DENINU KUE FIRST NATION
P.O. BOX 1899
FORT RESOLUTION, NT
X0E 0M0

FACSIMILE TRANSMITTAL SHEET

TO: Mackenzie Valley Environmental Impact Review Board	FROM: Chief Louis Balsillie, Deninu Kue First Nation
COMPANY: MVEIRB	DATE: JANUARY 18, 212
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RE: Gah Cho Kue Environmental Impact Review Process Information Request	YOUR REFERENCE NUMBER:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

ATTENTION:

Alan Elrich, Chuck Hebert, Environmental Assessment Officers

From: Rosy Bjornson, DKFN Resource Management Coordinator

LGL LIMITED
environmental research associates

Tel: (250) 656-0127
Fax: (250) 655-4761
http://www.lgl.com

January 17, 2012

Rosy Bjornson
DKFN Resource Management Coordinator
Deninu Kue First Nation
Box 1899
Fort Resolution, NT
XOE OMO

RE: Review of Environmental Impact Statement for the Gahcho Kue Diamond Project

We are pleased to present to you the results of our review of De Beers Canada Inc.'s (De Beers) environmental impact statement (EIS) for the proposed Gahcho Kué Diamond Project (the Project). In summary, De Beers is proposing to develop a diamond mine in the North Slave Region of the NWT at Longitude 63° 26' North and Latitude 109° 12' West. The Project site is located at Kennady Lake, approximately 140 kilometres (km) northeast of Łutselk'e and 280 km northeast of Yellowknife and is located the transition between the boreal forest and the northern tundra.

The Project will take about two years to build, which will include time for dewatering much of Kennady Lake in order to access to the ore that lies under the lake. Ore will be mined for about 11 years from three separate pits. At the conclusion of the mining operations, the Project will be decommissioned and Kennady Lake will be refilled with water. It will take about eight to sixteen years for Kennady Lake to return to its natural water level after the facilities have been decommissioned.

Kennady Lake discharges to the north, via a series of small lakes, into Kirk Lake and then into Aylmer Lake. Aylmer Lake is located on the main stem of the Lockhart River about midway along its length. The Lockhart River system drains into the north-eastern arm of Great Slave Lake.

In this letter report we identify information requests directed towards De Beers in order to obtain additional information, receive clarification on issues and concerns and to improve an understanding to the implications of the project on natural resources that are important to the DKFN.

As was set out in a meeting with the other Akaitcho Treaty 8 first nations (Lutsel K'e Dene First Nation, Yellowknives Dene First Nation), our review has focused on the technical aspects of Section 10 of the EIS - Key Line of Inquiry: Long-term Biophysical Effects, Closure and Reclamation. Where time and resources have allowed, we have also reviewed the materials prepared by the other first nations and have commented on other sections of the EIS.

Presented below are the information requests that we believe will be some of the key issues associated with the EIS.

Key Line of Inquiry: Long-term Biophysical Effects, Closure and Reclamation

Subject: Section 10.1 INTRODUCTION

Preamble: Under subsection 10.1.2 Purpose and Scope; the assessment of cumulative impacts is not included.

Request: Provide clarification as to whether cumulative impacts are included in the scope of the assessment for the long-term biophysical effects.

Subject: Section 10.1 INTRODUCTION

Preamble: Under subsection 10.1.3 Study Area; in an area of such an amazing frequency of rivers and lakes is the hydrological connectivity always completely limited to the obvious and surface visible connections via rivers or can subsurface connections via the aquifer also exist?

Request: If yes, is the LSA correctly defined?

Subject: Section 10.1 INTRODUCTION

Preamble: Under subsection 10.1.4 Content; the title "Cumulative Impact Assessment to the Lockhart River System" is missing.

Request: Has a real cumulative impact assessment been carried out? Please provide details.

Subject: Section 10.2 SUMMARY

Preamble: Under Closure and Reclamation Plan (p. 10-12); the reclamation program includes 'construct additional fish habitat enhancement structures'.

Request: Provide details on the site locations and design of these structures.

Subject: Section 10.2 SUMMARY

Preamble: Under Existing Environment (p. 10-12); "groundwater or subsurface water quality" is missing as a component from this section.

Request: Is "groundwater or subsurface water quality" just missing as a component of the existing environment here or throughout the EIS?

Subject: Section 10.2 SUMMARY

Preamble: Under Long-term Effects to Water Quality (p. 10-14); seepage from materials in the mine rock pile, coarse PK pile and fine PKC facility is expected to enter surrounding water bodies.

Request: Have attempts been made to quantify this seepage through modeling? If not, how can this seepage be stopped or the seepage water be treated to a quality that conforms with CCME Water Quality Guidelines? Section 3 – Project Description on page 3-4 states "The only outflow from the controlled area will be licensed discharges that are monitored". Will the aforementioned seepage be licensed and monitored?

Subject: Section 10.2 SUMMARY

Preamble:

Request: Provide a detailed analysis comparing expected under-ice O_2 winter concentrations with O_2 demands of all present fish species to assess potential mortality rates for all species and the overall changes to the species composition. In addition to an analysis for all fish species, this analysis should include the effects to invertebrates and aquatic vegetation.

Subject: Section 10.2 SUMMARY

Preamble:

Request: Please provide a detailed analysis comparing expected post-closure year-round concentrations of chromium, iron, cadmium and copper and compare with toxicity of the metals for all present fish species throughout the life history stages for fish species using Kennady Lake. Please assess potential mortality rates for all species and the overall changes to the species composition. In addition to an analysis for all fish species, this analysis should include the effects to invertebrates and aquatic vegetation.

Subject: Section 10.2 SUMMARY

Preamble:

Request: Please provide the analysis suggested for Kennady Lake in the last two requests for Area 8 as well.

Subject: Section 10.2 SUMMARY

Preamble: Under Long-term Effects to Fish and Fish Habitat (p. 10-16); the statement "The project is expected to have low or negligible effects on aquatic health in Kennady Lake…therefore, no effects to fish populations or communities are expected to occur…" is in stark contrast with the statement "…due to the change in trophic status to mesotrophic, overwintering habitat in Kennady Lake at post-closure may become more limited for cold water fish species, such as lake trout and round whitefish, than under baseline conditions".

Request: We recommend deleting the misleading first statement and leaving the truthful second statement. We further recommend to look into wind powered aeration as a mitigative measure to avoid winter kill of fish under the ice.

Subject: Section 10.2 SUMMARY

Preamble: Under Long-term Effects to Fish and Fish Habitat (p. 10-17); the re-establishment of a fish community post closure in Kennady Lake re-filling could be helped along with a compensatory measure in form of a stocking project with fish from surrounding lakes.

Request: Consider a stocking project during the post-closure period of the project.

Subject: Section 10.2 SUMMARY

Preamble: Under Long-term Effects to Fish and Fish Habitat (p. 10-18); the fish species composition or the increase in grazeable plankton following re-colonization is speculative. The added nutrients may lead to the establishment of a phytoplankton community that is less grazeable, contribute less to the trophic chain and ultimately lead to less fish in the lake.

