on the Trans Mountain Pipeline project where it was ruled that the Government of Canada failed to fulfil its legal duty to consult Indigenous peoples and that project was quashed as a result.

2. Approach

The Mackenzie Valley Environmental Impact Review Board (the Review Board) produced a Scoping Document and Reasons for Decision (April 18, 2019) and a subsequent clarification document (May 21, 2019) for the Diavik Processed Kimberlite to Mine Workings (PKMW) project. The Review Board is interested in understanding the interactive and additive nature of potential effects of the proposed activities. The Review Board believed that three important questions that need to be answered in this environmental assessment were 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, DDMI prepared an environmental assessment that considered 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).

On behalf of the DKFN, LGL Limited environmental research associates (LGL) has prepared this intervention, primarily to address these components. The intervention is based on our independent technical review of the Summary Impact Statement (DDMI 2019) and responses to Information Requests prepared by DDMI. To present outstanding issues and concerns for this intervention the following questions were asked internally:

- Is the baseline information complete and up to date, or are there outstanding deficiencies, including incomplete use of the literature?
- Is the level of environmental assessment commensurate with the potential for impacts arising from the proposed project?
- Does the environmental assessment accurately identify and interpret potential adverse effects (i.e., project pathways) on Valued Components (VC)?
- Is the impact assessment methodology sound and applied properly to each VC-project pathway that justifies it?
- Are there any project risks that have not been adequately described or interpreted, but of which the DKFN should be aware?

3. Valued Components

3.1 Water Quality Model and Residual Effects Characterization

The scope of this review included Section 4 (Assessment of Potential Effects on Water Quality) of the Summary Impact Statement (DDMI 2019) for the PKMW project and other relevant sections that provided supporting information for the review. In addition, Appendix B of the Summary Impact Statement (i.e., Water Quality Model Results) was reviewed.

3.1.1 Impact Predictions

DDMI concluded for pit lakes A418 and A154, modelling conducted for the PKMW project predicted a neutral effect of negligible magnitude (in relation to Aquatic Effects Monitoring Program [AEMP] benchmarks) within the project development area during closure and post-closure for a continual period of time within a disturbed area (pit lake) following reconnection with Lac de Gras under the three scenarios (2a, 3a and 4a). Given that no adverse effects to pit lakes are anticipated, DDMI expects there will be no adverse effects to Lac de Gras.

Modelling results for pit lake A21 scenario 2a predicted a neutral effect of negligible magnitude within the project development area during closure and post-closure. Modelling results for pit lake A21 scenario 4a predicted 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, DDMI expects there will be no adverse effects to Lac de Gras under scenario 2a.

Modelling results for pit lake A21 scenario 3a predicted residual effects on the aquatic environment, with an adverse effect of high magnitude for moderate duration within the project development area during closure and post-closure. Given that an adverse effect to pit lake A21 for scenario 3a is anticipated, there is the potential that an adverse effect to Lac de Gras could occur.

3.1.2 Developer's Conclusion

In Section 3.1.1 of the Summary Impact Statement (DDMI 2019), DDMI stated that the deposition of extra fine processed kimberlite (EFPK) into mine workings (i.e., the pits) was withdrawn from the PKMW project but that DDMI "has retained the assessment of deposition of EFPK into mine workings as part of this assessment, as the issues of concern related to this optional activity are the same as for deposition of FPK (fine processed kimberlite) to mine workings, as are the assessment methods".

3.1.3 Intervener Conclusion

We disagree that the issues of concern regarding the deposition of EFPK are the same as for deposition of FPK to mine workings. The water quality model predicted changes in two generic surrogate parameters: 1) a conservative water quality constituent to represent major ions, nutrients, and metals; and 2) a settleable constituent to predict the behaviour of particulate materials. However, the comparative size, shape, and relative density (i.e., specific gravity) of the modelled constituent to either the FPK or EFPK was not included. The sedimentation rate and resuspension potential of particles in the

water column is driven primarily by particle size, shape, and density. In addition, the mineralogy of the sediments that drive electrochemical interactions can also influence settleability. Therefore, the assumption that EFPK and FPK will behave similarly with respect to settleability and resuspension potential has not been validated and the accuracy of the water quality model in predicting settleability and resuspension potential is in question.

