Fisheries and Oceans Canada
Environment Canada

Information Requests

Environmental Impact Statement
and Supporting Documents
Gahcho Kué Diamond Mine Project

Submitted to:
DeBeers Canada Inc.
January 18, 2012

MVEIRB File No.: EIR0607-001

Source: DFO&EC IR #1
To: DeBeers Canada Inc.
Subject: Assessment Approach
EIS Section: 6, 8.5, and 9.5 – Assessment Approach

Preamble: In order to assess the extent of impacts of a project on the biophysical environment, the EIS must look at the positive or negative changes and interactions of each project activity, or a combination of activities, on a particular VEC. The assessment approach conducted by DeBeers only looks at individual project activities impacts on a particular VEC.

Request:

a) Explain the rationale for the threshold values used (primary, secondary and no linkage) in the pathway analysis in order to determine which impacts should be further evaluated through the effects analysis.
b) Please provide information on the potential synergistic, or cumulative effects, of pathway impacts on fish and fish habitat. This would also include the interaction among primary, secondary, or no linkage pathways. For instance the release of sediment to Area 8 during the construction of dyke A may change water and sediment quality and affect fish habitat (secondary) in combination with the erosion of lake-bottom sediments in Area 8 near the outfall that may also cause changes to water and sediment quality and affect fish habitat and fish (no linkage identified). As well, dewatering of Area 7 to Area 8 may change flow, water levels and channel stability in Area 8 and may negatively affect fish and fish habitat (see Table 8.6-1). The potential interactions of these impacts also need to be considered.

Source: DFO&EC IR #2
To: DeBeers Canada Inc.
Subject: Assessment Methodology – Classification of Time Periods – Residual Effects
EIS Section: 6, 8 and 9

Preamble: In Volume 6 the assessment approach for determining the significance of the residual impacts is described, and definitions are provided for the eight classification criteria used which include direction, geographic extent, duration, frequency, reversibility, likelihood, ecological context, and magnitude. Though not explained in Volume 6, Volume 8 and 9 include an additional "classification of time periods" by which to categorize the residual impacts. For example, in Table 8.14-5, the residual impacts are categorized under two time periods, from initiation of the project to 100 years later and the second being after 100 years. In the opinion of DFO and EC, impacts within these timeframes are considered permanent.

Request:

a) By choosing such long timeframes (e.g., 100 years), this approach potentially dilutes the significance of the impacts. Please provide a more reasonable time period for the residual effects assessment on fish and habitat within, and downstream of Kennady Lake. Consideration should be given to providing time increments for assessment that relate to specific activities post-closure, physical changes, and biological cycles.
b) Please describe the residual impact on fish and fish habitat that may occur during the various project phases (e.g. construction, operation and decommissions).
c) If needed, how will additional mitigation or monitoring programs be identified for a particular impact at a specific stage in the project if they are combined over a long time period.
d) What is the rationale for having a different temporal boundary for the effects assessment versus the residual impact assessment? For instance in Section 8.5.5 it states that " the effects to water quality and fish in Kennady Lake and its watershed are assessed during construction, operations, and closure phases of the Project."

Source: DFO&EC IR #3
To: DeBeers Canada Inc.
Subject: Fish Population Estimates
EIS Section: 9.5.1.3 Fish

Preamble: Collecting baseline information on the fish community is an important component of a monitoring program, but sampling itself can impact fish populations. Using a standardized protocol such as Broad Scale Fish Community Monitoring or Nordic Netting allows you to get a snapshot in time without causing unnecessary mortality.

Request:

a) It is indicated in the EIS that fish population estimates were undertaken. What are the estimates of the populations? Please identify where the data to support the estimates of fish populations can be found and a description of the baseline data available to support a meaningful assessment of fish populations.
b) It is indicated in the EIS Measurement Endpoints for fish VECs (i.e., Lake Trout, Arctic Grayling and Northern Pike) that abundance and persistence of desired populations will be assessed and the measurement end point is fish numbers. Please indentify if De Beers is proposing to do multiple population estimates or compare relative abundances through a netting program (It is recommended that De Beers consider the implementation of a standardized program such as the Broad Scale Fish Community Monitoring Program or Nordic Netting).

c) Table 9.5-2 lists the Assessment Endpoints and Measurement Endpoints for Valued Components Identified for Water Quality and Fish Downstream of Kennady Lake. Please provide rationale as to why these assessment and measurement endpoints were chosen. Please indicate what monitoring will occur to measure the measurement endpoints.

Source: DFO&EC IR #4
To: DeBeers Canada Inc.
Subject: Water Chemistry
EIS Section: 9.8 Effects to Surface Water Quality

Preamble: Comprehensive baseline information is essential in order to allow comparisons during construction and operations to detect potential mine effects. Addressing the Information Requests listed below will result in a substantial increase in understanding and definition of baseline conditions within the study area, and will increase the probability that the objectives of the monitoring program will be met.

Request:

a) Provide a description of baseline water chemistry for all lakes and streams in the study area. It is suggested that a box-plot analysis (median, 25%, 75%, and definition of outliers) and Piper Plots be used to define upper and lower bounds of baseline water chemistry.
b) Provide model total suspended solids (TSS) concentrations related to construction, operation and closure conditions.
c) Define the sampling sites that will be used for the AEMP for all water quality parameters.

Source: DFO&EC IR #5
To: DeBeers Canada Inc.
Subject: Water Clarity
EIS Section: 9.3.4 Lower Trophic Levels

Preamble: Comprehensive baseline information is essential in order to allow comparisons during construction and operations to detect potential mine effects.

Request:

a) Undertake a comprehensive sampling program to better understand water clarity. Using either Secchi discs or light sensors, sample twice per month through the open water season for reference lakes, Kennady Lake and downstream lakes. Sample at the deepest point in the lake to maximize the vertical profile.
b) How will changes to TSS and light attenuation, that may affect primary productivity and benthic invertebrates, be monitored?

Source: DFO&EC IR #6
To: DeBeers Canada Inc.
Subject: Groundwater
EIS Section: 8.3.4.3 Groundwater Quality

Preamble: Comprehensive baseline information is essential in order to allow comparisons during construction and operations to detect potential mine effects.

Request:

a) Please develop a table summarizing groundwater chemistry. Box and whisker plots, and Piper Plots accompanied by a short description would be useful.

Source: DFO&EC IR #7
To: DeBeers Canada Inc.
Subject: Downstream Effects – Winter Flows
EIS Section: 9

Preamble: It is indicated in Volume 9 that limited field data was collected over the winter because project effects to winter flows are predicted to be small. However, changes to winter flows can have larger impacts on aquatic ecosystems. In addition, it is indicated that there was no flow under ice conditions at the outlets. However it also indicates that measurements were not taken.

Request:

a) Please describe how flow conditions were determined if measurements were not taken, and describe measures proposed to confirm this prediction.

Source: DFO&EC IR #8
To: DeBeers Canada Inc.
Subject: Down Stream Effects – Interlake data – Dissolved Oxygen
EIS Section: 9.3

Preamble: With the removal of overwintering habitat from dewatering Kennady Lake, it is important to know if other lakes in the area can offset the loss. One of the main indicators of overwintering potential is dissolved oxygen levels later in the winter during maximum ice coverage.

Request:

a) It is indicated in Volume 9 that limited field data was collected over the winter. Please clarify if the results presented in Figure 9.3-4 average across the years 1998-2010?
a) Please clarify if Table 9.3-19 is providing an average of all the interlake individual measurements together.

b) Given that a number of studies have demonstrated that fish survive in waters with dissolved oxygen below levels of 6.5mg/L, please justify the potential impacts to overwintering habitat presented in the EIS.