Request: In consideration of above, provide an updated assessment of this section.

Subject: Section 10.2 SUMMARY

Preamble: Under Long-term Effects to Downstream Watersheds, Long-term Effects to Water Quality (p. 10-19); the predicted increase of Phosphorus and trophic status from oligo- to meso-trophic in Lakes M3 and M4 will apparently "remain sufficient to support aquatic life". Certain species that are part of "Aquatic life" can persevere without any oxygen at all.

Request: Please state what the anticipated effects are of the decreased under-ice O_2 levels on fish, zooplankton and phytoplankton in Lakes M3 and M4.

Subject: Section 10.2 SUMMARY

Preamble:

Request: Have the small lakes in the L watershed been investigated for under-ice fish presence? It is recommended that the assumption of no fish in these lakes be validated.

Subject: Section 10.2 SUMMARY

Preamble: Even if the trophic status of Lake 410 will not change from oligo- to meso-trophic, a small increase in primary productivity can lead to under-ice O_2 depletion and winter fish kill.

Request: Provide more detail with regards to the anticipated effects of increased nutrients on Lake 411. Please also state whether the current oligo-trophic classification is based on a Phosphorus or a Nitrogen limitation.

Subject: Section 10.2 SUMMARY

Preamble: Under Long-term Effects to Downstream Watersheds, Long-term Effects to Fish and Fish Habitat (p. 10-20); as pointed out before, the sentence "…no effects to fish populations or communities are expected to occur from changes in aquatic health" is preceded by the statements " … although there may be reduced suitability and availability of spawning habitat immediately downstream of Kennady Lake due to increased benthic algal growth on streambed substrates" and "… there may be reductions in overwintering habitat availability or suitability…".

Request: The latter statements contradict the "no effects to fish" statement and we therefore recommend to delete the "no effects to fish" statement and instead provide more detail about the fish species that will likely be affected and suggest mitigative or compensatory measures.

Subject: Section 10.2 SUMMARY

Preamble: Under Residual Impact Classification (p. 10-22); the statement "The projected long-term impacts of the Project on the suitability of water to support a viable and self-sustaining aquatic ecosystem are considered to be not environmentally significant for the Kennady Lake watershed, and its downstream watershed" is not supported by earlier statements about the potential for under-ice winter kills due to higher phosphorus and primary productivity levels causing increased bacterial breakdown that will reduce the O_2 levels under the ice. In addition to the loss of lacustrine fish, winter fish kills cause large changes to aquatic ecosystems based on the cascading trophic interactions hypothesis as shown by Vanni et al. (1990). Large increases in phytoplankton grazing due to less predation on zooplankton may completely change the limnology of Kennady Lake.

Request: We recommend that De Beers carry out a more detailed analysis and modeling exercise of the anticipated winter fish kills and suggest mitigative and compensatory measures such as aeration, combined with the introduction of highly efficient zooplankton grazers such as cisco.

Subject: Section 10.3 EXISTING ENVIRONMENT

Preamble: Subsection 10.3.2.1 Temperature and Dissolved Oxygen; figures 10.3-4 show that in addition to low oxygen concentrations in deeper water, fish located directly under the ice would find hyperoxic conditions with oxygen saturation levels of more than 150%. In this scenario, the range of suitable oxygen saturation depths would be between 2-6 m in some basins of Kennady Lake and between 2-12 m in others. The expected post-closure increase in bacterial oxygen consumption to facilitate the phosphorus mediated increase in breakdown of organic matter will further reduce oxygen concentrations. This may results in a very small range of depths suitable for overwintering of fish.

Request: More modeling and examples from other studies are needed to assess whether the anticipated oxygen reduction will render Kennady Lake uninhabitable for fish under the ice.

Subject: Section 10.3 EXISTING ENVIRONMENT

Preamble: Subsection 10.3.2.4 Metals; it is certainly a fact that metal concentrations in excess of CCME levels are often found in uncompromised watersheds but it is also true that for any additional discharge of metals into those waters, site specific water quality objectives have to be developed.

Request:. Have site specific water quality objectives been developed?

Subject: Section 10.3 EXISTING ENVIRONMENT

Preamble: Subsection 10.3.3 Lower Trophic Levels; in Figure 10.3-6 Relative Biomass of Major Phytoplankton; the very high and most likely statistically significant variability in phytoplankton composition between years demonstrates the unpredictability of effects potentially caused by the anticipated phosphorus fertilization. Especially since higher primary and secondary productivity also influences pH stability which in turn will influence the composition of the phytoplankton community. In summary, effects of the added phosphorus to Kennady Lake are completely unpredictable but will certainly be seen. All statements predicting no significant negative change to the Kennady Lake and downstream lakes are completely speculative and come with a high degree of uncertainty.

Request: Given that a precautionary approach should be taken, we would recommend that DeBeers admits to this unpredictability and set aside a compensation trust fund for the potential loss of Kennady Lake as a fish rearing lake. As part of this compensation trust

fund DeBeers could suggest compensatory measures and use them as measures to build good local relationships.

Subject: Section 10.3 EXISTING ENVIRONMENT

Preamble: In Figure 10.3-7 Relative Abundance of Major Zooplankton Taxa in Kennady Lake, the very high and most likely statistically significant variability in phytoplankton and zooplankton composition between years is justification for more sampling. Through the addition of samples taken throughout one year and over more years, DeBeers may be able to better explain the high variability and make assumptions about future effects of phosphorus addition.

Request:. This should be a consideration for the aquatic effects monitoring program.

Subject: Section 10.3 EXISTING ENVIRONMENT

Preamble: Under Subsection 10.3.4.1 Aquatic Habitat, Streams; the rare gravel substrates in the streams downstream of Kennady Lake will be used by arctic grayling for spawning and should therefore be identified in detail.

Request:. This site should be used as a monitoring site of the effects of increased primary productivity expected post-closure and for changes in hydrology during mine operations. If negative effects are identified, mitigative (such as gravel cleaning) or compensatory measures (such as creation of added spawning gravel) should be considered.

Subject: Section 10.4 CLOSURE AND RECLAMATION

Preamble: Subsection 10.4.1.3 Mine Rock Piles; the approach taken by De Beers to structure the mine rock piles in a way that keeps the PAG rock in a permanently frozen state is fine as long as all PAG rock will be stored under water at closure. Climate change has already thawed permafrost areas and a permanent storage of PAG rock neutralized by freezing may therefore pose the risk of thawing and acid rock drainage and subsequent metal leaching.

Request: Provide an assessment of storing all PAG rock under water at closure.

Subject: Section 10.4 CLOSURE AND RECLAMATION

Preamble: Subsection 10.4.1.7.1 General Demolition and Disposal Procedures, mentions the disposal of inert solid materials.

Request: Provide a map showing where the inert solid landfill is located.

