DE BEERS
CANADA
GAHCHO KUÉ PROJECT

November 10, 2012

Chuck Hubert
Senior Environmental Assessment Officer
Mackenzie Valley Environmental Impact Review Board
Suite 200, 5102 – 50th Avenue
P.O. Box 938
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Dear Mr. Hubert:

Technical Report Responses – Fisheries & Oceans Canada

De Beers is pleased to provide the Mackenzie Valley Environmental Review Board with Responses to the Technical Submission from Fisheries & Oceans Canada dated October 22, 2012.

Should you have any questions regarding this submission, please contact our office.

Regards,

Veronica Chisholm
Permitting Manager

Attachment

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Fisheries & Oceans Canada

Technical Report Responses

November

2012

TABLE OF CONTENTS

SECTION **PAGE**

1 INTRODUCTION

On October 22, 2012 Fisheries and Oceans Canada (DFO) submitted their technical report to the Mackenzie Valley Environmental Impact Review Board (MVEIRB) for the De Beers Canada Inc. (De Beers) proposed Gahcho Kué Project (Project). This report provides responses to those recommendations outlined in the DFO technical report (DFO 2012).

2 FISHERIES AND OCEANS CANADA RECOMMENDATIONS AND RESPONSES

2.1 FISH AND AQUATIC BASELINE

2.1.1 Recommendation 1

The Proponent commit to adopting and using a set of standardized, repeatable methods for baseline collections, which include additional reference lakes, adequate methods for sampling reference lakes, water clarity, sediment quality, benthic invertebrates and plankton as outlined in Section 2.3, to ensure that appropriate data are collected prior to any development.

- Standard methods should be used for all aquatic and fisheries sampling.

2.1.2 Response

De Beers commits to using standardized, repeatable methods for all aquatic and fisheries sampling in the Aquatics Effects Monitoring Program (AEMP). The study design and methods will be outlined in the AEMP design document, which will be developed according to currently accepted statistical design principles and regulatory guidance. De Beers will continue to engage with regulatory agencies and Aboriginal communities in the development of the AEMP through the Water License permitting process.

2.2 OVERWINTERING HABITAT

2.2.1 Recommendation 2

The Proponent provides a revised table to DFO that includes a summary of information pertaining to fish overwintering habitat (e.g. ice thickness, waterbody size, maximum depth, dissolved oxygen, sample dates).

2.2.2 Response

De Beers commits to revising the table provided in the response to Round 1 Information Request DFO&EC_9a, which provided ice thickness measurements and associated sampling dates to show the requested additional data where available (De Beers 2012a). The table will be provided by November 30, 2012.

As indicated in the response to Round 1 Information Request DFO&EC_9a, ice thickness will be routinely measured and included in the database, along with other relevant data parameters as part of on-going winter water quality data monitoring programs, including the AEMP once implemented (De Beers 2012a).

2.3 RIVERINE HABITAT

2.3.1 Recommendation 3

The Proponent commit to providing a revised tabulated summary of the pre-impacted study area streams including a detailed description of the existing substrates within these streams.

2.3.2 Response

De Beers commits to provide DFO with a tabulated summary of the habitat characteristics (including substrate information) in streams to be potentially affected by the Project. This information will be consolidated from summary tables presented in Annex J, Appendix J.I and Addendum JJ, Appendix JJ.VI of the 2010 Environmental Impact Statement (EIS; De Beers 2010).

2.4 ALTERNATIVES ANALYSIS

2.4.1 Recommendation 4

The Proponent should further evaluate alternatives which allow area 7 to be retained as it provides very important overwintering habitat for Valued Ecosystem Component (VEC) species identified in the EIS. If it is determined not to be feasible, the Proponent should consider alternatives that would refill area 7 as soon as possible after dyke construction to reduce further impacts to fish and fish habitat.

2.4.2 Response

De Beers has evaluated mine plan alternatives in the Detailed Alternative Analysis submitted to the public registry on June 18, 2012 (De Beers 2012b). Alternatives were considered that did not include dewatering Area 7 as part of the mine plan. The analysis determined that the options which did not include Area 7 within the mine plan would impact the technical and economic viability of the Project. However, in the response to Round 2 Information Request EC 2, De

Beers has committed to look for opportunities to restore Area 7 earlier in the mine plan (De Beers 2012c).

