Fisheries and Oceans
Canada

Pêches et Océans
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Your file *Votre référence*

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Our file *Notre référence*

Via e-mail to:
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July 16th, 2012

Mackenzie Valley Environmental Impact Review Board
#200 Scotia Center
5102-50th Ave
Yellowknife, NT
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RE: Fisheries and Oceans Canada Second Round of Information Request for the DeBeers Canada Gahcho Kué Diamond Mine Project

The Department of Fisheries and Oceans (DFO) has reviewed and would like to provide the following information requests related to the reports and memorandums posted on the Mackenzie Valley Environmental Impact Review Board registry on June 18th and 29th 2012, which include:

- Gahcho Kue Adaptive Management Advisory Committee – draft Terms of Reference;
- Flow Mitigation Plan
- Fish Habitat Compensation Plan – Update;
- Water and Sediment Quality Objectives Framework and
- Detailed Alternatives Analysis Report

DFO does not have specific comments on the water and sediment quality objectives framework report, as this falls under Environment Canada's mandated responsibilities to administer section 36 of the *Fisheries Act*, but it is expected that DeBeers will design their project in a way that will meet reasonable water quality and sediment quality objectives at closure prior to reconnecting Kennady Lake to the downstream environment.

Please note that all of the information requests included in the following submission are directed to the proponent. If there are any questions or clarification needed regarding DFO's submission, please contact at Sarah Olivier at sarah.olivier@dfo-mpo.gc.ca or by phone at (867) 669-4919.

Regards,

Larry Dow
A/Area Director
Fisheries and Oceans Canada

cc. Kelly Burke, Fisheries and Oceans Canada
Bev Ross, Fisheries and Oceans Canada
Bruce Hanna, Fisheries and Oceans Canada
Corrinne Gibson, Fisheries and Oceans Canada

DeBeers Canada Gahcho Kue Project
Fisheries and Oceans Canada Topic Specific Round Two Information Requests

IR Number: DFO IR#2-1
Source: Fisheries and Oceans Canada
To: De Beers Canada Inc.
References: Technical Memo dated June 29th 2012, *"Gahcho Kue Flow Mitigation Plan (June 2012)"*

Fisheries and Oceans Canada provided comments to DeBeers Canada on a draft conceptual flow mitigation plan dated May 8th, 2012. These comments can be found in Appendix A of this submission. Many of the issues raised in our previous comments have been addressed in the June 29th "*Gahcho Kue Flow Mitigation Plan*" memo in the Future Work and Adaptive Management Section. Commitments were made to monitor during the operation period to refine the flow releases based on passage needs of fish. Additional field surveys will be done 2012 to validate the assumptions for the flow at which barriers to migration persist and on the availability and suitability of spawning and rearing habitat at a wide range of flows. The updated flow mitigation plan also identifies the outmigration in late summer to overwintering habitats as one of the objectives of the flow mitigation plan. The monitoring program should include the outmigration period to ensure that grayling have enough flow to return from the spawning and rearing areas, with a commitment to increase flows, if needed. DFO would also like to request the following information on this current version of the plan:

1. It is indicated that the target for providing access is 3 out of 4 years. How will the year skipped be determined? What if there is a series of dry years in a row?

2. What information was used to compile the information on timing and duration outlined in Table 1? Supporting documentation and data used in the development of this plan will be needed. The assumptions regarding the timing of life history stages of grayling are of vital importance in coordinating the discharge to support the life stages in question. Northern based information should used as the timing and duration of life stages is highly variable for species depending on latitude and prevailing climatic conditions. In addition to other sources, the work by Jones et al., should be reviewed as they relate to grayling habitat use in NWT tundra streams. The use of existing scientific literature (especially research on northern systems), as well as ground truthing and monitoring of existing conditions should be used to develop and refine this mitigation plan.

3. Will the timing of flow be fixed or will the release of water be scheduled based on the environmental conditions any given year? E.g. If there is a late spring grayling would run later. The flow mitigation plan should accommodate the potential for inter-annual variability in the timing of freshet and other hydrological processes.

4. From Table 2 it appears that there is a focus on providing adequate flow for fish passage into spawning streams, but not the outmigration of adults and juveniles. This should be addressed.