Subject: Section 10.4 CLOSURE AND RECLAMATION

Preamble: Subsection 10.4.1.7.9 Conceptual Fish Habitat Compensation Plan, in Table 10.4-2, raising lakes A3, D2, D3, E1 and N14 are proposed as compensation measures. The potential effects of raising these lakes relative to methyl mercury generation, increased shoreline erosion, and increased turbidity are not specified.

Request: Provide an assessment of these potential effects, as well as the potential effects from increased turbidity on phytoplankton development, fish feeding, gill abrasion and egg survival rates. Also, provide an assessment of how the presence of permafrost on the shoreline may exacerbate erosion and turbidity effects, and may prolong the period until the shoreline (and effects) stabilizes.

Subject: Section 10.4 CLOSURE AND RECLAMATION

Preamble: Subsection 10.4.3 Consideration of Public Feedback and Traditional Knowledge in Developing the Plan; it needs to be mentioned that the increased primary productivity poses the very real risk of winter fish kills under the ice due to low oxygen saturation (hypoxia) conditions.

Request: Please update this section accordingly.

Subject: Section 10.4 CLOSURE AND RECLAMATION

Preamble: On page 10-87, Protect the Quality of Water.

Request: Please explain the statement "Supplemental mitigation considered for the Fine PKC Facility will reduce loading of geochemical constituents (e.g. phosphorus) associated with seepage that comes into contact with fine PK ". Page 10-80, 10.4.2.2 did not give us any more clues about the planned supplemental mitigation.

Subject: Section 10.4 CLOSURE AND RECLAMATION

Preamble: Subsection 10.4.3.3.4 Reclaimed Processed Kimberlite Facilities Not Attractive to Caribou, mentions that these facilities will not be attractive to caribou therefore no effects to caribou are expected. However, there is no mention of other wildlife species (e.g., small mammals) using these facilities post-closure. Small mammals are vital prey species for other wildlife species (e.g., wolverine, grizzly bears, foxes) that are top level predators.

Request: Provide an assessment of the health risk to these predators when they prey upon small mammal species that inhabit the processed kimberlite facilities during the post-closure phase of the Project.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Nutrients (p. 10-91), three mitigation strategies are being considered for the Fine PKC Facility.

Request: Describe potential contingency measures that could be undertaken post-closure, to reduce phosphorous loadings to Kennady Lake. should the mitigation strategies not perform as anticipated.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Nutrients (p. 10-91), the modeled elevation of the trophic status from oligo- to eutrophic would likely lead to large winter fish kills. Therefore it will be crucial to implement the well thought out supplemental mitigation measures.

Request: Please clarify the model that was used to reach the conclusion that the top 6 m of the water column would stay suitable as overwintering habitat despite higher nutrient loadings given that only the top 6 m of the water throughout the lake are suitable for overwintering before increased primary productivity. Please also consider the current O_2 super-saturation found right below the ice to further reduce fish overwintering habitat. Please quote examples out of the peer-reviewed literature to prove that the model assumptions are correct and that the predicted model outcome will be likely.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Nutrients (p. 10-91), an in-depth discussion of low O_2 concentrations on benthic invertebrates is missing. Lowell et al. (1999) are reporting that benthic invertebrates show reduced feeding and change their behaviour in search of higher O_2 concentrations. Similar changes have been observed by other authors. These kinds of changes can lead to sweeping changes in the food base for fishes and the whole lake ecosystem and should be considered.

Request: Please provide an assessment of low O_2 concentrations on benthic invertebrates.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Under Subsection 10.5.4 Long-term Effects to Aquatic Health; Chromium, Iron, Cadmium and Copper concentrations will exceed water quality guidelines. Therefore site specific water quality guidelines must be developed for evaluation by DFO. The detailed rationale required to develop site specific water quality guidelines will give De Beers the opportunity to mention all mitigative circumstances.

Request: Identify site specific water quality objectives for the project.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Under subsection 10.5.5 Long-Term Effects to Fish and Fish Habitat (p. 10-95), the authors state: 'The predicted change in the trophic status of Kennady Lake is expected to result in an increase in summer phytoplankton biomass… increased secondary productivity and biomass of the zooplankton community'.

Request: Although not suggested in the report, please discuss the feasibility and rationale of introducing the planktivorous cisco (native to Lake N16, Lake 410 and Kirk Lake) into Kennady Lake. Please discuss relative to the increased zooplankton populations and relative to potential effects on overwinter dissolved oxygen concentrations.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Under subsection 10.5.5 Long-Term Effects to Fish and Fish Habitat; the anticipated chain of events following the anticipated increase in primary productivity is well described but the decrease in suitability for overwintering may not only apply to Lake Trout and Round Whitefish if the current O_2 supersaturation is considered.

Request: A more detailed explanation is needed. In addition, the local First Nations groups may consider what kind of measures they would expect to compensate for the potential loss of at least lake trout and round whitefish.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: The aquatic habitat figures on pages 10-50 and 10-51 show a limited distribution of cobble/gravel substrates in Kennady Lake.

Request: Provide an assessment of the importance of these areas as potential fish spawning habitats, and the post-closure implications on Kennady Lake fish populations of locating 5034 Pit and Tuzo Pit on or immediately adjacent to these substrates. Similarly, provide an assessment of the post-closure implications on potential fish spawning of siting the South Mine Rock Pile on boulder/cobble substrate in Area 6.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Under Subsection 10.5.6 Recovery of Kennedy Lake; in general, De Beers has followed the proper approach to the prediction of the recovery time but based on the assessment, the majority of examples chosen to compare the Kennady Lake conditions are based on conditions found in more temperate areas. Obviously, more limnological research has been carried in lower latitudes and more temperate climates and therefore examples from sub-arctic areas are sparse. Therefore, it is impossible to determine the exact outcome of the increased primary productivity.

Request: De Beers should therefore err on the side of caution and assume that under-ice winter fish kills will happen and suggest how to best mediate them or, in the worst case scenario, compensate for them. One idea for compensation of the use of Kennady Lake during operations of the mine could be the establishment of a cold water fish hatchery

and grow-out operation. Fed by a pump, the hatchery could produce edible size fish of one or two of the species preferred by local First Nations.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Under Subsection 10.5.6 Recovery of Kennedy Lake; based on local low organic carbon content of the soils, the likelihood of microbial methyl mercury production and release from flooded organic matter is low.

Request: Due to the high toxicity of methyl mercury, the monitoring of mercury levels in all lakes with flooded shores should be conducted often (weekly or monthly) and lime could be added only if needed as a short-term measure. The release of methyl mercury from flooded soils is time limited and therefore a temporary measure may be all that is needed until the soils stop to release methyl mercury.

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Under Subsection 10.5.6 Recovery of Kennedy Lake; we agree with the general statements that the post-closure and recovered fish community will likely still be composed of the same species as found before Kennady Lake was de-watered and that the increased primary production may favour northern pike over lake trout as the top predator.