2.5 DYKE CONSTRUCTION

2.5.1 Recommendation 5

The Proponent commit to developing and implementing a sediment and erosion plan for dyke construction which includes the use of best management practices (such as the use of silt curtains) to prevent potential sediment release into fish bearing waters, and impacts to fish and fish habitat. This plan should include contingencies (including thresholds for triggering contingency actions) to be followed should the proposed mitigation not work as intended.

2.5.2 Response

De Beers commits to develop and implement a sediment and erosion plan for dyke construction to control sediment release. This plan will include details of the sediment and erosion control measures for each dyke to be constructed, along with contingency plans. The Sediment and Erosion Plan will be submitted to the Mackenzie Valley Land and Water Board (MVLWB) as a component of the Water Licence Application.

2.6 WATER WITHDRAWAL, DIFFUSER AND INTAKES

2.6.1 Recommendation 6

The Proponent commit to establishing minimum water level thresholds with a mitigation action plan to be initiated should these thresholds be approached in order to protect littoral habitats in water-withdrawal lakes including area 8.

2.6.2 Response

De Beers commits to develop and implement minimum water level thresholds in Area 8 during construction and operation, as well as Lake N11 during closure. In Area 8, winter water withdrawals from Area 8 for potable water will meet the DFO *Protocol for Winter Water Withdrawal from Ice-Covered Waterbodies in the Northwest Territories and Nunavut*. In Lake N11, planned pumping rates during open water conditions will be set accordingly to ensure that the total annual discharge from Lake N11 does not drop below the 1-in-5 year dry condition.

Hydrological monitoring will be conducted as part of the project, both for operational decision-making with respect to the water management plan, and also as part of the AEMP. Staff gauges will be installed to monitor water levels to protect littoral habitat; this was identified in the response to Round 1 Information Request DFO&EC_61 for Area 8 (De Beers 2012a). If changes to water levels are greater than predicted (e.g., water levels approach benchmarks developed as part of the AEMP), then adaptive management will be applied, as appropriate.

2.7 IMPACTS FROM INITIAL DEWATERING

2.7.1 Recommendation 7

The Proponent commit to address impacts to stream habitat from changes in drainage patterns for inflow streams.

2.7.2 Response

De Beers has addressed impacts to stream habitat due to the diversion of the upstream watersheds through the assessment of potential effects in the EIS, and including the loss of fish habitat in the draft No Net Loss Plan (NNLP) submitted to the public registry in November 2012 (Golder 2012).

The effects of the watershed diversions in the B, D, and E watersheds on fish and fish habitat (including stream habitat) are assessed in the 2011 EIS Update, in Section 8.10.3.3 of the EIS Update (De Beers 2011). The effects of the A watershed diversion are assessed in Section 8.2.7.1.3 of the 2012 EIS Supplement (De Beers 2012d).

The loss of fish habitat in these streams resulting from placement of the dykes in and subsequent dewatering of downstream stream segments is included in the compensation plan to ensure that no net loss in fish habitat is achieved for the Project. In the draft NNLP the habitat conditions and fish communities in the affected watercourses are summarized in Section 3.2 and the habitat losses in watercourse segments are quantified in Section 4.3 (Golder 2012).

2.7.3 Recommendation 8

In addition to the Proponent's plan to utilize *in situ* flocculation to reduce sediment, the Proponent is encouraged to assess and implement current best management practices to further mitigate impacts of suspended sediment to fish

habitat particularly in relation to the transfer of sediment laden waters from the drawdown activities in the southern basins.

2.7.4 Response

De Beers commits to utilizing *in situ* flocculation and other applicable best management practices to minimize the risk of sediment-laden water affecting downstream habitats.

