Gahcho Kue Information Requests

Yellowknives Dene First Nation

Table of Contents

FROM:
Todd Slack
Research and Regulatory Specialist
Yellowknives Dene First Nation
Land and Environment
P.O Box 2514, 901 Sikyea Drive (Ndilo)
Yellowknife, NT
X1A 2P8
Ph: (867) 766-3496
Fax: (867) 766-3497

TO:
Chuck Hubert
Environmental Assessment Officer
Mackenzie Valley Review Board
tel: 867-766-7052
fax: 867-766-7074
email: chubert@reviewboard.ca

Section 1: Caribou

IR Number: YKDFN 1.1

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Persistence of caribou used as endpoint metric

Preamble:

Analyses of residual effects are conducted using pathway analysis (starting pg. 7-48). Potential pathways are described (through largely qualitative assessment) as no linkage, secondary, or primary. Secondary pathways – "*could result in a measurable and minor environmental change, but would have a negligible residual effect on a VC relative to baseline or guideline values*" (pg. 7-50) – were not analyzed further. Thus, unless a pathway was described as primary and could potentially "*result in environmentally significant effects on the **persistence** of caribou populations and continued opportunity for traditional and non-traditional use of caribou*" (pg. 7-50), they were not analyzed to their full extent. In other words, unless the **persistence** of the population was in jeopardy (as in a reasonable chance of elimination of the Bathurst herd), no determination of significance could be found. Persistence does not appear to be formally defined in the Gahcho Kue KLOI – caribou document, but in the Fortune NICO response to IRs (Response to YKDFN_2.1; December 2011) appears to be described as the minimum viable population defined by the smallest number of individuals in a population with a high probability of persisting over a long period of time. Using persistence of caribou appears to be a very low bar to clear. Sustainability of the herd might have been a more reasonable metric, and would have better considered the trade-off for Aboriginal communities between potential loss of harvest and development.

Request:

1. Please justify further why persistence of caribou is the metric used to determine significance, and not sustainability that could better address harvesting.
2. The Proponent complete an analysis that evaluates the direct and indirect impacts of the mine on the sustainability of the herd, with a particular focus on not just the ability to hunt but the number of animals available for harvesters

IR Number: YKDFN 1.2

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Use of 40% habitat loss threshold

Preamble:

The proponent compares direct habitat loss to seasonal herd ranges (an obviously very small proportion, <<0.1%). They quote "*the cumulative direct disturbance to each seasonal range from the Project and other previous, existing and future developments is predicted to be less than or equal to 1.7% relative to reference conditions for seasonal ranges of Ahiak and Bathurst caribou. This change is well below the 40% threshold value identified for habitat loss associated with declines in bird and mammal species*" (pg. 7-91 and elsewhere). This is an uninformative comparison. Many of the citations deal primarily with endangered species (e.g., Reed et al. 2003), and thus the comparison with the Bathurst caribou herd is incorrect. The 40% habitat loss value is often cited and rarely tested (Swift and Hannon 2010). Habitat loss thresholds has never been tested for barren-ground caribou, and are unlikely to be a valid assumption for barren-ground caribou in tundra situations where habitat loss or fragmentation is less of an issue compared with functional habitat loss caused by other forms of disturbance and displacement. Responses to habitat loss or fragmentation may be linear or non-linear, and likely vary among species and landscapes. If 40% habitat loss was the threshold for declines in caribou numbers and triggers of significance going in to these analyses, the proponent could have saved a lot of paper and computer time by simply stating no significance from the start. Requiring something to cause a significant decline before it is recognized as a significant effect sets a very low bar.

Reed, D.H., J.J O'Grady. B.W. Brook, J.D. Ballou, and R. Frankham. 2003. Estimates of minimum viable population size for vertebrates and factors influencing those estimates. Biological Conservation 113:23-34.

Swift, T.L., and S.J. Hannon. 2010. Critical thresholds associated with habitat loss: a review of the concepts, evidence, and applications. Biological Reviews 85:35–53.

Request:

1. Please describe how a 40% value for habitat loss can be justified as a significance threshold for caribou in a tundra environment.

IR Number: YKDFN 1.3

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Calculation of the impact of the zone of influence (ZOI)

Preamble:

Calculations of the effects of zone of influence on caribou distribution and abundance state "*It was predicted that the ZOI (geographic extent)... would be 15 km around the Project and other active mine sites. Specifically, active mines were estimated to reduce* ***habitat quality*** *by 95% within a 1 km radius,*

50% from 1 to 5 km, and 25% from 5 to 15 km." (pg. 7-147). A number of references are provided to justify these numbers. The references cited stating ZOIs are likely <5 km for caribou and other wildlife species all come from or summarize results from forested habitats, and the situation in tundra environments is likely quite different (longer sight lines unimpeded by trees, potentially great ability of stimuli (i.e., noise, dust) to travel over open, relatively flat habitat). Regardless, Boulanger et al. (2012) demonstrated **an average 75% reduction** in caribou occurrence within a 14 km ZOI, and did not assume or predict graduated zones of avoidance and relative abundance within this 14-km radius. The implicit assumption is that habitat quality is reduced as indexed by a behavioural avoidance (which Gahcho Kue was measuring and assessing) translates to reduced abundance (which they did not assess). While the concept of staggered zones of impact to reduced habitat quality may be valid, it may equally be incorrect (if for example, a mine provides higher predation risk right adjacent to the mine). When you do the math, if these zones relate to caribou occurrence (from habitat quality), then the proponent's analysis determines an **average 28% reduction** in caribou abundance within the 15 km ZOI, and overestimates caribou abundance by about 3 times beyond the overall 75% reduction in the entire ZOI as calculated by Boulanger et al. (2012).

Boulanger, J., K.G. Poole, A. Gunn, and J. Wierzchowski. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou and diamond mine case study. Wildlife Biology 18: in press.

Request:

1. The YKDFN requests that the Proponent justify their calculations of the impacts of reduced caribou occurrence within the ZOI;
2. The Proponent should also discuss the implications of a 28% versus 75% reduction in occurrence.

IR Number: YKDFN 1.4

Source: Yellowknives Dene First Nation

To: De Beers and GNWT (ENR)

Subject: Energetics modelling

Preamble:

The proponent used an energetic modelling approach (pg. 7-110) to conclude that Project-induced effects would have incremental and insignificant effects on caribou behaviour, energy balance and calf production (pg. 7-152). An independent review of the energetic model presented by Golder in the Gahcho Kue EA was conducted and concluded that how the model was applied offers an inadequate assessment of energy costs to caribou of the Gahcho Kue project (D. Russell, unpubl. data, December 2011). The review identified five main concerns with the model:

1. Failure to account for difference in activity of caribou in and out of ZOI. The Golder assessment mistakenly assumes that caribou that did not overtly react to the encounter (45% of encounters) within the ZOI had "normal" activity budgets;
2. Only considering half of the energy balance equation. The ability of caribou to meet their energy requirements can be affected by increasing energetically costly activities (which increase the requirement) and/or reducing energy intake (which reduces energy available to meet requirements). The Golder model only considers the energy expenditure side of the equation (and only compared with caribou not reacting to an encounter but still in the ZOI), not the energy intake side;
3. Comparing energy balance costs of insects to energy expenditure costs of encounters. First, the Golder model states the cost of insect harassment was 0.037 kg body weight per 1 unit of insect harassment (pg. 7-117). In fact the cost in Weladji et al (2003) study was 0.037 kg of **carcass** weight, not **body** weight, which increases the cost on a body weight basis to ~0.067 kg. Secondly, change in fall weights of calves in Weladji et al (2003) has integrated all costs of insect harassment, thus accounting for all components of energy balance as described in the equation in the previous section. Thus it is not appropriate to apply the energy cost per encounter as determined by Golder to the full cost of insect harassment. Golder cost estimate misses most of the sources of energy costs;
4. Use of pregnancy rate instead of probability of pregnancy. Golder's approach models an individual caribou and thus they should be relating cost of encounters with that animals' probability of getting pregnant (0 or 1), not a population pregnancy rate; and,
5. Using 16 kg drop in fall body weight (resulting in 0% pregnancy rate; pg. 7-115) assumes that all animals are at maximum body weight going into the development zone and/or insect season. Many factors dictate the variability in caribou body condition entering the insect season. It is conceivable that a very limited number of encounters could result in a drop in body weight that reduces that individual's probability of pregnancy below 50%. That variability needs to be acknowledged.