Request:

Subject: Section 10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE

Preamble: Predicted Recovery of Kennady Lake (p. 10-103), the authors state: 'Mesotrophic conditions (in Kennady Lake) are likely to be more favourable to northern pike…'

Request: Although not suggested as a potential compensation measure in the report, please discuss the feasibility and rationale of creating/enhancing shallow water habitat for northern pike.

Subject: Section 10.6 LONG-TERM EFFECTS TO DOWNSTREAM AQUATIC ECOSYSTEMS

Preamble: In general, all issues that are summarized in this section have been discussed before and the main potential threats to fish and invertebrates and their habitat are the increased primary productivity and the potential for winter fish kill that goes along with it. Heavy metal concentrations that are predicted to be exceeding water quality guidelines benefit from solution once they have reached downstream aquatic ecosystems and are modeled to be within water quality guidelines.

Request:

Subject: Section 10.7 LONG-TERM EFFECTS TO WILDLIFE AND HUMAN USE

Preamble: Subsection 10.7.2.1.3 Long-term effects of a decrease in open water area to wildlife habitat, it is stated that long term residual effects to water birds and shorebirds are anticipated to be negligible in magnitude.

Request: How was this determined especially since "the classification of residual effects for wildlife has not been presented" (page 10-114 par 2 line 3)?

Subject: Section 10.8 IMPACT CLASSIFICATION

Preamble: Subsection 10.8.2 Results, Annex I , Water Quality Baseline states on page I4-2 "In general, DO concentrations at depths greater than 8 m in deeper basins and at depth below 4-6 m in shallow basins were below the CWQG for the protection of cold-water-life (9.5 mg/L for early life stages and 6.5 mg/L for other life stages)". It is important to remember that these values are valid for a pre-mine condition. In addition you have an average of 2 m ice thickness and in combination a thin layer from 2 m to 4-6 m of depth is suitable for the protection of cold water life under ice. The Residual Impact Classification does not use the conditions stated in Annex I as the basis for the evaluation of impact and no modeling or literature based prediction of the changes in O_2 concentrations in the thin layer of suitable overwintering habitat is given. Therefore residual impact cannot be classified as is.

Request: Please give a modeled or literature based likelihood of winter fish kills in post-mine closure Kennady Lake.

Subject: Section 10.8 IMPACT CLASSIFICATION

Preamble: Subsection 10.8.2 Results, Annex I , to classify residual impacts on arctic grayling, the previously mentioned potential for fish winter kill or reduction in spawning habitat at the outlet of Kennady Lake due to nutrient enrichment needs to be taken into consideration.

Request: Please include the two factors into the residual impact classification and re-assess all assumptions made.

Subject: Section 10.8 IMPACT CLASSIFICATION

Preamble: Subsection 10.8.2 Results, Annex I , as previously mentioned the potential for under-ice winter fish kills (arctic grayling or lake trout) and the reduction of spawning habitat for (arctic grayling) are hardly mentioned.

Request: We believe that these factors can significantly effect VCs and therefore ask DeBeers to re-assess the significance of effects to these factors based on existing data, better modeling and scientific literature.

Subject: Section 10.9 UNCERTAINTY

Preamble: Subsection 10.9.1 Project Site Water Balance and Hydrology; the uncertainty in the water quality modeling is much higher than stated. Based on the thorough analysis of Appendix 8.V, page 8.V-11 (Table 8.V-6), the model outcome of the level of oxygen depletion based on phosphorus enrichment is not clearly described throughout Section 10. Winter O_2 concentrations are calculated to become anoxic or close to anoxic below 6 m and to be between 7.7 mg/L and 10.34 mg/L from 0-6 m depth. Since the O_2 concentration values certainly do not decrease from 8.88 mg/L to 0 mg/L within a few centimeters De Beers should calculate all values from right under the ice to 6 m depth to inform the reader at which depth the O_2 concentrations fall to anoxic levels and below the CCME guidelines for aquatic life. Based on our quick and rough graphic estimation for an interpolation between the two given values, only the top 1 m of the water column would have sufficient O_2 levels for overwintering lake trout and the top 1-3 m would have overwintering O_2 levels for arctic grayling and northern pike.

Request: Please re-calculate the predicted O_2 concentrations under added phosphorus load for the whole depth profile from 0-6 m and re-evaluate all previous statements about significance of residual effects based on this re-calculation.

Subject: Section 10.9 UNCERTAINTY

Preamble: Subsection 10.9.4 Understanding of Ecosystems in the Region of the Project, there is no discussion about the understanding of long-term impacts to terrestrial ecosystems. It has been identified under several components that sedge wetlands are the most effected ecosystem in the Project area. These wetland also support the largest species composition (i.e., biodiversity) in the area.

Request: Provide additional information regarding the impacts to these important ecosystems and the resultant effects on the biodiversity in the project area.

Subject: 10.10 MONITORING AND FOLLOW-UP

Preamble: All water quality requirements for De Beers during operations and post-closure will be determined through the regulatory agencies.

Request: We recommend that De Beers develop a monitoring plan together with the local First Nation and include First Nations in the execution of water monitoring throughout the project operational and post-closure period. In this context De Beers may also consider an offer to train First Nations technicians in water quality monitoring methods.

Subject: 10.10 MONITORING AND FOLLOW-UP

Preamble: Subsection 10.10.2 Potential Monitoring Activities, long-term monitoring activities are focused on water quality, fish and fish habitat.

Request: Clarify if long-term monitoring for terrestrial biophysical components (e.g., caribou) will occur.

Subject of Note: Carnivore Mortality

Subject: 11.10.1 INTRODUCTION

Preamble: Subsection 11.10.1.3.4 Wolverine Study Area, this area is identified as the Slave Geological Province; however, on subsequent sections and figures in the chapter the potential effects to wolverine are discussed in the context of the RSA (Regional Study Area).

Request: Clarify what the assessment area is for wolverine.

Subject: 11.10.3 PATHWAY ANALYSIS

Preamble: Subsection 11.10.3.2.2 Primary Pathways, this section analyzes and classifies the primary pathways in the effects assessment including: changes to habitat quantity and fragmentation; changes to habitat quality, movement and behavior, and changes to survival and reproduction. The linkage between these effect pathways and the predominant cause of mortality at mine sites (i.e., attractants to site) is not clear.

Request: Demonstrate how the effect pathways are (or are not) linked to the predominate causes of carnivore mortality at the Project.

Subject: 11.10.4 EFFECTS ON POPULATION SIZE AND DISTRIBUTION OF GRIZZLY BEAR AND WOLVERINE

Preamble: Subsection 11.10.4.3.2 Effects Beyond the Regional Scale of the Project, Table 11.10-18 (p. 11.10-120) identifies a negative balance for preferred (high and good) habitats for all seasons for grizzly bear (decrease of 12.4%). A similar trend is presented for wolverine (decrease of 9.5%).