2.8 DOWNSTREAM IMPACTS - FLOW

2.8.1 Recommendation 9

The Proponent commit to developing and implementing a revised Flow Mitigation Plan that incorporates and details operational procedures and protocols. Implementation of the plan should be adaptable to enable adjustments for site-specific changes and should include:

- A summary of available overwintering habitat in the project area once the mine is operational;
- Measures to mitigate changes in water residency times and hydrologic pathways;
- Detailed downstream flow measurements, including from lakes N11 and N1 (issue outstanding from DFO IR #7, Round 1); and,
- A detailed plan on how downstream monitoring will be conducted (as part of the AEMP).

2.8.2 Response

De Beers commits to develop and implement an operational Flow Mitigation Plan. As discussed in meetings with DFO (i.e., 21 February 2012, 9 May 2012, and 27 June 2012) and in the response to Round 2 Information Request DFO 2-1, an operational Flow Mitigation Plan will be developed prior to implementing flow mitigation (De Beers 2012e). The operational plan will include operational protocols that De Beers will follow to provide protection to the downstream fish populations. The operational plan will be developed in consultation with DFO.

2.9 EFFECTS TO FISH AND FISH HABITAT AND OFFSETTING

2.9.1 Recommendation 10

To ensure that predicted impacts to fish habitat are identified and approaches to offset these impacts are developed, the Proponent is to provide a revised draft habitat compensation plan to offset impacts to fish and fish habitat, acceptable to DFO, which includes input received from affected communities.

2.9.2 Response

De Beers commits to continue to develop a detailed No Net Loss Plan (NNLP) that will describe habitat compensation plans to offset losses to fish habitat. A draft NNLP was submitted to the public registry in November 2012 (Golder 2012). This draft is expected to continue to evolve and be further refined as additional community and regulatory input is received during the permitting phase.

2.10 CLOSURE

2.10.1 Recommendation 11

During the refilling of Kennady Lake, all fish species and life stages should be excluded until the impacted areas are restored to the extent that they can support fish.

2.10.2 Response

De Beers commits to applying available technologies or management practices (e.g., appropriately sized and designed screens on the intake in Lake N11, consistent with that described in the *Freshwater Intake End-of-pipe Fish Screen Guideline* [DFO 1995]), and to following recommended guidelines during closure to limit the potential for fish species and life stages from entering Kennady Lake during refilling until it is demonstrated that the lake can support fish. The selection of technologies or management practices would include consultation with the regulatory agencies, including DFO.

This intent has been provided by De Beers previously with respect to the removal of the diversion dykes in the upstream watersheds during closure. On May 22, 2012 at the Technical Sessions, De Beers indicated that if monitoring in Kennady

Lake demonstrates that water quality is not suitable for fish to be allowed back into the lake through the reconnection of the upper watersheds, then the breaching of those dykes would be delayed.

Additionally, in the response to Round 1 IR DFO&EC_50, De Beers stated it will monitor water quality within Kennady Lake prior to, and during the refilling period, and use adaptive management to make decisions with respect to dyke removal, in consultation with regulatory agencies (De Beers 2012a). If monitoring indicates that water quality is not acceptable in Kennady Lake during refilling, De Beers have the option to delay the removal of the upstream diversion dykes, and determine appropriate mitigation, as required, to address the problem.

2.10.3 Recommendation 12

A comprehensive aquatic and riparian re-vegetation plan should be developed in consultation with DFO, and implemented as soon as possible to ensure that vegetation efforts are establishing as intended.

2.10.4 Response

De Beers commits to developing a revegetation plan for riparian and aquatic vegetation as part of the interim closure and reclamation plan for Kennady Lake. The details of the plan will be developed in consultation with DFO and would include opportunities for early implementation. Monitoring of the re-establishment of aquatic vegetation in the refilled lake will also be included as part of the AEMP.

2.11 MISCELLANEOUS

2.11.1 Recommendation 13

In order to allow for an accurate assessment of impacts to fish and fish habitat from the proposed Project and to move forward on the development of a plan to offset the predicted losses to fish and fish habitat, the duration of the potential impacts to VECs should be defined in a manner which is relevant to the lifecycle of the VEC of concern. More specifically, impacts which would extend beyond the lifecycle of one generation of fish within a given waterbody should be considered “permanent”.