Therefore, there appear to be errors in the Golder energetic analysis that underestimate the cost of development.

Weladji, R.B., O. Holand, and T. Almoy. 2003. Use of climate data to assess the effect of insect harassment on the autumn weight of reindeer (*Rangifer tarandus*) calves. Journal of Zoology 260:79-85.

Request:

1. The proponent should revise their energetic model in light of this review (which can be provided to the proponent).
2. The assessment of significance should be re-examined based on revision to the energetic model.

IR Number: YKDFN 1.5

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Handling of the Beverly caribou herd

Preamble:

The wildlife baseline (pg. F4-9) acknowledges that Beverly numbers have declined perhaps 99% up to 2009. It also says the herd will have some, although low likelihood of interacting with the project ("*The likelihood of large numbers of animals from the Beverly herd interacting with the Project was predicted to be too low to have detectable effects on the herd*" pg. 7-15; "*Although individuals from the Beverly herd can be expected to travel through the RSA during the autumn or winter periods in some years, the direct and indirect effects from the Project on the population are predicted to be negligible*" pg. 7-48). Similar statements are made regarding effects on population size and distribution of Beverly caribou (pg. 7-79). There is no work plan that demonstrates how these conclusions were reached. Given low numbers of the Beverly herd, project effects to even a few individuals (but a large proportion of the population) might result in a measureable change in population size.

Request:

1. The Proponent should clarify what are the implications to the herd and project if the Beverly herd increases in numbers over the next 2 decades.
2. The Proponent should clarify what the impacts to the herd are if the mine effects even a small proportion of the herd then there is the possibility of significant impacts. Minor impacts to a small portion of the herd may lead to significant impacts on sustainability, but given the difficulties and uncertainties faced by the herd at presence, persistence is a clear issue.

IR Number: YKDFN 1.6

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Deposition of total suspended particulates (TSP)

Preamble:

Dust may change habitat quantity and result in habitat fragmentation. The document acknowledges that dust deposition may cover vegetation and decrease abundance of caribou forage and alter caribou movement and behaviour (Table 7.4-1, and elsewhere). Use of the term "dust" is inconsistent, referring

to total suspended particulates (TSP) deposition (pg. 7-65), but also apparently to fugitive dust which incorporates TSP as well as smaller PM10 and PM2.5 particulates. Maximum deposition rate will occur within 100 m of footprint (pg. 7-71), but this does not acknowledge longer distance TSP deposition – out to 14-20 km at Ekati and Diavik – at lower concentrations (Rescan 2006). Low levels of TSP may be a casual mechanism for the observed approx. 14 km zone of influence observed at other open pit diamond mines (Boulanger et al. 2012), and may be enough to discourage caribou use of an area without having any direct or measureable effects on the vegetation. Thus, these influences may be a result of sensory disturbance rather than direct changes to vegetation.

Boulanger, J., K.G. Poole, A. Gunn, and J. Wierzchowski. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou and diamond mine case study. Wildlife Biology 18: in press.

Rescan 2006. EKATI Diamond Mine: CALPUFF Air Dispersion Modelling Assessment. Report prepared for BHP Billiton Diamonds Inc. by Rescan Environmental Services Ltd., June 2006.

Request:

1. The YKDFN requests that the Proponent clarify whether they are addressing fugitive dust or TSP in their assessment;
2. The YKDFN requests that the Proponent re-examine the pathways to include dust deposition affecting caribou distribution and abundance through sensory disturbance, rather than direct changes to vegetation.
3. The DAR repeatedly mentions that '99% (or maximum predicted deposition rate) of the dust falls within 100 m of the footprint'; pg. 7-71) or language to that effect, yet this only presents a portion of the picture. The YKDFN request that analysis and discussion be prepared for the other 1% of dust and evaluate it as part of the impacts.

IR Number: YKDFN 1.7

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Incorrect use of caribou life span and generation time

Preamble:

The DEIS relates duration of impacts with caribou life spans, and states "*The duration of the impacts from the Project and other developments on population size and distribution is expected to occur over a period of 27 to 32 years (i.e., long term). It is predicted that impacts should be reversed within two caribou life spans*" (pg. 7-165, also pg. 7-162). It is more appropriate to use generation time for this metric. Generation time is not the age at first reproduction, but the mean age of parents at reproduction (Hernandez-Suarez 2011). COSEWIC (2004) assumed a generation time for Peary caribou

of 7 years, but the basis for this was not provided. Boulanger (unpubl. data) recently conducted an analysis suggesting generation time for the Bathurst herd was approximately 8 years, but varied with changes in fecundity and survival rates. Percent changes in numbers related to generation time (generally 10 years or three generations, whichever is longer) is often used in assessing trends in populations (IUCN 2001, SARC 2010). Calculation of generation time can be complicated (Hernandez-Suarez 2011), and depends on the age structure and average age of the population, which for caribou can change over time. Use of life span instead of generation time minimizes the impact of development on caribou.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2004. COSEWIC assessment and update status report on the Peary caribou *Rangifer tarandus pearyi* and the barren-ground caribou *Rangifer tarandus groenlandicus* (Dolphin and Union population) in Canada. Ottawa. COSEWIC.

Hernandez-Suarez, C.M. 2011. A note on the generation time. Oikos 120:159-160.

IUCN (2001) IUCN Red List Categories and Criteria: Version 3.1. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, U.K. Available at http://www.redlist.org/).

SARC. 2010. Northwest Territories Species at Risk Committee (SARC) Species Assessment Process. Species at Risk Committee, Yellowknife, NT. Available at www.nwtspeciesatrisk.ca

Request:

1. The proponent should use generation time, not life span, in calculations for the assessment, or justify why life span should be used.
2. The proponent should evaluate the residual impacts and the significance of utilizing generational time. Further, if generation time is utilized in any calculations, it should be identified, recomputed and compared to the original life span values.

IR Number: YKDFN 1.8

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Use of canned packages in the assessment process

Preamble:

The proponent uses a number of canned packages during the assessment, including FRAGSTATS to examine landscape fragmentation (pg. 7-83), RAMAS for population viability analysis (PVA; pg. 7-127), and friction modelling or least cost path analysis to identify the location of potential caribou movement pathways) pg. 7-26). Because of the Black Box nature of these packages, it is difficult for Aboriginal

people trying to interpret an assessment of significance, and leads to a lack of transparency in the assessment process.

Request:

1. The proponent should explain in greater detail and plain language how the inputs into these canned packages are treated in the program, and their implications to the assessment. For example, does the PVA consider the trade-off that may occur between caribou harvest for communities and development?

IR Number: YKDFN 1.9

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Inadequate handling of the potential impact of the winter road

Preamble:

The potential pathways for effects to caribou table (Table 7.4-1) indicates that the winter access road and the Tibbitt-Contwoyto winter road may alter caribou movement and behaviour, and increase the risk of injury or mortality to caribou, which can affect population size, increase dust deposition and sensory disturbance, among other things (pgs 7-51-58). Reportedly there have only been three reported road-related wildlife mortalities along the Tibbitt-Contwoyto winter road between 1996 and 2009 (only one incident that killed five caribou), but reports verifying these data post 2001 are not cited, and are not available to verify methodology or accuracy (pg 7-75). With up to 11,000 trucks annually during an 8-12 week period each winter when caribou are potentially present, it is difficult to believe that only one group of caribou has ever been hit but a truck. Thus the conclusion of negligible residual effect (pg 7-76) is not supported (except of course that it uses persistence as the measurement metric – see IR YKDFN 1.1).

The Gahcho Kue winter access road will see up to 2,000 trucks per year during construction, decreasing to about 1,200 per year during operation (pg 7-101). Over a 12 week winter road period, this equate to approximately 25 and 14 trucks per day (pg 7-101). With warming temperatures and decreasing length of ice road season, the intensity of truck traffic will need to be increased. Analysis was not conducted on the impact of a shortened winter trucking season on the filter or semi-permeable barrier effect of the road under these conditions.

Request:

1. The proponent should acknowledge the uncertainty in the caribou mortality data, and revise their pathway analysis accordingly.

