Hamlet of Tuktoyaktuk, Town of Inuvik
Government of Northwest Territories

ISSUED FOR USE

RESPONSE TO THE JANUARY 16, 2012 INFORMATION REQUESTS FROM THE ENVIRONMENTAL IMPACT REVIEW BOARD FOR CONSTRUCTION OF THE INUVIK TO TUKTOYAKTUK HIGHWAY, NWT

EIRB FILE NO. 02/10-05

February 2012

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ACRONYMS

CCP	Community Conservation Plan
CEAA	Canadian Environmental Assessment Act
DFO	Department of Fisheries and Oceans
DOT	Department of Transportation
EIA	Environmental Impact Assessment
EIRB	Environmental Impact Review Board
EIS	Environmental Impact Statement
EMP	Environmental Management Plan
ENR	Environment and Natural Resources
GDP	Gross Domestic Product
GNWT	Government of the Northwest Territories
HSE	Health, Safety and Environmental Policies
HTC	Hunters and Trappers Committee
IFA	Inuvialuit Final Agreement, as Amended April 2005
IR	Information Request
ILA	Inuvialuit Land Administration
ISR	Inuvialuit Settlement Region
LSA	Local Study Area
MSES	Management Solutions in Environmental Science
NWT	Northwest Territories
RSA	Regional Study Area
VC	Valued Components
VEC	Valued Ecological Component
VSC	Value Socio-economic Component
ZOI	Zone of Influence

1.0 Introduction

The Developers of the proposed Inuvik to Tuktoyaktuk Highway are pleased to provide the following responses to the EIRB's first round of Information Requests dated January 16, 2012. The Developers responses are included after each information request. Please note that new tables or figures, created for the most recent information requests, have been numbered according to their respective IR Number. Any tables or figures from the EIS or previous response documents have retained their original number.

2.0 Assessment Approach

IR Number: 1

To: Department of Transportation (DOT) and the Hamlet of Tuktoyaktuk

Subject: Project partnership and past performance by the Developer (Executive Summary, p. i; EIS Section 1.1.2, p. 1-4; EIS Section 1.5.1, p. 15)

Preamble
The DOT and the Hamlet of Tuktoyaktuk (two of the Developer partners) have previously collaborated to facilitate the successful development and completion in 2010 of the all-weather access road from Tuktoyaktuk to Granular Source 177. As the Developer has indicated, this access road can be considered a 'pilot project' for the currently proposed Project in terms of environmental review and permitting, cost, schedule, logistics, construction methods, environmental protection, and effects mitigation. From this recent experience there should be first-hand information available with respect to the ability to successfully minimize or eliminate environmental impacts. This information will assist in detailing the past environmental performance of the Developer.

Request

1. In the context of the all-weather access road from Tuktoyaktuk to Granular Source 177, please identify and discuss specific environmental mitigation strategies that were identified as being successful and explain how the relative effectiveness of the mitigation was measured.
2. Please identify and discuss the specific 'lessons learned' with respect to the development of the all-weather access road from Tuktoyaktuk to Granular Source 177 and how this information will assist with, and can be applied to the proposed Development.

Developer Response: 1.1

Firstly and most importantly, the success of the mitigation strategies were based on the implementation of a comprehensive Health, Safety, and Environmental (HSE) program, which included a detailed Worker Orientation Package. The HSE program emphasized protection of the environment and detailed to all employees and stakeholders both the general objectives of the program and the specific strategies that needed to be implemented to protect the environment.

One of the major environmental mitigation strategies employed during the construction of the access road was to undertake the embankment construction in the winter. By completing the work in the winter the contractor was able to dramatically minimize and almost eliminate damage to the

permafrost. No off road travel onto the permafrost occurred during summer. End-dumping of frozen gravel off of the already constructed roadway onto the frozen permafrost was undertaken.

Associated with the winter construction was the strategy of constructing and using overland winter roads used to gain access to the quarry and the right of way during the winter construction. All access routes and truck turnarounds were constructed of snow and ice on top of the frozen permafrost. By contrast, if the embankment construction was completed in the summer then any truck turnaround and pit access roads would have had to be constructed from gravel thus expanding the amount of impact and the overall footprint of the Project. Furthermore, inadvertent construction events such as a gravel truck sliding off the roadway would have had much greater consequences on the environment in summer rather than in winter when the permafrost is frozen. The success of these measures is apparent by the fact that there was/is very little disturbance to the tundra both along the right of way and in the quarry access area.

Another of the environmental mitigation strategies employed was the use of low ground pressure (LGP) vehicles in the construction of the winter access roads. This minimized any environmental impact of the winter snow and ice road construction.

The placement of geotextile between the permafrost and the first lift of the gravel embankment is another mitigation strategy which helped preserve the frozen bottom core of the roadbed and prevented excessive slumping and subsidence in the spring and summer seasons.

A further mitigation strategy included the placement of erosion matting, riprap and silt fencing around the culverts on the embankment side slopes at watercourses identified as fish bearing or supporting fish bearing habitat areas. These measures were specifically designed and the designs implemented specific to the characteristics of each watercourse. These measures were successful in that they kept the silt and any of the embankment material from migrating into the watercourses and having a possible adverse effect on fish and their habitat. This is evident when viewing the fish bearing streams.

Other mitigative strategies included:

- Use of wildlife monitors and environmental monitors on a 24 hour/day basis during the construction
- Ensuring environmental supplies such as pads, spill kits, shovels, containers and other items were readily available in all trucks and heavy equipment
- Undertaking worker training programs which emphasized environmental protection
- Management, supervisory and employee vigilance to ensure that any potential environmental risks or hazards were identified and that appropriate measures were taken to prevent and/or mitigate these risks or hazards (for example, additional preventive maintenance and checks on vehicles to ensure that any fuel or oil leaks were prevented).

Developer Response: 1.2

The Developer Response 1.1 represent "lessons learned". Additional "lessons learned" are provided as follows:

- One of the "lessons learned" relates to embankment thickness and its effects on the settlement of the roadway. It is imperative that the thickness of the embankment be sufficient so that the

core of the embankment stays frozen during summer-fall. Significant differences in settlement were noted in areas where the embankment thickness was minimal, compared to sections where the embankment fills were deeper and thick enough to prevent thaw from reaching the tundra during summer months.

- Another "lesson learned" relates to survey work. The right of way should be surveyed and staked during the summer months. This would allow for quicker, and a more environmentally and cost effective construction process. There were times during the Source 177 Access Road construction when forward momentum was delayed due to survey issues. These survey issues included slight changes in the road height or layout and equipment issues with the GPS survey equipment not being able to locate satellites because of weather. It was also more difficult for the survey and engineering team to obtain a fuller understanding of the drainage patterns of the surrounding landscape during winter when snow cover is present. This was particularly important during the layout and installation of culverts.

IR Number: 2

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Route alignment alternatives (Executive Summary, Table 1, p. vi; EIS Section 1.2, p. 5; November 2011 Correspondence: Letter to EIRB re Upland Route November 2011)

Preamble

Based on the multiple-accounts analysis that was undertaken and presented in the EIS, and the Addendum to the EIS, the Developer's position is that the Primary 2009 Route with the possible incorporation of Alternative 3 (2010 Minor Realignment) should remain in consideration for the future design of the Project and may even be considered the preferred final alignment.

The Developer's position is that the adoption of this alternate alignment as part of the total Primary 2009 Route will capitalize on several important technical and economic advantages, as outlined in the November 9, 2011 letter to the EIRB.

The Developer has also explained why Alternative 2 (Upland Route) was eliminated from Consideration in the EIRB Review. However, there is no indication of the basis for this decision beyond professional judgement.

In addition, it appears that no engineering or environmental assessment work has been completed to support any decision-making surrounding Alternative 3. The Developer states that if the project is approved, Alternative 3 would be further considered and likely adopted in the detailed design stage based on additional information to be gathered in future surveys, and geotechnical and other investigations (Executive Summary, p. iv).

The Developer further states that because the selected and alternative routes only differ slightly, the same communities will be affected; therefore, a separate assessment of the routes, with respect to social, cultural, and economic setting is not necessary (EIS, Section 1.4.2, page 11).

Request

1. Please provide a comparison of the potential environmental and socio-economic impacts among the highway route alternatives.
2. Please provide environmental, socio-economic, and technical evidence related to the effects of Alternative 3 so that an informed decision can be made by the EIRB regarding the remaining highway route alternatives.

Developer Response: 2.1

The following is a brief comparison of the potential environmental and socio-economic effects between Highway route alternatives.

The alignments considered in the evaluation included:

- Primary 2009 Route (with encroachment on Husky Lakes setback);
- Alternative 1 (2009 Minor Realignment) to the Primary 2009 Route (to meet Husky Lakes setback);

- Alternative 2 (Upland Route); and
- Alternative 3 (2010 Minor Realignment).

A description of each of these route options is provided in Section 2.1.2 of the EIS. As noted in the EIS, the route options share a common alignment from KM 0 (North end of Navy Road, near Inuvik) to KM 71, and again from KM 118 to KM 137 (near Granular Source 177, by Tuktoyaktuk). Therefore, the comparison of the remaining route options is only for a relatively short distance (10-30 km, depending on the route option), with a range of approximately 5-10 km between route options.

Section 2.2 of the EIS described the evaluation process for the Primary 2009 Route and Alternatives 1 and 2. During the preparation of the EIS, Alternative 3 (2010 Minor Realignment), recommended by Inuvialuit interests, was considered a viable route option, but had not yet been assessed in the field; therefore, modeling to identify accurate geometric design factors was not yet available. However, since that time, additional archaeological and fish and fish habitat studies have been conducted. Alternative 3 is similar to Alternative 1 in that it does not encroach on the Husky Lakes setback, yet Alternative 3 is shorter in length, at approximately 135 km.

The Primary 2009 Route and Alternatives 1 and 2 were evaluated for environmental, economic, social, and technical factors that were further divided into a number of sub-indicators. In some cases (i.e., cost) these factors were specifically quantified; in other cases, where the quantified differences between options were small (i.e., within 5 to 6%), then the two options were considered of equal merit.

It was also noted that scientific and economic factors were only part of the development decision. The technical teams who assessed the options maintained an awareness of the values, particularly for the Husky Lakes, held by the communities. These values and interests were discussed in the October 2009 and January 2010 consultation meetings, and were also provided during the initial EISC assessment process. The intent was to integrate those values, while delivering key technical information to decision makers and stakeholders to review and to draw their own conclusions about the acceptability of the proposed Highway. It was clear that any incursion into the 1 km Husky Lakes setback would not be acceptable; therefore, the Developer has focused on the alternative route options to the Primary 2009 Route.

The results of the evaluation were summarized in several tables that were presented in the EIS. These tables are re-presented as follows with relevant text drawn from the EIS as appropriate. Supplemental data collection has been conducted for the GNWT DOT regarding Alternative 3 (2010 Minor Realignment) since the preparation of the EIS, including fill quantity, cost, archaeology, and fish and fish habitat assessments. Information will be inserted into the comparative tables, where possible.

Table 2.2-1 (from the EIS) presents a summary of the quantity and cost estimates for each of the three alignments initially considered. The summaries were based on the full length of the Highway alignment (including common segments) from Inuvik to Tuktoyaktuk.

TABLE 2.2-1: COMPARISON OF ESTIMATED QUANTITY OF GRANULAR MATERIALS AND COSTS PER ROUTE OPTION

Element	Primary 2009 Route	Alternative 1 (2009 Minor Realignment)	Alternative 2 (Upland Route)	Alternative 3 (2010 Minor Realignment)[1]
Estimated Highway Length	137 km	142 km	134 km	135 km
Estimated Embankment Quantity	4.5 million m^3	4.8 million m^3	5.4 million m^3	4.5 million m^3
Estimated Surfacing Gravel Quantity	250,000 m^3	259,000 m^3	242,000 m^3	247,400 m^3
Estimated Capital Construction Cost	$221,000,000	$233,000,000	$258,000,000	$219,000,000

1. A field overview program and preliminary design for the short length of the Highway that comprises Alternative 3 have not been undertaken at this stage in the project development. The quantity and cost estimates presented in this letter are Class D or Budgetary Level estimates.

As reflected in this table, Alternative 2 (Upland Route), although shorter in length, traverses more rugged terrain than the other alignments considered. This poses challenges for constructability, resulting in an increase in material quantities to meet the minimum design parameters, and requiring higher fills that could result in maintenance and operational issues.

The net result is that the overall cost estimate for constructing Alternative 2 (Upland Route), at $258 million, is about $25 million more than Alternative 1 (2009 Minor Realignment), about $37 million more than the Primary 2009 Route, and about $39 million more than Alternative 3 (2010 Minor Realignment).

Table 2.2.4-1 from the EIS compares the specific geometric features for each alignment option initially evaluated in the Husky Lakes area between KM 71 to KM 118, to identify which alignment might have a higher potential for collisions and therefore a higher potential for negative or adverse effects on public safety.

TABLE 2.2.4-1: COMPARISON OF GEOMETRIC FEATURES PER ROUTE OPTION

Geometric Feature	Primary 2009 Route	Alternative 1 (2009 Minor Realignment)	Alternative 2 (Upland Route)
Number of horizontal curves with radius less than 350 m	27	32	89
Number of segments with vertical grades greater than 4%	39	44	55
Total length of segments with vertical grades greater than 4%	5.39 km	5.95 km	7.59 km
Maximum Grade	8%	8%	8%

For each geometric feature presented, a lower number represents a highway alignment that exceeds the minimum safety requirements more often and by a greater degree, and therefore, has a lower risk of collision. A higher number for each feature represents a highway alignment that just meets the minimum requirements, and therefore, has a higher risk of collision. A lower risk of collision is more favourable when it comes to public safety.

As can be noted in this table, Alternative 2 (Upland Route) is projected to have about three (3) times as many curves as either of the other alternative alignments considered. In addition, Alternative 2 (Upland Route) is projected to have considerably more and longer sections of road with steeper grades than either of the other alternative alignments considered.

Although not evaluated at the time, Alternative 3 (2010 Minor Realignment) recommended by Inuvialuit interests, traverses similar terrain to that followed by the other two routes considered in the initial evaluation. Each of these options has more favourable geometric design characteristics than Alternative 2 (Upland Route).

Table 2.2.6-1 from the EIS provides a summary of the complete evaluation based on all of the factors and sub-indicators, including Environmental, Economic, Social and Technical considerations as discussed in Section 2.2 of the EIS. Of the 16 sub-indicators evaluated for the three alignment options initially considered, four (4) of the sub-indicators were considered to be equal. Where information is available, an evaluation has been conducted for Alternative 3 (2010 Minor Realignment) using the same criteria as described in Section 2.2 of the EIS.

TABLE 2.2.6-1: SUMMARY OF EVALUATION

Factor	Sub-indicator	Primary 2009 Route	Alternative 1 (2009 Minor Realignment)	Alternative 2 (Upland Route)	Alternative 3 (2010 Minor Realignment)
Environment	Footprint Area	Most favourable	Most favourable	Least favourable	Most favourable
	Wildlife and vegetation effects	Most favourable	Most favourable	Least favourable	Most favourable
	Fish and fish habitat effects	Least favourable	Favourable	Most favourable	Favourable
	Potential for dust generation during operation	Equal	Equal	Equal	Equal
Economic	Estimated cost of design and construction	Most favourable	Most favourable	Least favourable	Most favourable
	Estimated cost of maintenance and operations	Most favourable	Most favourable	Least favourable	Most favourable
Social	Public Safety	Most favourable	Favourable	Least favourable	NA
	Economic Advantages to the Local Communities	Equal	Equal	Equal	Equal
	Local Job Creation and Diversity	Equal	Equal	Equal	Equal
	Quality of Life	Favourable	Favourable	Least Favourable	NA
	Cultural Heritage	Favourable	Most favourable	Favourable	Most favourable
Technical	Footprint Area	Most favourable	Most favourable	Least favourable	Most favourable
	Geometric Design Requirements	Most favourable	Favourable	Least favourable	NA
	Potential for geotechnical hazards	Equal	Equal	Equal	Equal
	Permitting Risk	Least favourable	Favourable	Favourable	Favourable
	Construction Risk	Most favourable	Favourable	Least favourable	NA

Alternative 3 (2010 Minor Realignment) was not included in the previous evaluation; however, this route was recommended by Inuvialuit interests and traverses similar terrain to that followed by the other two routes considered in the initial evaluation. Each of these options has more favourable geometric design characteristics than Alternative 2 (Upland Route). In addition, due to the proposed length of Alternative 3, the footprint area is favourable.