2.11.2 Response

By definition, impacts that are short-term, medium-term, or long-term in duration are reversible. With the ecosystem recovering to a stable and productive ecosystem, the impacts would be considered temporary.

In the 2010 EIS (De Beers 2010), the criteria for the residual impact classification of the Project on valued components (VCs) were based on the Terms of Reference (ToR) for the Project (Gahcho Kué Panel 2007). As per the ToR, the criteria included both **duration** and **reversibility**.

Duration takes into account the timeframe of the impact. As per the ToR, both the duration of individual events (e.g., waste water discharges) and the overall time frame during which the impact may occur (e.g., phases of a Project during construction, operation, and closure) are considered. Duration also takes into account the amount of time from the beginning of an impact to when the impact on a VC is reversed. For the aquatic Key Lines of Inquiry (De Beers 2011, Section 8, Table 8.14-1), duration is as follows:

- short-term: projected impact is reversible by the end of construction;
- medium-term: projected impact is reversible upon completion of refilling Kennady Lake (i.e., end of closure); and
- long-term: projected impact is reversible sometime after the refilling of Kennady Lake is complete (i.e., beyond closure) or not reversible.

As per Section 6.7.2 of the 2010 EIS, for those VCs in which the duration of the impact extends past closure (i.e., long-term impacts), the estimated duration is considered in the context of life spans (e.g., fish and wildlife) or generation times (i.e., humans), and reversibility (De Beers 2010). For fish, the biological cycles of long-lived VC species, such as lake trout, is considered in the duration of impacts.

Reversibility is the likelihood and time required for a VC or system to return, after removal of the stressor, to a state that is similar to the state of systems of the same type, region and time period that are not affected by the Project. Reversibility does not imply returning to environmental conditions prior to development of the Project. For the aquatic Key Lines of Inquiry, duration is as follows:

- Reversible: projected impact will not result in a permanent change from existing conditions or conditions compared to ‘similar’ environments not influenced by the Project

- Not reversible: projected impact is not reversible (i.e., duration of impact is unknown or permanent).

As described in the EIS, Kennady Lake will be refilled and reconnected to the downstream environment and will be a functional aquatic ecosystem; as a result, even long-term impacts were considered to be reversible.

Due to the overall nature of how the Project will affect the Kennady Lake watershed, residual impacts were classified for two specific time periods, rather than just one. The first period extended from the initiation of the Project to 100 years later. This time frame incorporated the construction and operations, and closure phases of the Project, and the expected recovery period in which the aquatic ecosystem would be in a stable and productive state (i.e., taking into account the duration of the Project during construction, operations, and closure, and recovery during post-closure). The recovery period was conservatively based on the amount of time that species, such as northern pike and lake trout, will require to re-establish to stable, self-sustaining populations in Kennady Lake following the complete refilling of Kennady Lake. The second period focused on future conditions after 100 years from Project initiation. Rather than classifying one snapshot in time, the classification in this period focused on the ability of the affected ecosystems to recover to a steady state.

The estimated timeframe for recovery of Kennady Lake is conservatively based on the life span of the longer living fish VCs. For example, the average life span of northern pike is 10 to 12 years in fast-growing southern Canadian populations and in slow-growing Arctic populations as high as 24 to 26 years (Scott and Crossman 1973). Allowing 15 years for development of the supporting food web, the estimate of 50 to 60 years is expected to allow for the completion of two life cycles of these slower growing predators. Lake trout are a slow-growing, longer-lived species (i.e., 30+ years). The re-establishment of a stable, self-sustaining lake trout population is anticipated to take approximately 60 to 75 years following the complete refilling of Kennady Lake. However, it is expected that a functional aquatic ecosystem, including fish populations, will re-establish in Kennady Lake shortly after refilling and reconnection. Basing the impact assessment on the biological cycles of shorter-lived species (i.e., few years) would not be suitable for the assessment of medium- or long-term impacts, or recovery.