2. Climate change may result in shorter winter trucking seasons in some years and more often in the future. The proponent should amend their analysis to consider the effects of a shortened ice road season on both caribou mortality and barriers to movement.

IR Number: YKDFN 1.10

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Quality of maps and figures in reports

Preamble:

The digital file size of most of the major sections and annexes is reasonable, but most maps and figures are of such poor resolution as to be unreadable. Examples can be seen throughout the caribou KLOI (Section 7; e.g., Figs. 7.3-4, 7.5-8). This is a major hurdle in interpreting the information provided.

Request:

1. To allow proper review of the EIA, the YKDFN requests that the Proponent supply the digital documents so that they provide figures and maps that are clear and legible.

IR Number: YKDFN 1.11

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Airport fencing

Preamble:

The proponent acknowledges that "*aircraft/vehicle collisions may cause injury/mortality to individual animals*" (Table 7.4-1), but is not clear whether fencing of the airstrip is proposed, and if so, what type of fencing will be used (to avoid the issues with electric fencing that have occurred at Ekati and Diavik). No aircraft collisions have caused mortality to caribou at existing mines, likely because they are fenced.

Request:

1. The YKDFN requests that the Proponent clarify whether fencing of the airstrip is proposed, and if so, what type of fencing will be used.

IR Number: YKDFN 1.12

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Winter Road Data, Impacts and Access

Preamble:

Section 11.8.4.3 references a decline in the number of vehicles stopping at the winter road (from 573 to 284). As this 'checkpoint' was a voluntary stopping point, there is a strong suspicion from YKDFN and other Parties that the data is not indicative of trend of reducing utilization that the proponent suggests. During the caribou harvesting restrictions, GNWT certainly intimated that the First Nations harvesting effort has remained very high.

Request:

1. The proponent provides a discussion on the capture rate of the voluntary checkpoint and what indication that declining participation may have on their assertion and assumption.

IR Number: YKDFN 1.13

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Winter Road – Restriction to Movement

Preamble:

Section 11.8.4 and 11.8.5 discusses the possibility of the winter road acting as a barrier to movement for wildlife. While the DAR acknowledges that the "presence of winter roads may represent a barrier to animals, and lead to fragmentation of the population within the RSA" it does little to evaluate this potential – it suggests that the winter road will likely be a "leaky barrier" (evidence from the North seems to confirm this) and that the fact of the winter road being limited to an 8 to 12 week period each year represents some mitigation. This would be true if it weren't for the fact that the 8 to 12 weeks that the road is in operation is the period which caribou are likely to be in the area, thus the effects on movement are in place. The DAR does not go on to meaningfully evaluate or assess these impacts, only suggesting that they low to minimal in magnitude.

Request:

1. The proponent provides a thorough discussion on the likely direct and indirect impacts of the introduction of a leaky barrier to the movements of caribou.

2. Included as part of this discussion should be an analysis which considers the encounter of collared caribou with the winter road route. This analysis should focus on if an animal would encounter the road or the project during a year as well as the number of encounters (relative to the number of 'caribou years' of data.
    a. Furthermore, the proponent should provide information on the temporal resolution of the collaring data and the uncertainty that this injects into the analysis
    b. Table 7.3.2does not contain any indication how the company addressed the issue of standardizing the variances across the years. For instance, newer collars generally broadcast more often, especially during key parts of the year – so the raw results presented in this table present a misleading picture and can introduce bias.

IR Number: YKDFN 1.14

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Winter Road – Monitoring

Preamble:

The winter roads are effectively operated as though they are independent of the mine itself and do not undertake monitoring activities directly related to the operation of the mine. Often the Wildlife Effects Monitoring Programs do not address the concerns or confirm the predictions made during EA. With this consideration, YKDFN want the company to make clear commitments on how they intend to verify their EA predictions with respect to road operations. It is not acceptable to simply make a statement during the permitting phase.

Request:

1. How does the company intend to monitor the use and impacts of the winter road during the operations, closure and post-closure period.

IR Number: YKDFN 1.15

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Caribou Habitat - basedata

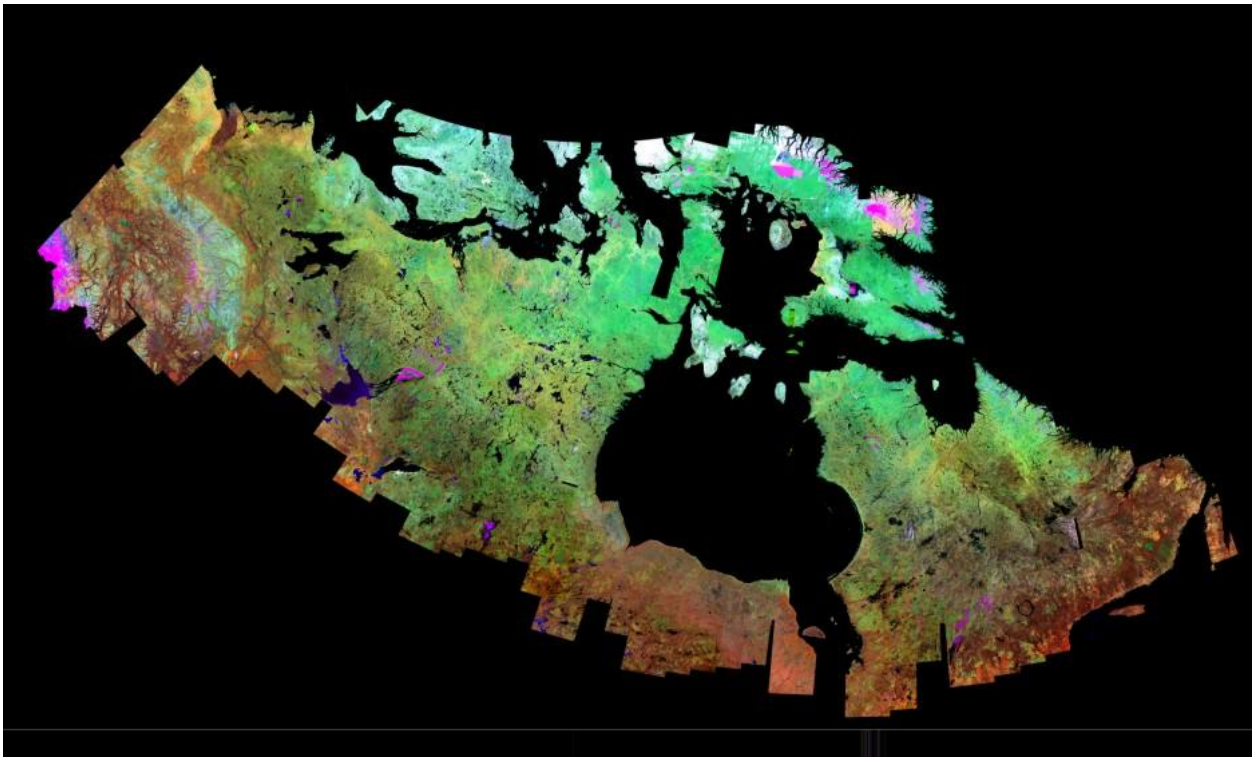
Preamble:

The proponent utilizes the Land Cover of Canada vegetation classification which has a 1 km resolution (pgs 7-83, 7-102) – the City of Yellowknife would be reduced to a few pixels, while Dettah is probably not detectable. This is a very low resolution basedata, which was then subjected to a modification process to resample it to a smaller resolution (down to 25-m resolution, then resampled to 200-m cell sizes (pg 7-83, 7-102). However, this does not improve the data, it simply slices the larger squares into smaller squares of the same value. Utilizing this data is only appropriate if the larger cells do a good job at approximating the actual landcover on the ground.

There are several high resolution datasets available for parts of the territory and from industrial projects in this extent. The creation of a unified legend/classification scheme would allow a comparison between the areas classified in the Land Cover of Canada and the higher resolution datasets, providing some indicator of the relative quality and confidence that the parties should have in the basedata. YKDFN have a real concern that the basedata used to complete the various analyses in the EIS may be producing results that will result in poor decisions and management as well as not assuring the Board or the Parties that the conclusions of no significant impacts are likely.