As noted in the EIS, the evaluation presented a simplified multiple accounts analysis where all sub-indicators were considered with equal weight or importance. The summary of favourability for each of the three alignment options initially considered in the EIS is presented in Table 2.2.6-2.

TABLE 2.2.6-2: SUMMARY OF FAVOURABILITY

	Primary 2009 Route	Alternative 1 (2009 Minor Realignment)	Alternative 2 (Upland Route)	Alternative 2 (2010 Minor Realignment)
Most Favourable	8	6	1	6
Favourable	2	6	2	2
Least Favourable	2	0	9	0
Equal	4	4	4	4
Not Evaluated	-	-	-	4

As noted in this summary table, Alternative 2 (Upland Route) was determined to be least favourable for nine (9) of the sub-indicators considered.

Due to the greater potential risks to public safety, the considerably higher estimated cost of project construction, the greater constructability challenges, and the greater projected operation and maintenance costs, the Developer is no longer considering Alternative 2 (Upland Route) as a viable option. As indicated in responses to recent information requests, the Developer has clarified to the EIRB that Alternative 3 (2010 Minor Realignment) is now the preferred alignment for the Inuvik to Tuktoyaktuk Highway in the Husky Lakes area.

Developer Response: 2.2

The following section describes the specific effects of Alternative 3. Inuvialuit interests recommended Alternative 3 (2010 Minor Realignment) as a proposed modification of Alternative 1 (2009 Minor Realignment)(Section 2.1.2.3). This modification creates a more direct route through suitable terrain, along a four to five kilometre segment. The entire route alignment is located outside of the 1 km Husky Lakes setback.

Alternative 3 (2010 Minor Realignment) starts at approximately KM 90 of the Primary 2009 Route and re-joins the Primary 2009 Route at KM 111+700. Alternative 3 (2010 Minor Realignment) is shown in Figure 2.1.2-2 of the EIS, and is now considered to be the Preferred Route by the Developer.

It is important to note that previous studies have been conducted for the common alignment from KM 0 (North end of Navy Road, near Inuvik) to KM 90, and again from KM 111 to KM 135 (near Granular Source 177, by Tuktoyaktuk). Since the submission of the EIS in 2010, additional studies have been conducted and/or are scheduled to be conducted.

The Developer continues to assert that the environment and socio-economic effects are similar between each route alternative; the effects that generally differentiate the route options are safety, fill quantity, cost, number of bridges required, and distance from Husky Lakes. However, the Developer is pleased to provide a brief discussion of the potential effects associated with the incorporation of Alternative 3.

Technical

A field overview program and preliminary design for the relatively short length (approximately 21 km) of the Highway that comprises Alternative 3 have not been undertaken at this stage in the project development. The quantity and cost estimates presented in this section are Class D or Budgetary Level estimates.

Table IR2-1 identifies the estimated fill quantity by topography and terrain. The estimated capital cost to construct the Highway with the incorporation of Alternative 3 (2010 Minor Realignment), using a traditional design and construction approach, is $218.8 million.

TABLE IR2-1: ESTIMATED FILL QUANTITY BY TOPOGRAPHY AND TERRAIN

Alignment Segment	Length	Surfacing Gravel (m^3)	Embankment (m^3)	Average Embankment Fill Estimated per km (m^3)	Remarks on Topography and Terrain
KM 0 - KM 10	10	19,000	391,000	39,100	Elevation climb out of Inuvik
KM 10 - KM 44	34	62,000	969,000	28,500	Higher ground with drops to creeks
KM 44 - KM 90	46	82,200	1,801,000	39,150	Lower ground twisting around Husky Lakes
KM 90 - KM 110	20	37,400	614,000	30,700	Topographic maps show terrain is similar to km 110 to km 118
KM 110 – KM 118	8	15,000	245,600	30,700	Flatter terrain
KM 118 – KM 135 (Tuktoyaktuk)	17	31,800	436,900	25,700	Upgrade access road to the Highway

Environmental

Terrain, Geology, Soils and Permafrost

The potential effects related to the incorporation of Alternative 3 are considered to be similar to the potential effects as described in Section 4.2.1 of the EIS. As stated previously, the majority of Alternative 3 is located in areas that have been studied since the 1970s. The 21 km section that comprises the alternative route is also located in continuous permafrost.

The surficial geology and landforms along the Highway are primarily the result of glacial activity in the region. The terrain conditions along the common alignment are described in Section 2.3 of the EIS. Additional terrain information specific to the Alternative 3 are described briefly in Table 2.2-1 of this response. A detailed discussion of surficial geology landforms is presented in Section 3.1.1 of the EIS.

A LiDAR survey was recently completed and the information is being processed. This information will be used for more detailed terrain baseline mapping and to finalize the detailed engineering of the route.

Further mapping and geotechnical studies will occur in 2012 (as described in the Developer Response to EIRB (Requests 2b and 2c) submitted to the EIRB in November 2011). These maps and studies will support detailed design of the route alignment and costing and build on the preliminary terrain stability and permafrost information provided in the EIS.

The key geotechnical issues, discussed in Section 2.4 of the EIS, also apply to Alternative 3. As such, the potential effects, mitigation measures, and residual effects discussed in Section 4.2.1 of the EIS remain appropriate for Alternative 3.

Air Quality

The potential air quality effects, mitigation measures, and residual effects remain similar for each route alternative. Therefore, Section 4.2.2 of the EIS applies equally to Alternative 3.

Noise

The sound levels generated during construction and operation will be similar no matter which route is selected. The potential effects, mitigation measures, and residual effects are considered the same for each route alternative. Therefore, Section 4.2.3 of the EIS applies to Alternative 3.

Water Quality and Quantity

As discussed in Section 4.2.4 of the EIS, water quality and the aquatic environment in general is an important component to consider for protection. Particularly within the development area, the lake and stream waters of the watersheds crossed by the proposed Highway are linked to fish and fish habitat abundance and quality.

The primary differences between effects that each route option may have on water quality and quantity pertain to the location of the route along streams. Alternative 3 is located closer to the headwaters of each stream, which means that there will likely be reduced flows, less drainage, the streams in this area will be more ephemeral, and the streams will be "flashier" (i.e., water levels increase and decrease quickly, making it less likely to be fish habitat). This is a primary advantage of Alternative 3 compared to the Primary 2009 Route and Alternative 1 (2009 Minor Realignment), which are located further downstream.

Otherwise, the potential effects, mitigation measures, and residual effects are considered to be generally the same for each route alternative. Therefore, Section 4.2.4 of the EIS applies to Alternative 3.

Fish and Fish Habitat

Effects of construction and operation activities associated with the Highway on fish and fish habitat relate primarily to the construction phase of the Project, and secondarily to the operations phase.

The primary difference between effects that each route option may cause on fish and fish habitat pertains to the location of the route in its proximity to Husky Lakes and the location of the route along the stream. A primary concern stated during the consultations and discussed in the EIS is the potential increased access to Husky Lakes (note: this was also considered an advantage by some) and

the potential for increased fish harvesting. Alternative 3 is located further from the Husky Lakes than the Primary 2009 Route and Alternative 1 (2009 Minor Realignment).

Similar to the response provided for Water Quality and Quantity, Alternative 3 is located closer to the headwaters of each stream, which mean that there will likely be reduced flows, less drainage, the streams in this area will be more ephemeral, and the streams are "flashier". These features are characteristic of poorer fish habitat quality and a lower likelihood that fish would be found in these streams. Therefore, Alternative 3 is preferable to Primary 2009 Route and Alternative 1 (2009 Minor Realignment).

Otherwise, the potential effects, mitigation measures, and residual effects are considered to be generally the same for each route alternative. Therefore, Section 4.2.5 of the EIS applies to Alternative 3.

Vegetation

A comparison between the types and amounts of vegetation disturbed by each route option is presented in Section 4.2.6 of the EIS. Alternative 3 has a comparable footprint area to the Primary 2009 Route. The types of potential effects, mitigation measures, and residual effects are considered the same for each route alternative. Therefore, Section 4.2.6 of the EIS applies to Alternative 3.

Wildlife and Wildlife Habitat

In general, the types of potential effects, mitigation measures, and residual effects are considered to be similar for each route alternative. Therefore, Section 4.2.7 of the EIS applies to Alternative 3.

Effects that relate to specifically to Alternative 3 are described as follows:

- Based on Figure 3.1.9-1, Alternative 3 is located in an area that is likely to be used less frequently by the Cape Bathurst Caribou Herd than Alternative 2 (Upland Route), but more frequently used than the Primary 2009 Route and Alternative 1 (2009 Minor Realignment).
- Based on Figure 3.1.9-2, all route options are in an area with the same likelihoods of use by the Bluenose West Caribou Herd.
- Based on Figure 3.1.9-3, all route options are located in the Cape Bathurst Herd and Bluenose West Herd ranges during December 1 to March 31 (winter).
- Based on Figure 3.1.9-3, Alternative 2 (Upland Route) is located in an area where more caribou have been observed during December 1 to March 31 (winter) than Alternative 3.
- Based on Figure 3.1.9-4, all route options are located in the Cape Bathurst Herd and Bluenose West Herd ranges during April 1 to May 31 (spring, spring migration and pre-calving).
- Based on Figure 3.1.9-4, Alternative 3, Alternative 1 and the Primary 2009 Route are located in areas where more caribou have been observed during April 1 to May 31 (spring, spring migration and pre-calving) than Alternative 2 (Upland Route).
- Based on Figure 3.1.9-5, none of the route options are located in the Cape Bathurst Herd range or Bluenose West Herd ranges during the calving/post calving period (June 1 to 25).
- Based on Figure 3.1.9-6, none of the route options are located in the Cape Bathurst Herd or Bluenose West Herd ranges during June 26 to July 15 (early summer).

- Based on Figure 3.1.9-7, none of the route options are located in the Cape Bathurst Herd or Bluenose West Herd range during July 16 to August 7 (mid summer).
- Based on Figure 3.1.9-8, none of the route options are located in the Cape Bathurst Herd or Bluenose West Herd range during August 8 to October 7 (late summer).
- Based on Figure 3.1.9-9, all of the route options are located in the Cape Bathurst Herd and Bluenose West Herd ranges during October 8 to 31 (fall/rut).
- Based on Figure 3.1.9-3, Alternative 2 (Upland Route) is located in an area where more caribou have been observed during October 8 to 31 (fall/rut) than Alternative 3.
- Based on Figure 3.1.9-10, Alternative 2 (Upland Route) and Alternative 3 are located in the Cape Bathurst Herd and Bluenose West Herd ranges during November 1 to 30 (fall/ post rut).
- Based on Figure 3.1.9-10, Alternative 2 (Upland Route) is located in an area where more caribou have been observed during November 1 to 30 (fall/ post rut) than Alternative 3.
- Based on Figure 3.1.9-14, all route options are located within Wildlife Management Area I/BC/07, which has been closed to all hunting of barren-ground caribou since September 2007.
- Based on Figure 3.1.9-15, all route options are located within the Eskimo Lakes grizzly bear subpopulation range. Alternative 2 (Upland Route) is also partially located within the Richards Islands grizzly bear subpopulation range.
- Based on Figure 3.1.9-17, all route options are located within grizzly bear denning areas.

Socio-Economic

In general, the types of potential effects, mitigation measures, and residual effects are similar for each route alternative. Therefore, Section 4.3 of the EIS applies to Alternative 3.

Effects that relate to specifically to Alternative 3 are described as follows:

Harvesting

- Based on Figure 3.2.8-1, all route options are located within the spring caribou harvest area (302C) and the winter caribou harvest area (315C).
- Based on Figure 3.2.8-11, all route options are located within the winter wolverine harvesting areas (314C).
- Based on Figure 3.2.8-13, all route options are located within the spring goose harvesting areas (304C), although Alternative 2 (Upland Route) is only partially located within this area.
- Based on Figure 3.2.8-17, a portion of Alternative 3 is located within the summer fishing harvesting area (307C), while a portion of Alternative 2 (Upland Route) is located within the winter fishing harvesting area (316C).

Land Use

- Based on Figure 3.2.9-1, several residential leases (seasonally used cabins) are located near the Husky Lakes. Alternative 3 was intentionally recommended by Inuvialuit interests to be located further from the Husky Lakes than the Primary 2009 Route and Alternative 1 (2009 Minor Realignment).

- Based on Figure 3.2.9-4, all route options are located within areas designated as Management Category "E".

Archaeology

- Based on Figure 3.2.10-1, Alternative 3 is not located near any known archaeological sites; whereas the Alternative 2 (Upland Route) is considered to be more prospective for archaeological sites.
- The 2011 Archaeology Study indicated that "no new archaeological sites were recorded as a result of the investigations and no sites will be directly impacted by the proposed Highway [Right-of-Way] and alternate routes" (IMG-Golder 2011, p. 14). The study specifically investigated Alternative 3.

Reference:

IMG-Golder Corporation. December 20, 2011. Archaeological Impact Assessment of the Inuvik to Tuktoyaktuk Highway. Submitted to Department of Transportation, Government of the Northwest Territories. Report No. 11-1320-0001.

IR Number: 3

To: The Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Alternatives to the Project (EIS, Section 2 and supplementary materials)

Preamble
The current Review is being conducted pursuant to the Inuvialuit Final Agreement (IFA) to satisfy requirements of that agreement and it is also a substituted Review for purposes of the *Canadian Environmental Assessment Act* (CEAA). Consequently, the Review must satisfy the requirements of both the IFA and CEAA. Section 16(e) of CEAA requires that alternatives to the project be considered as part of all panel reviews.

Request

1. Please indicate where in the Environmental Impact Statement or in the supplementary materials on the record for this proceeding the Developer has identified and considered the relative advantages, disadvantages and impacts of alternative means for providing improved transportation facilities to Tuktoyaktuk and the Inuvik region.
2. If this analysis is not currently included in the EIS please complete one and file it with the Board.

Developer Response: 3.1

The EIS and the Addendum discuss the alternative means and methods of carrying out the project in terms of alternative alignments and construction considerations. The sections of the EIS that describe the Consideration of Alternatives are listed in the Concordance Table of the EIS, specifically on pages lxii-lxiii. Further information used to describe the alternative means of constructing the Highway are also described in Addendum to the Environmental Impact Statement (submitted to the EIRB in August 2011) – Section 2.0 (Category 3) #7 and #8.

The proposed Inuvik to Tuktoyaktuk Highway provides an alternative to the existing transportation infrastructure between Inuvik and Tuktoyaktuk. Transportation infrastructure include:

- Marine access (via Mackenzie River and Kittigazuit Bay) during the short, open-water period;
- Air access via the local airports, year-round; and
- Vehicle access (via the winter ice road) during winter months.

The EIS and subsequent documents submitted to the EIRB discuss the advantages, disadvantages and potential impacts of constructing the Highway (the proposed alternative transportation infrastructure).

Developer Response: 3.2

See "Developer Response 3.1".

IR Number: 4

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Potential impacts from borrow pit sources (EIS, Section 1.5.1.1, p. 15; EIS Executive Summary, p. ix; EIS Section 3.1.1.3, p.105, Addendum to the Environmental Impact Statement for the Construction of the Inuvik to Tuktoyaktuk Highway, NWT, p.4-18).

Preamble

During some phases of construction, the Development will require the extraction of large quantities of borrow resources, and additional permits will be required. Although the potential borrow sources near Inuvik and Tuktoyaktuk have been ground-truthed and their spatial extent determined, many of the granular resources along the Primary 2009 Route are not proven and are described by the Developer as probable or prospective granular material resources whose existence and extent have been inferred. In the EIS, the Developer has acknowledged that additional site investigation is necessary prior to using these materials. The confirmation of additional borrow sites is ongoing. It is not clear how the environmental impacts (i.e., impacts to Valued Ecological Components (VECs)) from these as yet undefined borrow sites will be evaluated in the context of the Development and the EIS. It is understood that a final baseline report is expected by August 31, 2012.