IR Number: DFO IR#2-2
Source: Fisheries and Oceans Canada
To: De Beers Canada Inc.
References: Technical Memo dated June 29th 2012, *"Gahcho Kue Fish Habitat Compensation Plan - Update"*

DFO has met with DeBeers Canada on several occasions to discuss their conceptual fish habitat compensation plan as well as the approach to calculating and classifying the extent of the harmful alteration, or disruption or the destruction (HADD) of fish habitat that is likely to occur as a result of the project. DFO has requested on a number of occasions that DeBeers continue to explore additional compensation options beyond the flooding of the D-E-N area due to the timing of when the compensation area would be constructed and the uncertainties associated with its success (monitoring would have to occur over several years post-closure) as well as the potential environmental impacts associated with flooding the terrestrial environment. DFO will continue to work with DeBeers to further develop their compensation plan. The following questions relate specifically to the June 29th, 2012 memo:

1. Mercury mobilization from newly flooded soils and vegetation can lead to bioaccumulation of mercury in the food chain, ultimately causing increases in the fish populations. DeBeers has identified that this may be an issue in the proposed compensation of the newly developed habitat areas in the D-E-N lakes and that they plan to monitor to see if additional mitigation measures may be required prior to closure.

   How will the potential mobilization and bioaccumulation of mercury be evaluated for the flooding of the D-E-N lakes? How would it be monitored and what additional mitigation measures would be implemented to deal with any issues?

2. Please update Table 9 and 10 to include all impacted lakes specifically Lakes Kb4, N7, D1.

IR Number: DFO IR#2-3
Source: Fisheries and Oceans Canada
To: De Beers Canada Inc.
References: Technical Memo dated June 18th 2012, *"Detailed Alternatives Analysis Report"*

1. For the assessment of water and waste management alternatives the following impacts were considered from an economic perspective.

   - Capital cost impacts (dyke design and method of construction, quarry requirements, water treatment plant, fine PKC facility, lake refilling and closure costs, camp and infrastructure requirements, support services (planes, trucking, etc).
   - Operating cost impacts (water transfer and pumping, increased fuel and labour costs; water treatment plant operating costs, monitoring and inspection, etc).
   - Schedule impacts (extended design and construction period, seasonal construction restrictions, construction sequence issues, etc).

DFO noted that for several options the cost of compensation was not included in the total economic analysis. For example Alternative A2, where Area 2,3,5 and 7 would not be dewatered, could have lower costs of compensation compared to other options with greater impacts on Kennady Lake. Other things to consider in the evaluation are the benefit of maintaining overwintering habitat, and maintaining a persistent population of lake trout during operations. By maintaining a semblance of the ecological function of these areas, the time required to return Kennady Lake to a viable self sustaining aquatic ecosystem at closure could be greatly reduced.

Please include the cost of habitat compensation and effectiveness monitoring for all options within this analysis.

2. The mine plan proposes to use the 3 pits to store processed kimberlite tailings as well as water from the water management pond. While using mined out pits for storage makes sense, effects on water quality once Kennady Lake is flooded are unknown.

   Will the Reclamation Research Plan include an assessment of the predicted and actual water quality in the pits after they have been filled and prior to the rest of Kennady Lake being flooded?

3. With both alternatives provided for mine rock storage it is stated that seepage and runoff from the mine rock piles will flow directly into Kennady Lake after re-filling.

   What is the water quality of the seepage and runoff water expected to be over the long term from the waste rock piles?

4. As part of the proposed mine plan, the 3 pits referenced above as well as the impacted sediment from the water storage pond area will be submerged at closure in addition to the seepage from the waste rock piles and the process kimberlite containment facility all of which could influence water quality in Kennady Lake at closure. What is the worse case scenario, if water quality cannot be met in Kennady Lake after refilling? What would be the costs associated with implementing contingency or adaptive management options?

5. It is stated in the Alternatives Analysis, that "*earlier alternatives suggested a fish passage channel could be constructed to allow water to flow to Area 8. The channel canal was considered uneconomical due to the extensive earthworks undertaking, and schedule impacts. Furthermore, with no head differential between Area 3 and Area 8, design would necessitate a deep channel and wide channel to avoid full freezing and snow blockage conditions*." As identified by DeBeers, BHP Billiton constructed a 4-km diversion channel at the Ekati Diamond Mine, "*bypassing the southern portion of Panda Lake and Koala Lake providing for a water and fish bypass channel between the upstream lakes and Kodiak Lake*."

   Please compare the anticipated level of effort, difficulty and technical feasibility of the construction of a diversion channel to Area 8, to what was undertaken for the Panda Diversion Channel.