Request:

1) The proponent should undertake a comparison between the Land Cover of Canada dataset and the higher resolution data available from around the NWT and Nunavut to ensure that the information being utilized in the models is valid for the purpose. Example datasets include vegetation classifications from Tyhee, Avalon, Ekati, Diavik, and Bathurst Port and Road as a start.
2) The proponent should provide a discussion why they chose not to use the 90 m (Extents found below) medium resolution Landcover of Canada (2005) or the 250m MODIS Landcover of Canada (2005) rather than a 1km version. These datasets would have provided a much improved picture of caribou use.



Pictured: Extent of the 90m Landsat Vegetation Classification.

IR Number: YKDFN 1.16

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Caribou Habitat – Habitat Suitability Modelling

Preamble:

The EIS, despite being voluminous, does not elaborate on how the proponent derived or defined the "good" vs. "bad" habitat other than to suggest that it applied Johnson's method, though the later used a much higher resolution for its initial data.

These types of models generally work by comparing the habitat available to caribou to the habitat that they select. Utilizing the 1km basedata instead of higher resolution data creates a number of potential errors within the output. Firstly, with cells this large, the evaluation of choice becomes much different – each cell is, because of the initial resolution, a large area of 100 hectares that is effectively homogonous in the image. Thus, the availability of the habitat to be selected is much reduced. Secondly, this introduces potential errors of commission, where an animal is selecting one type of habitat within a larger more dominant class, but because of the relative difference in abundance, the more common

class is spectrally dominant in the imagery – an easy example here would be stream banks on the tundra where shrubs and woody vegetation appears, but because its relatively small in area the pixel would be classed as the dominant area.

Request:

1) The proponent should provide a clear explanation of the methods used to derive the habitats that caribou select for compared to what they select against.
2) The proponent should prepare a discussion which evaluates the predictive nature of the HSI models with differing resolutions of data, specifically addressing the issue of bias with larger pixels.
    a. For example, in the current analysis which started with low resolution data (1km/large pixels), if the starting vegetation is 'class A' there would be a significant bias that next, selected point would also be the same class.
3) A test sample should be prepared which compares the outcomes, coefficients, and selection preferences of caribou with different resolution basedata (90 m Landsat based landcover pictured above, 250 m MODIS). How does the use of different bases affect the results?

IR Number: YKDFN 1.17

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Economic impact of reduced caribou availability (Section 7.7.2.2, 7.3.3.4)

Preamble:

The impact from the project on the caribou population (1.5%) and distribution will increase the costs and reduce the success rate of hunters. Given that there is no substitute for land users to access, this will have a real economic cost that the company needs to evaluate for the Parties to understand the potential for significant impacts.

On the one hand, the EIS states "Availability of caribou for human use is related to changes in the populations size and distribution of caribou", while on the other it suggests that the resulting impact will be negligible to low. When this is combined with the impacts already occurring, YKDFN is concerned that the impact will be significant over time. Research from the Beverly Qamanirjuaq Management Board has indicated that each caribou not harvested has an economic replacement cost of approximately $1000.

Given that the project is expected to have a low impact to the fecundity and population of the Bathurst, Beverly and Ahiak Caribou herds, this will have a clear and obvious impact on harvesting success. The

EIS tends to downplay the impacts on caribou to the mines, giving credence to a small number of publications generally focusing on the Central Arctic Herd as their references to evaluate the impact of development on the herd. However, this does not conform with the widely held experiences of traditional land users – the TK holders of the YKDFN strongly believe that the mines have complicated the natural cycle of caribou populations.

The company suggests that impacts from insects have a much larger potential impact on the population of the herd, which may be true. However, this is moot as it is the impacts from the mine the issue here – they will be additive to those of the environment.

Recommendation:

1) The company should prepare an analysis that quantifies the economic impact of lost harvesting opportunities and reduced hunting success.

2) The company should conduct population modelling showing the impact of this minesite on caribou populations. This work is essential – the imposition of harvesting restrictions on the YKDFN is, without question, a significant impact – and if this minesite, even with its 'low' magnitude impact, results in a delay of the herd recovery (even a delay of a small magnitude), then this is something that the Parties need to understand to evaluate this project.

Section 1b: Carnivore Analysis

IR Number: YKDFN 1.18

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Carnivore Input Data – Image Manipulation (Starting Section 11.10.4.2.1)

Preamble:

The machinations used to develop the basedata used in this analysis are unclear. According to the EIS, the 1km Land Cover of Canada was the starting product, which was then 'up-sampled' into 25m cells. It was again re-sampled into 200m cells. From the presentations at the workshop in November, it seems that this is incorrect for the Carnivore analysis and the basedata was derived from the West Kitikmeot Slave Study.

Secondly, the company states that "Visual inspections of the distribution of cover data in the areas that overlapped the SGP and Land Cover of Canada guided the reclassification process". What YKDFN is unclear about is just how a visual inspection guide the process considering that each of the starting cells contained in excess of a thousand cells from the SGP dataset?

If the product was generated from the Land Cover of Canada there should be almost no visual difference between starting and final product, but when compared to the 25m scale, a small areal sample from the SGP (i.e. WKSS Vegetation Classification) would have a large diversity relative to the working product which would be nearly uniform at large scales.

Request:

1) The Proponent must provide clear reference to what basedata was used for this analysis, including links to obtain and appropriate metadata for the Landcover of Canada.
2) The Proponent should be required to clearly explain just what modifications were undertaken to 'prepare' the data prior to analysis. If the wildlife analyses were completed on the 1km Landcover dataset, then the EIS is clear, but based on the presentations provided to Parties and some of the models that were run, it seems likely that alternative data was used and prepared for input into the analysis.
3) The Proponent should be clearly required to explain what computational limitations required different analysis techniques than in 2005. Given the rapid increase in computing power, providing data not directly comparable to previous results, should not have been an issue. Indeed, the proponent has provided analysis based on input data with less than 40 times the resolution.
4) The proponent should clearly explain why they altered the processing scheme employed by Johnson 2005 and how this process produced a better result – the Johnson project used the WKSS data, and a moving 3x3 window to scale the data rather than simple nearest neighbor re-sampling.

5) The proponent should provide a clear explanation as to why the WKSS or CCRS's 90m Landsat vegetation dataset were not used.
6) If the original dataset was the 1km Landcover of Canada (as stated on page 11.10-99), the proponent should provide a clear explanation as to why the same study area/boundary was selected as in Johnson. This seems a very artificial and irregular boundary and a new study area reflecting natural terrain or watersheds should be considered.
7) In addition to the completion of relative accuracy assessment amongst datasets, the proponent should undertake an accuracy assessment of the dataset used, utilizing the vegetation sites collected for the WKSS in addition with the vegetation plots that the company has collected for the Snap Lake and Gahcho Kue project (and any additional vegetation information available, perhaps via other industry or government projects). By comparing these sites to the vegetation classifications used in the modeling work, the Parties will have an actual assessment to gauge the applicability of this data for the manner with which it is used in the sophisticated analyses undertaken.
8) The company should provide a discussion on the applicability of deriving fragmentation and edge statistics considering that they have affected both of these values through the re-sampling process.
9) The company should provide a discussion on the how the lack of resolution affects the "available resources" for the animals to choose from within the modeling effort and what this means when considering the models used – for example, if the rate of movement is very low, it is entirely conceivable that the animal wouldn't actually leave the original cell (1km). This is critical in establishing the species selection preferences for different available habitats.

IR Number: YKDFN 1.19

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Carnivore Input Data – Endpoint prediction utility (Section 11.10.4, 11.10.5, 11.10.6, 11.10.7 and 11.10.9)

Preamble:

While the EIS referenced using the Landcover of Canada dataset, the presentations in November (see slide 7 of Terrestrial presentation) referenced the Slave Geologic Province and the availability of high-resolution data. Data derived from 1km cells cannot be considered high resolution by any reasonable person, regardless of the degree of 'up-sampling' applied – you cannot derive additional resolution. Thus, it seems that the proponent utilized the SGP/WKSS dataset and the remainder of this information request is based on this assumption. The example provided by the proponent on slide 13 seems to confirm this – the 0-1km zone seems to have approximately 15-20 cells as the displayed scale (likely not 1:1). Lastly, in reviewing the Johnson 2004 and 2005 references (which the proponent is reproducing), the basedata used was the WKSS data.