Source: DFO&EC IR #9
To: DeBeers Canada Inc.
Subject: Overwintering in Small Lakes
EIS Section: Volume 9-386

Preamble: Overwintering habitat is predicted to be limited in small lakes in various watersheds (e.g., L watershed) if the lakes are less than 3 m deep because the annual predicted ice thickness is 2 m. However, lakes with less than 1 m of free water under the ice are known to support fish.

Request:
a) Please provide ice thickness measurements (including time of year that ice thicknesses where taken). Also, DO should be monitored late in the winter (e.g., April) to establish the overwintering potential of the lakes in question.
b) Please provide information on how reduced flows will affect overwintering potential in these lakes.

Source: DFO&EC IR #10
To: DeBeers Canada Inc.
Subject: Downstream Effects – Lake N11 and Lake N1
EIS Section: 9.3.3.2.2 Lakes in N Watershed

Preamble: Lake N11 will receive water from the Water Management Pond during operations and will be used as a source lake for the pump flooding of Kennady Lake at closure. Therefore, it is essential to have comprehensive baseline information in order to detect potential effects. This also applies to other lakes that will be impacted by mine operations.

Request:
a) Please provide limnological and fisheries baseline data for Lake N11. These data should include, but not be limited to, dissolved oxygen (DO), and TSS.
b) Please clarify how long is it expected for Lake N11 to return to baseline conditions after pumping from the water management pond has ceased.
c) It is indicated that Lake N11 will experience increases in concentrations of nitrogen and ammonia mainly from blasting residuals. Please describe the proposed handling practices and what other mitigation measures that could be applied to reduce nitrogen and ammonia sources.
d) Given the limited baseline data available for lakes N11 and N1, and their connecting and outlet streams, please describe how DeBeers will develop and implement a comprehensive monitoring program to address this data

Source: DFO&EC IR #11
To: DeBeers Canada Inc.
Subject: Downstream Effects - Increased total phosphorus and increased productivity
EIS Section: 9

Preamble: One of the expected impacts of the development is increased total phosphorus (TP) concentrations, and increased productivity in downstream habitats of Kennady Lake. These increases in TP and productivity are predicted to impact the oxygen dynamics, with the potential to produce anoxia and disrupt fish habitat. In some water quality tables (e.g. 9.3-21) the minimum Method Detection Limit (MDL) for TP was reported as 0.005 mg/L (i.e. 5 ug/L), while in others (e.g. 9.3-19) the MDL for TP is reported as 0.02 mg/L (i.e. 20 ug/L). This latter detection limit is unacceptable. Modern laboratories are more than capable of achieving much more sensitive detection limits. The Gahcho Kue systems are oligotrophic, and by definition, have TP concentrations generally below 10 ug/L. As such, in cases where the MDL was reported as 20 ug/L TP was reported to be below analytical detection limits, forcing the Proponents to use subjective statistical approaches to analyzing data (e.g. 9-45). This will make detecting changes in TP over the project, and after closure, extremely difficult.

Request:

a) That a MDL for TP at 2 ug/L be utilized for all future analyses.
b) All water bodies be re-sampled during 2012 (monthly) using this new MDL to clarify the pre-impact condition and for model simulations.
c) All baseline data for total phosphorus using methods with detection limits >10 ug/L should be considered of minimal value. The more accurate methods employed in more recent surveys should be utilized in the future.

Source: DFO&EC IR #12
To: DeBeers Canada Inc.
Subject: Plankton and Chlorophyll Sampling
EIS Section: 9.3.4 Lower Trophic Levels

Preamble: The developer provides limited baseline data on plankton biomass and chlorophyll for a series of lakes, or lake basins, for a single month (August) for two pre-impact years. Despite little change in chlorophyll between years, algal biomass (by cell counting methods) differed by one order of magnitude between years. Thus, the results for phytoplankton biomass are highly suspect. The large difference in biomass, combined with the low sample size (n= 2 years), will make detecting a statistical change in the phytoplankton biomass extremely difficult. In general, there is considerable among-year variation in the baseline data for lower trophic levels and it is unclear whether this arises from differences

in seasonal variation, changes in methods, or true differences among lakes and years. Differences in sampling protocols (e.g. depth integrated versus discreet profiles) greatly confuse the comparison of survey results.

Request:

a) Please provide a re-evaluation of phytoplankton biomass (re-counts) for both sampling years to verify values relative to Chlorophyll *a* (Chl*a a)* samples. Please also provide an explanation of approaches taken and how the discrepancy in phytoplankton biomass and Chl*a* may have arisen.
b) In order to ensure adequate pre-impact baseline data with which to assess changes in lower tropic levels, the following items should be included in a sampling program for 2012 as part of baseline data collection, and should be continued as part of an ongoing monitoring program:
    i. Phytoplankton in reference lakes, Kennady Lake and downstream lakes (including N9 and N11) should be sampled for taxonomy and biomass, once every two weeks for at least one entire open water season and then twice through the winter (Water clarity and Chla *a* could serve as proxies for primary productivity, though in this case information regarding community structure would be lost).
    ii. Zooplankton in reference lakes, Kennady Lake and downstream lakes should also be sampled for taxonomy and biomass once every two weeks for at least one entire open water season, and then twice through the winter.
    iii. (Chla *a*) sampling should be conducted once every two weeks through the open water season for reference lakes, downstream lakes and Kennady Lake.
    iv. Calculate taxon richness for phytoplankton and zooplankton communities.
    v. Calculate Trophic State Index (Carlson and Simpson 1996) for reference lakes, Kennady Lake and downstream lakes using Chla, TP, TN, and/or Secchi depth measurements.
    vi. Water clarity should be monitored using either Secchi discs or light sensors. Sampling should be undertaken every two weeks through the open water season for reference lakes, Kennady Lake and downstream lakes. Sample at the deepest point in the lake to maximize the vertical profile.
    vii. An effective evaluation of within-season variance should also be done for organisms with short generations (e.g. phytoplankton, zooplankton) in order to put the among-year data into context.

Source: DFO&EC IR #13
To: DeBeers Canada Inc.
Subject: Fish Baseline for Small Lakes and Streams in Kennady Lake Watershed
EIS Section: 9.3.5 Fish

Preamble: Lakes and their fish communities are intimately connected to their position in the landscape and the radical alterations in hydrology that many will experience are likely to greatly affect them.
Request:

a) Please clarify if fish sampling was quantitative for small lakes and streams. Lakes and their fish communities are intimately connected to their position in the landscape and the radical alterations in hydrology that many will experience are likely to greatly affect them.

Source: DFO&EC IR #14
To: DeBeers Canada Inc.
Subject: Non-Fish Bearing vs. Fish Bearing
EIS Section: 8

Preamble: Limited rationale has been provided for designating lakes as non fish bearing.

Request:

a) Please provide further rationale for determining whether a lake is non-fish bearing, as a lake with a maximum depth of 3 meters still has overwintering potential.

Source: DFO&EC IR #15
To: DeBeers Canada Inc.
Subject: Riverine Habitat
EIS Section: 9

Preamble: The assessment of riverine habitat quality seems to be based on the spawning potential for Northern Pike and Arctic Grayling. The assessment should be expanded beyond this.

Request:

a) Provide an assessment of riverine habitat based on the species likely to be present, and at all life stages.

Source: DFO IR #16
To: DeBeers Canada Inc.
Subject: Round Whitefish
EIS Section: 8, page 133

Preamble: Round Whitefish were selected as one of the fish species used in a telemetry study. Unfortunately, too few were tagged to provide conclusive information on the species' movement in Kennady Lake. The results of a telemetry study would be helpful in determining how Round Whitefish are currently using Area 8.