Request

1. Please provide an update with respect to the ongoing delineation of potential borrow sites associated with the Development and provide rationale as to why borrow pits can be excluded from any detailed impact assessment in the EIS.
2. Please explain how the environmental impacts (i.e., impacts to VECs) from these as yet undefined borrow sites will be evaluated in the context of the Development, the EIS, and the Review given that the 'baseline' report will not be completed until August 2012.

Developer Response: 4.1

A comprehensive granular source evaluation report describing the geotechnical site investigation undertaken and the results of the laboratory testing and data analyses will be available at the end of August 2012. The geotechnical work, which requires drilling beneath the land surface, will not commence without regulatory authority approval of the permit applications.

Developer Response: 4.2

Section 2.6.8.3 of the EIS identified the current preferred borrow sources that are proposed for construction of the Highway These sites are illustrated in Figure 2.6.8-2 of the EIS and estimated quantities from each source based on the conceptual design are presented in Table 2.6.8-2, which are re-presented as follows. It is important to note that all borrow source development would respect the 1 km Husky Lakes setback.

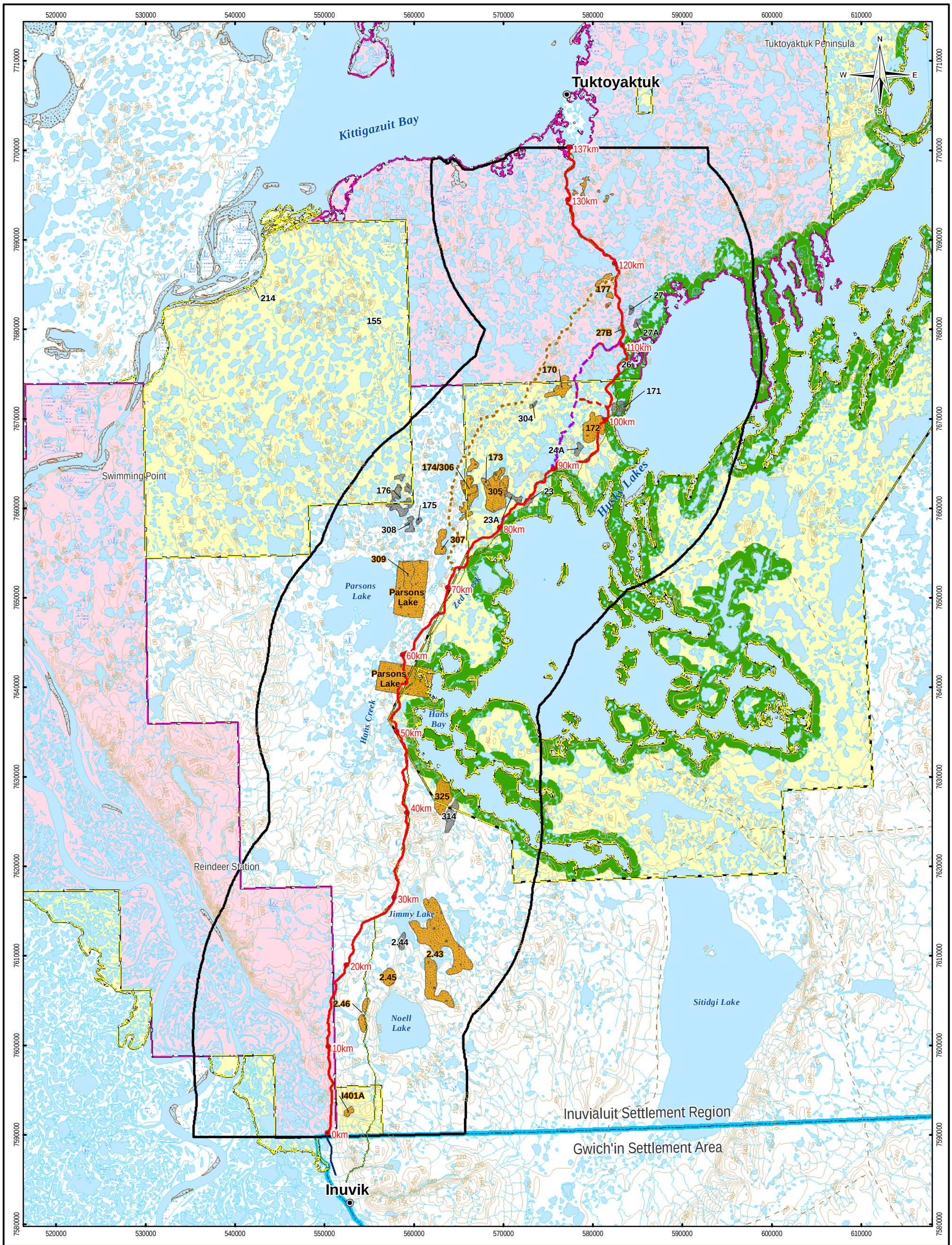
TABLE 2.6.8-2: ESTIMATED QUANTITIES FROM POTENTIAL BORROW SOURCES

Highway Segment	Potential Borrow Source	Estimated Borrow Quantity[1]	Land Owner	Quality
KM 0 - KM 5	I401A	198,000	Crown	Class 4
KM 5 - KM 10	2.46	198,000	Crown	Class 3, 4
KM 10 – KM 21	2.45	351,000	Crown	Class 2
KM 21 - KM 34	2.43	351,000	Crown	Class 3, 4
KM 34 - KM 45	325 (outside of Husky Lakes setback)	329,000	Crown	Class 3
KM 45 - KM 56	Parsons Lake – (west of alignment only)	445,000	Crown	NA
KM 56 - KM 69	309	671,000	Crown	Class 2
KM 69 - KM 83	307	516,000	Crown	Class 3
KM 83 - KM 100	173/305, 174/306	563,000	Inuvialuit	Class 1, 2
KM 100 - KM 112	172, 170	363,000	Inuvialuit	Class 3, 4
KM 112 - KM 118	27B	244,000	Inuvialuit	Class 2
KM 118 – KM 137 (Tuktoyaktuk)	177	510,000	Inuvialuit	Class 2

As discussed in Section 4.2.5.1 of the EIS, the borrow pits required for construction of the Highway will be developed, operated and decommissioned in full compliance with all regulatory requirements (e.g. ILA Land Use Permit and Quarry Permit, INAC Quarry Permits, ILA's ISR Pits and Quarries Guidelines, INAC's Northern Land Use Guidelines: Pits and Quarries and according to pit development plans (PDPs).

The PDPs will include the standard available mitigation measures described in the suite of applicable guidelines to address potential environmental concerns. Key mitigation measures include developing borrow sources primarily during the winter period, maintaining sufficient distance of undisturbed land between borrow source locations and any waterbody, and the application of appropriate erosion and sediment control management practices for the borrow source activities.

Q:\Vancouver\GIS\ENVIRONMENTAL\V232\V23201322_TukRoad_EIS\Maps\EIS\V23201322_EIS_Map020_Dev_GranInvest.mxd modified 5/19/2011 by stephanie.leusink



LEGEND

- Regional Study Area (15 km buffer)
- Primary 2009 Route
- Alternative 1 (2009 Minor Realignment)
- Alternative 2 (Upland Route)
- Alternative 3 (2010 Minor Realignment)
- PWC 1977
- Navy Road
- Inuvialuit 7(1)(a) Lands
- Inuvialuit 7(1)(b) Lands
- Gwich'in / Inuvialuit Boundary
- Husky Lakes 1000m Setback
- Borrow Sources
- Potential Highway Borrow Sources - (further investigation and potential use in construction)
- Trail
- Contour
- Watercourse
- Waterbody
- Wetland
- Sand

NOTES
Base data source: NTS 1:250,000
Borrow Sources, ILA Lands, Husky Lakes 1000m Setback: Inuvialuit Land Administration

ISSUED FOR USE

PROPOSED INUVIK-TUKTOYAKTUK HIGHWAY
ENVIRONMENTAL IMPACT STATEMENT

Potential Borrow Sources Requiring Further Investigation For Potential Use

PROJECTION	DATUM
UTM Zone 8	NAD83

Scale: 1:400,000
5 2.5 0 5 10
Kilometres

FILE NO. V23201322_EIS_Map020_Dev_GranInvest.mxd

PROJECT NO.	DWN	CKD	REV
V23201322	SL	TS	0

OFFICE	DATE
EBA-VANC	May 19, 2011

Figure 2.6.8-2

During the course of borrow source development and materials extraction, ongoing monitoring will be undertaken by environmental (ILA) and wildlife (HTC) monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to watercourses and prevent erosion and subsequent sedimentation by stopping specific activities causing or likely to cause erosion and off-site discharges of turbid water. If blasting is required, it will be conducted according to DFO's Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters (Wright and Hopky 1998).

As discussed in Section 2.6.8.6 of the EIS, borrow pits will generally be closed as soon as they are no longer required and reclaimed in a progressive manner by the GNWT DOT's contractors. Areas required for the continued maintenance of the Highway during operation (and for community use) will remain open while in use, and will be reclaimed after they are no longer required. The disturbed areas will be re-contoured, at closure. Borrow pits will be designed to prevent entrapment of wildlife at closure.

Section 4.2 of the EIS assessed the typical types of impacts that could occur to any of the VECs associated with the development of borrow sites. These included:

- Long term but localized loss of vegetation within the borrow site disturbance footprint;
- Short term loud noise from occasional blasting and lower level material excavation and trucking noise primarily during winter;
- Short term dust emissions, primarily during the winter operational period;
- Potential erosion and localized sedimentation effects on water quality and fish habitat;
- Potential short term disturbance of wildlife, in particular caribou, foxes, wolves, ptarmigan, that may be active in the area during the period when the borrow sites are in operation.

As indicated in the Developer's responses to Responses 2b and 2c, submitted to the EIRB in November 2011, winter geotechnical drilling, sampling and lab testing of portions of nine (9) of the preferred borrow sites will be undertaken later this winter (2012) to confirm the extent, quantity and quality of materials available at these sites. Follow-up vegetation cover, and rare plant field surveys and sampling will also be conducted at these preferred borrow sites in the summer of 2012.

The site-specific geotechnical and biophysical environmental data obtained from these survey activities will be used to assist in the development of the necessary pit development plans (PDPs), including the identification of site-specific environmental mitigation measures that will accompany each PDP to ensure that potential site-specific environmental issues (e.g. presence of rare plants or other critical habitat) can be effectively mitigated.

Based on the discussion provided, the Developer remains confident that the current predictions in the EIS pertaining to the typical types of impacts that could occur to any of the VECs associated with the development of the preferred borrow sites are appropriate and can be effectively mitigated.

IR Number: 5

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Water crossing – downstream impacts and connections to Husky Lakes (EIS, Section 3.1.7, p. 150 and Section 4.2.5, p.494)

Preamble

Although there is some discussion surrounding the 46 stream crossings and their overall impact assessment in the context of water quality and fish and fish habitat, it is not clear if or how potential downstream effects were assessed.

Request

1. Please explain how the potential development impacts downstream of water crossings and in the Husky Lakes will be assessed.
2. For monitoring of the effects of water crossings, indicate the parameters that will be measured, the locations of monitoring sites and the frequency of measurements.
3. Identify monitoring plans for Husky Lakes and indicate the parameters which will be used, the location of measurement sites, and frequency of monitoring to assess effects on the water quality in the Husky Lakes.

Developer Response: 5.1

The installation of culverts and the construction of bridges will be guided by an Environmental Management Plan (EMP), which will include construction scheduling restrictions, environmental construction guidelines, methods to prevent spills of deleterious substances, an erosion and sediment control plan, and a monitoring plan. The implementation of the measures contained in the EMP are intended to avoid or minimize effects to aquatic resources.

Potential effects on fish and fish habitat, in the absence of appropriate mitigation measures or due to culvert failure, would occur due to obstruction of fish passage at culvert crossings and downstream sedimentation caused by bank or stream bed erosion. Inspection of culverts, particularly in fish bearing streams, will be carried out annually following construction to ensure compliance with fish passage requirements. Since unanticipated post-construction effects downstream would be restricted to those resulting from localized sediment transport and deposition, mitigation measures can be readily applied to remedy these situations at the source, if determined to be necessary. As a result, assessment in the Husky Lakes will not be necessary.

Developer Response: 5.2

- Parameters that will be measured: turbidity (Nephelometric Turbidity Units (NTU); pH; dissolved oxygen; conductivity; temperature.
- Sampling will be conducted within 50 metres upstream of each crossing site and 50 and 100 metres downstream of each crossing site (i.e. three measurement sites per stream).

- Sampling will occur in spring, following ice-out, which is the time of freshet when there is the greatest risk of erosion and sediment transport.

Turbidity measurement comparisons between sites upstream and downstream of road crossings will be used as indicators of erosion and sedimentation, effectively providing a control-impact monitoring design. Turbidity can be measured on site, allowing rapid identification of deteriorated water quality conditions and the timely application of remediation measures. The threshold turbidity levels that will be followed for the implementation of remediation are based on the BC Ministry of Environment Ambient Water Quality Guidelines, as follows:

- During clear flow periods: background levels should not be exceeded by more than 8 NTU.
- During turbid flow periods: background levels should not be exceeded by more than 5 NTU at any time when background turbidity is between 8 and 50 NTU. When background exceeds 50 NTU, turbidity should not be increased by more than 10% of the measured background level at any one time.

Developer Response: 5.3

As indicated in response 5.1, no impacts to the Husky Lakes are anticipated and monitoring will be conducted within potentially affected streams in the vicinity of stream crossings such that unanticipated sediment releases can be rapidly remedied at the source. Thus, no monitoring is proposed for the Husky Lakes.

IR Number: 6

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Noise spatial boundaries (EIS, Section 3.1.4, p. 139 and Section 3.1.4.1, p.140, Section 3.1.4.5, p.142)

Preamble

The Developer states that *"The spatial boundary for noise is represented by the area in which effects are likely to occur. The local study area is considered to be within 0.5 km of the Highway center-line while the regional study area is defined by the area within 15 km of the Highway center-line."* No scientifically defensible rationale is provided to support the above assertions.

The Developer states that the *"Baseline sound levels have been recorded at the proposed Mackenzie Gas Project's Inuvik Area Facility which was considered representative of ambient sound levels along most of the pipeline corridor."* The Developer further states that sound levels at the survey sites were low and were consistent with remote environments, but no data originating from along the proposed Highway route have been provided. This suggests that no baseline noise levels were monitored along the proposed Highway route.

Request

1. Please provide a defensible rationale for the noise spatial boundaries selected in the context of the proposed Development and its location.
2. Please explain and justify your conclusion that sound levels along the proposed Highway route are consistent with remote environments.

Developer Response: 6.1

In environmental assessment, it is common to create a spatial boundary based on a local study area (LSA) and a regional study area (RSA). In this case, the LSA overlaps the Project footprint and allows for an additional 500 m on either side of the Highway alignment to predict the noise level at the Project site. The RSA overlaps the Project footprint and extends a further 15 km on either side of the Highway alignment.

The noisiest activity anticipated to occur during the construction phase is blasting. As stated in Section 4.2.3.1, the US Department of Transportation states that blasting activities produce a peak sound pressure level of approximately 110 dBA at 100 m (within the LSA), and in flat open topography, the sound level reduces to approximately 76 dBA at 5 km from the source (within the RSA). As stated in Section 4.2.3.5 of the EIS, sound levels will diminish with increased distance from the source. As such, the Developer deemed it conservative to apply a 15 km RSA to the noise parameter.

Developer Response: 6.2

The term "remote" is defined by Merriam-Webster dictionary as "out of the way, secluded" or "separated by an interval or space greater than usual". The proposed Highway route, between Inuvik and Tuktoyaktuk is accessible by snow machine during the winter months, but is inaccessible during the snow-free season. Data regarding the proximity of the proposed route to human

receptors were provided previously in the Developers response to Health Canada (submitted to the EIRB in August 2011). The areas that might be affected by operations, transportation and construction noise have two seasonal dwellings located within 1 km of the proposed preferred route, and as such, are considered remote.