The sections referenced outline numerous analyses that the proponent undertook, but there is no certainty that the basedata being utilized is credible and has sufficient rigor to be used in this way (this is true for either the LCC or the SGP/WKSS data).

Section 11.10.9 discusses uncertainty with the analysis and predictions that are made with regards to carnivores. However, at no point does the document discuss the fact that all of the assumptions based on models derived from the vegetation classification are highly suspect. When using analysis techniques such as fragmentation and habitat suitability, then the input data must have a high degree of certainty else the outputs, despite being subjected to complex modifications, are inherently of no value. The common expression for this type of situation is "GIGO" – Garbage In, Garbage Out.

This issue was raised at the session held at the Prince of Wales Northern Heritage Centre, but the proponent discounted the concern, suggesting that errors were systematic and did not affect the analysis. YKDFN strongly disagree – obviously the error is not systematic between the images as each scene is classified separately (and each has its own error values attached). It is not 'a wash' where all other things are equal – these errors matter - if the data feeding into the model is not correctly classified, then any conclusions reached on the impacts to habitat use and quality is effectively incorrect almost half the time.

In item 7 of the November 23rd response from the proponents consultant, the company suggests that this product was validated by a 'qualitative visual assessment'. While it certainly helps to confirm that the results make sense, this is not an applicable validation by itself. The mosaic in question is many thousands of pixels and the product that it was compared against was of a different resolution (with 1km cells vs. 25/30m) – thus each cell on the validation product would contain over a thousand cells to be compared – the variation seen, both correctly captured and erroneous, could not be 'validated'. This visual inspection also seems to have been used for the reclassification of other datasets, but again, it was unclear what the process entailed or if there was any tools used to evaluate the correctness of the final product.

The sophisticated models that the proponent employs (i.e. Habitat Suitability) rely on the relationship between site selection of a particular vegetation class and the types of habitats available that were not selected – these values inform sections 11.10.4.3 onwards and YKDFN feel that all results after this point are invalid until the input data can be appropriately verified. The dataset forming the foundation for this section – the West Kitikmeot Slave Study Vegetation Study from Matthews et al (2001) – has significant deficiencies that make it inappropriate for continued use without improvement.

The accuracy matrix (taken from Matthews et al. 2001) for the 8 scenes that form the mosaic which the proponent used are as follows:

Scene	Producer's Accuracy	User's Accuracy	Overall Accuracy
45-15	66	68	67
44-14	59	58	55
46-14	60	59	60
43-13	63	65	65
45-12	49	52	51
46-13	57	60	60

44-15	76	85	82
46-15	68	74	68

While these values all mean slightly different things, what should be clear is that the data is very uncertain and falls below commonly accepted benchmarks for usability (with the probable exception of scene 44-15). Image classification does not have a hard standard for acceptability, but the general rule of thumb and widespread best practice is to seek an accuracy exceeding 85% prior to use. As such, it is not clear if this dataset can provide sufficient predictive value to be used in these types of analysis.

Request:

1) The products derived from this basedata should be re-evaluated for utility. If the original dataset cannot be improved, the subsequent analyses performed on the dataset should be ignored.
2) If the base data was not derived from WKSS data, the proponent should still consider if the principle assumption – that correctly represents the natural world - is valid. In this light, the applicability of the analyses and products produced here should be discussed.
3) If the WKSS data was used, the Proponent should prepare a summary for each scene in the SGP/WKSS Vegetation Classification that takes a series of proportionate (to the occurrence within the study area) random sample from the final working dataset. Each of these samples should be used to extract the habitat values (cross tabs) from the SGP/WKSS data to create a proportional table allowing parties to evaluate the general accuracy of the final sub-sampled result from the Land Cover Classification of Canada. The result should be evaluated against the visual inspection which was completed.

Section 2: Fish and Water

IR Number: YKDFN 2.20

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Water Chemistry Pathways

Preamble:

From section 8.6 & 9.6 it is clear that some of the more substantive effects pathways (related to water chemistry) that are screened out of the assessment include the following;

- Erosion and entrainment of lake sediments in Area 3 and 5 due to continual alterations in water elevation during operations, increased shoreline erosion and re-suspension of bottom sediments caused by dewatering of Areas 1, 2, 4, 6 and 7 during construction, and refilling of Kennady Lake during closure.
- Removal of groundwater from the open pits and subsequent increases of surface flows and alterations in water chemistry.
- Development of seepage from rock piles and tailings areas.

These pathways have the potential to significantly affect surface flows and/or water chemistry. Effects may include; temporary and permanent loss of fish habitat in littoral and lotic environments, reduction in water quality including general and widespread increases in TSS, increases in acidity, increases in salinity, hardness and nutrients, and both upstream and downstream alterations in water quantity.

Request:

These are among the central effects of the project and require clear, comprehensive statements on their potential effects. Specific criteria for continued discharge from the Water Management Pond are required for Parties to properly evaluate the likely magnitude of impacts to the local and regional watershed. YKDFN request that the proponent provide sufficient information to allow Parties and the Board to evaluate significance of impacts from water chemistry changes.

IR Number: YKDFN 2.21

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Bathymetric Maps (Annex J, Appendix J.II; Addendum HH, Appendix HH.III)

Preamble:

There are bathymetric profiles and/or maps that have been developed for many of the lakes found within the study area. However, none of the maps contain area & volume data. These data are important for understanding the potential effects of alterations in water quantity associated with the project, for understanding the amount of fish habitat that is currently available, and for understanding how the amount of habitat might change if water levels are altered.

Request:

To address this uncertainty, YKDFN request the company provide area & volume data were provided for all bathymetric maps.

IR Number: YKDFN 2.22

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Length and Weight for Fish (Addendum JJ, Table JJ.II-4, p. JJ.II-5; Annex J, Appendix J.I, Table J.I-57, Table J.I-58, Table J.I-82)

Preamble:

Length and weight measurements for fish provide the basis for understanding and comparing current and future fish condition. The condition of fish is one of the most important indicators of the health and productivity of an aquatic ecosystem, and is a parameter that can be used to indicate an alteration in ecosystem health. Fish length and weight have been measured for hundreds of fish and for several different species found within the study area.

The length/weight dataset is not complete (Lake Trout data for 2004 only, and one set of Slimy Sculpin data). This makes it impossible to check or recalculate the existing length/weight formula, reduces the

ability to increase the data set in future years and will make it difficult to update and recalculate the fish condition formulae as additional data are collected.

Request:

1) To ensure that future efforts can be used to strengthen and update current understanding, YKDFN request the proponent compile all length/weight measurements for fish into a database (including all years, not just 2004).
2) YKDFN request that the proponent compile all log length/log weight formulas into one table and to refine these formulae by developing Standard Weight equations (Murphy et al, 1990) for as many species as possible (See IR 2.4 below - Species List), but particularly for Lake Trout, Arctic Grayling and Slimy Sculpin. The Standard Weight equations could then be used 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.

IR Number: YKDFN 2.23

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Species List for Fish (Annex J, Table J.4.6-1, p. J4-159; Table J4.4-31, p. J4-143; Table J4.4-33, p. J4-149; Table J4-61, p. J4-159; Addendum JJ, Table JJ4.4-4, p. JJ4-42; Section 9, Table 9.3-40; Table 9.3-42; Table 9.3-44

Preamble:

Over the past 15 years, a considerable amount of work has been undertaken for the purpose of developing species lists of fish for many of the lakes within the study area. These lists are scattered throughout the EIS document (above subject list is for example purposes and is not complete). These data are useful for increased understanding of the potential effects of the project on fish.

Request:

The proponent should develop a single place for residence of the species lists - It would be useful for understanding potential effects of the project on fish to develop in one place 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 etc.

IR Number: YKDFN 2.24

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Ground Water Chemistry

Preamble:

The infiltration of groundwater into the open pits is a recognized effect of the project. The groundwater will be pumped out of the pits, into the Water Management Pond (i.e. Kennady Lake), and then into the downstream receiving environment (Lake N11, and Area 8). It is also recognized that the chemistry of groundwater is considerably different than surface water. Currently, however, there is almost no groundwater chemistry data summarized in Section 8, or 9 and there is no understanding or definition of baseline groundwater chemistry. This data gap makes it is difficult to evaluate the potential effect of groundwater discharge on the downstream receiving environment.