Request: Demonstrate the link between this expected decrease in preferred habitat and the predominate cause of carnivore mortality at mine sites. Provide an assessment of how this expected decrease in preferred habitat in the future and cumulative scenario is related to the long-term biophysical effects.

Subject: 11.10.4 EFFECTS ON POPULATION SIZE AND DISTRIBUTION OF GRIZZLY BEAR AND WOLVERINE

Preamble: Subsection 11.10.4.5 Effects from Changes in Prey Availability, cumulative effects of development were predicted to have a moderate effect on caribou abundance, which may change the encounter rate between grizzly bears and caribou. If prey availability rates change around the Project, scavenging predators may be attracted to other food sources.

Request: Provide an assessment of the changes to prey availability and the relationship to the predominate causes of potential carnivore mortality at the Project. Include a discussion of the long-term effects.

Subject of Note: Other Ungulates

Subject: 11.11.2 EXISTING ENVIRONMENT

Preamble: Subsection 11.11.2.3 Muskoxen, a description of habitat use, behaviour and distribution, population characteristics, and traditional and non-traditional use is provided.

Request: Provide a description of the status and trend of the local population of muskoxen in the Project area, particularly during the winter season. Provide an assessment of the proportion of the local population that is expected to be affected by the Project. Further, in the context of long-term trends and potential impacts, provide an assessment of whether increased occurrences of muskoxen are expected in the Project area.

Subject: 11.11.4 EFFECTS ON THE POPULATION SIZE AND DISTRIBUTION OF MUSKOXEN

Preamble: Subsection 11.11.4.1.2 Results, Table 11.11-6 (p. 11.11-65) identifies change in area and configuration of habitat types in the spring to autumn period.

Request: Explain how these changes in habitat types will effect the availability of wintering habitat for muskoxen in the Project area.

Subject: 11.11.6 RESIDUAL EFFECTS SUMMARY

Preamble: A discussion of the effects on populations and distributions is not included.

Request: Identify what the population and density of muskoxen and moose is in the RSA. Identify what the frequency of occurrence for these species is in the RSA. Clarify if there are impacts to any key habitat features (e.g., mineral licks) in the vicinity of the project that would result in a direct effect on these species.

Subject of Note: Species at Risk and Birds

Subject: 11.12.4 EFFECTS ON POPULATION SIZE AND DISTRIBUTION OF UPLAND BREEDING BIRDS

Preamble: Subsection 11.12.4.2.1 Methods, p. 11.12-102 3rd paragraph states that during baseline studies, 500 m x 500 m plots were surveyed. It was previously stated that 100 m x 500 m plots were surveyed.

Request: Clarify the methods used for the baseline studies for upland breeding birds.

Subject: 11.12.4 EFFECTS ON POPULATION SIZE AND DISTRIBUTION OF UPLAND BREEDING BIRDS

Preamble: Subsection 11.12.4..2.2 Results, it is stated that direct habitat loss is expected to decrease bird abundance.

Request: Provide an assessment of this impact on the bird species affected and effects to their local populations.

Subject: 11.12.5 EFFECTS ON POPULATION SIZE AND DISTRIBUTION OF WATER BIRDS

Preamble: Subsection 11.12.5.1.2 Results, it is stated that the lake surface area in the LSA will be decreased by 2.2%. It is presumed that the majority of this decrease will result from the loss of Kennady Lake as usable habitat during the operations of the project.

Request: Provide an assessment of the effects to the species composition and population levels of water birds directly affected by the loss of habitat in Kennady Lake.

This concludes of review of the Gahcho Kue EIS for this first round of information request. Our compiled comments on Section 10 of the EIS are included in Attachment A. The following references are included in our submission:

Lowell, R.B and J.M. Culp. 1999. Cumulative effects of multiple effluent and low dissolved oxygen stressors on mayflies at cold temperatures. Canadian Journal of Fisheries and Aquatic Sciences, 56: 1624-1630.

Vanni, M.J., C. Luecke, J.F. Kitchell, Y. Allen, J. Temte and J.J. Magnuson. 1990. Effects on lower trophic levels of massive fish mortality. Nature, 344: 333-335.

Please let me know if you have any questions or comments on the information presented above. I can be reached by email at mdentremont@lgl.com or by phone at 250-656-0127.

Sincerely,

Marc d'Entremont, PhD Candidate, R.P.Bio.
Senior Wildlife Biologist

ATTACHMENT A

LGL Limited
Review of Gahcho Kue Diamond Project EIS

Detailed LGL Limited Comments on
Section 10 Key Line of Inquiry: Long-term Biophysical Effects, Closure and Reclamation
(Comments as of January 17, 2012)

Ref. #	Section	Page & Par.	Deficiencies/Questions/Comments
10.1 INTRODUCTION			
	10.1.1 Context	10-1	
	10.1.2 Purpose and Scope	10-2	Cumulative impact classification / assessment has not been included.
	10.1.3 Study Area	10-3	10.1.3.2 Study Area Boundaries. Are wolves included in the study area (LSA and RSA)
		10-8	In an area of such an amazing frequency of rivers and lakes is the hydrological connectivity always completely limited to the obvious and surface visible connections via rivers or can subsurface connections via the aquifer also exist? If yes, is the LSA correctly defined?
	10.1.4 Content	10-10 & 10-11	The title "Cumulative Impact Assessment to the Lockhart River System" is missing. Has a real cumulative impact assessment been carried out?
10.2 SUMMARY			
		10-11	Closure and Reclamation Plan (p. 11-12): The reclamation program includes 'construct additional fish habitat enhancement structures'. Please provide details on the site locations and design of these structures.
		10-12 Existing Environment	Is "groundwater or subsurface water quality" just missing as a component of the existing environment here or throughout the EIS?
		10-14 Long-term Effects to Water	Seepage from materials in the mine rock pile, coarse PK pile and fine PKC facility is expected to enter surrounding water

Ref. #	Section	Page & Par.	Deficiencies/Questions/Comments
		Quality	bodies. Have attempts been made to quantify this seepage through modeling? If not, how can this seepage be stopped or the seepage water be treated to a quality that conforms with CCME Water Quality Guidelines? Section 3 – Project Description on page 3-4 states "The only outflow from the controlled area will be licensed discharges that are monitored". Will the aforementioned seepage be licensed and monitored?
			Please provide a detailed analysis comparing expected under-ice O_2 winter concentrations with O_2 demands of all present fish species to assess potential mortality rates for all species and the overall changes to the species composition. In addition to an analysis for all fish species, this analysis should include the effects to invertebrates and aquatic vegetation.
			Please provide a detailed analysis comparing expected post-closure year-round concentrations of Chromium, Iron, Cadmium and Copper and compare with toxicity of the metals for all present fish species throughout the life history stages for fish species using Kennady Lake. Please assess potential mortality rates for all species and the overall changes to the species composition. In addition to an analysis for all fish species, this analysis should include the effects to invertebrates and aquatic vegetation.
			Please provide the analysis suggested for Kennady Lake in the last two requests for Area 8.
		10-16, 10-17 Long-term Effects to Fish and Fish Habitat	The statement "The project is expected to have low or negligible effects on aquatic health in Kennedy Lake...therefore, no effects to fish populations or communities are expected to occur..." are in stark contrast with the statement "...due to the