6. One of the disadvantage listed for Alternative A is the need for a TSS treatment plant. However, a treatment plant could reduce the area required for water management.

   Please provide a comparison of the area required for water management with a treatment plant and without a treatment plant.

7. On page 27 a disadvantages of Alternative A is that "*The environmental risk of uncontrolled water seepage will be high, both during mine operation and after closure, because the raised west Area 6 pond contained within the ring dyke has high head of water above the natural topography*."

   In DeBeers' preferred mine plan, water from the water management pond would be pumped into Tuzo Pit. Could a similar approach be used to pump water from Area 6 into one of the pits thereby reducing the risk of uncontrolled water seepage at closure? Could this area then be capped or designed in a way to no longer store water at closure?

8. DeBeers identified that a disadvantage associated with a TDS treatment plant is that high TDS residual brine and sludge will need to be properly disposed of.

   Does the inclusion of a TDS treatment plant reduce the amount of water that would need to be managed over the life of mine? Could the waste from the TDS treatment plant be placed in the Tuzo pit?

9. Perimeter dykes presented in Option 3A in Section 4.1.1.4 will be constructed around the west portion of Area 6 before mine production; the final dykes will have a maximum height of 28 m and a total length of approximately 3,900 m. The Area 7 pond will be used to store the contact water, including the pit water that does not meet the discharge criteria, **in Year 11** after the mined-out 5034 and Hearne pits are full.

   If Area 7 is utilized for contact water storage at the beginning of operations rather than waiting until Year 11, how would this affect the height of the dyke required for Area 6?

10. DeBeers has not provided sufficient evidence to prove that fish habitat in Areas 2, 3 and 5 will be destroyed by drawing down the water level by 3 metres. As there is no regulatory mechanism to allow the deposit of a deleterious substance, alternatives should be assessed by DeBeers accordingly.

    Please provide additional information on the proposed alternatives that don't require the deposit of a deleterious substance into fish frequented waters (e.g. Option 6 or 3 in the Fine PK alternatives options).

11. It is stated in the Alternatives Analysis that the 3 metre proposed drawdown would cause high quality lake trout and round whitefish spawning habitat to be exposed and unavailable. High quality habitat that would be lost is in the 2 to 4 metre depth range which is kept free of silt and fine organic debris by wave generated currents and below the zone of ice scour. "*As the lake level is reduced, the lake bed in the remaining areas would still be subject to up to 2 m of ice scour. Beyond this new ice scour zone, the substrate is composed primarily of loose,*

organic sediment that would not be suitable for lake trout and round whitefish spawning, ***at least during the initial years*** *until sufficient wave action clears the sediments from the substrate. Therefore, suitable spawning habitat for these fish species would be lost for the duration of the mine*".

How many years does DeBeers believe it will take for wave action to expose suitable spawning habitat? If wave action created suitable habitat in the "initial years" spawning habitat would not be lost for the duration of the mine.