Request:

The proponent should develop information and tables to allow for the evaluation of potential effects of groundwater on the receiving environment. At a minimum this should include a table summarizing groundwater chemistry, defining baseline groundwater chemistry using box and whisker plots, Piper Plots and a short descriptive paragraph.

IR Number: YKDFN 2.25

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Benthic Invertebrates – EPT Index (Annex J, Appendix J.I, Table J.I-29)

Preamble:

Benthic invertebrates are a major food source for many species of fish. Benthic Invertebrate community data therefore provides an understanding of the quality of fish habitat. One of the most sensitive indicators of ecosystem stress is species richness. As disturbance and stress increase, species richness tends to decrease. Within streams, some of the species most sensitive to environmental disturbance include the mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddisflies (Trichoptera). The number

of Ephemeroptera, Plecoptera and Trichoptera taxa is a sensitive indicator of environmental stress within stream environments called the EPT Index. The data for calculating the EPT Index is already available, so this effort would require a simple compilation and calculation of the pertinent data.

Bray-Curtis Index of Dissimilarity (BCI) values for both stream and lake samples are not calculated. The data necessary for calculating BCI are available from a variety of locations. The BCI is an important parameter because it directly compares the benthic invertebrate communities between two sites, and is a sensitive indicator of changes in the benthic invertebrate community through space and over time. The BCI values can be analyzed using simple inferential statistics or in ordination techniques.

Request:

1) It would be useful to calculate the EPT Index for all stream sites.
2) Calculate Bray-Curtis Index of Dissimilarity (BCI) for reference sites for both stream and lake samples. For the lake samples, combine five subsamples before calculation.

IR Number: YKDFN 2.26

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Benthic Invertebrates – Temporal Consistency

Preamble:

One of the fundamental principles of environmental monitoring is an unwavering and core commitment to consistency in sampling methodology. Temporal consistency, however, is a difficult standard to achieve; alterations in personnel, changes in project scope and definition, improvements in protocols can all result in collection of data that is incompatible over time. This is the situation with the benthic invertebrate data that has been collected for the Gahcho Kue EIS, and the result is that a competent understanding of baseline conditions has not yet been achieved for this project. Failure to maintain temporal consistency will result in collection of incompatible data that will provide only a limited understanding of baseline conditions and alterations over time.

Request:

During summer 2012 the proponent should initiate a comprehensive sampling program for benthic invertebrates so that a complete baseline dataset can be developed that has data for all required lake and stream sites sampled 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.

IR Number: YKDFN 2.27

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Plankton Species Richness

Preamble:

One of the most sensitive indicators of ecosystem stress is species richness. As disturbance and stress increase, species richness tends to decrease. It would be useful to calculate taxon richness for phytoplankton and zooplankton communities to monitor for changes in species richness.

Request:

The data for calculating species richness is already available, so this effort would require a simple compilation and calculation of the pertinent data.

IR Number: YKDFN 2.28

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Plankton Species Sampling (Annex J, Sections J3.4 and J4.3)

Preamble:

Use of a single sample to characterize phytoplankton and zooplankton community. Because of the rapid growth rates and short generation times of phytoplankton and zooplankton, species composition and total biomass of phytoplankton and zooplankton within a lake can change quickly over time. This means that characteristics of the phytoplankton and zooplankton community within a lake cannot be characterized with a single sample, as has been done for the Gahcho Kue EIS.

For development of a competent baseline understanding of biomass and community structure, it is essential to sample phytoplankton and zooplankton in reference lakes, Kennady Lake and downstream

lakes once every two weeks for at least one entire open water season and then twice through the winter.

Request:

YKDFN request that the company commit to developing and implementing this within their Aquatic Effects Monitoring Program. Alternatively, water clarity and Chla could serve as proxies for primary productivity, though in this case information regarding community structure would be lost. If water clarity and Chla are substituted, then a comprehensive sampling program will be required to develop a competent understanding of water clarity and Chla. These two parameters should be sampled twice per month through the open water season for reference lakes, Kennady Lake and downstream lakes.

IR Number: YKDFN 2.29

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Eutrophication (Section 8.8, Section 9.8, Sections 10.5.3 to 10.5.6 - J.3.4.1, p. J.3-32; data for Chla (Annex J, Appendix JJ, Table J.I-14) and Secchi depth (Annex J, Table J.4.2-1; Appendix J.I, Tables J.I-4&5)

Preamble:

It is expected that eutrophication will be one of the effects of the project on Kennady Lake and the downstream receiving environment. Currently, the assessment uses broad categories of productivity such as oligotrophic, mesotrophic, eutrophic. For tracking the effect of nutrient enrichment, it would be useful to calculate a more precise estimate of lake productivity.

The Trophic State Index (Carlson and Simpson 1996) uses Chla and nutrient parameters to calculate a value that indicates the Trophic State. These values can then be compared through space and time to precisely determine the effect of increases in nutrient concentration on productivity within the aquatic environment. Currently, the amount of data is not sufficient for calculation of a TSI, so it would be of great benefit during future monitoring programs to increase measurement of both Chla and Secchi depth.

Request:

The proponent should calculate the TSI for reference lakes, Kennady Lake and downstream lakes using Chla, TP, TN, and/or Secchi depth measurements.

IR Number: YKDFN 2.30

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Total Suspended Sediment (Section 9.6)

Preamble:

Dewatering of Kennady Lake during construction, and discharge of water from the Water Management Pond during operations, has the potential to entrain large amounts of suspended sediment into Kennady Lake and release this sediment into the downstream receiving environment. Within Section 9 of the EIS, the potential downstream effect of suspended solids has been discounted from the effects assessment.

Request:

The proponent should complete analyses which determine the areal extent, estimate the total amount, and measure the chemistry, of flocculent sediment in Kennady Lake.

IR Number: YKDFN 2.31

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Baseline Water Chemistry (Tables 9.3-19 & 8.3-21)

Preamble:

Baseline conditions are of prime importance in understanding and recognizing project effects in future years. A simple yet effective approach to defining baseline water chemistry is to develop a description of baseline water chemistry using box plot analysis (median, 25%, 75%, and definition of outliers) and Piper Plots. The use of box and whisker plots is superior to the use of maxima and minima because these latter values provide no understanding of the upper and lower bounds of baseline condition. The use of box and whisker plots allows for the identification of outliers, which is always important for water chemistry datasets.

Request:

The proponent should develop box and whisker plots should be for the water chemistry data of all lakes and streams in the Study Area, and the box plots should be used to define upper and lower bounds of baseline water chemistry.

IR Number: YKDFN 2.32

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Downstream Receiving Environment (Section 9)

Preamble:

Lake N1 and N11 are the immediate downstream receiving environments for discharges from the Water Management Pond. As such, they will be the most affected by alterations in water chemistry caused by project discharges. Currently, however, there is almost no baseline data for Lake N1 or Lake N11. Fish studies, invertebrate samples, sediment cores, water chemistry data, phytoplankton samples and zooplankton data for these lakes are all missing from the EIS. The lack of baseline data for Lake N1 and Lake N11 means that there will be no ability to understand effects of the project on these two lakes once construction and operations begin.

Request:

It is essential that the proponent commit to developing and implement a monitoring program for Lake N11 and Lake N1.

IR Number: YKDFN 2.33

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Monitoring and Follow-up for Fish and Wildlife (Section 8.16 & 9.15)

Preamble:

Consistency in monitoring methods is of central importance in development of monitoring programs. Lack of consistency in methods, and sampling times and locations will reduce the effectiveness of the monitoring program. Considering the lack of consistency in the existing data, it is essential that a Monitoring Program be developed that will provide as much continuity with the extant data as is possible, while at the same time ensuring that required improvements are also implemented.

Request:

> "Effects monitoring programs will include a Surveillance Network Program (SNP) that focuses primarily on Project site operations as well as a more broadly focused Aquatic Effects Monitoring Program (AEMP). De Beers will develop the scope of the SNP and AEMP in consultation with regulators and interested parties. It is anticipated, however, that the AEMP will include water flow, water quality and sediment quality components, along with components focused on lower trophic communities (i.e., plankton and benthic invertebrates), fish and fish habitat. Sampling areas are likely to be located in the Kennady Lake watershed, potentially affected areas of the N watershed and the A, B, D, and E watersheds, Lake 410, and Kirk Lake, and a suitable reference lake. Components of the AEMP will be developed according to a common, statistically-based study design incorporating regulatory guidance and current scientific principles related to aquatic monitoring." (p. 8-516 & p. 9-428).