The proposed Meadowbank Gold Project in Nunavut used a comparable 24-hour background sound survey completed for the Fort McKay area in Northern Alberta to represent the baseline conditions for the Meadowbank Gold mining project, as "the Fort McKay area also has no anthropogenic noise sources present". For interest, the assumed background noise (in DBA) in the Meadowbank Project area ranged between 30.0 dBA (L_{min} – night time) to 67.5 dBA (L_{max} – daytime).

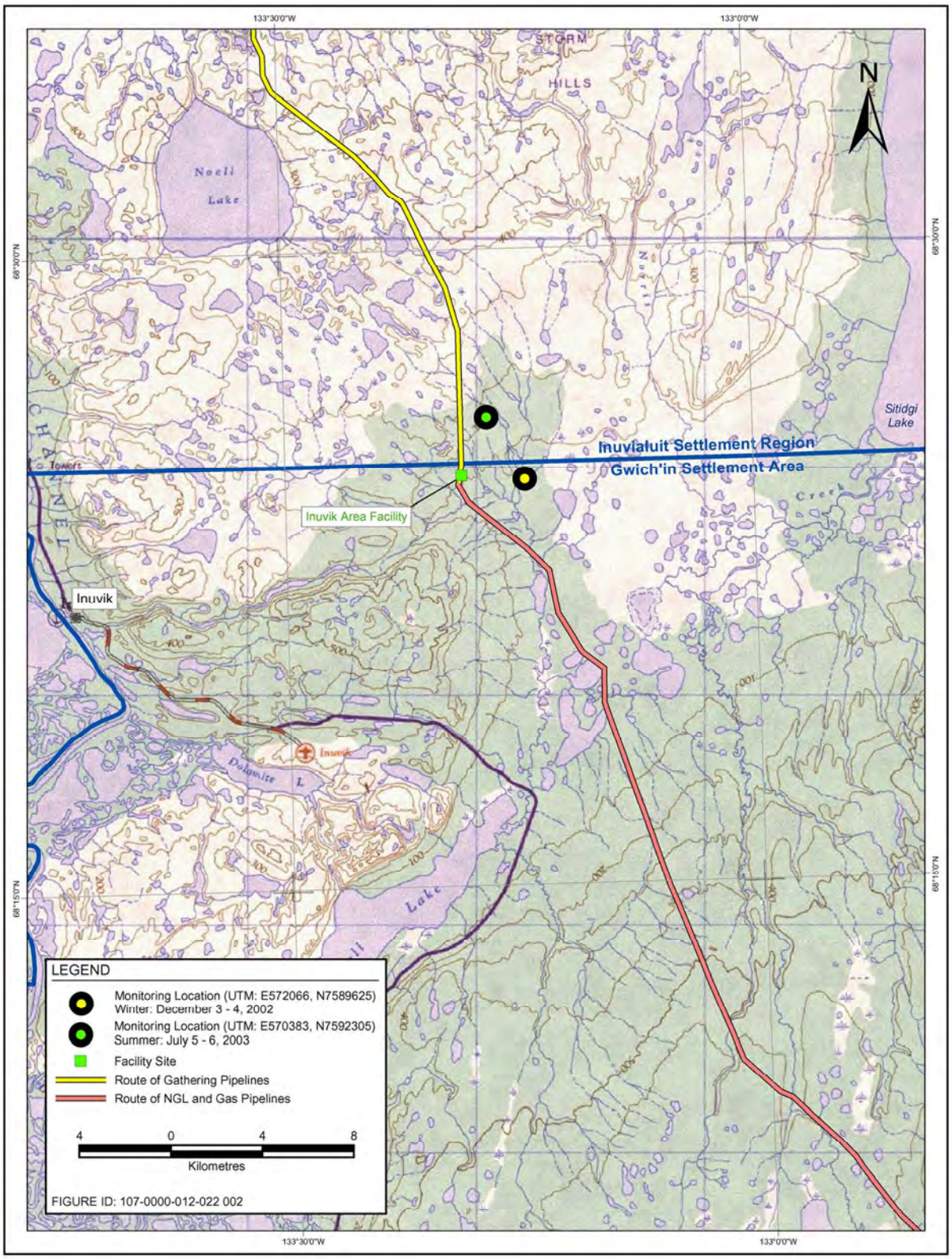
In the case of the proposed Inuvik to Tuktoyaktuk Highway, data were available from the region that were collected for the Mackenzie Gas Project's proposed Inuvik area facility. The sound monitoring equipment was located at 68°24'37"N and 133°14'42" W (UTM: E572066, N7589625) during December 3-4, 2002 and was located at 68°26'4"N and 133°17'1" W (UTM: E570383, N7592305) during July 5-6, 2003. Figure IR 6-1 from the Mackenzie Gas Project EIS identifies the sound monitoring locations in comparison to the preferred route. The sound monitoring equipment is located relatively near the Town of Inuvik. Even at that distance, the sound levels are less than the typical noise levels of quite outdoors, as identified by the Alberta EUB (2007) in Section 3.1.4.4 of the EIS, and less than the background noise levels identified for the Meadowbank Project (Cumberland Resources Ltd. 2005).

A comprehensive noise field study is not required for the Project under applicable noise guidelines because of the remote nature of the Project and the limited number of noise-sensitive receptors near the proposed Highway route.

Reference:

Cumberland Resources Ltd. January 2005. Meadowbank Gold Project Noise Impact Assessment. Retrieved January 19, 2012 from http://ftp.nirb.ca/02-REVIEWS/COMPLETED%20REVIEWS/03MN107-MEADOWBANK%20GOLD%20MINE/02-REVIEW/05-DRAFT_EIS/SUPPORTING%20DOCUMENTS/52c._050209_02_Impact_Assessments-IMAE/006%20Noise%20Impact/006%20Noise%20Impact%20Assessment.pdf

FIGURE IR 6-1 – sound monitoring locations (upland-off) from the Mackenzie Gas Project EIS



IR Number: 7

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Construction noise (EIS, Section 3.1.4.2, p.140)

Preamble
The Developer claims that construction noise has traditionally been excluded from impact assessments because, although it can have great magnitude, it is usually temporary in nature. Yet no scientifically defensible rationale or concrete examples of the exclusion of construction noise in environmental effects assessment are provided to support the above assertions.

Request

1. Please provide a defensible rationale for excluding construction noise from the impact assessment in the context of the proposed Development and its location.
2. Please provide examples of major road or highway assessments where construction noise was excluded from the impact assessment and the associated rationale that was provided for doing so.

Developer Response: 7.1

The Developer would like to strike the following statement from Section 3.1.4.2 of the EIS:

"Construction noise has traditionally been excluded from impact assessments because, although it can have great magnitude, it is usually temporary in nature."

As per the EIRB's Terms of Reference, the Developer did include both baseline information (Section 3.1.4) and an effects assessment (Section 4.2.3) discussion for construction, as well as operations, related to noise in the EIS.

Developer Response: 7.2

Please see Developer Response 7.1.

IR Number: 8

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Development Setting, Spatial Boundaries, Socio-economic Study Area(EIRB ToR, 2.4, 5.4; EIS Sec. 1.4, p.9; EIS Sec. 4.1.3.1, p.462-463; EIS Sec. 4.3, p.568; Table 4.3-1, p.568; Table 4.3-2, p.569)

Preamble

The EIRB ToR (5.4) requests the Developer to provide a general overview of the geographic, ecological, social, economic and cultural setting in which the development is proposed to take place, as well as to describe positive contributions at the local, regional, territorial and national levels (2.4).

The EIS (p.9) provides a general overview of Inuvik and Tuktoyaktuk. The EIS (p.462) states that "Local and regional spatial boundaries were determined for biophysical and socio-economic components based on their respective characteristics and anticipated interactions with Highway activities." The EIS (p.463) further states that the Human Environment Study Area "includes the communities of Inuvik and Tuktoyaktuk and the Inuvialuit that may be impacted by the proposed development", and defines the socio-economic study area as "…limited to the Town of Inuvik, the Hamlet of Tuktoyaktuk, and the land base between the two communities, including the Husky Lakes area" (p.568),

The EIS does not differentiate between a local study area (LSA) or a regional study area (RSA) for the socio-economic effects assessment. Throughout the assessment, however, references are made to regional effects. For example, Tables 4.3-1 (p.568) and 4.3-2 (p.569) present the assessment summary for the Valued Socio-economic Components and other Socio-economic Components, respectively. Under the column "*Affected Areas*" in each of the tables, "*ISR*" is included with Tuktoyaktuk and Inuvik.

Request

1. Please explain whether, and how, socio-economic effects were assessed at a regional level.
2. With regard to "…*the Inuvialuit that may be impacted by the proposed development*…" please explain how such impacts will be measured and monitored, and if necessary, mitigated, if these effects are outside the socio-economic study area.

Developer Response: 8.1

As referenced in the Preamble, the socio-economic study area concept was applied predominantly on the basis of "anticipated interactions with Highway activities". As in most environmental assessments, the Developer's approach was to identify the socio-economic components "most directly affected" and to focus on the human population most directly affected. For this project, the concept of local study area is best applied when considering a single community (either Inuvik or Tuktoyaktuk) and a regional study area is best applied when considering the two communities together and/or the land users within 15 km of the preferred route depending on the VSCs.

Given the reasonably simple socio-economic context of the Project (i.e. the limited scale of annual construction, the limited manpower/equipment needs for the construction phase), there is limited need to analyze most variables at both the community level and regional level. Because of this, the EIS tended to discuss the effects more flexibly.

The two summary tables referenced in the Preamble (Tables 4.3-1 (p.568) and 4.3-2 (p.569)) summarize the detailed subcomponents for each of the listed socio-economic components. These tables must be read in concert with the detailed descriptions of the subcomponents.

Developer Response: 8.2

The term "*and Inuvialuit that may be impacted by the proposed development*" is intended to reflect the importance of the more broadly held rights of the Inuvialuit under the Inuvialuit Final Agreement, including those who may have a collective interest but may not be directly affected. In these cases, the concept of regional study area is less useful. For example, effects on hunting rights can be broader than just those people residing in the two primary communities. Archaeological sites are another example, as these are not tied to either of the primary communities but are a collective interest of the Inuvialuit. Many Valued Socio-economic Components in Table 4.3-1 meet this level of collective interests of the Inuvialuit. The EIS assessed the effects of a large number of key socio-economic subcomponents in Section 4.3, which formed the basis of the summary socio-economic component assessment Table 4.3-1. These are described in detail from pages 595 to 609 [see also IR Response 9.1].

IR Number: 9

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Valued Socio-economic Components (EIS, Executive Summary, p.ii**;** EIS, Sec. 4,3, p.568-609**;** EIS Sec. 4.1.2, p.461-462**;** Addendum to the EIS, Table 4, p.45-46; Developer Response to 2b and 2c, p. 80-131)

Preamble

The EIS (p.461) defines Valued Socio-economic Components (VSCs) as "Cultural, social, economic, or health aspects of the study population that, if affected by the project, would be of concern to local human populations or government regulators" (NEB 2011)." Table 4.1.2-1 (EIS p.462) lists the VSCs for the Human Environment, and Table 4.3-1 presents a summary of the assessment for these VSCs. Table 4.3-2 (EIS p.569) presents a summary of the predicted socio-economic effects for other socio-economic components assessed within the Human Environment Section.

The Valued Socio-economic Components listed in Table 4.1.2-1 are not inclusive of the range of predicted socio-economic effects as these are (1) outlined in the Executive Summary (EIS, p.ii), (2) identified and listed as spin-off socio-economic effects (EIS, p.573), and (3) defined by the NEB (2011, EIS, p.461).

Further, the Human Environment Assessment presented in the EIS (p.569-609) and the Developer Response to 2b and 2c (p.80-131) discusses the Development effects on a range of socio-economic topics (EIS Sec. 4.3-1 through 4.3-9). It is acknowledged that there is overlap and obvious relation between the VSCs and other Socio-economic Components, and the topics discussed and assessment presented in the EIS and Developer Response to 2b and 2c. However, it appears as though the assessment of effects on the VSCs in particular draws from more than one of the topics discussed in the EIS and Developer Response to 2b and 2c, and it is not immediately clear which information has been used in the determination of these effects.

Request

1. Please explain why the "Socio-economic Components" (EIS p.569) were not identified and considered as "Valued Socio-economic Components" (EIS p.568), especially given that many of the predicted effects of the Highway described on p.ii (EIS) and p.573 (EIS) pertain to the "Socio-economic Components".
2. Please explain whether, and how, the differentiation between "Valued Socio-economic Components" and "Socio-economic Components" determined the assessment of socio-economic effects.
3. For each of the VSCs listed in Table 4.3-1, please identify the relevant sections from (1) the EIS and (2) the Developer Response to 2b and 2c from which the assessment of effects on the VSCs is drawn.

Developer Response: 9.1

In developing the list of Valued Social Components, the Developer drew from the EIRB's Terms of Reference (2011), Section 8.1, which states:

> *If using the valued components methodology, the Developer shall include and consider the following elements…*

- *Land and resource use by the Inuvialuit.*
- *Areas of special ecological and cultural importance (e.g., Husky Lakes and the 1,000 m set-back)*
- *Land designation areas as identified in applicable CCPs and the IFA.*
- *Tourism, commercial and public recreational use.*
- *Heritage and archaeological sites.*

The Developer attempted to conform to the EIRB's Terms of Reference by using these VSCs. The Developer agrees the VSCs identified by the EIRB draw from several socio-economic components.

In the Project Description Report, the Developer had identified several socio-economic components related to the proposed Highway based on the issues raised during the 2009 and 2010 consultation events. These include regional economy; infrastructure; individual/family and community wellness; and, traditional cultures. The components were described and assessed through a large number of key socio-economic sub-components in Section 4.3 of the EIS. Table 4.3-2 of the EIS presented a summary of the detailed subcomponents. Although the term "valued" was not used, these subcomponents were treated in the manner required in the TOR. These are described in detail from pages 569 to 594. While it is not the Developer's intention to repeat this information, the EIS Residual Effects description formed the basis of the summary table.

The Developer is aware of an unintentional omission of evidence for one socio-economic subcomponent. On page 593, the EIS discussed a potential for increased substance abuse and derivative accidental or violent injuries, particularly in the Hamlet of Tuktoyaktuk, and more specifically, the issue of family violence which could increase with the increased availability of alcohol. The EIS should have indicated the decision taken by the community to restrict alcohol availability beginning March 1, 2010. Given the ability to enforce the Tuktoyaktuk regulations restricting alcohol possession in the community [see IR Response 44.1 for details], the Developer requests the Residual Effects (page 593) be replaced with the following:

4.3.4 Human Health and Community Wellness

Residual Effects

The Highway will create long-term, year-round access between Inuvik and Tuktoyaktuk. The benefits include increased access to medical and dental facilities. The potential risk of increased access to unrestricted amounts of alcohol in the Hamlet of Tuktoyaktuk has been substantially reduced by the community's decision to impose restrictions on the possession of alcohol within the community. Several programs are currently in place to prevent or treat substance abuse issues. Increased interaction between residents of the two communities, youth groups and schools is expected to positively benefit the communities.

Developer Response: 9.2

The VSCs and socio-economic components shown in Table 4.3-2 were assessed in the same manner. The assessments were based on a review of the effects assessment from related socio-economic components. The EIS contains a lengthy analysis of the potential effects and residual effects in Section 4.3. Tables 4.3-1 and 4.3-2 present summaries or overall conclusions of project

effects/residual effects on the VSCs and socio-economic components. More detail is provided for the socio-economic subcomponents in the EIS.

Developer Response: 9.3

Table IR 9-1 identifies the relevant socio-economic components and locations in the EIS and Developer Response to 2b and 2c used to assess the VSCs.