Request:

a) Please provide DeBeers' plans with respect to augmenting this information with additional data. Does DeBeers intend to conduct another telemetry study with Round Whitefish to gather the data that was not available due to low numbers of tagged fish in the initial study?

Source: DFO IR #17
To: DeBeers Canada Inc.
Subject: Baseline Netting
EIS Section: Section 9, page 107-109, Table 9.3-41 (small lakes survey downstream of Kennady Lake and in adjacent N watershed.

Preamble: Section 9.3.5.2.5 provides a summary of fish species caught in small lakes downstream of Kennady Lake, and in the adjacent N watershed. However, information on methodology is limited and fish data (e.g. length, weight) is absent.

Request:

a) Please provide additional information on methods (e.g., mesh size, soak time, number of nets/per lake, time of year, number of years).
b) Please provide fish data (e.g. length, weight, age, abundance).

Source: DFO&EC IR #18
To: DeBeers Canada Inc.
Subject: Baseline Data for Lakes Between Kennady and Kirk Lakes
EIS Section: Appendix J

Preamble: On p. J3-30, Kirk Lake is identified as a "new downstream water body" to be sampled. Changes in these lakes may provide fore-warning of impacts that may affect larger lakes like Kirk Lake and Lake 410 at a later date.

Request:

a) Please clarify if there will be continued sampling of Lake 410.
b) To improve the understanding of downstream impacts, more Lakes should be sampled downstream of Kennady Lake including Lakes M3, M4, and possibly L2.

Source: DFO&EC IR #19
To: DeBeers Canada Inc.
Subject: Benthic Invertebrates
EIS Section: Section 9-7

Preamble: Benthic invertebrate baseline and subsequent monitoring will result in a substantial increase in understanding and definition of baseline conditions within the study area, and will increase the probability that the objectives of the monitoring program will be met.

Request:

a) Please clarify whether there were differences detected between shallow and deep water benthic communities?
b) Please clarify how “deep” is defined in terms of benthic samples.
c) Please confirm the number of samples from Lake 410 that were collected for benthic invertebrate analysis.
d) Please provide a map depicting sampling sites.
e) In order to ensure adequate pre-impact baseline data with which to assess changes in benthic communities, the following items should be included in a sampling program for 2012 as part of baseline data collection, and should be continued as part of an ongoing benthic monitoring program:
    i) Calculate EPT Index (number of Ephemeroptera, Plecoptera, and Trichoptera taxa) for stream sites.
    ii) Calculate Benthic Community Indices for reference sites for both stream and lake samples. For the lake samples, combine five subsamples before calculation.
    iii) Ensure a complete data set is collected for all required lake and stream sites. Sampling should occur at the same time using the same methods. For lake sediments, five or six subsamples should be collected for each sample such that there are at least 200 individuals per sample. For stream sites, three subsamples should be collected for each sample.

Once-a-year sampling of benthos is probably sufficient, but differences in mesh sizes and sampling locations among years make determination of natural variance difficult in the existing data set. A determination of among-year natural variability using consistent methods is an essential component of any baseline monitoring program and should be conducted.

Source: DFO&EC IR #20
To: DeBeers Canada Inc.
Subject: Changes to Water Quality in Area 8
EIS Section: Appendix 8

Preamble: In Appendix 8.I.3.1 it is argued that modeling of water quality in Area 8 is unnecessary because it will not be in contact with the rest of the lake and hence will not be affected. In reality, the isolation of this part of the lake from the rest of its hydrologic network is likely to alter water chemistry and food web structure considerably.

Request:

a) Modeling should be conducted to identify what changes to water quality in Area 8 might occur after its isolation from Kennady Lake. The potential for, and extent of impacts on the current aquatic community structure in this basin should also be discussed.

Source: DFO&EC IR #21
To: DeBeers Canada Inc.
Subject: Impacts to Biota from Changes in Cations
EIS Section: Appendix 8

Preamble: Although total dissolved solids (TDS) may not exceed water quality guidelines, changes in cations and anions may affect the species composition of the food webs of Kennady Lake and downstream systems. For example, many invertebrates are limited by calcium in soft-water systems like Kennady Lake.

Request:

a) The statement on p. 8-361 that "aquatic life in Kennady Lake or Area 8 will be largely unaffected by the projected increase in salinity" seems unlikely. Please justify this statement.

Source: DFO&EC IR #22
To: DeBeers Canada Inc.
Subject: Use of Control (reference) Lake
EIS Section: Appendix 8

Preamble: Lake N16 has been identified as a control or reference lake. To be effective, this approach needs multiple years of pre-impact data to capture natural variability, (these data currently do not exist). In addition, a larger suite of reference lakes would be preferred to provide an envelope of natural variability (see Underwood 1992 Exp. Mar. Biol. Ecol. 161: 145-178; Underwood 1994. Ecol. Appl. 4: 3-15). Consideration should be given to methods that employ multiple control sites such as the reference condition approach (Reynoldson et al. 1997. J. N. Am. Benthol. Soc. 16: 833-852).

Request:

a) Please describe the methods (e.g. BACI, reference condition) that will be used to assess project effects. Also describe the approach to be undertaken to gather more detailed pre-impact data from more reference lakes.

Source: DFO&EC IR #23
To: DeBeers Canada Inc.
Subject: Determinations of Sediment Quality and Benthic Invertebrates
EIS Section: 9.3 Existing environment

Preamble: Changes in sediment quality and benthos are especially difficult to quantify in lakes undergoing changes in water level because conditions at any individual site after manipulation reflect both recent conditions and historical conditions when the site was at a different depth.

Request:

a) Determinations of sediment quality and benthic invertebrates should be done in transects, so as to better quantify the distribution in the lake with respect to depth.

Source: DFO IR #24
To: DeBeers Canada Inc.
Subject: Fish Data
EIS Section: 9.3 Existing environment

Preamble: With so much information on fish in the project area, separated into various sections of the EIS, it would be useful for reviewers if DeBeers could collate information together into a database.

Requests:
a) Compile all length/weight measurements for fish into a database (including all years, not just 2004). Also, please compile all log length/log weight formulas into one table.
b) Develop a fish-species list for each lake and stream that has been studied, and include: comprehensive life-history information for each species, such as spawning time/temperature, food preferences, years to sexual maturity, feeding/rearing/ spawning location.
c) Develop Standard Weight equations (Murphy et al. 1990) for as many species as possible, but particularly for Lake Trout, Arctic Grayling and Slimy Sculpin. Use the Standard Weight equations to develop an understanding of Relative Weight for as many species as possible, for as many lakes as possible, and for as many times as possible.
d) Please provide the dates that habitat surveys were conducted.

Source: DFO&EC IR #25
To: DeBeers Canada Inc.
Subject: Bathymetry
EIS Section: J3-3

Preamble: To adequately understand, predict, and mitigate potential impacts to fish and other aquatic biota, it is essential to have an understanding of the environment in which the biota reside. Lake bathymetry provides the physical boundaries of that environment.

Request:
a) Please provide area and volume data for all bathymetry maps (for those not already calculated). For example, N16 and the L watershed lakes are missing.

Source: DFO&EC IR #26
To: DeBeers Canada Inc.
Subject: Dyke Construction
EIS Section: 8-127

Preamble: As noted in Section 8-217, silt curtains are proposed as the primary mitigation for sediment release during dyke construction for Area 8. The Meadowbank project in Nunavut was cited as an example of where silt curtains were used as mitigation. However, silt curtains were not initially successful as mitigation, and DeBeers should outline additional mitigation measures which may be implemented. The Meadowbank project may provide an example of where mitigation did not work, and subsequent improvements.