3.1.4 Intervener Recommendations

It is strongly recommended that a third-party review of the water quality model be conducted to identify areas of improvement prior to decision on the environmental assessment. Specific elements of the water quality model that should be reviewed, at minimum, include:

- a. The resuspension module to understand the characteristics of the settleable constituent relative to FPK and EFPK; and
- b. The assumption that there is no (or negligible) run-off from the rock wall in comparison to other inflows.

Section 4.1.3 briefly described the potential effects, pathways, and measurable parameters as a result of the PKMW project; however, this section does not include sufficient detail to provide a conceptual understanding of how the PKMW project may result in changes to water quality (i.e., a conceptual site model). The lack of information in this section does not instill a sense of confidence in the residual effects characterization. Therefore, it is recommended that DDMI develop a conceptual site model that includes primary release mechanisms of contaminants, secondary/tertiary release, transport, and uptake mechanisms; and exposure pathways that can be used to communicate the components of the residual effects assessment and demonstrate a comprehensive understanding of the system.

Section 4.1.6 states that the Aquatic Effects Monitoring Program (AEMP) and significance thresholds are applied within the top 40 m of surface water as it is assumed that there is limited use by aquatic receptors below this depth. DDMI concluded that exceedances of significance thresholds below this depth were irrelevant as it pertains to significance determination. However, the threshold of 40 m has not been validated through predicted (e.g., literature review or using analogous pit lakes) light attenuation in the pit lakes. In addition, large-bodied fishes such as lake trout are known to inhabit depths of at least 50 m (McPhail 2007). The use of 40 m as the threshold likely underestimates the available habitat in the pit lakes for aquatic life, including fish. Therefore, it is recommended that DDMI conduct a literature search and/or supporting study (e.g., using analogous pit lakes) to identify an evidence-based depth threshold to define the euphotic zones for the proposed pit lakes.

Table 4-3 provides the ecological thresholds for water quality (including significance thresholds). No significance threshold for total dissolved solids (TDS) was provided despite this parameter being subject to project related changes. In addition, an ecologically relevant TDS threshold should be included. Toxicity testing to support previous assessments in the Northwest Territories (i.e., Snap Lake Diamond Mine) found that thresholds for the protection of aquatic life (i.e., benchmarks that are analogous to water quality guidelines) ranged between 312 and 778 mg/L. More specifically, the IC10 and IC20 for reproductive effects on *Ceriodaphnia dubia* were 560 and 778 mg/L, respectively, while the IC10 and

IC20 for reproductive effects on *Daphnia magna* were 312 and 684 mg/L, respectively. Ultimately, a site-specific water quality objective of 684 mg/L was proposed. Comparatively, the human-health based threshold used by DDMI is 500 mg/L, within the range of observed benchmarks for aquatic life in water with presumably similar ionic ratios. Therefore, it is recommended that the AEMP threshold of 500 mg/L be validated through a suite of toxicity tests prior to characterizing residual effects.

3.2 Fish and Fish Habitat – Uncertainty Regarding Stratification and Water Quality

The scope of this review included Section 6.0 (Assessment of Potential Effects on Fish and Fish Habitat) of the Summary Impact Statement (DDMI 2019) for the PKMW project as well as components of Section 4.0 specific to the DDMI's conclusions as they relate to conditions of water quality and stratification within the pit lakes.

3.2.1 Impact Predictions

Impact predictions as they were presented by DDMI specific to fish and fish habitat relied primarily on the following three conditions:

1. That fish will be excluded from the pit lakes until all water quality AEMP benchmarks can be met;
2. That long-term maintenance of stratification/meromixis in the pit lakes to prevent exposure of fish to deleterious water quality conditions can be achieved; and
3. That the life processes of fish species part of Lac de Gras will be restricted to a depth of 40 m from surface within the pit lakes.

3.2.2 Developer's Conclusion

DDMI concluded that where all conditions summarized above can be met, no impacts to fish and fish habitat will result from the proposed activity. However, Section 4.4.1.3 of the Summary Impact Statement (DDMI 2019) indicated that under certain modelling scenarios AEMP benchmarks will be exceeded in pit A21 and that meromixis in pit A21 were predicted to break down, such that pit lake waters will fully mix after 50 years. Further to this, no evidence, as derived from current fish studies, is presented in Section 6.0 to validate the assumption that fish life processes will be restricted to a depth of 40 m from surface within the pit lakes.