TABLE IR 9-1: RELEVANT SECTIONS OF VSCS

VSC	Related Socio-Economic Component	EIS Section	Developer Response to 2b and 2c Section
Land and Resource Use by the Inuvialuit	• Land Use • Harvesting • Socio-Cultural Patterns	3.2.9, 4.3.8 3.2.8, 4.3.7 4.3.6	16.0 15.0 14.0
Areas of Special Ecological and Cultural Importance	• Land Use • Harvesting • Archaeological Resources	3.2.9, 4.3.8 3.2.8, 4.3.7 3.2.10	16.0 15.0 17.0
Land Designation Areas (as per IFA and CCPs)	• Land Use • Infrastructure and Institutional Capacity Community Services – Management of Renewable Resources • Harvesting	3.2.9, 4.3.8 3.2.5.16, 4.3.4.9 3.2.8, 4.3.7	16.0 11.8 15.0

Tourism, Commercial and Public Recreational Use	• Land Use
	• Infrastructure and Institutional Capacity Community Services:
	  • Supply of Aggregate and Granular Materials
	  • Quarries and Quarry Materials
	  • Transportation Infrastructure
	• Socio-Cultural Patterns
		
		3.2.5.17
		
		4.3.4.7
		4.3.4.1
		4.3.6
			16.0
			
			11.7
			
			11.1
			14.0

Heritage and Archaeological Sites	• Archaeological Resources	3.2.10, 4.3.9	17.0

IR Number: 10

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Determination of Impact Significance (EIS, Chapters 4 and 5)

Preamble
Chapters 4 and 5 of the EIS deal with Impact Assessment on Biophysical Components and the Human Environment Components of the environment in sections 4.2 and 4.3 respectively. Within those sections, a variety of subsections discuss and analyze various valued components of the ecosystem, review project activities, predict effects, set out mitigation measures, identify and assess the significance of residual effects. Specific references include sections 4.2.1; 4.2.2; 4.2.3; 4.2.4; 4.2.5; 4.2.6; 4.2.7; 4.3.8; 4.3.9; 4.4.5; and 5.4.1.

Request

With specific reference to the sections listed above please provide the following information:

1. Identify the scientist, engineer or technical expert primarily responsible for the impact evaluation for each section. If more than one person was involved in the determination of impact significance identify each of them and indicate which person was responsible for the final conclusion; and

2. Please file CVs for every person identified in the answer to question 1.

Developer Response: 10.1

The environmental and socio-economic assessments were developed with a collaborative process, using multiple personnel. The assessments were completed using a variety of sources of material including field studies, previously conducted studies for other projects, and then professional judgement was used to determine the overall impact significance. It is also important to note that a number of GNWT departments were consulted during the impact assessment determination process and considerable input was provided by several GNWT departments. Overall senior review of the document was undertaken by Mr. Richard Hoos and Dr. Richard Sims.

Table IR10-1 identifies the key consultant personnel involved in determining the impact significance for each section.

TABLE IR10-1: KEY CONSULTANT PERSONNEL

Section No.	Topic	Primary Personnel	Senior Authority
4.2.1	Terrain, Geology, Soils and Permafrost	Dr. Sam Proskin Ed Grozik Robyn McGregor Walter Orr (FSC) Rick Hoos	Robyn McGregor Rick Hoos
4.2.2	Air Quality	Tara Schmidt Travis Miguez Robert Draho	Tara Schmidt Rick Hoos

TABLE IR10-1: KEY CONSULTANT PERSONNEL			
Section No.	**Topic**	**Primary Personnel**	**Senior Authority**
4.2.3	Noise	Shawneen Walker Tara Schmidt	Tara Schmidt Rick Hoos
4.2.4	Water Quality and Quantity	David Morantz Cameron Kulak Jamie Stirling Rick Hoos	David Morantz Rick Hoos
4.2.5	Fish and Fish Habitat	David Morantz Cameron Kulak Rick Hoos	David Morantz
4.2.6	Vegetation	Tania Perzoff	Tania Perzoff
4.2.7	Wildlife and Wildlife Habitat	Steve Moore Jeff Matheson Claudio Biancini	Jeff Matheson Rick Hoos
4.3.8	Land Use	Tara Schmidt Brian Miller Sunny Munroe	Tara Schmidt
4.3.9	Archaeological Resources	Gabriella Prager Tara Schmidt	Tara Schmidt, based on the conclusions of Gabriella Prager
4.4.5	Worst Case Scenario	Cameron Kulak Rick Hoos Dr. James Stronach	Rick Hoos
5.4.1	Significance Determination for the Highway in Relation to Past, Present and Future Projects	Tara Schmidt David Morantz Tania Perzoff Rick Hoos	Rick Hoos

Developer Response: 10.2

Please see Attachment 1 for the CVs of the primary personnel.

3.0 Project Description

Board IR Number: 11

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Use of Environmental Monitors

Preamble
The Developer has committed to use Environmental Monitors from the appropriate Hunters and Trappers Committee (HTC) in order to identify and then mitigate environmental effects of highway construction. These HTC Monitors are referred to in numerous sections and tables throughout the EIS as an important element of mitigation and environmental, especially wildlife protection plans.

Question

1. Please advise the Board of any specific arrangements have been made with affected HTCs. If an agreement has been reached please file a copy with the Board. If no agreement has been completed please indicate what plans the Developer has for negotiating such agreements and provide an outline of the proposed contents.

2. Please explain the roles and responsibilities of such HTC Monitors. Who will they report to? What authority will they have?

3. Please outline how any information collected by such Monitors will be used in the Developer's Adaptive Management Program. Will HTC Monitors play any role in compliance monitoring? If they will please explain.

Developer Response: 11.1

No arrangements have been made with the affected HTCs at this time. Based on past experience with construction of the Tuktoyaktuk to Granular Source 177 access road, the environmental monitors will be provided by the ILA and the wildlife monitors will be provided by the HTCs.

The costs associated with the provision of the environmental and wildlife monitors will be directed to the Highway construction contractors, who will include these costs in their invoicing to GNWT DOT.

Developer Response: 11.2

The roles and responsibilities of the monitors include:

- Work with DOT's contractors to verify the operations meet the terms and conditions of their permits and licences and general environmental standards/guidelines as set forth by ILA, AANDC, DFO, and other agencies as appropriate. Should the contractor not be in compliance with any of these conditions the monitor will take appropriate action by contacting the Site Supervisor.
- Abide by the project specific and all general safety measures, as required.

- Act as a liaison between ILA/AANDC and the contractor on day to day matters and provide advice as necessary.
- Communicate, on a regular basis, with all key personnel on site (including the wildlife monitor) regarding any issues or potential areas of concern.
- Take appropriate action in responding to critical situations in a timely and effective manner. (i.e. fuel spills).
- Prepare daily and weekly Environmental Monitoring Reports; identifying any and all non-compliance issues that occurred during the day.

Developer Response: 11.3

DOT will ensure that the Highway construction contractors will take all steps necessary to comply with the terms and conditions of all legislation, permits and licenses. As indicated in the response to Information Request 2 (above) the monitors will conduct regular monitoring of project activities and report observations of any problem areas to the contractor's site supervisor. Any corrective action will be implemented as necessary to ensure regulatory compliance and adherence to sound environmental practices. In addition to the work done by monitor working for/with the contractor, compliance monitoring will be performed by monitors that will be working directly for the ILA and the HTCs.

IR Number: 12

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Wildlife management activities along the highway (EIS Section 4.2.7, p. 519 and EIS Executive Summary, p. xv)

Preamble
As summarized in the EIS by the Developer, the objectives of wildlife management activities along the proposed highway will be to mitigate potentially negative effects on wildlife in the following general ways:

- Minimize loss of habitat and reductions of habitat effectiveness via Project design;
- Minimize direct mortality due to collisions with vehicles;
- Reduce attractants at construction camps through responsible waste management and effective environmental awareness programs;
- Reduce the volume, duration, and frequency of noise producing activities;
- Selective timing of Project activities to avoid critical periods for wildlife;
- Conformance with pre-determined setback distances from key wildlife habitat features;
- Effective transportation, storage and disposal of wastes;
- Ensure Project personnel have appropriate levels of wildlife training and awareness; and
- Encourage organizations such as the Hunter and Trapper Committees, Wildlife Management Advisory Council and GNWT Department of Environment and Natural Resources to work together to develop guidelines and conditions for highway usage and follow-up with monitoring of harvesting activities.

According to the Developer, the GNWT DOT's operational policies are designed to mitigate potential impacts on wildlife and wildlife habitat. With the application of the numerous available mitigation measures described in the EIS, effects on wildlife and wildlife habitat are generally expected to be localized and limited and are considered to be minor in the context of the overall Development area.

In the absence of a detailed monitoring plan to assess the effectiveness of the proposed mitigation measures in the context of the proposed development, it will be difficult to assess the proposed mitigation measures and the resulting effects on wildlife and wildlife habitat in the context of the Review.

Request

1. Please explain and justify how the Developer proposes to determine the relative effectiveness of the wildlife management mitigation measures for the proposed development.
2. Please provide specific details with respect to how the 'success' of the proposed mitigation measures would be determined.

Developer Response: 12.1

As indicated in the EIS, the Contractors selected by the Developer to construct the Highway will be required, consistent with their contracts, to comply with all conditions imposed by the necessary

licenses and permits that will be issued for the Highway construction project. In addition, the Developer (Department of Transportation) will require its construction Contractors to conform with the Wildlife Management Plan (WMP) that will be developed for the Inuvik to Tuktoyaktuk Highway construction project. This plan will reflect the numerous wildlife mitigation measures described in Section 4.2.7 of the EIS and will include specific mitigation measures for Species at Risk, caribou, moose, furbearers, and birds.

During the seasonal construction phase, all Highway construction and related activities will be undertaken by independent environmental monitors provided by the Inuvialuit Lands Administration (ILA) and wildlife monitors provided by the Tuktoyaktuk and Inuvik HTCs, to ensure the application of prescribed mitigation measures as necessary. This approach is consistent with the construction-phase environmental and wildlife monitoring that was conducted for the recently completed construction of the Tuktoyaktuk to Source 177 Access Road.

During the following spring break-up and summer periods, the construction Contractors will be required to undertake follow-up monitoring, maintenance and mitigation work as may be necessary on culverts and bridges installed the previous winter and the Highway embankment.

In addition, the Developer will be working as necessary with the ILA, the Tuktoyaktuk and Inuvik Hunters and Trappers Committees (HTCs); the Wildlife Management Advisory Committee (WMAC), the Fisheries Joint Management Committee (FJMC) the GNWT Department of Environment and Natural Resources (ENR), and selected environmental consultants to monitor stream crossing water flows, water quality, terrain, vegetation and wildlife habitat to validate conformance with the mitigation measures contained in the Wildlife Management Plan and the various licenses and permits that will be issued for the Highway construction project.

Developer Response: 12.2

The success of the proposed mitigation measures as outlined in the EIS and as will be provided in the appropriate environmental management plans will initially be evaluated and determined by the on-site, third party ILA and HTC environmental and wildlife monitors, respectively. Since most of the major construction activities will be taking place in the winter period, the main environmental issues that might arise would typically be associated with the limited encounters that could potentially occur with a few wildlife species, in particular caribou, moose, wolf, fox, possibly wolverine and some birds such as ptarmigan, snowy owl and raven that may be present in the vicinity of ongoing construction activities on occasion.

The on-site monitors will also be responsible for ensuring that culverts and bridge structures installed during the winter period are being constructed in accordance with DFO operational statements, letters of advice and other requirements as may be specified by applicable permits and licenses.

In the spring and summer months, the results of follow-up monitoring, particularly related to fish-bearing stream crossings, vegetation and wildlife, as discussed in response to item 12.1 above, will be evaluated by environmental consultants retained by the Developer, to determine the success of the mitigation measures implemented and the need for further mitigation if determined to be warranted by the consultants and the various responsible parties to whom the results are reported.

IR Number: 13

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Alignment Options (EIS Sec. 2.2, p.46-54; EIS Sec. 2.2.4, p.50)

Preamble

The Developer has undertaken a comparison of alignment options through an evaluation of environmental, economic, social, and technical factors. Sub-indicators are identified for each factor. Under the "*social*" factor, one of the sub-indicators is "*quality of life*". The EIS (p.50) defines this as follows:

> "*Quality of life includes both benefits and adverse effects on daily life of community members. Examples of expected benefits include new infrastructure, and better access to healthcare, education and training. Examples of potential adverse effects include increases in vehicular accidents, noise, dust, traffic, or Highway closures*."

The EIS (p.50) identifies all three alignment options as having equal benefits, and equal adverse effects with the exception of dust, potential for Highway closures, and risks to public safety. While Alternative 2 (Upland Route) is expected to generate the least amount of dust, the EIS concludes that it is the least favourable in terms of "*quality of life*" as it has a higher potential for Highway closures due to poor weather conditions and a higher risk of collisions due to topographical design challenges.

Request

1. Please provide a reference(s) for the definition of "*quality of life*" that was used in the EIS (p.50).
2. Please explain how the criteria for "*quality of life*" were identified and whether these criteria were confirmed with Inuvialuit residents from potentially affected communities.
3. Please explain and justify whether dust and noise from the other alignment options closer to Husky Lakes might also impact quality of life for those individuals using the area.

Developer Response: 13.1

A specific industry or academic reference for quality of life as described on p. 50 in the EIS was not used. Factors that provide beneficial or adverse effects on daily life of community members are defined by the things that are important to the community members themselves and are unique to those community members.

Section 2.2.1 Evaluation Process of the EIS (p. 47) provides the following:

> *Scientific and economic factors are only part of the development decision. The technical teams who assessed the options maintained an awareness of the values, particularly for the Husky Lakes, held by communities. These values and interests were discussed in the October 2009 and January 2010 consultation meetings, and were also provided during the initial EISC assessment process. The intent has been to integrate those values, while delivering key technical information to decision makers and stakeholders to review and to draw their own conclusions about the acceptability of the proposed Highway.*

The technical team who assessed the options used the values and interests that were discussed by the community members at the October 2009 and January 2010 consultation meetings to refine and present the factors that were considered to provide beneficial or adverse effects on daily life and therefore, impact quality of life.

Developer Response: 13.2

Please refer to Response 13.1 above.

Developer Response: 13.3

In the "Developer Response to Health Canada" document, submitted in August 2011 to the EIRB, the following table (herein labelled as Table IR13-1) was produced to identify the number of potential human receptors within certain distances of each proposed route option. The number of human receptors was based on the number and location of residential leases issued by the Inuvialuit Land Administration.

TABLE IR13-1: PROXIMITY OF RESIDENTIAL LEASES TO ROUTE ALIGNMENTS

	Number of Residential Leases				
	<1 km from Alignment	1-5 km from Alignment	5-10 km from Alignment	10-15 km from Alignment	Total
Primary 2009 Route	2	33	46	21	102
Alternative 1 (2009 Minor Realignment)	2	33	46	21	102
*Alternative 2 (Upland Route)	1	12	31	36	80
Alternative 3 (2010 Minor Realignment	2	19	51	26	98

Note: *Alternative 2 (Upland Route) is no longer being considered by the Developer as a viable route option.

The potential effects from dust and noise will diminish with distance from the source of dust and noise. As stated in Section 4.2.2 of the EIS:

> *"Dust emissions are anticipated to remain primarily in the LSA. Dust, in the form of fine ($PM_{2.5}$) and coarse (PM_{10}) particulate matter and total suspended particulates, is expected to be emitted during the construction and operations phases. The review of scientific literature identified consistent factors that affect dust deposition behaviour and include the deposition load, duration, frequency, and chemical properties of the dust. Particle size also plays a role in determining how far away from a source dust effects can be expected to occur. The effects of road dust on vegetation have been detectable 100 m away (Auerbach et al. 1997), 200 m away (Santelmann and Gorham 1988; Angold 1997), and up to 400 m away from a source (Lamprecht and Graber 1996). These distances are consistent with United States Environmental Protection Agency (US EPA 1995) observations of the deposition properties of particles with various aerodynamic diameters (under more "typical" conditions).*
>
> *Larger dust particles (e.g., with aerodynamic diameters more than 100 μm) typically settle within 10 m of a source, while particles with aerodynamic diameters between 30 to 100 μm settle out within 100 m. Smaller particles than these are less susceptible to gravitational settling and can be transported over greater distances (US EPA 1995). It is anticipated that the largest effects to vegetation ecosystems and plants from fugitive dust will occur within 100 m of a dust source."*

According to Table 3, one to two residential leases are located within 1,000 m of the Highway, depending on the route. As described in the previous paragraphs, dust deposition is expected to primarily occur within 100 m, but may occur up to 400 m from the Highway in less quantity. Pending approval of this Project, the GNWT Department of Transportation currently anticipates acquiring a right-of-way on Inuvialuit-owned lands and securing land tenure on Crown lands, which may reduce the number of human receptors within 400 m of the Highway. Based on the anticipated dust concentrations and amount of time spent at the lease, minimal effects to quality of life are anticipated for the one to two potential human receptors located within 1 km from the proposed Highway.