Ref. #	Section	Page & Par.	Deficiencies/Questions/Comments
			change in trophic status to mesotrophic, overwintering habitat in Kennady Lake at post-closure may become more limited for cold water fish species, such as lake trout and round whitefish, than under baseline conditions". We recommend deleting the misleading first statement and leaving the truthful second statement. We further recommend to look into wind powered aeration as a mitigative measure to avoid winter kill of fish under the ice
		10-17	The re-establishment of a fish community post closure in Kennady Lake could be helped along with a compensatory measure in form of a stocking project with fish from surrounding lakes.
		10-18	The fish species composition or the increase in grazeable plankton following re-colonization is speculative. The added nutrients may lead to the establishment of a phytoplankton community that is less grazeable, contribute less to the trophic chain and ultimately lead to less fish in the lake.
		10-19 Long-term Effects to Downstream Watersheds, Long-term Effects to Water Quality	The predicted increase of Phosphorus and trophic status from oligo- to meso-trophic in Lakes M3 and M4 will apparently "remain sufficient to support aquatic life". Certain species that are part of "Aquatic life" can persevere without any oxygen at all. Please state the anticipated effects of the decreased under-ice O_2 levels on fish, zoo- and phyto-plankton in Lakes M3 and M4.
			Have the small lakes in the L watershed been investigated for under-ice fish presence? It is recommended that the assumption of no fish be validated.
			Even if the trophic status of Lake 410 will not change form oligo- to meso-trophic, a small increase in primary productivity can lead to under-ice O_2 depletion and winter fish kill. Please state more detail with

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			regards to the anticipated effects of Increased nutrients on Lake 411. Please also state whether the current oligo-trophic classification is based on a Phosphorus or a Nitrogen limitation.
		10-20 Long-term Effects to Downstream Watersheds, Long-term Effects to Fish and Fish Habitat	As pointed out before, the sentence" ...no effects to fish populations or communities are expected to occur from changes in aquatic health" is preceded by the statements " ... although there may be reduced suitability and availability of spawning habitat immediately downstream of Kennady Lake due to increased benthic algal growth on streambed substrates" and "... there may be reductions in overwintering habitat availability or suitability...". The latter statements contradict the "no effects to fish" statement and we therefore recommend to delete the "no effects to fish" statement and instead provide more detail about the fish species that will likely be affected and suggest mitigative or compensatory measures.
		10-22 Residual Impact Classification	The statement "The projected long-term impacts of the Project on the suitability of water to support a viable and self-sustaining aquatic ecosystem are considered to be not environmentally significant for the Kennady Lake watershed, and its downstream watershed" is not supported by earlier statements about the potential for under-ice winter kills due to higher Phosphorus and primary productivity levels causing increased bacterial breakdown that will reduce the O_2 levels under the ice. In addition to the loss of lacustrine fish, winter fish kills cause large changes to aquatic ecosystems based on the cascading trophic interactions hypothesis as shown by Vanni et al. (1990). Large increases in phytoplankton grazing due to less predation on zooplankton may completely change the

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			limnology of Kennady Lake. We recommend that De Beers Canada Inc. carry out a more detailed analysis and modeling exercise of the anticipated winter fish kills and suggest mitigative and compensatory measures such as aeration, combined with the introduction of highly efficient zooplankton grazers such as Cisco (Suggestion by Marc Gaboury LGL Limited).
10.3 EXISTING ENVIRONMENT			
	10.3.1 Surface Water Quantity	10-23	
	10.3.2 Surface Water Quality	10-28	
		10-29, 10.3.2.1 Temperature and Dissolved Oxygen	Figures 10.3-4 show that in addition to low oxygen concentrations in deeper water, fish located directly under the ice would find hyperoxic conditions with oxygen saturation levels of more than 150%. In this scenario, the range of suitable oxygen saturation depths would be between 2-6m in some basins of Kennady Lake and between 2-12m in others. The expected post-closure increase in bacterial oxygen consumption to facilitate the Phosphorus mediated increase in breakdown of organic matter will further reduce oxygen concentrations. This may results in a very small range of depths suitable for overwintering of fish. More modeling and examples from other studies are needed to assess whether the anticipated oxygen reduction will render Kennady Lake uninhabitable for fish under the ice.
		10-34, 10.3.2.4 Metals	It is certainly a fact that metal concentrations in excess of CCME levels are often found in uncompromised watersheds but it is also true that for any additional discharge of metals into those waters, site specific water quality objectives have to be developed. Have they been developed?
	10.3.3 Lower	10-39, Figure	The very high and most likely statistically

Ref. #	Section	Page & Par.	Deficiencies/Questions/Comments
	Trophic Levels	10.3-6 Relative Biomass of Major Phytoplankton Taxa in Kennady Lake	significant variability in Phytoplankton composition variability between years demonstrates the unpredictability of effects potentially caused by the anticipated Phosphorus fertilization. Especially since higher primary and secondary productivity also influences pH stability which in turn will influence the composition of the phytoplankton community. In summary, effects of the added Phosphorus to Kennady Lake are completely unpredictable but will certainly be seen. All statements predicting no significant negative change to the Kennady Lake and downstream lakes are completely speculative and come with a high degree of uncertainty. Given that a precautionary approach should be taken, we would recommend that DeBeers Canada Inc. admits to this unpredictability and set aside a compensation trust fund for the potential loss of Kennady Lake as a fish rearing lake. As part of this compensation trust fund DeBeers Canada Inc. could suggest compensatory measures and use them as measures to build good local relationships.
		Previous and 10-40, Figure 10.3-7 Relative Abundance of Major Zooplankton Taxa in Kennady Lake	The very high and most likely statistically significant variability in Phytoplankton and Zooplankton composition between years is justification for more sampling. Through the addition of samples taken throughout one year and over more years, DeBeers Canada Inc may be able to better explain the high variability and make assumptions about future effects of Phosphorus addition. This should be a consideration for the aquatic effects monitoring program.
	10.3.4 Fish	10-55, 10.3.4.1 Aquatic Habitat, Streams	The rare gravel substrates in the streams downstream of Kennady Lake will be used by Arctic Grayling for spawning and should therefore be identified in detail. Gravel substrate sites should also be used as