Request:

a) Please provide a dyke construction plan with mitigation alternatives (e.g., site isolation, water management and construction practices) and contingencies.

Source: DFO&EC IR #27
To: DeBeers Canada Inc.
Subject: Down Stream Effects – Changes to flows
EIS Section: Volume 9

Preamble: On page 9-172 of the July 2011 EIS document, it is indicated that the combined natural and diverted flows may exceed the 2 year flood discharge, while the rest of Volume 9 maintains that the discharge will be limited to a one in two year flood.

Request:

a) Please provide standard flow rates for N 11.

Source: DFO&EC IR #28
To: DeBeers Canada Inc.
Subject: Downstream Effects – Shoreline Stability
EIS Section: Volume 9

Preamble: Volume 9 of the EIS provides predictions and conclusions as to the potential effects to the downstream aquatic environment.

Request:

a) Describe the potential effects to shoreline stability from the sustained flood conditions in the N, L, and M watersheds. Potential effects should consider:
    i. All watercourses and waterbodies affected by increased flows.

ii. Effects to watercourses/waterbodies if permafrost is within the banks and shorelines is affected by the increased flows.

b) Provide mitigation measures proposed for outlets of N6 and N17, to limit the potential for erosion from increased flows. Please provide the timing of the mitigation as well. It should be clearly identified what the proposed mitigation measures are and any effects of the mitigation (e.g., reduction in littoral and riparian area due to armouring).
c) The EIS indicates that downstream areas will be "prepared" for discharge. Please explain what is meant by "prepared" and provide mitigation measures, timing and potential effects of mitigation.

Source: DFO&EC IR #29
To: DeBeers Canada Inc.
Subject: Filling and Stability of Pit Lakes
EIS Section: Section 8

Preamble: In order to ensure water quality objectives are met upon closure, prior to reconnection of Kennady Lake to the downstream watershed, a key consideration is the thermal and chemical stratification of the pit lake basins.

Requests:
a) A water quality model should take into account the volume of water in each basin over time, and incorporate natural variability and thermal boundary conditions.
b) The temperature of the pre-mine groundwater at the elevation of the bottom of the pit should be considered as warmer water at the bottom of the pit can promote vertical mixing with warmer water at the bottom of the pit rising, and cooler surface waters sinking.
c) Please provide information on how long monitoring will be required to ensure that the predicted meromixis has occurred and is stable.
d) Provide an assessment of the impacts on water quality in Kennady Lake in the event that the dedicated meromixis of Tuzo pit does not occurred, and is not permanent.
e) Describe the contingencies proposed (e.g. isolation of Kennady Lake) if water quality objectives in Kennady Lake are not met.

Source: DFO&EC IR #30
To: DeBeers Canada Inc.
Subject: Processed Kimberlite and Hearne Pit
EIS Section: Section 8.8.4.2, Table 8.6-4

Preamble: It is anticipated that the high TDS water associated with the kimberlite placed in the Hearne Pit will promote the development of a chemocline. In Section 8, it is stated that "If meromixis does occur in Hearne pit, the deeper water in contact with the fine processed kimberlite will be isolated and the input of

the diffusive flux of metals and nutrients from the bottom of Hearne pit to the water quality in area 6 will be unlikely". Based on this, it appears that meromixis in Hearne pit should be the objective. However, it is expected that meromixis will not occur in Hearne pit (page 3-41), and the pit water will become fully mixed with water in Area 6.

Request:

a) Please clarify this apparent contradiction, including an assessment of potential impacts to overall water quality in Kennady Lake if complete mixing does occur.

Source: DFO&EC IR #31
To: DeBeers Canada Inc.
Subject: Dissolved Oxygen
EIS Section: Appendix 8

Requests:

a. Clarify if changes in the size and morphometry of the lake, as the mine components are developed over time, were taken into account.
b. Given that impacts on oxygen may be the greatest negative effect of increases in phosphorus on these systems, please clarify if the model detected changes in oxygen in only Area 8 or also in the downstream lakes, and what the extent and timing of these changes were.
c. It is implied that the large pits in Kennady Lake will provide a high-oxygen refuguim. To what extent this is true is unclear; their main impact on oxygen dynamics is only to increase lake volume. The pits will have lower areal winter oxygen depletion rates, but will they effectively mix and re-oxygenate each year? As a result, they may become anoxic. The statement on page 8.V-13 that "the pits are expected to have a much deeper epilimnetic zone" is inaccurate – the depth of the epilimnion is set by air temperatures, wind, thermal radiation, etc (see Jansen et al. 2004 Environ Biol. Fishes 70: 1-22 as an example).
d. The model assessing processes potentially affecting oxygen conditions in Kennady Lake appear over-simplified. At this time it is unclear whether these simplifications under- or over-estimate the impacts. Some factors not included in their models:
    i. How might inter-annual variability in primary production and other factors potentially impact oxygen conditions? Given that it only takes a single low oxygen event to have a significant impact on aquatic biota, using average conditions is not the best basis for determining impacts to oxygen. For example, Figure 8.V-1 shows considerable variability among years in oxygen conditions with depth.
    ii. How well did the models predict current rates of oxygen consumption?
    iii. It is unclear how Models 1 and 2 were applied to the different depth zones (Table 8.V-6). Oxygen consumption is inherently driven by sediment respiration and, hence, the sediment area/ water volume ratio

iv. What are the potential impacts of greater primary production on summer oxygen conditions, especially with climate change? A longer growing season will increase carbon inputs to sediments and potentially cause a longer period of stratification, but this will be offset by a shorter period of ice-cover. The intensity of stratification may also change. Is there any risk that cold water species may get "squeezed" by greater anoxia in deep water and the warmer epilimnion (see Schindler et al. 1996 Limnol Oceanogr. 41:1004-1017; Plumb & Blanchfield 2009 CJFAS 66:2011-2023)?

v. What is the depth distribution of cold water species like lake trout in Kennady Lake? Where do they reside relative to the thermocline in summer? Can this be determined from the hydro-acoustic surveys?

vi. Disagreements to statements in Appendix 8 include:

p. 8.V-8 In reference to Kelly et al. (1984), the authors state that "A 50% carbon metabolism is considered conservative, as winter water temperatures in Kennady Lake are cold…". All of the lakes studied by Kelly et al. also freeze and have similar winter temperatures to Kennady Lake. The same holds true for summer hypolimnetic temperatures. The real differences between the temperate lakes studied by Kelly et al. and the lakes in this study are carbon inputs and the relative lengths of the growing season and periods of stratification and ice-cover.

p. 8.V-8: the authors imply that Model 3 provides an upper bound because it is driven by sediment oxygen demand. In reality, this is implicitly true for all the models.

Source: DFO&EC IR #32
To: DeBeers Canada Inc.
Subject: Increased Mercury Levels from Flooding
EIS Section: Section 8

Preamble: On pages 8-221-225, it is argued that flooding of lakes A3, D2, D3, and E1 will have no effect on mercury and limited impacts on nutrients. Although there is little data for systems like these, it is possible that a mercury problem could arise. In small flooded temperate systems (e.g. St. Louis et al. 2004; Hall et al. 2009), large increases in MeHg have occurred in biota. The development

of reservoirs in northern regions (e.g. Lucotte et al. 1999; Hecky et al. 1991) also indicates that such systems may be highly vulnerable to Hg contamination. The "benefit" of short growing seasons and low organic matter content in flooded soils of northern systems is often offset by slow growth in affected fish populations. It is notable that maximum Hg concentrations of 0.8 and 1.4 in lake trout were found (and even higher concentrations in sculpin) from Kennady Lake and N16, which far exceed recommended consumption limits. As a result, Hg concentrations are already high in the lakes of this region (which is typical) and the contention that flooding of the Kennady Lake systems will have minimal impacts on mercury should be regarded with caution. There is a possibility that refilling of Kennady lake might also contribute to greater mercury methylation, although the risk is probably low.