As discussed in Information Request No. 6, the LSA for noise is 0.5 km from the Highway's centre line and the RSA is 15 km from the Highway's centre line. According to the Section 4.2.3 of the EIS, noise levels associated with road construction averages approximately 93 dBA, with a maximum of just over 100 dBA (Eaton 2000). Blasting activities associated with the borrow source operations will likely be the noisiest activity, producing peak sound pressure levels of approximately 110 dBA at 100 m, but only for very short durations of less than 1 second per blast. In flat open topography, blasting can generate a sound level of approximately 76 dBA at 5 km from the source.

Several residential leases, as identified in Figure 4.3.8-1 of the EIS or in Table 3 of this response, are located within the RSA. Since most residential leases are located near the Husky Lakes, the route alternatives located closest to the Husky Lakes (Primary 2009 Route and Alternative 1-2009 Minor Realignment) would potentially affect the greatest number of leaseholders (102 receptors), while Alternative 2 (Upland Route, located furthest from the Husky Lakes), would affect the least number of leaseholders (80). Due to the increased distance from Husky Lakes, Alternative 3-2010 Minor Realignment affects fewer receptors than Primary 2009 Route and Alternative 1-2009 Minor Realignment (98).

When comparing the number of human receptors potentially affected within 5 km from the proposed route options, the number of receptors is reduced. As stated in Section 4.2.3 of the EIS, at 5 km from the source, the sound level from blasting is expected to be 76 dBA, which is below the territorial and federal occupational exposure limits, which permits a certain amount of continuous or intermittent impulse sounds while working. The number of potential human receptors within 5 km of the proposed Highway is 35 (Primary 2009 Route and Alternative 1-2009 Minor Realignment), 21 (Alternative 3-2010 Minor Realignment) and 13 (Alternative 2-Upland Route).

As also discussed in the EIS, construction will proceed in stages over a four year period, using a model similar to that for construction of the Tuktoyaktuk to Source 177 Access Road. Most construction will take place in the winter, with some activities occurring in the summer and fall. Therefore, noise from construction will potentially affect only those leaseholders located near to the current year's construction phase.

Noise from the Highway operations will be limited to the sound that traffic makes when passing by, and as such, will be intermittent in nature, and will diminish with distance from the source.

As stated in the EIS, minimal effects to quality of life are anticipated based on construction and operations sound levels for leaseholders located within 15 km from the Highway. Leaseholders located closer to the construction activities or completed Highway, such as those within 5 km, may hear some sounds. As discussed in the Developer Response to Health Canada:

> *"Residential leases are typically cabins used during the late fall and early spring months (when there is daylight), for intermittent periods, for recreation and traditional purposes. The leases are most accessible during the snow-covered period when residents may travel by snowmachine. This is evidenced by the snowmachine trails shown on Figure 4.3.8-1. The Developer is unaware of permanent residents occupying the residential leases."*

Based on the following factors, the potential effects to quality of life are expected to be minimal:

- sound levels diminish with distance from the source;
- relatively few leaseholders are located within 5 km of the proposed route (minimum 13 and maximum 35);
- leaseholders use the leases intermittently and seasonally;
- construction periods are relatively short (i.e. typically a few months per year for winter construction activities) for each phase of the Highway; and
- relatively few vehicles are anticipated to travel on the Highway once operational (i.e., 150 to 200 vehicles per day or 6 to 8 vehicles per hour), which would generate limited sound emissions for short periods of time in any specific area.

IR Number: 14

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Construction Camps (EIS Sec. 2.6.9, p.87)

Preamble
The EIS (p.87) states that "*The Project proposes a number of 15-20 person construction camps in the first year, although in the second year, at least one camp of greater than 50 persons may be added*."

Request

1. Please provide an estimate of the number of 15-20 person construction camps that would be required in the first year, and how many camps would be operational at any one time.
2. Please include the location of each camp and the timing of when these camps would be in each location.
3. Please provide an estimate of the number of 15-20 person construction camps that would be required beyond the first year of construction, and how many camps would be operational at any one time.
4. Please clarify whether the "*one camp of greater than 50 persons*" that may be added during the second year would be operational for subsequent construction years.

Developer Response: 14.1

Upon review of the camp requirements with potential contractors the Developers are revising their estimated camp requirements. Currently, it is projected that there will be will four (4) 40 to 50 person camps operating during each of the three main winter construction seasons. Two camps would operate on the north end and two camps on the south end of the Highway. Camps would likely operate from December 1 to April 15 each winter season.

Developer Response: 14.2

Year 1: Dec 1 to April 15

- North Section of Highway: camps at/adjacent to Source 177 and Source 170
- South Section of Highway: camps at/adjacent to Inuvik and Source 2.46

Year 2: Dec 1 to April 15

- North Section of Highway: camps at/adjacent to Source 170 and Source 305
- South Section of Highway: camps at/adjacent Source 2.46 and Source 3.25

Year 3: Dec 1 to April 15

- North Section of Highway: camps at/adjacent to Source 305 and at southeast end of Source 309 near Parsons Lake (approximately KM 68 of the Inuvik to Tuktoyaktuk Highway)
- South Section of Highway: camps at/adjacent to Source 325 and south end of Source 312 near Parsons Lake (approximately KM 56 of the Inuvik to Tuktoyaktuk Highway)

Developer Response: 14.3

There will be will four (4) 40 to 50 person camps operating during each of the three main winter construction seasons.

Developer Response: 14.4

Camp requirements are revised as per the Developer Response 14.1.

4.0 Existing Biophysical and Human Environment

IR Number: 15

To: The Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Baseline Data Collection Programs Schedule and Status (Addendum November 2011 Part D1 pages 1 to 6 Developers Response #2(b))

Preamble
In response to the EIRB deficiency request #2(b), issued to the Developer in a letter dated October 25, 2011, the Developer provided a table showing the proposed schedule and status of current and planned data collection programs (the "Reporting Schedule"), and an indication of how the Developer intended to use the information for the design and approval of the development proposal.

The data being collected is considered to be critical information as it informs the identification of environmental effects, the determination of the significance of the effects, and the design of specific mitigation and monitoring plans and programs. These are all key components of the EIS which is the primary focus of the Review. The following table identifies some of these critical data collection programs (information summarized from Developers response):

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
Terrain and Geotechnical	Draft Surficial Geology Map of LSA and borrow sites at 1:20,000 including delineation and classification of surficial geology.	March 1, 2012	Kavik-Stantec	Underway	Supports identification of potential wildlife habitat. Supports mitigation design and planning.
	Draft Terrain Constraints Map of LSA and potential borrow sites at 1:20,000 including delineation and classification of ice-rich deposits and terrain related geo-hazards.	March 1, 2012	Kavik-Stantec	Underway	Supports mitigation planning.
Traditional Knowledge/ Traditional Land Use	Final Report (reporting of TK workshop results and analysis)	April 30, 2012	Kavik-Stantec		Used in mitigation confirmation and construction phase Wildlife Mitigation and Monitoring Plan.
Vegetation Baseline	Preliminary LSA vegetation cover map.	March 31, 2012	Kavik-Stantec		Used in field survey planning. Used to confirm impact predictions. Informs habitat potential mapping and wildlife field surveys.

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
	Vegetation cover and Rare Plant Field Surveys and Sampling	June 2012	Kavik-Stantec		Used in vegetation mapping and to confirm EIS vegetation typing. Used in final design and mitigation determination.
	Draft Report including vegetation cover map at 1:20,000 and rare plant occurrences	August 15, 2012	Kavik-Stantec	Revised Schedule	Used in wildlife habitat mapping.
Wildlife and Wildlife Habitat	LSA features relevant to wildlife	March 31, 2012	Kavik-Stantec	Revised Schedule	Used in refining construction phase Wildlife Mitigation and Monitoring Plan. Used in design and implementation of habitat mitigations.
	Spring waterfowl staging survey	May 2012	Kavik-Stantec in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan. Used in design and implementation of habitat mitigations.
	Breeding waterfowl survey	June 2012	Kavik-Stantec in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan. Used in design and implementation of species mitigations.
	Breeding passerines/ shorebirds survey	June / July 2012	Kavik-Stantec in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan. Used in design and implementation of species mitigations.
	Draft Report including wildlife habitat features and observations map at 1:20,000	August 15, 2012	Kavik-Stantec	Revised Schedule	Used in design and implementation of species mitigations. Used in refining Construction Wildlife Mitigation and Monitoring Plan
	Raptor nest survey	June 2012	ENR - Inuvik		Used in design and implementation of habitat mitigations.

According to the most recent review schedule issued by the EIRB on December 19, 2011, the Technical Review phase is scheduled to be completed by early April 2012 and the Public Hearings are scheduled for June 2012.

Request

1. Given the current Review schedule and the identified Reporting Schedule for the baseline data collection programs, please explain how this information could be factored into an EIRB decision.

2. A monitoring program developed prior to construction but after the completion of the Review is not helpful to the Board's determination of impacts. Please review your commitments table, the EIS and supplementary materials and provide the Board with a comprehensive list of monitoring commitments and plans. Indicate the earliest dates when those plans could be provided to the EIRB.

Developer Response: 15.1

An updated baseline data collection schedule is provided in Table IR15-1 as follows. Brief descriptions of how this new information will be applied to future design and regulatory applications are provided in the last column of the schedule.

TABLE IR15-1: INUVIK TO TUKTOYAKTUK HIGHWAY BASELINE DATA COLLECTION PROGRAMS

SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
Aerial Photography	1:10,000 scale photos Final Digital prints	August 31, 2011	DOT	Completed	Used in LSA mapping for vegetation and design
	Ortho-Photo Mosaic	September 2011	DOT	Completed	Used in engineering design and a variety of field surveys
LiDAR	LiDAR Survey	August 2011	Consultant	Completed	n/a
	LiDAR Analysis	November 2011	DOT	Completed	Used in detailed engineering and terrain baseline mapping Used in field survey planning for wildlife and wildlife habitat
Fisheries	Fish Habitat Assessment	August 22 – September 23, 2011	IMG-Golder	Completed	Used in report preparation
	Final Report	January 31, 2012	IMG-Golder	Complete	Provides, in conjunction with 2010 surveys, site specific baseline for refined effects assessment Supports development of Fish and Fish Habitat Protection Plan Supports HADD application if necessary Supports TC Navigable Waters application Supports Water Licence application

TABLE IR15-1: INUVIK TO TUKTOYAKTUK HIGHWAY BASELINE DATA COLLECTION PROGRAMS SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
Archaeology Impact Assessment	Field Survey	August 22 – September 23, 2011	IMG-Golder	Completed	Provides adequate baseline for Project EA assessment including site specific mitigation
	Final Report	December 20, 2011	IMG-Golder	Completed	Provides, in conjunction with 2009 surveys, site specific baseline for refined effects assessment Supports Archaeological Impact Assessment including defining site-specific mitigations Supports Archaeological Protection Plan development
Potential Borrow Source Recon-naissance	On ground reconnaissance of suitability of potential borrow sources	July – August 2011	Kavik-Stantec	Partially Completed	Supports 2011 and 2012 winter geotechnical investigation contracts
Terrain and Geotechnical	Draft Surficial Geology Map of LSA and borrow sites at 1:20,000 including delineation and classification of surficial geology Mapping from digital imagery and High Definition and Mapping and Applications system	March 1, 2012	Kavik-Stantec	Underway	Supports detailed route alignment and costing Supports design of geotechnical program for site investigations of landforms, terrain stability, permafrost conditions, presence of waterbodies, identification of winter access road stream crossings, and hydrological factors affecting access or borrow extraction activities Supports planning of borrow source geotechnical investigations Supports vegetation landcover mapping Supports identification of potential wildlife habitat. Supports mitigation design and planning
	Draft Terrain Constraints Map of LSA and potential	March 1, 2012	Kavik-Stantec	Underway	Supports detailed route alignment and engineering

TABLE IR15-1: INUVIK TO TUKTOYAKTUK HIGHWAY BASELINE DATA COLLECTION PROGRAMS SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
	borrow sites at 1:20,000 including delineation and classification of ice-rich deposits and terrain related geohazards				Supports planning of borrow source geotechnical investigations Supports mitigation planning
	Final Terrain and Geotechnical Constraints report including identification, delineation and classification of surficial geology, ice-rich deposits and terrain constraints at a representative scale of 1:7,500; to be reproduced at 1:20,000	March 31, 2012	Kavik-Stantec	Underway	Assists with detailed engineering and design Supports wildlife habitat mapping and field survey planning Supports Sediment and Erosion Plan development Supports LUP and WL applications
	Winter geotechnical drilling, sampling and lab testing of portions of 9 borrow sources to confirm the extent, quantity and quality of materials.	March - October 2012	TBD		Supports project planning and design, costing. Supports Pit Development Plans for Quarry Permits
Traditional Knowledge/ Traditional Land Use	Literature Review	September 2011	Kavik-Stantec	Completed	Used in TK Workshop preparation
	TK/TLU workshop material preparations	November 31, 2011	Kavik-Stantec	Completed	Used in conducting workshops
	Workshop - Inuvik	Week of January 21, 2012	Kavik-Stantec	*Postponed*	Confirms understanding of site specific traditional knowledge and site specific traditional land use activities Provides adequate baseline for Project EA assessment including site specific mitigation Supports planning of

TABLE IR15-1: INUVIK TO TUKTOYAKTUK HIGHWAY BASELINE DATA COLLECTION PROGRAMS SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
					geotechnical investigations
	Workshop - Tuktoyaktuk	Week of January 21, 2012	Kavik-Stantec (lead)	*Postponed*	Confirms understanding of site specific traditional knowledge and site specific traditional land use activities Provides adequate baseline for Project EA assessment including site specific mitigation Supports planning of geotechnical investigations
	Analysis and community review	January/ February 2012	Kavik-Stantec		Used in mitigation confirmation and construction phase Wildlife Mitigation and Monitoring Plan
	Final Report	April 30, 2012	Kavik-Stantec		Assists with detailed engineering and design Used in mitigation confirmation and construction phase Wildlife Mitigation and Monitoring Plan Supports TC Navigable Waters application
Vegetation Baseline	Preliminary LSA vegetation cover map	March 31, 2012	Kavik-Stantec		Used in field survey planning Used to confirm impact predictions Informs habitat potential mapping and wildlife field surveys
	Rare Plant literature review				Used in field survey planning
	Vegetation cover and Rare Plant Field Surveys and Sampling	June 2012	Kavik-Stantec		Used in vegetation mapping and to confirm EIS vegetation typing Used in final design and mitigation determination
	Draft Report including vegetation cover map at 1:20,000 and rare plant occurrences	August 15, 2012	Kavik-Stantec	Revised Schedule	Used in final design and mitigation implementation Used in wildlife habitat mapping
	Final Baseline Report including vegetation	August 31, 2012			Used in final design and mitigation implementation

TABLE IR15-1: INUVIK TO TUKTOYAKTUK HIGHWAY BASELINE DATA COLLECTION PROGRAMS SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
	cover map at 1:20,000				Used in mitigation / compliance monitoring
Wildlife and Wildlife Habitat	LSA Features Relevant to Wildlife	March 31, 2012	Kavik-Stantec	Revised Schedule	Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of habitat mitigations
	Spring Waterfowl Staging Survey	May 2012	Kavik-Stantec in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of habitat mitigations
	Breeding Waterfowl Survey	June 2012	Kavik-Stantec in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of species mitigations
	Breeding Passerines/ Shorebirds Survey	June / July 2012	Kavik-Stantec in consultation with EC		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in design and implementation of species mitigations
	Draft Report including wildlife, key wildlife habitat features and observations map at 1:20,000	August 15, 2012	Kavik-Stantec	Revised Schedule	Used in design and implementation of species mitigations Used in refining Construction Wildlife Mitigation and Monitoring Plan
	Final Baseline Report	August 31, 2012	Kavik-Stantec		Used in refining construction phase Wildlife Mitigation and Monitoring Plan Used in mitigation / compliance monitoring
	Grizzly Bear Den Survey	October 2011 October 2012	ENR - Inuvik	Conducted October 12, 2011	Used in implementation of den mitigations prior to subsequent winter geotechnical investigations and construction

TABLE IR15-1: INUVIK TO TUKTOYAKTUK HIGHWAY BASELINE DATA COLLECTION PROGRAMS SCHEDULE & STATUS

Program	Activity	Proposed Program Timing	Responsible	Status	Application in Project EA/ Design/ Planning/ Regulatory Applications
	Raptor Nest Survey	June 2012	ENR - Inuvik		Used in design and implementation of habitat mitigations
Engineering	Right-of-Way Surveys	July – August 2012	DOT		Used in implementation of mitigations
	Bridge Design	July 2012	DOT		Design and implementation of habitat mitigations
Hydrological Assessments	Determine span widths and abutment placement	June 2012	TBD		Support bridge crossing design and engineering Supports Water Licence application Support Navigable Water permit applications
Water Source Studies	Bathymetric Mapping of proposed water sources	June 2012	TBD		Supports Water Licence application Supports construction planning
	Assessment of allowable withdrawal quantities per source	July 2012	TBD		Supports Water Licence application Supports construction planning

Developer Response: 15.2

Please refer to Response 67.1 and 67.2.