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			monitoring sites for the effects of increased primary productivity expected post-closure and for changes in hydrology during mine operations. If negative effects are identified, mitigative (such as gravel cleaning) or compensatory measures (such as creation of added spawning gravel) could be taken.
	10.3.5 Wildlife	10-58	P 10-59,par 1. mentions low wolverine densities - no reference is provided. Refer to Mulders work.
10.4 CLOSURE AND RECLAMATION			
	10.4.1 Conceptual Closure and Reclamation Plan	10-60	10.4.1.7.1 General Demolition and Disposal Procedures. Inert Solid Materials - where is the inert material landfill located? Proposed Conceptual Compensation Plan (p. 10-73): In Table 10.4-2, raising lakes A3, D2, D3, E1 and N14 are proposed as compensation measures. The potential effects of raising these lakes relative to methyl mercury generation, increased shoreline erosion, and increased turbidity are not specified. Please discuss these potential effects, as well as the potential effects from increased turbidity on phytoplankton development, fish feeding, gill abrasion and egg survival rates. Also, please discuss how the presence of permafrost on the shoreline may exacerbate erosion and turbidity effects, and may prolong the period until the shoreline (and effects) stabilizes.
		10-65, 10.4.1.3 Mine Rock Piles	The approach taken by De Beers Canada Inc. to structure the mine rock piles in a way that keeps the PAG rock in a permanently frozen state is fine as long as all PAG rock will be stored under water at closure. Climate change has already thawed

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			permafrost areas and a permanent storage of PAG rock neutralized by freezing may therefore pose the risk of thawing and acid rock drainage and subsequent metal leaching.
	10.4.2 Long-term Viability of the Plan	10-77	
	10.4.3 Consideration of Public Feedback and Traditional Knowledge in Developing the Plan	10-82	10.4.3.3.4 Reclaimed Processed Kimberlite Facilities Not Attractive to Caribou. What about use of these areas by other wildlife species, particularly small mammals, which are prey species for other wildlife species (e.g., wolverines, grizzly bears, foxes). What is the risk to the health of predators?
		10-85, Refill Lake to Support Fish	In this section it needs to be mentioned that the increased primary productivity poses the very real risk of winter fish kills under the ice due to low oxygen saturation (hypoxia) conditions.
		10-87, Protect the Quality of Water	Please explain the statement "Supplemental mitigation considered for the Fine PKC Facility will reduce loading of geochemical constituents (e.g. phosphorus) associated with seepage that comes into contact with fine PK ". Page 10-80, 10.4.2.2 did not give us any more clues about the planned supplemental mitigation.
10.5 EFFECT OF PROJECT ACTIVITIES ON THE LONG-TERM RECOVERY OF KENNEDY LAKE			
	10.5.1 Background	10-88	
	10.5.2 Long-term Effects to Hydrology	10-88	
	10.5.3 Long-term Effects to Water Quality	10-89	Nutrients (p. 10-91): Three mitigation strategies are being considered for the Fine PKC Facility. Please describe potential contingency measures that could be undertaken post-closure, should the

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			mitigation strategies not perform as anticipated, to reduce phosphorous loadings to Kennady Lk.
		10-91, Nutrients	The modeled elevation of the trophic status from oligo- to eutrophic would likely lead to large winter fish kills. Therefore it will be crucial to implement the well thought out supplemental mitigation measures. Please clarify the model that was used to reach the conclusion that the top 6m of the water column would stay suitable as overwintering habitat despite higher nutrient loadings given that only the top 6m of the water throughout the lake are suitable for overwintering before increased primary productivity. Please also consider the currently found O_2 super-saturation found right below the ice to further reduce fish overwintering habitat. Please quote examples out of the peer-reviewed literature to prove that the model assumptions are correct and that the predicted model outcome will be likely.
			An in-depth discussion of low O_2 concentrations on benthic invertebrates is missing. Lowell and Culp (1999) are reporting that benthic invertebrates show reduced feeding and change their behaviour in search of higher O2 concentrations. Similar changes have been observed by other authors. These kinds of changes can lead to sweeping changes in the food base for fishes and the whole lake ecosystem and should be considered.
	10.5.4 Long-term Effects to Aquatic Health	10-93 to 10-94	Chromium, Iron, Cadmium and Copper concentrations will exceed water quality guidelines. Therefore site specific water quality guidelines must be developed for evaluation by DFO. The detailed rationale required to develop site specific water quality guidelines will give De Beers Canada Inc. the opportunity to mention all

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			mitigative circumstances.
	10.5.5 Long-term Effects to Fish and Fish Habitat	10-95	The authors state: 'The predicted change in the trophic status of Kennady Lake is expected to result in an increase in summer phytoplankton biomass... increased secondary productivity and biomass of the zooplankton community'. Although not suggested in the report, please discuss the feasibility and rationale of introducing the planktivorous cisco (native to Lake N16, Lake 410 and Kirk Lk) into Kennady Lake. Please discuss relative to the increased zooplankton populations and relative to potential effects on overwinter dissolved oxygen concentrations. The aquatic habitat figures on pages 10-50 and10-51 show a limited distribution of cobble/gravel substrates in Kennady Lake. Please discuss the importance of these areas as potential fish spawning habitats, and the post-closure implications on Kennady Lake fish populations of locating 5034 Pit and Tuzo Pit on or immediately adjacent to these substrates. Similarly, please discuss the post-closure implications on potential fish spawning of siting the South Mine Rock Pile on boulder/cobble substrate in Area 6.
		10-95 to 10-96	The anticipated chain of events following the anticipated increase in primary productivity is well described but the decrease in suitability for overwintering may not only apply to Lake Trout and Round Whitefish if the current O_2 supersaturation is considered. A more detailed explanation is needed. In addition, the local First Nations groups may consider what kind of measures they would expect to compensate for the potential loss of at least Lake Trout and Round Whitefish.
	10.5.6 Recovery	10-96	p. 10-103: The authors state: 'Mesotrophic

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	of Kennedy Lake		conditions (in Kennady Lake) are likely to be more favourable to northern pike...' Although not suggested as a potential compensation measure in the report, please discuss the feasibility and rationale of creating/enhancing shallow water habitat for pike.
		10-96 to 10-101, Methods to Recovery Time	In general, De Beers Canada has followed the proper approach to the prediction of the recovery time but based on the text, the majority of examples chosen to compare the Kennady Lake conditions to are based on conditions found in more temperate areas. Obviously, more limnological research has been carried in lower latitudes and more temperate climates and therefore examples from sub-arctic areas are sparse. Therefore, it is impossible to determine the exact outcome of the increased primary productivity. De Beers should therefore err on the side of caution and assume that under-ice winter fish kills will happen and suggest how to best mediate them or, in the worst case scenario, compensate for them. One idea for compensation of the use of Kennady Lake during operations of the mine could be the establishment of a cold water fish hatchery and grow-out operation. Fed by a pump, the hatchery could produce edible size fish of one or two of the species preferred by local First Nations.
			Based on local low organic carbon content of the soils, the likelihood of microbial Methyl Mercury production and release from flooded organic matter is low. However, due to the high toxicity of Methyl Mercury, the monitoring of Mercury levels in all lakes with flooded shores should be monitored often (weekly or monthly) and lime could be added only if needed as a short-term measure. The release of Methyl Mercury from flooded soils is time limited