3.2.3 Intervener Conclusion

Pit A21 should not be considered as an option for processed kimberlite deposition and subsequent fish habitat creation due to the uncertainty of adverse effects on fish and fish habitat and the likelihood that long-term meromixis cannot be achieved in that environment. Where there is potential for berms around pit A21 to fail, any deposits contained within pit A21 also have the potential to disperse to Lac de Gras and other pit lake(s) restored to provide fish habitat.

3.2.4 Intervener Recommendations

To ensure the long-term protection of fish and fish habitat it is recommended that pit A21 be removed from consideration for processed kimberlite deposition. As well, it is recommended that DDMI conduct a literature search and/or supporting study to identify an evidence-based depth threshold to define the extent of fish habitat within the proposed pit lakes.

3.3 Fish and Fish Habitat – Siltation and Disturbance to Stratification During Breaching of Dikes

Breaching of the dike/berm around the pit(s) has the potential to introduce deleterious substances to fish habitat and/or disturb the stratification of the pit lake(s) during this process.

3.3.1 Impact Predictions

The details regarding the process of breaching the dikes to allow water and biota to enter the pit lake(s) is not well described by DDMI.

3.3.2 Developer's Conclusion

DDMI identifies a potential effect on stratification due to the act of breaching the dyke walls. The physical disturbance caused when re-connecting the pit lakes to Lac de Gras could cause de-stratification within the pits resulting in localized impacts to water quality, fish habitat and fish. DDMI has not assessed this potential effect to its full extent in the Summary Impact Statement (DDMI 2019).

3.3.3 Intervener Conclusion

There is the potential for localized significant effects from the potential migration of contaminants upward in the water column, which could expose fish, plankton and benthic invertebrates in the immediate vicinity to potentially harmful levels. As well, breaching of the dike may introduce additional deleterious substances (e.g., total suspended solids) into fish habitat. Mitigation planning as outlined by DDMI is limited to the mention of silt curtains (where feasible) on page 56 of the Summary Impact Statement (DDMI 2019).

3.3.4 Intervener Recommendations

It is recommended that DDMI clearly outline the methods and mitigation to be used during breaching of the dikes as this is an important component of an impact assessment for fish and fish habitat. A proactive contingency plan should also be developed, which includes detailed monitoring, to ensure that breaching is ceased prior to water quality parameters exceeding thresholds.

3.4 Wildlife and Wildlife Habitat – Considerations for Caribou

Wildlife and Wildlife Habitat was selected as a valued component (VC) because the PKMW project has the potential to result in changes in water quality, which could result in changes in wildlife health (i.e.,

exposure to contaminants). There is concern from Indigenous groups 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. Furthermore, the Review Board stated in its scope of decision that 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* (emphasis added).

3.4.1 Impact Predictions

In its Summary Impact Statement (DDMI 2019), DDMI stated the PKMW project has the potential to affect wildlife health through a change in water quality within the pit lakes prior to re-connection with Lac de Gras as well as dike breaching and mixing of pit lake surface water with Lac de Gras during closure and post-closure. The change in water quality could result in a change in health for caribou through the ingestion of drinking water and increased exposure to metals and other contaminants, including sodium, sulfate, nitrate and nitrite as nitrogen, cadmium, copper, molybdenum, arsenic, nickel, selenium, silver, and zinc, in some species of prey and sediment.

3.4.2 Developer's Conclusion

DDMI concluded with the application of project design features as well as existing mitigation and monitoring, the PKMW project is not expected to result in a measurable change in habitat, sensory disturbance, change in movement, or increased mortality risk for barren-ground caribou (and other wildlife) relative to existing conditions. In specific regards to the Bathurst caribou herd, DDMI predicted residual effects of the PKMW project on caribou health would 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.

3.4.3 Intervener Conclusion

In making its prediction, DDMI used criteria to characterize project residual effects on wildlife that was consistent with the criteria used in the 1998 Comprehensive Study (Government of Canada 1998). Likewise, the determination of a significant residual effects was consistent with the definition provided in the 1998 Comprehensive Study (Government of Canada 1998), which states:

“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” (emphasis added)

Upon examination of this definition and in careful consideration of impact, there is the potential for a long-term effect (i.e., a residual effect that extends beyond decommissioning and abandonment). Plus, an effect with a high magnitude is characterized by a change in a selected parameter by more than 10% from baseline conditions. The baseline condition of the Bathurst caribou herd has changed drastically compared to what it was twenty years ago. The Bathurst caribou population went from an apparently

stable, self-sustaining population to one that is classified as threatened at both the federal and territorial level, so a change of less than 10% may have a significant effects on the herd.