Request:

a) More baseline data on mercury in fish from these systems should be collected.
b) Mercury concentrations should be related to fish size and age, which was not done in the EIS.
c) Note that methyl mercury production in lakes flooded by the project may also cause mercury problems in downstream lakes and streams. Fish in lakes should be sampled for mercury (e.g. N1, N9).

Source: DFO&EC IR #33
To: DeBeers Canada Inc.
Subject: Methyl Mercury vs. Total Mercury
EIS Section: Section 8

Preamble: The methods for estimating Hg in water appear to have been inappropriate, at least some of the time. The reported determinations of 0.02 and 0.06 ug/L are probably in error. Methyl mercury (not total mercury) concentrations in water should be used for the estimation of bioaccumulation factors (p. 8-352). The listed BAF (9450) is far lower than what is typically observed for methyl mercury (>10000).

Request:

a) Methyl mercury (not total mercury) concentrations in water should be used for the estimation of bioaccumulation. Please correct.

Source: DFO&EC IR #34
To: DeBeers Canada Inc.
Subject: Downstream Effects – Predicted TSS levels
EIS Section: Volume 9

Preamble: Volume 9 of the EIS provides predictions and conclusions as to the potential effects from pumping the discharge from the Water Storage Pond to

Lake N11, and Area 8 of Kennady Lake. A large portion of volume 9 is dedicated to the effects

Request:

a) Provide a model of predicted TSS concentrations in Kennady Lake, Lake N11 and Area 8 that includes the following:
    i. TSS concentrations within Kennady Lake Areas 2 to 5 during the dewatering process.
    ii. TSS within the Discharge to both N11 and Area 8.
    iii. Distribution of inputted TSS discharged within N11 and Area 8.
    iv. TSS loadings that Lake N11 and Area 8 will receive as a result of the discharge.
    v. Provide potential effects and impacts to the aquatic environments, including fish habitat, in N11 and Area 8, from receiving the TSS loadings identified above.

Source: DFO&EC IR #35
To: DeBeers Canada Inc.
Subject: Downstream Effects – Pumping
EIS Section: Volume 9

Preamble: Volume 9 of the EIS provides predictions and conclusions as to the potential effects from pumping the discharge from the Water Management Pond to Lake N11 and Area 8 of Kennady Lake.

Request:

a) Provide a conceptual design for the diffusers proposed to discharge to Lake N11 and Area 8.
b) Provide predicted velocities of discharge from the discharger and extent of area affected by the increased velocities (zone of turbulence).
c) Provide mitigation for potential scour and erosion caused by the diffusers. It is indicated that mitigation measures will be applied to prevent flushing and stranding of fish within the downstream watercourses.
d) Please provide information on flows that will be discharged throughout the ramp up and ramp down operations, and the timing in which these events occur.
e) Please identify the extent of the mixing zone.

Source: DFO&EC IR #36
To: DeBeers Canada Inc.
Subject: Downstream Effects – Modeling of Impacts
EIS Section: 9.4 Water Management Plan Summary

Preamble: The EIS document implies that the only potential impacts to diversion lakes are changes in water level and fish migration patterns. In fact, the diversions will re-route water so that flow patterns, residence time, etc., will be

radically altered. Lake communities intimately reflect their place in the landscape and these changes in system hydrology may have considerable impacts. At present, these impacts are very difficult to predict.

Request:

a) Please describe the potential impacts to the aquatic environment resulting from changes to flow patterns and residence time in the downstream lakes. Please also describe measures proposed to mitigate these impacts.

Source: DFO&EC IR #37
To: DeBeers Canada Inc.
Subject: TDS for N11
EIS Section: Section 9, page 391

Preamble: Increased TDS levels are predicted for Lake N11 and Lake 410, although they are predicted not to affect fish.

Request:

a) Please provide the expected TDS levels for lakes between Kennady Lake and Lake 410.

Source: DFO IR #38
To: DeBeers Canada Inc.
Subject: Diversion Channels
EIS Section: Section 8

Preamble: Diversion channels will be constructed to allow fish passage, prevent erosion and sediment issues, and provide spawning and rearing habitat for species such as Arctic Grayling. If water quality is met in Kennady Lake they would be decommissioned and natural drainage would be restored.

Request:

a) Clarify what specific habitat features will be included in the diversion channels as a contingency in case natural drainage cannot be restored due to poor water quality in Kennady Lake. These features would need to be incorporated into the stream design to allow them to stabilize over time and have improvements made if necessary, rather than waiting until refilling of Kennady Lake was finished.
b) Please describe additional options considered for water diversion and their potential impacts.

Source: DFO&EC IR #39
To: DeBeers Canada Inc.
Subject: Alternative Means of Carrying out the Project – Alternative Rock Piles
EIS Section: Project description

Preamble: The placement of waste rock piles, processed kimberlite, and other mining by-products has implications on the overall project foot-print, losses of fish habitat, and reclamation options. Losses of fish habitat will require appropriate compensation in the form of habitat gains. Avoiding losses to fish habitat through project redesign can minimize overall impacts to fish habitat.

Request:

a) Please provide alternatives for placement of mine rock and PK, including Areas 6 and 7, quarries, etc.

Source: DFO IR #40
To: DeBeers Canada Inc.
Subject: Impacts to Littoral Habitat – N11
EIS Section: Volume 8-160

Preamble: Supplemental pumping from Lake N11 will be used to refill Kennady Lake at closure. No more than 20% of the normal annual flow will be diverted per year to ensure there is enough water to support downstream aquatic systems in the N watershed. However, impacts to the littoral habitat within Lake N11 do not seem to be considered.

Request:

a) What is the predicted impact to the littoral habitat in Lake N11 during the refilling of Kennady Lake?

Source: DFO&EC IR #41
To: DeBeers Canada Inc.
Subject: Carrying Capacity of Lakes
EIS Section: Volume 8-390

Preamble: Lakes in A, B, C, D, and E watersheds have a carrying capacity limited by low nutrient availability. During operations it is thought that fish will be able to disperse into the N watershed through constructed diversion channels if the carrying capacity in the likes of the A, B, C, D, and E watershed are exceeded.

Request:

a) Please provide rationale as to how the lakes in the N watershed (presumably also at their carrying capacity) will able to support additional fish migrating from other watersheds.

Source: DFO&EC IR #42
To: DeBeers Canada Inc.
Subject: Sediment Quality
EIS Section: 8.3.6 Surface Water

Preamble: – Flocculants may have implications for re-establishing lake as viable fish habitat.

Request:

a) Clarify where flocculants will be used and mitigation for distribution of flocced sediments throughout the basin (e.g. areal extent, estimate the total amount [area X depth]).
b) Please provide a predicted measure of the chemistry of flocculent sediment in Kennady Lake.

Source: DFO&EC IR #43
To: DeBeers Canada Inc.
Subject: Nutrification of the L and M Watershed
EIS Section: Volume 9

Preamble: It is indicated that the L and M watersheds will change from oligotrophic to mesotrophic conditions, after Dyke A has been breached. One source of increased nutrients is from the fine processed kimberlite facility (FPKC).

Request:

a) What mitigation measures is De Beers considering to reduce the release of phosphorous from the FPKC?
b) What are the contingency plans should the phosphorous released be higher than predicted or if the mitigation measures are not effective?