De Beers believes that the residual classification system meets the ToR, incorporates conservative approaches, and takes into account physical changes associated with the Project, as well as the biological cycles of the selected VCs. As a result, De Beers does not believe that changes beyond one life cycle of a fish species should be considered permanent.

2.11.3 Recommendation 14

The Proponent should provide a clear definition for "desired" (in terms of populations) and "persistence" that includes some level of quantification as to what the future abundance and distribution of fish will be measured against to determine if downstream effects have occurred.

2.11.4 Response

Within the context of the 2010 EIS and 2011 EIS Update (De Beers 2010, 2011), "desired" and "persistence" were not meant to convey a level of quantification. These words were included in the assessment endpoints specifically to communicate the value of the three individual fish species chosen as highly VCs for the assessment, i.e., *Abundance and Persistence of Desired Populations of Lake Trout, Arctic Grayling, and Northern Pike*. Assessment endpoints are defined as formal narrative expressions of the actual environmental value that is to be protected, and are not typically quantifiable. Assessment endpoints are the ultimate properties of VCs that should be protected or developed for use by future human generations. Measurement endpoints, such as fish presence, relative abundance, and observed movement, are the qualitative and quantitative metrics used to classify and determine the significance of effects to assessment endpoints in the EIS.

As stated in Round 1 Information Request DFO&EC_68 (De Beers 2012a), “desired” refers to populations of lake trout, Arctic grayling, and northern pike that are considered as being important to people in a traditional sense and perceived to have value. Their selection was based on their value to Aboriginal people, their abundance and dominance in Kennady Lake and adjacent watersheds, and the ecological niche they represent (i.e., life history, habitat requirements, food source). In the EIS assessment endpoints, “persistence” referred to the sustainability of the population; a sustainable population is one where the abundance and distribution will be maintained (or persist) into the future, such that there will be continued opportunities for traditional and non-traditional use by people. For the purposes of the assessment, these fish species were also representative of the fish that could be potentially affected as a result of Project activities.

De Beers is in the process of developing an AEMP for the Project. This process will include engagement with Aboriginal communities and regulatory agencies to elicit on-going input and feedback on the design of the AEMP through the Water License permitting process. For the AEMP, the assessment endpoints for fish presented in the EIS are being further refined to more specifically reflect abundance and distribution, without the use of terms “desired” or “persistence”.

However, this does not detract from the overarching objective of the AEMP, which is to be protective of the VCs of water quality and fish. For the AEMP, the measurement endpoints will also be refined, but will continue to be quantifiable (i.e., measurable) expressions of the aquatic environment that influence the assessment endpoints. For example, measurement endpoints in the AEMP related to fish abundance may include metrics such as, small-bodied and large-bodied fish presence and relative abundance (e.g., catch per unit effort), sentinel species length/weight/age, and sentinel species size-at-age.

Monitoring of fish populations will be conducted through the use of standardized, repeatable methods (e.g., a random, stratified, standard fish community monitoring program), which will be ratified according to currently accepted statistical design principles and regulatory and community guidance and review. The data collected (e.g., presence, relative abundance, and population statistics of selected fish species) would be compared to metrics or benchmarks developed for the AEMP, associated with pre-construction conditions and to predicted effects of the Project during operations and closure. The AEMP will also incorporate a response framework, so that adaptive management, additional mitigation and/or monitoring can be applied, where necessary. Furthermore, in a post-closure perspective, the presence, relative abundance, and population data from Kennady Lake would be used to track fish species re-establishment in Kennady Lake.

3 REFERENCES

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4 ACRONYMS AND ABBREVIATIONS

AEMP	Aquatics Effects Monitoring Program
De Beers	De Beers Canada Inc.
DFO	Fisheries and Oceans Canada
DFO&EC	Fisheries and Oceans Canada and Environment Canada
EC	Environment Canada
EIS	Environmental Impact Statement
MVEIRB	Mackenzie Valley Environmental Impact Review Board
MVLWB	Mackenzie Valley Land and Water Board
NNLP	No Net Loss Plan
Project	Gahcho Kué Project
ToR	Terms of Reference
VC	valued components