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			and therefore a temporary measure may be all that is needed until the soils stop to release Methyl Mercury.
			We agree with the general statements that the post-closure and recovered fish community will likely still be composed of the same species as found before Kennady Lake was de-watered and that the increased primary production may favour Northern Pike over Lake Trout as the top predator.
10.6 LONG-TERM EFFECTS TO DOWNSTREAM AQUATIC ECOSYSTEMS			
		10-105	In general, all issues that are summarized in this section have been discussed before and the main potential threats to fish and invertebrates and their habitat are the increased primary productivity and the potential for winter fish kill that goes along with it. Heavy metal concentrations that are predicted to be exceeding water quality guidelines benefit from solution once they have reached downstream aquatic ecosystems and are modeled to be within water quality guidelines.
10.7 LONG-TERM EFFECTS TO WILDLIFE AND HUMAN USE			
	10.7.1 Overview	10-110	
	10.7.2 Summary of Residual Effects	10-110	10.7.2.1.1 Long-term Effects to Wildlife Health. The summary of residual effects related to the assessment of effects from only the project. It is unclear whether effects from other projects are taken into consideration (cumulative effects).
			10.7.2.1.3 Long-term effects of a decrease in open water area to wildlife habitat. What about shoreline/riparian habitat especially if terrestrial vegetation colonizes the shoreline area where their is water drawdown - this could potentially be suitable habitat for nesting waterfowl and shorebirds and these species may becomes

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			attracted to this area. Considering this will be part of the water management pond, what deterrent activities will DeBeers employ to keep water birds away from these area? Long term residual effects to water birds and shorebirds are anticipated to be negligible in magnitude - how was this determined especially since "the classification of residual effects for wildlife has not been presented" (page 10-114 par 2 line 3).
10.8 RESIDUAL IMPACT CLASSIFICATION			
	10.8.1 Methods	10-115	
	10.8.2 Results	10-119	In the preamble to this section it is stated that "...long-term effects to wildlife (i.e., caribou, muskoxen, moose, grizzly bear and wolverine, vegetation) were not predicted as a result of the Project...". A cumulative effects assessment for caribou ...inclusion of population trend information in long-term effects A discussion of the long-term effects is warranted given the various levels of uncertainty identified in section 7.9. p. 7-173. ...there remains a high degree of uncertainty in the effectiveness of revegetation techniques for reversing the impact of direct disturbance from development to wildlife habitat.
			Annex I , Water Quality Baseline states on page I4-2 "In general, DO concentrations at depths greater than 8m in deeper basins and at depth below 4-6m in shallow basins were below the CWQG for the protection of cold-water-life (9.5mg/L for early life stages

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			and 6.5mg/L for other life stages)". It is important to remember that these values are valid for a pre-mine condition. In addition you have an average of 2m ice thickness and in combination a thin layer from 2m to 4-6m of depth is suitable for the protection of cold water life under ice. The Residual Impact Classification does not use the conditions stated in Annex I as the basis for the evaluation of impact and no modeling or literature based prediction of the changes in O_2 concentrations in the thin layer of suitable overwintering habitat is given. Therefore residual impact cannot be classified as is. Please give a modeled or literature based likelihood of winter fish kills in post-mine closure Kennady Lake.
		10-121 to 10-122, 10.8.2.2.1 Arctic Grayling, Kennady Lake Watershed	To classify residual impacts on Arctic Grayling, the previously mentioned potential for fish winter kill or reduction in spawning habitat at the outlet of Kennady Lake due to nutrient enrichment need to be taken into consideration. Please include the two factors into the residual impact classification and re-assess all assumptions made.
		10-127 to 10-129	As previously mentioned the potential for under-ice winter fish kills (Arctic Grayling or Lake Trout) and the reduction of spawning habitat for (Arctic Grayling) are hardly mentioned. We believe that these factors can significantly effect VCs and therefore ask DeBeers Canada Inc. to re-assess the significance of effects to these factors based on existing data, better modeling and scientific literature.
	10.8.3 Environmental Significance	10-127	

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10.9 UNCERTAINTY			
	10.9.1 Project Site Water Balance and Hydrology	10-130	
	10.9.2 Water Quality Modelling	10-131	
	10.9.3 Time to Aquatic System Recovery	10-133	The uncertainty in the water quality modeling is much higher than stated. Based on the thorough analysis of Appendix 8.V, page 8.V-11 (Table 8.V-6), the model outcome of the level of oxygen depletion based on Phosphorus enrichment is not clearly described throughout Section 10. Winter O_2 concentrations are calculated to become anoxic or close to anoxic below 6m and to be between 7.7mg/L and 10.34mg/L from 0-6m depth. Since the O_2 concentration values certainly do not decrease from 8.88mg/L to 0mg/L within a few centimeters De Beers Canada Inc. should calculate all values from right under the ice to 6m depth to inform the reader at which depth the O_2 concentrations fall to anoxic levels and below the CCME guidelines for aquatic life. Based on our quick and rough graphic estimation for an interpolation between the two given values, only the top 1m of the water column would have sufficient O_2 levels for overwintering Lake Trout and the top 1-3m would have overwintering O_2 levels for Arctic Grayling and Northern Pike. Please re-calculate the predicted O_2 concentrations under added Phosphorus load for the whole depth profile from 0-6m and re-evaluate all previous statements about significance of residual effects based on this re-calculation.
	10.9.4 Understanding of Ecosystems in	10-134	There is no discussion about understanding long-term impacts to terrestrial ecosystems. It has been identified under several

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	the Region of the Project		components that sedge wetlands are the most effected ecosystem in the Project area. These wetland also support the largest species composition (i.e., biodiversity) in the area. Please provide additional information regarding the impacts to these important ecosystems?
10.10 MONITORING AND FOLLOW-UP			
	10.10.1 Scope and Potential Monitoring Programs	10-136	All water quality requirements for De Beers Canada Inc during operations and post-closure will be determined through the regulatory agencies. However, we recommend that De Beers Canada Inc. develop a monitoring plan together with the local First Nation and include First Nations in the execution of water monitoring throughout the project operational and post-closure period. In this context De Beers Canada may also consider an offer to train First Nations technicians in water quality monitoring methods.
	10.10.2 Potential Monitoring Activities	10-137	What about long-term monitoring of terrestrial biophysical components (e.g., caribou)?
10.11 REFERENCES			
	10.11.1 Internet References	10-144	
	10.11.2 Personal Communication	10-145	
10.12 ACRONYMS AND ABBREVIATIONS			
	10.12.1 ACRONYMS	10-146	
	10.12.2 Units of Measure	10-146	

Literature Cited

Lowell, R.B and J.M. Culp (1999). Cumulative effects of multiple effluent and low dissolved oxygen stressors on mayflies at cold temperatures. Canadian Journal of Fisheries and Aquatic Sciences, 56: 1624-1630.

Vanni, M.J., C. Luecke, J.F. Kitchell, Y. Allen, J. Temte and J.J. Magnuson (1990). Effects on lower trophic levels of massive fish mortality. Nature, 344: 333-335.