Source: DFO&EC IR #44
To: DeBeers Canada Inc.
Subject: Downstream Effects – Effects to Fish
EIS Section: Volume 9

Preamble: It is predicted that there will not be any impacts to Lake Trout populations, despite predicted changes to the L and M watersheds including a substantial reduction in flows during operations and closure (and subsequent increase in temperatures), and changing the watersheds from oligotrophic to mesotrophic conditions at post-closure.

Request:

a) It is identified that Lake Trout overwintering habitat may be reduced at post-closure due to the rapid increase in nutrients in the L and M watersheds. Please provide an outline of a monitoring program to verify this prediction and describe contingencies to manage greater than predicted impacts.
b) It is predicted that at post closure in the L and M watershed Arctic Grayling spawning habitat may be impaired from increased algal growth. How far downstream is increased algal growth predicted? Please provide an

c) Please assess how the use of a water treatment plant could reduce nutrient inputs, and the extent of the algal growth downstream.
d) Please provide details of how areas flooded by the dewatering of Areas 2-7 of Kennady Lake will be "prepared" prior to flooding to reduce the amount or organic material.
e) Please provide details on how changes in flows, riverine morphology or decrease in water levels will be addressed through mitigation of design features.
f) Area 8 of Kennady Lake does not appear to be assessed for the effects of long term water withdrawal from the area which will be exacerbated by limited flow coming into Area 8 after pumping has ceased. Please provide a full assessment on this Effects Pathway and a fish and fish habitat assessment of Area 8.
g) Please explain how the Pathway Assessment resulted in a ranking of 'secondary' for the Effects Pathway "alteration of groundwater regime with pit development may change surface water levels and water quantity in downstream lakes, and affect fish habitat" when mitigation or environmental design features are not provided.
h) It is predicted that there will be measureable changes to water quality and water levels as a result of a change in groundwater flow regime in response to the creation of the pits. Please provide a full assessment on this Effects Pathway.
i) Provide a fish and fish habitat assessment on downstream watercourses and waterbodies where measureable differences in water levels are likely to occur.

Source: DFO&EC IR #45
To: DeBeers Canada Inc.
Subject: Potential Pathway for Effects to Fish Downstream of Kennady Lake during Closure
EIS Section: Volume 9

Preamble: Table 9.6-4 presents the "Potential Pathways for downstream Effects to Water Quality and Fish during Closure".

Request:
a) There are numerous potential impacts to fish and fish habitat resulting from breaching a dyke. Some of these include sedimentation and erosion of downstream shorelines, flushing of fish downstream, and exposing eggs and larval fish in the littoral areas upstream. These impacts may occur from removing any of the dykes. Please provide a decommissioning plan for the removal of the dykes, discharge rates, including timing, methods, sediment and erosion control, monitoring).

b) Table 9.6-4 has indicated that to mitigate changes in water quality, aquatic health and fish, Dyke A will not be breached until specific water quality criteria are met. It has been identified elsewhere in Volume 9 that watersheds L and M are predicted to change from oligotrophic to mesotrophic conditions, rapidly, after Dyke A has been breached. How would incorporation of a water treatment plant reduce the extent of downstream effects, the recovery time of Kennady Lake; and the length of time before the waters within Areas 3-7 of Kennady Lake meet specific water quality objectives prior to breaching Dyke A?

Source: DFO IR #46
To: DeBeers Canada Inc.
Subject: Kennady Lake – Limited Overwintering Post Closure
EIS Section: Volume 8-450

Preamble: It is stated in the EIS "*Although cisco may be able to access Kennady Lake in post-closure, this species is unlikely to become permanently established in Kennady Lake due to overwintering habitat limitations*". This is a concern as overwintering habitat is limiting in the area.

Request:
a) Please provide a summary of the reasons that overwintering habitat in the refilled Kennady Lake is to be limited. Also, please provide measures that could be implemented to address these overwintering habitat limitations.

Source: DFO IR #47
To: DeBeers Canada Inc.
Subject: Closure – Arctic Grayling Habitat
EIS Section: Section 9, page 391

Preamble: Quantification of habitat losses to fish habitat is necessary to determine appropriate measures to offset these losses.

Request:
a) Please describe what a "small" change to the suitability and availability of Arctic Grayling spawning and rearing habitat is in the L and M Watershed. Provision of a proportion or percentage would be helpful.

Source: DFO IR #48
To: DeBeers Canada Inc.
Subject: Closure - Pike
EIS Section: Section 8, page 20

Preamble: Northern Pike are predicted to be one of the species that will inhabit Kennady Lake post closure but aquatic habitat required by various life stages of this species is expected to be minimal

Request;

a) Has DeBeers considered an active re-vegetation program to address this habitat deficiency as part of closure planning?

Source: DFO&EC IR #49
To: DeBeers Canada Inc.
Subject: Closure - "New Equilibrium"
EIS Section: Section 9, page 392

Preamble: Returning the Project area, including downstream watersheds, to a stable functioning ecosystem should be the desired endpoint of closure.

Request:

a) Please describe the predicted "new equilibrium" that will be reached in the L and M watersheds after post-closure. How long will it take to be established?

Source: DFO&EC IR #50
To: DeBeers Canada Inc.
Subject: Closure - Fish Exclusion
EIS Section: Section 8, page 405

Preamble: The presence of fish will influence dyke removal activities. For guidance on fish salvage please refer to the following report: *Tyson, J.D., W.M. Tonn, S. Boss, and B.W. Hanna. 2011. General fish-out protocol for lakes and impoundments in the Northwest Territories and Nunavut. Can. Tech.Rep. Fish. Aquat. Sci. 2935: v + 34 p.*

Request:

a) It is stated that at closure dykes B, D and E will be removed. How will fish, including small bodied fish, be excluded from Kennady Lake until the water has met specific water quality criteria? How does this affect the timing of when these dykes are removed?

Source: DFO&EC IR #51
To: DeBeers Canada Inc.
Subject: Closure - Sediment and Water Management
EIS Section: Section 8

Preamble: The quality of water discharged to and from Kennady Lake is of utmost importance to the receiving ecosystem. The quality of sediment will have an influence on water quality.

Request:

a) What criteria will be used to determine if sediment quality in the former Water Management Pond is acceptable for Kennady Lake to be

Source: DFO&EC IR #52
To: DeBeers Canada Inc.
Subject: Closure - Post-closure Releases of Metals and Phosphorus
EIS Section: Section 8, pages 8-19 and 8-20; Section 9.8.2.2; Section 10.5.3

Preamble: The concentrations of phosphorus being flushed from the mine waste piles and PK into the lake water are projected to increase until reaching a steady state during post-closure. The additional phosphorus is predicted to change the trophic status from its current oligotrophic state to that of mesotrophic. The EIS states that "DeBeers is committed to incorporating additional mitigation to achieve a long-term maximum steady-state total phosphorus concentration of 0.018 mg/L in Kennady Lake." (p. 8-19). Three approaches to mitigation have been identified, but details of implementing mitigation have not been provided.

Metals are also predicted to increase in concentration after closure, with cadmium chromium and copper exceeding water quality guideline values. The source is predicted to be groundwater and geochemical sources.

Request:

a) Please describe mitigation measures that will be used to reduce total phosphorus levels to a maximum of 0.018 mg/L in Kennady Lake post-closure.
b) Cadmium, copper, and chromium are projected to exceed water quality guidelines in the main areas of Kennady Lake following closure. What mitigation measures are proposed to address this?

Source: DFO&EC IR #53
To: DeBeers Canada Inc.
Subject: Closure - PKC Runoff
EIS Section: Section 8 Section 10.4.2.1.2

Preamble: Mine waste material will be subject to runoff, and inundated with lake water post-closure. It is not clearly detailed what the potential impacts will be on water quality from runoff during re-filling of Kennady Lake, nor of the weathering of waste material at the edge of the lake.