YKDFN request that the proponent provide discussion on its commitment to ensure that future monitoring are completed in such a way that allows the historic data be fully utilized – a focus of this discussion should be the relationship between regulators desires and the company's commitments.

IR Number: YKDFN 2.34

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Monitoring and Follow-up – Diversion Channels (Section 8.16 & 9.15, p8-270)

Preamble:

Statement on page 8-270. *"All diversion channels will be designed and constructed to prevent erosion and sedimentation and to incorporate lessons learned from the Ekati Diamond Mine (Jones et al. 2003)"* The solution throughout this volume is to armour banks to prevent sedimentation. If this is the only solution, the same issues identified in Jones et al (2003) will occur again.

Request:

YKDFN request further clarification on the companies intentions to limit sedimentation. Included in this should be review of lessons learned from the Ekati mine and Diavik mines, and how construction of the diversion channels will incorporate these lessons learned.

IR Number: YKDFN 2.35

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Monitoring and Follow-up – Fish Migrations (Section 8.16 & 9.15, p8-389)

Preamble:

On page 8-389 the EIS states *"Although the dykes will in effect isolate the northern pike populations within their respective watersheds for the duration of mine operations (and permanently in Lake A3), it is likely that the isolated populations will be self-sustaining*." Although the assumption that isolated populations would be self-sustaining is likely accurate there is less confidence in predicting whether these isolated populations, especially the northern pike population in Lake A3 would retain the same level of productive capacity. Isolation may result in only marginally sustainable fish populations in Lake A3 as the Isolation can result in the loss of nutrients, invertebrates and forage fish to Lake A3. Additionally, this isolation would eliminate any fish recruitment, not only for northern pike but also other fish species found in Lake A3. These restrictions could result in lower productive capacity within the lake and could reduce the effectiveness of the lake ecosystem to respond to changes within the environment.

"The diversion of the A, B, D, and E watersheds are not expected to change migration patterns of fish in the N watershed, such that populations of fish are negatively affected. During baseline sampling, northern pike have not been captured in lakes and streams in the N watershed, although they are present in Kennady Lake and downstream to Lake 410; therefore, it appears that northern pike are absent from the N watershed, or are present in extremely low numbers" (Page 8-39). It is difficult to ascertain the presence, absence or abundance of northern pike in the N watershed due to the low fish sampling effort placed on the lakes in this watershed. Even if northern pike are not accessing the N watershed via the existing potential pathway there is not enough information presented to preclude northern pike from not using an alternative pathway as might be created through the diversions. If northern pike are absent from the N watershed the introduction of northern pike through the diversions may have negative consequences on existing fish populations in this watershed.

Request:

The sustainability of fish populations at current levels within Lake A3 after isolation requires further substantiation. Further study is likely required on fish populations and energy pathways to allow for meaningful monitoring of lake fish populations after isolation.

Additional fish sampling is recommended in the N watershed to determine presence and relative abundance of fish species. A more complete analysis is recommended on why northern pike may not be

using the existing access to the N watershed and what would prevent this species from utilizing an alternative access when made available to it.

IR Number: YKDFN 2.36

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Conceptual Fish Habitat Compensation Plan

Preamble:

The areas of dewatering or partial dewatering but otherwise unaltered are not part of the compensation plan. However, there will be a loss of productive capacity in these areas for 20+ years and potentially up to 70 years for some species before productive capacity may reach baseline levels. Section 8.10.3.2 (P. 8-379) effects of Dewatering on Fish and fish Habitat it states; *"Although Areas 2 to 5 will only be partially dewatered and will serve as the WMP for the Project, the depth, habitat, suspended sediment and water quality conditions in these areas will not be suitable to support a fish community".* It has also been stated in the EIS that Area 8 of Kennady Lake will have reduced productive capacity once it has been segregated from the remainder of the lake.

Dewatering an area and having it dewatered for an extended period of time is a form of habitat alteration. Calculations of habitat area and habitat units for these dewatered and partially dewatered areas are not used in determining compensation levels. The long-term loss of productive capacity of some systems and potential habitat alteration due to dewatering may lead to the net loss of productive capacity of fish habitat which is not compensated for.

The productive capacity of some fish habitat will be removed or reduced over several or more decades. The exclusion of fish habitat that is removed or affected over long-periods of time from the calculation of fish habitat compensation will make it difficult, if at all possible to meet the principle of the Departments of Fisheries and Oceans *Policy for the Management of Fish Habitat* guiding principle of "No Net Loss" of productive capacity of fish habitat.

Request:

1) The long-term loss of productive capacity and uncertainty of whether full productive capacity will be reached should be addressed in the Conceptual Fish Habitat Compensation Plan. The disruption (temporary loss) of fish habitat is one of the three elements; habitat alteration, disruption and destruction, which should be considered when assessing habitat compensation

requirements.

2) In the Conceptual fish Habitat Compensation Plan It is difficult to determine how the habitat units were used in the calculation of area required for compensation. On the surface it appears that in the end the total amount of surface area lost regardless of its habitat value is compensated by an area slightly larger (1.3 x post closure) and is compensation based on surface area and not habitat units. There should be greater transparency on how surface area of compensated habitat relates to the habitat units lost and gained. It would be beneficial to have a table of habitat units showing losses and potential gains through compensation.

Section 3: Cumulative Effects

IR Number: YKDFN 3.37

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Definition of "Potential to change the project" (Section 13.4.2)

Preamble:

The term "potential to change the Project" as used in determining reasonably foreseeable projects for use in the cumulative effects assessment is not defined.

The list of reasonably foreseeable projects has been developed based on three criteria (section 13.4.2, p.13-11), which includes activities that "have the potential to change the Project or the impact predictions". It is not clear what is meant by: "potential to change the Project". This is not a commonly used criterion for determining whether an external project or activity is "reasonably foreseeable".

Request:

1) Define this criterion
2) Provide reference to best practice or guidance that recommends the reasonably foreseeable projects be included based on "potential to change the project"

IR Number: YKDFN 3.38

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Reasonably Foreseeable Projects (Section 13.4.2)

Preamble:

Section 13.4 describes generally how reasonably foreseeable projects were selected for the cumulative effects assessment. Table 13.4-1 suggests that the RSA for the terrestrial environment cumulative effects assessment is based on the seasonal ranges of the Bathurst and Ahiak caribou herds, grizzly bear, wolverine and wolf. The list of reasonably foreseeable projects used in the assessment is based on an

evaluation of the potential of reasonably foreseeable activities, as defined on p.13-11, Section 13.4.2 within this RSA, to overlap with the Project's effects

This list of reasonably foreseeable projects within the RSA includes several advanced exploration and mining developments within NWT. A review of publicly available government information for some of these VCs (for example Bathurst and Ahiak caribou):

> http://www.enr.gov.nt.ca/_live/pages/wpPages/Bathurst_Caribou_Herd.aspx and
> http://www.enr.gov.nt.ca/_live/pages/wpPages/Ahiak_Caribou_Herd.aspx

suggests that other advanced exploration projects such as Izok and High Lake, Hope Bay, Hackett River and Kiggavik, and the Bathurst Inlet Port and Road are within the range of these broadest-ranging VCs. To be consistent with the methodology described in section 13.4, these projects should be included in the list of reasonably foreseeable developments, for the purpose of scoping the cumulative effects assessment, at least initially for the pathways analysis.

Request:

1) More information should be requested regarding the criteria for selecting the specific reasonably foreseeable projects and for excluding others, based on the range of the specific VCs provided in Table 13.4-1.

2) Specifically, the proponent should explain why they chose to exclude the following from their analysis:
    a. Existing Operations:
        i. Jericho – Existing Diamond Mine (See De Beers terrestrial presentation, slide 10)
    b. Active NIRB Reviews:
        i. Bathurst Port and Road (BIPR) – Submitted to NIRB in 2004
        ii. High Lake (MMR) – Submitted to NIRB in 2006
        iii. Hackett River (Xstrata/Sabina) - Submitted to NIRB in 2008
    c. Reasonably Foreseeable (proposed and sufficient level of detail exists):
        i. Ulu/Lupin – Elgin Mining
        ii. Back River – Sabina Gold and Silver

    YKDFN suggest that individual explanations would be most useful, comparing and contrasting the selection (or exclusion) of the project against the criteria in 13.4.2 as well as the six projects that the proponent selected.