IR Number: 16

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Project impacts to fish and fish habitat and mitigation (EIS Section 4.2.5.1, p. 495 and Table 4.2.5-1, p. 497)

Preamble

The Developer has predicted that with the application of the available mitigation measures, effects on fish and fish habitat are generally expected to be localized and limited and are considered to be minor in the context of the overall Development area. However, it is not clear how the proposed mitigation measures will be evaluated or measured with respect to their relative effectiveness or success. No specific contingency plans are apparent, and there is no discussion of how an Adaptive Management Plan would be applied should mitigation measures prove to be ineffective.

Request

1. Please identify and discuss how the effectiveness of the proposed mitigation measures will be evaluated or measured.
2. Please identify how and when site-specific contingency plans will be developed.
3. Please describe how an Adaptive Management Plan for the development could be applied should mitigation measures prove to be ineffective.

Developer Response: 16.1

The details of the proposed sampling program to evaluate the effectiveness of mitigation measures are provided in Developer Response 5. Sampling will focus on the in situ measurement of turbidity, pH, dissolved oxygen, temperature, and conductivity upstream and downstream of crossings over fish bearing streams. The focus will be on turbidity levels, which will signal significant changes in sediment transport due to erosion from crossing structure failure or improper installation.

Developer Response: 16.2

Site specific monitoring and contingency plans will be developed in conjunction with the detailed construction design phase of the Project. As a first step, an Environmental Management Plan will be developed to provide broad guidance relating to maintaining existing stream channel, fish habitat, and water quality conditions. The EMP will include an erosion and sediment control plan and a monitoring plan. The contractor(s) will prepare Environmental Protection Plans (EPP), which will based on the EMP and provide site specific measures to limit habitat loss, mitigate construction impacts, remediate unavoidable streambed and streambank damage, and prevent streambank and bed erosion.

Developer Response: 16.3

Adaptive management is a process for applying remedial methods and procedures when there is a failure in the predicted performance of designs and measures intended to protect environmental values. Erosion and sediment control mitigation and remedial measures are routinely applied for

road construction projects and are contained in BMPs and aquatic protection guidelines. The EMP will include an adaptive management component, which will reference appropriate BMPs, guidelines, and techniques that are relevant to construction in northern latitudes[1], and indicate how they are to be applied under specific circumstances (i.e. to deal with the most common types of erosion issues).

[1] For example: Coleridge, Frederic B. and Ashraf M. Mira. 1981. Erosion control along transportation routes in northern climates. Arctic 34(2): 147-157.

IR Number: 17

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Baseline data – Current Conditions (EIS Section 3.0, p.99)

Preamble
The Developer states that the *"Baseline data represent current conditions, to the extent possible."* (emphasis added). The apparent 'disclaimer' pertaining to baseline data warrants further explanation and clarification from the Developer in the context of the proposed Development and VECs.

Request

1. For all VECs, please indicate and explain where baseline data is and is not representative of current conditions.
2. Please include the date(s) or range of dates of the data or information used to represent 'current conditions' for each VEC assessed in the EIS.
3. Please confirm whether the baseline data used to represent current conditions are specific to the LSA and/or the RSA.

Developer Response: 17.1

This statement, made in the introduction to the Existing Environment section (Section 3.0) was a general statement to simply indicate that the data presented throughout this baseline description section of the EIS was the best available data, whether historic or recent, local or regional, from all available sources and is considered to be reasonably representative of current conditions.

This is a very standard approach to the preparation of any EIS, and with respect, the types of questions being asked in this IR are considered by all of our senior EIA practitioners to be extraordinary and well beyond the limits of what could be considered to be reasonable questions.

The baseline biophysical environmental material provided in the EIS has been referenced as appropriate, and indicates whether the information presented was collected specifically for this project, or whether the information was drawn from other larger assessments previously conducted in the area such as the Mackenzie Gas Project, the community conservation plans, and territorial and federal studies and data sources.

However, as the EIRB is aware, a number of ongoing environmental studies have been and will be undertaken, and the results of these studies will be evaluated to verify or refine our current understanding of the baseline conditions along the Highway corridor and the environmental assessment presented in the EIS. The results of any such refinements will be available and will be incorporated into the applicable environmental management plans that will be followed by the construction Contractors and monitored by the environmental/wildlife monitors assigned to the Project.

Developer Response: 17.2

The dates related to the more recent, Highway corridor-specific, baseline biophysical field work that was conducted in the fall of 2009 and the spring/summer of 2010 are referenced as appropriate in the applicable sections of the Existing Environmental section of the EIS. Dates associated with the other data and information presented from the studies, reports, data sets, etc. that were obtained from the available literature or provided by other parties, such as GNWT ENR and AANDC, are referenced by the dates associated with the respective documentation.

This method for referencing the information presented in the EIS reflects the normal protocol for presenting this type of documentation and, with respect, is considered to be more than adequate for reviewers of the EIS to determine when the information was collected.

Developer Response: 17.3

The baseline biophysical field data obtained for the Highway corridor in 2009 and 2010 and the additional new biophysical baseline data collected following submission of the EIS in 2011 are most representative of the LSA.

Every attempt was made to document where the data were applied, whether it was the northern Mackenzie Delta, the LSA, a specific stream, etc. Each figure identifies the LSA and the RSA, and where possible, data are presented on the applicable figure. The Developer would be pleased to provide clarification for any agencies that require further information on specific data and where it applies.

IR Number: 18

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Baseline data - Terrain (EIS Section 3.1.1.2, p.102 and69

Table 3.1.1.1-1, p. 102-103)

Preamble

In the Developer's description of terrain units along the proposed Highway routes, it is stated that highway routing focused on traversing the most favourable terrain with minimal footprint size, but no specific description of 'favourable terrain' is provided other than a reference to avoiding thick organic and ice-rich polygonal terrain, "where possible". With the absence of this information, it cannot be determined exactly what is meant by 'favourable terrain' or how much thick organic and ice-rich polygon terrain will potentially be disturbed by the proposed Development. Table 3.1.1.1-1 summarizes the terrain units along the Primary 2009 Route, but there is no link of potential development impacts to thick organic and ice-rich polygonal terrain.

Request

1. For all current Highway route alternatives being considered, please provide a definition of 'favourable terrain'.
2. For all current Highway route alternatives being considered, please provide an estimate of how much thick organic and ice-rich polygon terrain will be disturbed.
3. For all current Highway route alternatives being considered, please provide a map and a description of the locations of favourable terrain and the organic ice-rich polygon terrain.

Developer Response: 18.1

The word "favourable" was adopted by the engineering team during the reporting phase of the submission to group the favourable attributes/characteristics the reconnaissance team members were seeking during their 2009 field study of the proposed route such as elevated/drier ground, reasonably smooth terrain, better bearing capacity soils, avoiding water bodies, minimizing crossing very ice rich permafrost terrain, and absence of obvious denning habitat, amongst others. However, there was never a specific definition provided in the report for favourable terrain, nor was that the intent.

The word favourable was used to group attributes that positively affect the stability of constructing a road embankment. Favourable attributes to align the proposed routes included relatively high, dry, flat ground soils that that have some bearing capacity strength. This is an ideal location for most roads as the areas are blown clear of snow in the winter leading to frozen, hard ground conditions. In the summer and fall the areas are well drained and stable for supporting embankment fills. Clearly it is not always possible to locate a route in ideal terrain. Terrain that is particularly susceptible to erosion, sedimentation or subsidence was avoided, including steep slopes, depressions, unstable slopes and slide areas, stream beds and flood plains, and wet, ice rich areas, including thick organic and polygonal patterned ground terrain.

Table 3.1.1-1 of the EIS presents the four generalized terrain types that the route dominantly crossed. The most favourable terrain types are 1 and 2 and the less favourable are terrain types 3 and 4. Basically, the terrain types decrease in favourability from Type 1 to Type 4.

Table 2.6.4-1 is consistent with Table 3.1.1-1, which shows increasing embankment fill thickness with decreasing terrain type favourability (quality).

Naturally well drained topography, stable active layer soils such as till (ground moraine and hummocky moraine) and relatively smooth micro-topography were among the more important engineering parameters considered when applying this term for route location purposes (Terrain Types 1 and 2). Generally these attributes are found on the upland plateaus rather than the lowlands, the latter being dominated by thicker organic covers, a thin active layer, and a tendency to be ice-rich.

The field reconnaissance team included members of EBA's Arctic engineering group and FSC. These groups specialize in designing roads in areas with permafrost. It should be noted that members of the field reconnaissance team also contributed to the preparation of the Transportation Association of Canada's guidelines entitled "Development and Management of Transportation Infrastructure in Permafrost Regions" (TAC 2010).

Developer Response: 18.2

The Developers cannot specifically provide an estimate of how much thick organic and ice-rich polygonal terrain will be disturbed because the field reconnaissance team never documented this. It is noted, however, that about 5% of the route crosses Terrain Type 4. Where possible, the field reconnaissance team avoided these areas when planning the proposed route because these terrain conditions were deemed to be undesirable from the perspective of constructing a permanent road.

Detailed geotechnical investigation is scheduled to occur during 2012.

Developer Response: 18.3

The map book, provided in Appendix D of the EIS identifies unfavourable areas of thick organics and polygonal terrain (documented as "ice-rich polygons") along the Primary 2009 Route and Alternative 2 (Upland Route).

IR Number: 19

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Climate data (EIS Section 3.1.2, p.114 and Tables 3.1.2-1 through 3.1.2—4, p. 114-119)

Preamble

Climate data from two meteorological stations operated by Environment Canada, Tuktoyaktuk-A and Inuvik-A were used by the Developer for the discussion of climate for the Inuvik and Tuktoyaktuk areas. Inuvik climate normals between 1971-2000, and 1976-2005 were summarized in Tables 3.1.2-1 and 3.1.2-2, respectively. Tuktoyaktuk climate normals between 1971-2000 and 1978-2007 were summarized in Tables 3.1.2-3 and 3.1.2-4, respectively. The Developer states that each station can be assumed to generally represent a radius of 10 km, although the actual area of representation is dependent on local geography and that the terrain located within a 10 km radius of the Tuktoyaktuk-A and Inuvik-A weather stations is representative of what is present along the entire route and therefore the climatic data is generally representative of the entire route (presumably the Preferred 2009 Alternative). However, it is not clear how the Developer evaluated representative habitat, topography, terrain, etc. along the entire route as no actual quantitative habitat comparison was presented in this Section in the context of climate.

Request

1. Please explain, using supporting rationale and/or empirical data (i.e., modelling), that the habitats within a 10km radius of each respective weather station are representative of what is present along the entire proposed Highway route.
2. Please explain what parameters or criteria are being used as the basis of this qualitative comparison.
3. Please demonstrate that climate data is representative of what is present along the entire proposed Highway route.

Developer Response: 19.1

Figures, IR19-1a, IR19-1b, IR19-2a and IR19-2b, provided as part of this response, present a comparison of the broad land cover classes (using the same EOSD land cover data that were used to describe vegetation in the LSA and RSA) present within a 10 km radius of each climate station and within the ecoregions that are present along the proposed Highway route.

The location of each climate station is provided in Figure 3.1.2-1 of the EIS. The climate station in Inuvik is situated along the boundary of the Mackenzie Delta HS Ecoregion and the Sitidgi Plain HS Ecoregion. These two ecoregions comprise approximately 7% of the proposed Highway RSA and represent habitats below the treeline. The relative distributions of each habitat (as represented by EOSD land cover classes) are similar within 10 km of the Inuvik climate station (Figure IR19-1a) to those present in the same ecoregions of the RSA (Figure IR19-1b). It is therefore reasonable to conclude that the habitats within 10 km of this weather station are representative of those present along the southern portion of the proposed Highway route.

The climate station in Tuktoyaktuk is located within the Tuktoyaktuk Coastal Plain Ecoregion (which covers approximately 62.5% of the total RSA). The habitat types present (as represented by EOSD land cover classes) within 10 km of the Tuktoyaktuk climate station (Figure IR19-2a) are also

similar in distribution to those present within the RSA of this same ecoregion (Figure IR19-2b). It is therefore reasonable to conclude that the habitats within 10 km of this weather station are representative of those present along the northern half of the proposed Highway route.

The only region within the RSA where the relative habitat distributions are not as well represented by either climate station specifically is the Caribou Hills Ecoregion (which comprises approximately 30% of the RSA) (Figure IR19-3). This ecoregion is technically located above the treeline, however, is transitional between the treed areas to the south and the treeless tundra to the north. Dominant habitat types in this ecoregion are reflective of its transitional nature (e.g., higher proportion of "coniferous sparse" which is reflective of the reduction of tree cover as one moves from Inuvik north of the treeline, and increased presence of "bryoids" and "shrub low", which are reflective of conditions within the Tuktoyaktuk Coastal Plain ecoregion to the north.

It is reasonable to conclude, based on the relative distributions of habitat types present, that the climate data generated by both stations are applicable to the entire proposed Highway route, including the transitional Caribou Hills Ecoregion.