Request:

a) Please provide details on the impacts of mine waste being inundated with lake water and the long-term impacts of this configuration, taking weathering into account.
b) Please provide details on this design compared to other alternatives.

c) Runoff from the fine PKC, mine rock, coarse PK, plant site, etc. will go into Kennady Lake to assist the refilling. Please provide an estimate of water quality parameters in this runoff, and demonstrate how using this runoff will not present long term water quality concerns in Kennady Lake.

Source: DFO&EC IR #54
To: DeBeers Canada Inc.
Subject: Closure - PKC Facility Design
EIS Section: Section 10.4.2.2

Preamble: The current design for the fine processed kimberlite facility incorporates permafrost formation by the encouragement of air circulation. However it is not quantified what impact this design could have on the amount of seepage from the facility and the likelihood of acid rock drainage and metal leaching formation in the event that permafrost does not form or if it degrades in the future. It is noted that weathering of the cover material will occur over time, however there is no estimate of the length of time this process would take to occur or what impact this will have on potential seepage from the facility.

Request:
a) Please provide further details on the long-term impacts of the fine processed kimberlite facility design on the amount of seepage from the facility.

Source: DFO IR #55
To: DeBeers Canada Inc.
Subject: Fish Habitat Compensation
EIS Section: Volume 9

Preamble: Fish habitat compensation will be required to offset losses to habitat as a result of various aspects of the Project. A thorough understanding of habitat losses will be required to develop a viable habitat compensation plan. The following information requests relate to various habitat related impacts.

Request:
a) Area 8 and downstream is indicated to be a high quality forage area for Lake Trout. Access to this area will be reduced once Dyke A is built, and during operations and closure when flows are substantially reduced. Please provide quantification of habitat harmfully altered, disturbed or destroyed and update the conceptual compensation plan accordingly.
b) A water intake is proposed for Lake N11 and to be located within a rock structure to avoid the need for screens (Table 9.6-4). Please provide information on the timing of installation of the water intake, a habitat assessment of the area within which the water intake is proposed, a conceptual design, and a plan to prevent the impingement and entrainment of fish.

c) Please clarify if a permanent diversion from Lake A3 to the N watershed is proposed. Clarify if the use of an existing watercourse proposed or the creation of a diversion channel (table 9.6-4)?
d) Please provide a conceptual design of the channel, complete with the rock armour proposed to limit erosion to natural rates.
e) Provide an assessment of the potential for of increases in mercury regarding flooded areas proposed as habitat compensation.
f) Please clarify if the following lakes or water courses are expected to experience impacts to fish and fish habitat: Lakes A5-A7 - fine pkc facility, Lake Kb4 and Stream Kb4 - coarse PK pile, Streams A1-A3, A5-A7 - fine pkc facility.
g) Please submit HSI models for watercourse segments and assessment of habitat losses.
h) Please clarify what portion of Tuzo pit was considered in the preliminary net gains described on page 3.II-28 of the CCP.
i) Loss of streams D1 and D2, in addition to the loss of suitable spawning habitat in D3, will eliminate all natural spawning in D watershed. The loss of stream E1 will do the same for E watershed. Please describe the design alternatives considered to minimize this impact.

Source: DFO IR #56
To: DeBeers Canada Inc.
Subject: Alternative Means of Carrying out the Project – Measures to Offset Loss of Fish Habitat
EIS Section: Conceptual no-net-loss plan

Preamble: *The Policy for the Management of Fish Habitat* (DFO 1986) is the guiding policy for the administration of the Habitat Provisions of the *Fisheries Act*. The guiding principle of this DFO Policy is “No-net-loss of fish habitat”. This is accomplished by habitat losses being offset by habitat gains through compensation initiatives. To date, the habitat compensation options proposed to offset losses associated with Kennady Lake are not sufficient. As indicated in the EIS, the length of time that it will take for Kennady Lake to return to a stable state is predicted to be 50 to 75 years post mine closure. Since a habitat loss of for this duration would, for all intents and purposes, be permanent from a fish habitat perspective, habitat enhancement features within Kennady Lake would not be considered in the assessment of offsetting habitat losses, but rather in returning Kennady Lake to a functioning ecosystem post closure. Further, losses associated with small fish bearing lakes and creeks flowing into Kennady Lake have not been taken into account.

Request:
a) Please propose additional options to offset losses to fish habitat in Kennady Lake, as well as associated fish bearing lakes and creeks that may be isolated or otherwise impacted.

Source: DFO IR #57
To: DeBeers Canada Inc.
Subject: Impacts to Fish and Fish Habitat – Temporal Scale
EIS Section: 8.10.4

Preamble: DFO disagrees that the losses of fish and fish habitat in Kennady Lake during operation can be considered temporary, given the long time period over which the harmful alteration, disruption and/or destruction of fish habitat will occur and the uncertainty as to when, or if, the fish habitat will return to full function.

Request:

a) In addition to shorter term impacts, please describe the habitat impacts that would be expected to endure for longer than a period of several months in the context of a non-temporary HADD and describe the proposed methods to mitigate and/or offset these losses.

Source: DFO IR #58
To: DeBeers Canada Inc.
Subject: Fish Habitat Compensation – Structure
EIS Section: 8.10.4

Preamble: It is proposed in the EIS that construction of habitat structures will increase fish production.

Request:

a) Reviews of the effects of habitat structures for enhancing fish productivity are equivocal (e.g. Roni et al. 2008 N. Am. J. Fish. Manag. 28:856-890; Whiteway et al. 2010 CJFAS 67: 831-861; Smokorowski et al. 2007 Env. Rev. 15:15-41). Such structures clearly attract fish, but may or may not increase total population sizes. Other compensation ideas should be considered.
b) With regards to the use of impounded habitat as compensation, the flooding of systems may lead to other problems such as increases in mercury in fish, greater anoxia, etc. Other compensation options should be considered.

Source: DFO&EC IR #59
To: DeBeers Canada Inc.
Subject: Downstream Flow Mitigation Plan
EIS Section: Volume 9

Preamble: Changes to natural flow regimes have the potential to negatively impact downstream aquatic biota in a variety of ways. Limiting these changes and mitigating resultant impacts will be essential in minimizing the overall potential negative effects of the Project.

Request:

a) Please provide a downstream flow mitigation plan including, but not restricted to, the following:
    - Effect to Arctic Grayling spawning, rearing, feeding and overwintering habitat from a substantial reduction in daily discharges and flows through Stream K5
    - Temporal boundaries used for the assessment of downstream effects.
    - Potential impacts to Lake N11 and downstream from maintaining the N11 discharge at the 5 year dry flow condition.
    - Assessment of potential effects caused by changes to the flood regime using minimum and maximum water depths and velocities modeled for June to August discharge.
    - Information used for the qualitative assessment of effects on bank/ shoreline stability.
    - Mitigation measures to address potential stranding/ flushing of fish due to ramp up and ramp down during downstream discharge.
    - Potential effects of sustaining two year flood levels on beds of receiving waterbodies/ watercourse for three consecutive months.
    - When the flows will return to 'baseline' fall conditions after sustained high discharges from June to October, how the flows will be ramped down and over what period of time, and the implications to natural flow variation cues to Arctic Grayling to find overwintering habitat.
    - Natural flow range during September and October in comparison to predicted flows.
    - Methods to measure flow at N1 to determine if falls within the daily maximum, and contingency measures if the daily maximum is exceeded.
    - Concise rationale and data to support conclusion that there will be negligible effects on Young of Year Arctic Grayling.
    - Monitoring to ensure suitable habitat for Young of Year Arctic Grayling, and contingency measures if it is not.
    - Monitoring to ensure that Arctic Grayling spawning is not affected during dewatering.
    - Mitigation to address predicted negative effect from increased barriers to fish passage during operations.
    - Rationale to support prediction that there will be no sediment and erosion related effects in Lake N11 and Lake N1 due to increased water levels.
    - Descriptions of all lakes in the L and M watershed that are expected to have reduced overwintering habitat for fish as a result of reduced flows
    - Predicted loss of riparian and littoral habitat due to reduced flows.