3) The company should provide the date at which they received the development data for exploration projects in Nunavut. Additionally, the company should undertake a comparison of

the exploration effort in Nunavut today (2012) vs. what value was used in the analysis (number of projects, size of projects, and overall investment).

IR Number: YKDFN 3.39

Source: Yellowknives Dene First Nation

To: De Beers

Subject: Residual effects of existing activities (Section 13)

Preamble:

The cumulative effects assessment methodology does not describe which projects or activities contribute to the baseline (2010) conditions, nor which residual impacts of these activities potentially interact with Gahcho Kue.

The approach to cumulative effects assessment considers a "Baseline Case", "Application Case" and "Future Case". The baseline case is defined as conditions existing prior to the Gahcho Kue project (2010) and include environmental conditions prior to mineral and other development activity (reference conditions), as well as existing conditions subject to previous and existing projects. The baseline case was determined by compiling a database of previous and existing developments, based on information obtained from various regulators, developers and personal knowledge.

As is noted in the CEA, baseline (2010) conditions may already reflect cumulatively impacted conditions of environmental VCs. The Gahcho Kue project is not being developed in an un-impacted area. As was stated in the introduction to this section, concern has been expressed that "this is the 5th diamond mine in the area". While individual Key Lines of Inquiry sections do provide some assessment of the footprint of different types of activities (e.g., section 7.5.2.1), there appears to be little or no discussion of how specific residual impacts of these activities contribute to this baseline condition. For example, what are the specific residual impacts of the Snap Lake or EKATI or Diavik mines or the Tibbitt-Contwoyto road that have the potential to overlap with those of Gahcho Kue? In some cases these are elaborated on within the various individual assessment sections, but they are not specifically included in the stand-alone cumulative effects assessment section.

To our knowledge, the development database, or any summary thereof, referenced in 13.4 and 7.5.2.1 was not submitted as part of the CEA. The MVEIRB's Environmental Impact Assessment Guidelines (MVEIRB, 2004) recommend that all past, present and reasonably foreseeable projects be included in the assessment, and describe how these developments may interact with the project. It is of little value to conduct or review a cumulative effects assessment without first listing past and present developments or activities and without having some understanding of the residual impacts, and potentially overlapping impact of these activities, other than the simple footprint.

Request:

1) The proponents should provide a list of “past” and “present” activities which contribute to the baseline (2010) assessment case
2) For each of these, the proponent should provide information to indicate all impacts to VCs of these activities that have the potential to interact cumulatively with the Gahcho Kue project.

Section 4: Closure and Reclamation

IR Number: YKDFN 4.40

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Contingency Planning – Phased Development & Progressive Reclamation (3.5.4 Mining Sequence; 3.7, 3.8, 3.9 Management sub-sections; 3.12 Closure and Reclamation)

Preamble:

The closure and mining scenario is extremely dependant on a sequential and highly interdependent management scenario. With De Beers other mine in the NWT, we have seen that some of the key foundations that were advanced in the EA have not been enacted, despite several years of operations. Paste production and contaminant land farming are two such examples. Additionally, at the BHP site, we have seen the mine plan change numerous times over the operational life.

YKDFN support the progressive reclamation foundation of the mine plan – it is common sense to deposit the waste rock from one pit into another. However, this brings certain challenges with it as well – while reducing the environmental impact, it introduces a particular lack of flexibility to the mine plan. Changes made to the plan (for whatever reason), as seen at Snap Lake and Ekati will have ripple effects to the management of environment at the site.

Request:

The proponent should undertake contingency planning that considers what happens if various components of the mine are altered or delayed (e.g. pit development). Milestones identified as essential should be recognized, with the discussion and identification of contingencies or management options available as the mine evolves. Contained within this discussion should be the identification of what options are removed as potential contingencies occur.

IR Number: YKDFN 4.41

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Conceptual Reclamation Plan (Section 3.12 Closure and Reclamation)

Preamble:

The EIS did not include a preliminary closure plan.

In the Avalon Rare Minerals Environmental Assessment, the Board required the submission of "conceptual monitoring and management plans" for the DAR to be accepted in conformity. The preliminary closure plan is a critical step to understand the cradle to crave nature of a mineral development. Though this process is not an Environmental Assessment, the higher scrutiny attached to an Environmental Impact Assessment should require this information. The information available in 3.12 goes some of the way to providing the data for the Mine Components and closure Objectives so completing a preliminary closure plan that outlines these commitments and the site goals shouldn't be difficult.

Request:

The proponent should be required to submit the preliminary closure plan, utilizing the best practices from other closure plans and the MVLWB guidelines.

Section 5: Culture and Archaeology

IR Number: YKDFN 4.42

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Archaeological Assessment (Annex L)

Preamble:

The archaeologists divided the study area into high, medium and low potential areas. Presumably, this was used to govern the survey effort outside of the areas that would be directly affected by road construction, quarrying, or infrastructure. However, there is nothing that explains what the survey effort was, nor how it was broken down and if this proved to be a valid technique (i.e., more sites were found in the high potential areas than the low).

Request:

1) YKDFN request the company provide a clear, plain language discussion on the plan of action for the moderate and high significance sites that will be impacted?
2) Provide a map indicating the high, medium and low potential areas
3) Create a map identifying (and quantifying) the survey effort. Areas to be disturbed that have not been surveyed should be uniquely identified
4) Create a table that presents the standardized results – 'sites per survey unit effort' for each of the categories.

IR Number: YKDFN 4.43

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Integration of TK into assessment (Section 5.4.2.1.3)

Preamble:

The section provides no depth to the methods by which the proponent considered the data available. On the face of it, it does not seem as though they incorporated any traditional knowledge into the actual assessment, suggesting that because the Key Lines of Inquiry analyzed many of the principal topics of

the TK holders, then the assessment would consider the effects of the project. This implicitly suggests that they did not view traditional knowledge as evidence.

The proponent indicated that the information available to them could be contradictory – citing two examples extracted from the internet as their source. However, by only relying on secondary sources the available information is not thorough to arrive at a consensus.

Request:

The proponent should provide a discussion as to how they incorporated traditional knowledge into the assessment methods.

IR Number: YKDFN 4.44

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Traditional Knowledge – reliance on secondary sources (Section 5.4.2.1.3, Annex M)

Preamble:

> "De Beers is confident that it has sufficient and applicable TK from secondary sources to incorporate TK into the project design, to predict effects and to identify appropriate mitigation measures (p5-12)"

The secondary sources used to capture the breadth of the Yellowknives Dene First Nation's experience with this area and the Valued Ecosystem Components amounts to three reference books with a North American focus and a single day of hearings for the Drybones Bay hearing. These references provide little in the way of actual TK and the company should acknowledge the information gap.

The results presented in section M4 only discusses cultural identity, toponyms and traditional land use. The traditional land use section (M4.3.1, M4.5) is entirely historical, which is predictable given the resources that it accessed. However, it shows that the company has little understanding of the Yellowknives Dene traditional use of the Gahcho Kue region, one of the two primary user groups of the area (section 5-16) – "[Tlicho Government] confirmed that the Project was located in a shared area with the Akaitcho Dene First nation and that the primary user of that area was the Yellowknives Dene First Nation".

Request:

1) How can the company state that they are confident that they have sufficient TK data when it is drawn from such ineffective sources?

2) What information was taken from these sources and how did it influence project design, effects predictions and mitigation measures?

IR Number: YKDFN 4.45

Source: Yellowknives Dene First Nation (YKDFN)

To: De Beers

Subject: Cultural Identity

Preamble:

On page M4-1, the company discuss the importance of cultural identity landscape and indicates the 'results' of their work.

On page M4-3, the company states that the YKDFN are Chipewyan.

While portions of the community have a Chipewyan heritage, the majority of the membership has Dogrib heritage and the *Weledeh* dialect is more similar to the Tlicho.

Request:

De Beers should acknowledge and correct their error, perhaps restating their level of confidence in their understanding of traditional knowledge.