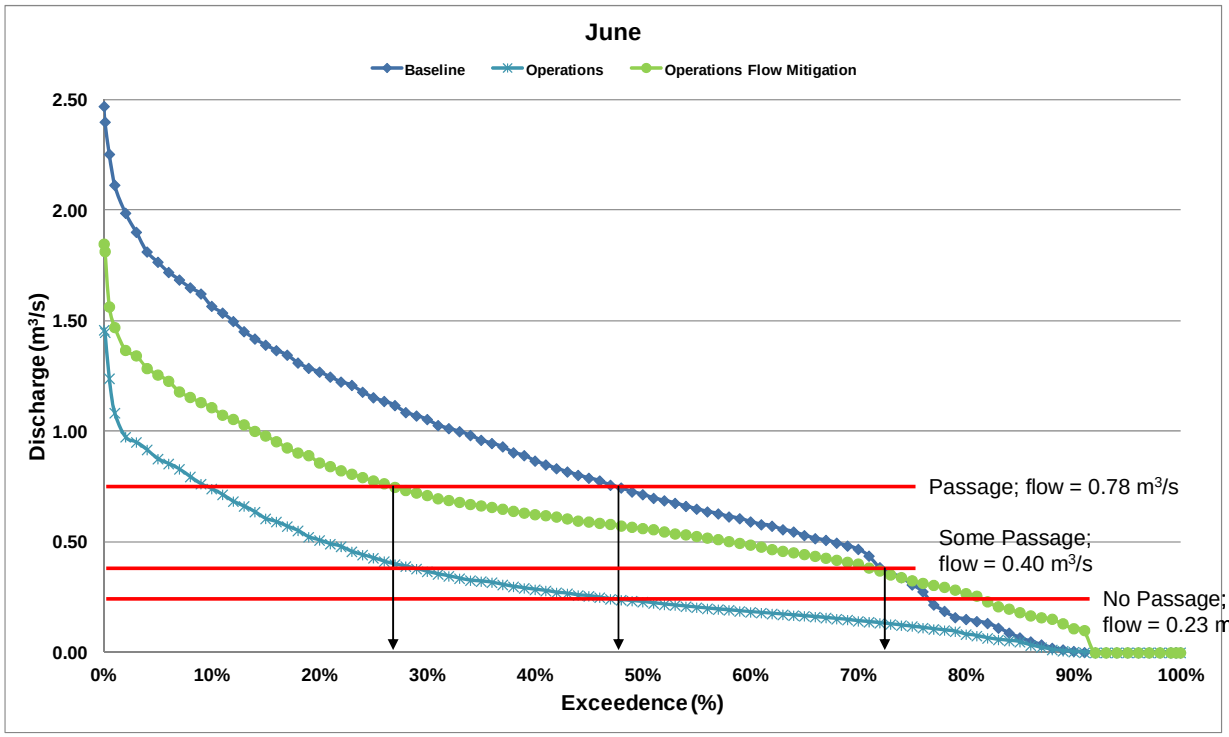
Appendix A - Department of Fisheries and Oceans Comments on Draft Conceptual Flow Mitigation Plan – May 8th, 2012

The following comments are based on the Draft Conceptual Flow Mitigation Plan contained in the May 8th, 2012 Technical Memorandum from Kasey Clipperton (Golder Associates).

The overall objective of providing flows that allow access to the spawning and rearing habitat for 3 out of 4 years appears to be a reasonable approach in sustaining the existing grayling population; however more work is needed to address some of data gaps that are discussed below.

According to the memorandum, natural barriers to fish passage exist at a discharge of 0.23 m^3/s, and are absent at a discharge of 0.78 m^3/s, and the transition discharge where fish passage is not affected is unknown. The three month timing window for grayling to access, utilize and return from their spawning and rearing habitat is relatively short and any delay in access to the habitat due flow limitations may affect spawning or rearing success. It is therefore very important to ensure that the discharge at the start of migration season is designed to minimizing delay and provide a high degree of passage success.

A comparison of the flow frequencies for the barrier to passage discharge values presented in the memorandum was made using the June Flow Exceedance Curve (Figure 1). The summary table shown below presents the results of the comparison.



Discharge (m^3/s)	Barrier to Passage	Percent Flow Exceedence June	
		Baseline	Mitigation
0.23	Yes	77	85
0.40	Some passage	73	73
0.78	No	47	27

For the 0.40 m^3/s discharge value that was used to develop flow targets for the mitigation plan and was assumed to provide "some passage" the flow exceedence is approximately 73% which equals the baseline value and would reflect the 3 out of 4 year passage criteria objective. However, as stated in the memorandum, more information on the passage effectiveness at the 0.40 m^3/s discharge is required before this value can be accepted.

For the 0.78 m^3/s discharge value that was identified as a "no barrier" to passage, the flow exceedance drops to 47 percent for baseline and only 27 percent for the proposed mitigation flow. The difference in flow frequency in this comparison illustrates the importance of establishing the correct migration discharge criteria.

Underestimating the flow releases for the June migration period could limit the use of the spawning and rearing habitat by increasing the frequency when grayling are unable to access the habitat as well as increasing the delay to gain access to the habitat.

Recommendations

- Focus flow augmentation requirements on the June migration period in order to maximize access to the spawning and rearing habitat. If grayling cannot access the habitat, they cannot use it.
- Develop a better understanding of the relationship between migration flow required to access the habitat and the flow that is needed to sustain the habitat during the spawning and rearing period (wetted habitat). Flow criteria should be designed to avoid the case where habitat is not utilized due to accessibility limitations.
- Has water velocity as a potential barrier to passage at higher flows been consider in the flow mitigation plan?
- If capacity of the water source that will provide supplementary flow is not limited, would it be possible increase mitigation flows to more closely match baseline flows and improve utilization of the spawning and rearing habitat?