- Clarification on whether barriers to fish passage in N11 are expected as there were contradictory statements in the EIS.
- Baseline minimum and maximum flow at the outlet of Lake N11.
- Impacts downstream of Kennady Lake when diversion channels are decommissioned and all water is directed back into Kennady Lake with no outflow during the refilling period.
- References that confirm Slimy Sculpin are not sensitive to changes in water depths and velocities as indicated in Section 9, page 329 of the EIS.
- Erosion monitoring, including how the information will be used (e.g. adaptive management).
- Clarification on extent of downstream effects. It is indicated that the downstream extent of effects is estimated to be between Area 8 and Lake 410. However this statement on page 391 of Section 9 is followed by another that indicates that both phosphorous uptake by biota and sequestration in the sediments, and nutrient related effects on fish and fish habitat are not expected in Kirk Lake or downstream of Kirk Lake even though Kirk Lake is approximately 12 km downstream of Lake 410.

Source: DFO&EC IR #60
To: DeBeers Canada Inc.
Subject: Area 1 – Alternative Processed Kimberlite Disposal
EIS Section: EIS Analysis Session Presentations

Preamble: Area 1 was previously slated to contain processed kimberlite (PK), with Lakes A1 and A2 being removed from the drainage basin. Under the revised scenario, all PK will be contained in Area 2, with some on land, but within the sub-watershed adjacent to Area 1. Water quality modeling included the dewatering of Area 1 lakes.

Request:
a) Please provide details of how the use of the revised PK disposal alternative will affect hydrology, modeled water quality, water balance, and closure configuration, and a comprehensive analysis of the associated effects.
b) Please describe additional options considered for placement of mine rock and processed kimberlite, including the option of using Areas 6 and 7.

Source: DFO IR #61
To: DeBeers Canada Inc.
Subject: Area 8 Water Withdrawal
EIS Section: Section 8 page 202

Preamble: Area 8 is proposed as the potable water source for the camp, and it is predicted that the water withdrawal may change water levels and affect fish

habitat. To mitigate this effect, freshwater usage will be limited by recycling elsewhere. While this will help, it is important to know the volume of Area 8 in order to address how much water can be removed. If measures were introduced to minimize water withdrawal, Lake Trout and Round Whitefish may persist in Area 8 until reconnection with Kennady Lake is possible.

Request:

a) Follow the *DFO Protocol for Winter Water Withdrawal from Ice-covered Waterbodies in the NWT and NU*. As this protocol assumes that recharge will occur during the open water season and Area 8 will be used throughout the year as the water source, staff gauges should be used to set minimum water levels that protect littoral habitat.

Source: DFO IR #62
To: DeBeers Canada Inc.
Subject: Area 8 Water Intakes
EIS Section: Section 8, page 227

Preamble: DeBeers is anticipating localized mortality of small fish species/ early life stages due to impingement/ entrainment in the intake screen for the water pump. Screens should be designed to protect the fish species and life stages that are found in Area 8.

Request:

a) Design the fish screen based on the criteria in the *DFO Freshwater Intake End-of-Pipe Fish Screen Guideline*.

Source: DFO&EC IR #63
To: DeBeers Canada Inc.
Subject: Area 8 Zone of Turbulence Around Diffuser
EIS Section: Section 8, page 198

Preamble: Use of a diffuser has been identified as a mitigation measure to prevent erosion from the pumped discharge to Area 8. However, potential impacts to fish from the turbulence created by the diffuser have not been assessed.

Request:

a) Provide an assessment of potential effects to fish from the zone of turbulence around the diffuser.

Source: DFO IR #64
To: DeBeers Canada Inc.
Subject: Area 8 Overwintering Habitat
EIS Section: Section 9, page 93-96

Preamble: Overwintering is a sensitive time for fish and limited resources often make overwinter habitat critical.

Request:

a) With overwintering habitat being limited after Kennady Lake is dewatered and other lakes possibly being at carrying capacity, has DeBeers considered measures to improve the overwintering potential of Area 8 as a temporary mitigation measure during operations and refilling at closure (e.g. aerators, clearing snow to increase light penetration)? In addition, please describe any other feasible measures considered to mitigate impacts to overwintering habitat.

Source: DFO&EC IR #65
To: DeBeers Canada Inc.
Subject: Area 3 Following Dewatering
EIS Section: Volume 2

Preamble: The alternatives assessment identifies the preferred option of retaining a portion of the remnant Kennady Lake as a water management pond. Area 3 would be used to receive mine water, treated camp wastewater, surface runoff, and processed kimberlite supernatant and would provide make-up water for the process plant.

The EIS does not provide a description of the conditions in Area 3 at the time it would be designated as the Water Management Pond.

Request:

a) Please provide a detailed description of the water quality conditions and physical fish habitat conditions in Area 3 following the initial 3m lake drawdown, and the modeling used to identify concentrations of key water quality parameters (including TSS, DO, metals) as well as physical habitat losses/alterations including alterations to sediments.

Source: DFO&EC IR #66
To: DeBeers Canada Inc.
Subject: Water Treatment Contingencies
EIS Section: Volume 3, Section 3.9.1; Section 9 (various); Tables 9.6-4, 9.8-4;

Preamble: Treatment of mine water, surface runoff, processed kimberlite supernatant, and other contact water is through the use of the Water Management Pond (WMP). In various sections of the EIS, reference is made to discharging water from the WMP to downstream waterbodies provided specific water quality criteria are met. For example, Section 3.7.5.1 states that part of the water management strategy is to allow for the discharge of water from the WMP to Lake N11, provided the water quality is acceptable for release. Criteria for release have not been specified, nor the extent to which the downstream receiving environment may be altered. The EIS provides maximum

concentrations for a range of total and dissolved parameters in Lake N11, but does not identify whether this is a whole-lake average or localized maxima around the diffuser.

The mined-out pits will receive excess water from the WMP once that volume is available, and from that point on it is anticipated any poor quality water would remain sequestered in the lower layers of the pit following refilling.

Request:

a) Please provide an alternatives assessment for water treatment, which considers the need to treat for a range of parameters prior to discharge to the downstream receiving environment. An analysis should be provided of the benefits or improvements represented by implementing treatment.

Source: DFO&EC IR #67
To: DeBeers Canada Inc.
Subject: Alternative Means of Carrying out the Project – Water Management
EIS Section: Project description

Preamble: How water is managed is a concern for downstream fish and fish habitat, and water quality.

Request:

a) Please describe additional water management options considered, including the options of using Areas 6 and 7 for water storage, and alternative routing options for discharge from Area 1.

Source: DFO&EC IR #68
To: DeBeers Canada Inc.
Subject: Downstream Effects – Definitions
EIS Section: Volume 9

Preamble: There are a number of terms which are used but do not appear to be defined. Defining these terms is essential when considering potential impacts, mitigation and residual effects.

Request:
Please define the following terms:

a) Long Term - Context: Pg 9-18 of the July 2011 EIS states “Average long-term concentrations…”
b) Desired - Context: Pg 9-140 of the July 2011 EIS states “Abundance and Persistence of Desired populations…”
c) Please clarify if a specific population or population size is “desired".
d) Persistence - Context: Pg 9-140 of the July 2011 EIS states “Abundance and Persistence of Desired populations…”