For caribou (and other wildlife), the measurable parameter and unit of measurement for measuring the change in wildlife health was assessed qualitatively based on results of surface water quality modelling and assessment. In other words, if water quality parameters were predicted to stay below water quality guidelines, then no effect of wildlife was predicted. This simple, linear approach taken and the use of assessment evaluation criteria from over 20 years ago, when valued components, especially caribou, were facing different pressures does not demonstrate careful consideration of the issues.

DDMI predicted in the comprehensive study for the Diavik Diamond Project in 1998 the effects of its proposed project and other current land use activities within the wildlife regional study area were not expected to measurably affect fitness, reproductive performance or abundance of the Bathurst caribou herd. In making this prediction, DDMI noted the number of animals likely to be exposed to the project's zone of influence, any potential effects represented a non-measurable change in production parameters at the population level. DDMI also concluded that while predicted project effects were considered non-measurable at the population level, they nevertheless represented incremental stresses to the Bathurst caribou herd population, and have the potential to act in an additive fashion with similar stresses from other land use activities. DDMI committed to participating in regional planning initiatives, supported by federal and territorial governments and Aboriginal governments/organizations, to ensure that future increases in such cumulative stresses from unforeseen projects do not jeopardize the viability of the Bathurst caribou herd (Government of Canada 1999).

As per the direction of the Review Board (and as stated above), any potential impact of the proposed activities on the Bathurst caribou herd should be carefully considered and mitigated. Since the original environmental assessment for the Diavik Diamond Project, additional guidance has become available for assessing environmental effects to species at risk, where the assessment of residual effects should consider whether such effects may intensify or aggravate known threats to wildlife species (Lynch-Stewart 2004). Further, determining whether residual effects are significant can be guided by an examination of whether project activities would exceed environmental thresholds (Lynch-Stewart 2004). No quantifiable metrics or thresholds for caribou were presented by DDMI to measure potential effects from the PKMW project, but metrics and threshold are presented in the draft Bathurst Caribou Range Plan. Here, the linkages between habitat disturbance, land use activity and caribou population were evaluated and the GNWT determined the reduction in herd productivity due to encounters with human disturbance resulted in a population effect that was additive to the direct mortality effects of predation and hunting, which corroborates the long-standing concerns and knowledge that Indigenous groups have regarding industrial development and declines in herd size (Government of Northwest Territories 2018).

3.4.4 Intervener Recommendations

Management recommendations in the range plan state that the Cumulative Land Disturbance Framework contained in the range plan should guide land and resource decision-making by all authorities involved in such decisions until Land Use Plans on the range are completed or revised.

Management thresholds are included in the range plan that are informed by traditional knowledge, caribou biology, societal risk tolerance and are reflective of the precautionary decision making for Bathurst herd management (Government of Northwest Territories 2018). These thresholds reflect a balance of the ecological, cultural and socio-economic values. The Diavik Diamond Mine is located in the Central Tundra range assessment area of the Northwest Territories (i.e., Area 2). Given the current level of disturbance in this area, activities pose a higher risk to caribou recovery compared to other areas (Government of Northwest Territories 2018). As such, a cautionary approach to caribou management, including the prediction of project related effects, is required. In its assessment of potential impacts of the PKMW project on caribou, DDMI did not demonstrate a cautionary level of consideration that showed an understanding of the socio-cultural and ecological risks.

4. Closure

The DKFN remains committed to working with the Review Board and DDMI on the successful resolution of concerns and looks forward to discussing these further. In closing we encourage the Review Board to consider the recommendations within this Intervention. Should you require any clarification on the information presented in this intervention please contact Dr. Marc d'Entremont, at mdentremont@lgl.com or 250-656-0127.

5. References

Government of Canada. 1999. Canadian Environmental Assessment Act Comprehensive Study Report Diavik Diamond Project. Government of Canada, Ottawa, ON. 247 pp.

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