Figure IR19-1a

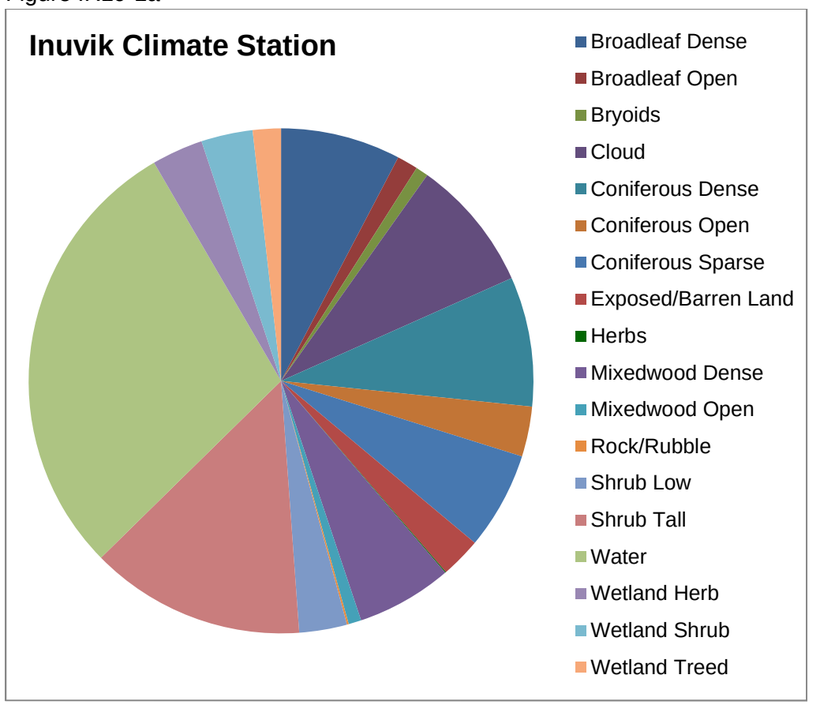


Figure IR19-1b

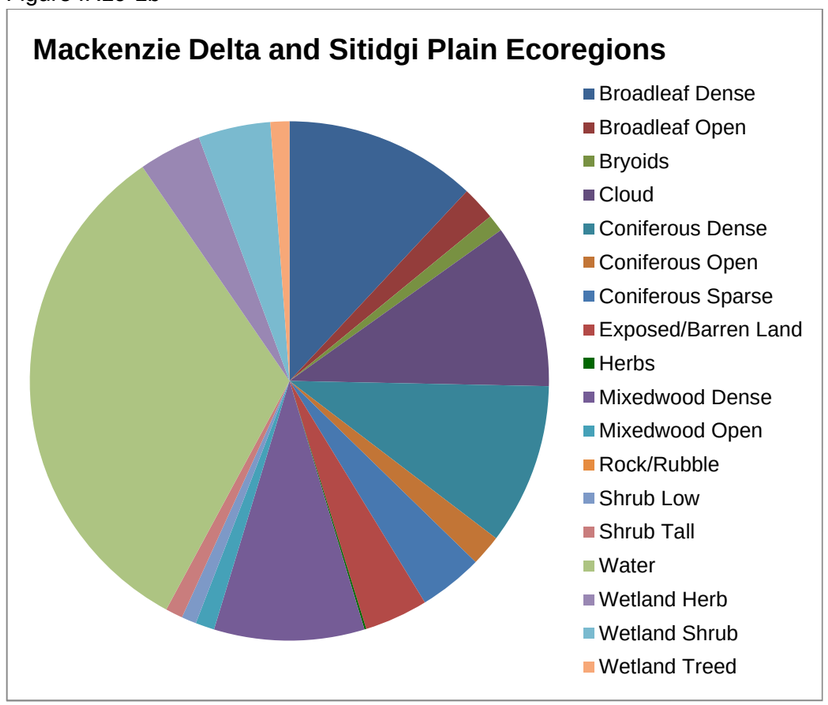


Figure IR19-2a

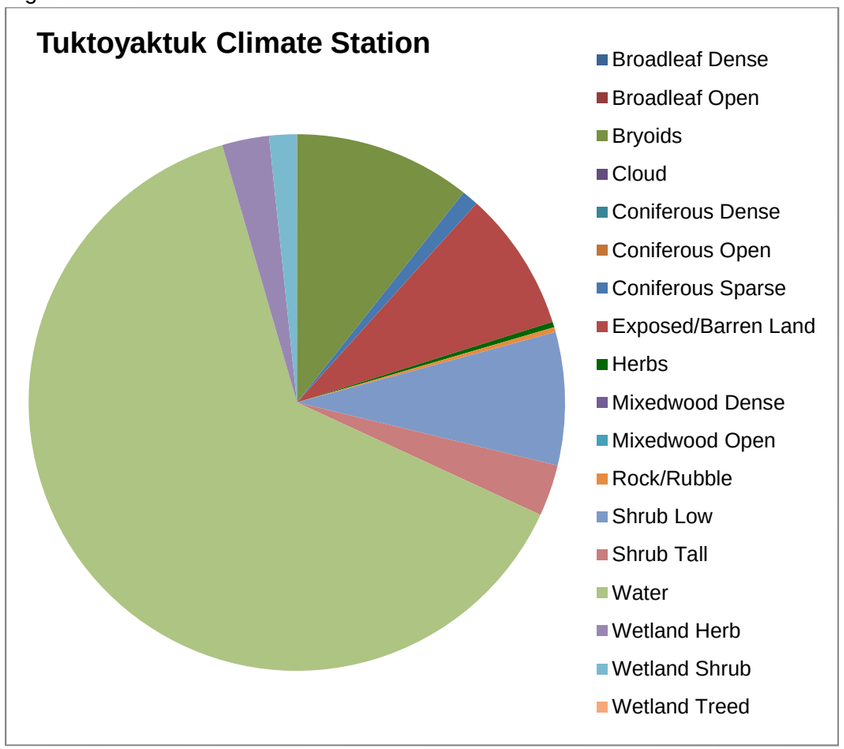


Figure IR19-2b

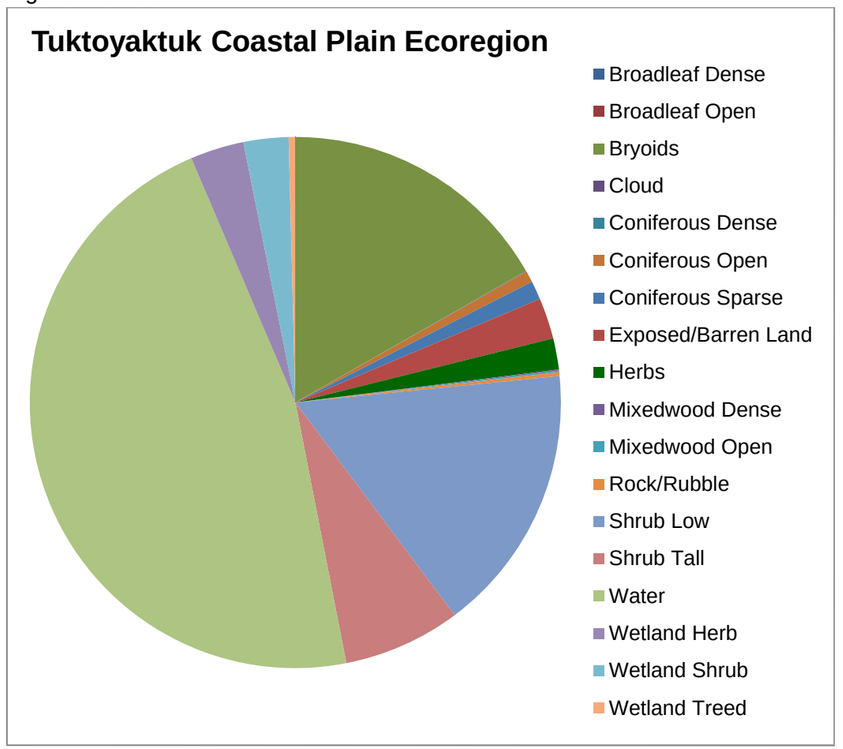
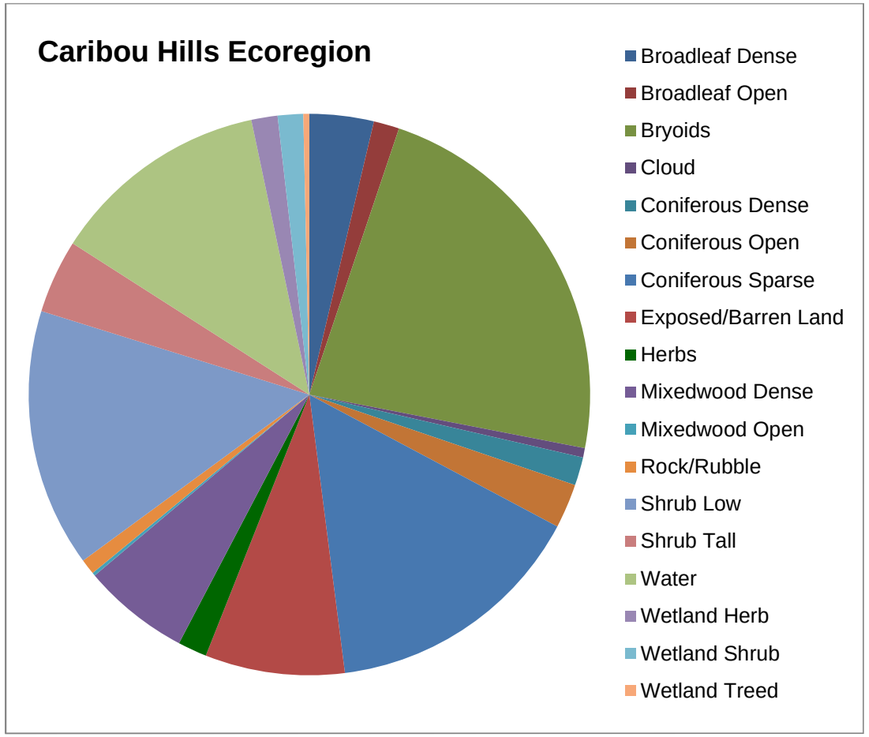


Figure IR19-3



Developer Response: 19.2

Please see Developer Response 19.1.

Developer Response: 19.3

Environment Canada has determined 30-year climate normals for temperature and precipitation based on data collected at the bounding ends of the study area (Tuktoyaktuk and Inuvik, separated by 125 km in the north-south direction). The climate at any point along the proposed route can be inferred through interpolation methods. Local climatic conditions could vary from a linear trend if relief was significant enough to influence the temperature gradient in the vertical or to produce orographic lifting or blocking effects which could affect local precipitation.

A typical lapse rate, indicative of the sensitivity of surface temperatures to elevation change, would be a decrease in temperature of approximately 1°C per 150 m of elevation. Elevations through the study area are typically below 100 m, with only small portions slightly above 200 m. Such small elevation differences, relative to the lapse rate, are not expected to significantly affect local temperatures or precipitation and therefore interpolation methods may be used. The study area's proximity to the coast may slightly affect the validity of the interpolated gradients along the route due to the influence of marine air. Tuktoyaktuk is located at the edge of the Beaufort Sea and therefore coastal effects would be inherent in the meteorological observations.

IR Number: 20

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Climate change data (EIS Section 3.1.2.9, p.125)

Preamble
With respect to climate change the Developer states:
"Natural variability, expressed as averages over the last 30 years, shows variations in average annual temperatures of 3˚C to 6˚C in the Mackenzie Delta. Depending on the climate model scenario used, these exceed (by two to three times) the average annual temperature increases obtained from the model. Nonetheless, based on observed trends and future modeled predictions, there is a consistent and gradual warming trend. Generally, modeling results indicate a warming trend in air temperature of up to 2.5˚C and an increase in precipitation of up to 11.8% in the 30 years between 2010 and 2039 (IOL et al. 2004)."

The model introduced here by the Developer is apparently that generated by Imperial Oil Limited in support of the Mackenzie Gas Project regulatory application. No background information pertaining to the climate change model is apparent in the EIS and the accuracy of the model is not discussed in the context of the proposed development.

Request

1. Please provide all relevant supporting background materials with respect to the model used in the EIS.
2. Please provide a detailed accuracy assessment of the model.

Developer Response: 20.1

As stated in the EIS, climate change information was derived from the Mackenzie Gas Project. The following text is quoted from the MGP EIS Volume 5, Part F, Section 11.2.1.1 Methods (of Section 11.2 Potential Climate Change). As noted in the following text, the models are based on global climate change models and regionally developed emission scenarios. As discussed in the following text, twenty-nine simulations were run using global climate models. The supporting background materials for all of these global climate change models will not be provided by the Developer but may be available from the public record for the Mackenzie Gas Project.

Climate Parameters

Changes in climate can be characterized by changes in:

- Temperature (e.g., average, maximum and minimum)
- Precipitation
- Extreme events (e.g., peak precipitation rates)

This assessment focuses on changes in average temperature and precipitation. Because future climate trends are based on climate model estimates that focus on likely average climate outcomes over large areas, they are not suitable for predicting extreme events, which occur on a more local scale.

Global Climate Models

In 1988, the Intergovernmental Panel on Climate Change (IPCC) was formed by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP) to review international climate change data. Improvements in global climate models arose from concerns over future climate trends and the impact of human activities on climate, which could affect natural ecosystems and the economy.

Modelling climate is a complex process that involves the mathematical representation of global land, sea and atmosphere interactions over a long period. There is substantial uncertainty in climate change predictions. The results of global climate models are subject to many uncertainties and interpretations. This assessment uses various scenarios to partially address this concern.

Northern Climate Change Scenarios

For the Mackenzie Gas Project, scenarios were developed based on the results of a multi-stakeholder workshop sponsored by Indian and Northern Affairs Canada (INAC). The purpose of the workshop was to develop a process to select appropriate climate change scenarios that could be used to evaluate the potential effects of climate change in the project study area. The workshop was attended by technical specialists representing Environment Canada, INAC, representatives of nongovernment organizations and a representative of the project proponents. The results of this workshop are presented in Burn (2003) and were used as the basis for this assessment.

Less confidence is generally placed in precipitation predictions than in temperature predictions from the global climate models. Precipitation can change quite rapidly from one location to another and the current resolution of global climate models cannot account for this variation. It is also not possible to interpret seasonal increases in precipitation or whether the precipitation will occur as rain or snow. Temperatures do not change as rapidly from one location to another area better resolved by current global climate models. Temperature trend forecasts during the life of the project are typically in the range of values observed over the last 30 years. However, predicted future precipitation changes are highly variable in both magnitude and direction and from one location to another.

Twenty-nine simulations were done using global climate models approved by the IPCC:

- CSIRO2B (Australia)
- HADCM3 (Britain)
- CGCM2 (Canada)
- ECHAM4 (Germany)
- CCSR98 (Japan)
- NCARPCM (U.S.)
- GFDLR30 (U.S.)

Emission scenarios from the Special Report on Emission Scenarios (SRES) were used in the models (IPCC 2000).

Given the wide range of possible inputs to global climate models, the IPCC has established a series of socio-economic scenarios that help define the future levels of global greenhouse gas emissions. The Third Assessment Report (IPCC 2001) identifies four general scenarios, A1, B1, A2 and B2. The A1 and A2 scenarios represent a focus on global economic growth, whereas B1 and B2 represent a shift toward more environmentally conscious solutions to growth. Both Scenario A1 and Scenario B1 include a shift toward global solutions whereas Scenario A2 and Scenario B2 include growth based on regional models. These four socio-economic scenarios are described in detail in the IPCC report (IPCC 2001).

The IPCC does not endorse any of these scenarios as being the most likely, because the future is unpredictable and views differ on which scenario is more likely to occur. Seasonal and annual trends were analyzed for the northern and southern parts of the Mackenzie Valley. Depending on the model, the Mackenzie Valley is covered by three or four model grid cells. The potential change in climate for each grid cell was based on the weighted average of the cell and the eight cells surrounding it. The northern grid cell results showed a distinct difference in climate change from the southern grid cell results for most of the model simulations. The Mackenzie Valley was divided into northern and southern regions based on these results with the boundary located at the latitude of Fort Good Hope.

For this assessment, the Inuvialuit Settlement Region, the Gwich'in Settlement Area and the Sahtu Settlement Area are included in the northern part of the Mackenzie Valley, and the Deh Cho Region and northwestern Alberta in the southern part.

Developer Response: 20.2

The Mackenzie Gas Project used internationally-accepted global climate models for the twenty-nine simulations that were run. The climate data were scrutinized extensively during the Mackenzie Gas Project permitting process. The Developer feels that these climate data, for the purpose of constructing an all-weather Highway, can be generally accepted based on this account.

IR Number: 21

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Air quality - dust (EIS Section 3.1.3, p.126 Table 3.1.3-1 p. 130, Section 3.1.3.5, p. 130 and Section 3.1.3.5, p. 133)

Preamble

As noted by the Developer, territorial and federal regulatory agencies have established standards and objectives to which ambient measurements are compared to determine the air quality. ENR maintains and operates the NWT Ambient Air Quality Monitoring Network, consisting of four monitoring stations located in Yellowknife, Inuvik, Fort Liard and Norman Wells. Each station is capable of continuously sampling and analyzing a variety of air pollutants and meteorological conditions. To establish a baseline for consideration of ambient air quality conditions expected to occur in the Development area, the Developer conducted a review of ambient air quality monitoring data for the Inuvik area (emphasis added). The Developer does not discuss or explain how air monitoring results from the Inuvik area are representative of air quality conditions along the proposed Highway route. It is not clear how the Inuvik baseline will act as a foundation for future monitoring programs, if any, along the proposed Highway route. The primary concerns appear to be with fine and coarse particulate matter ($PM_{2.5-10}$ /or dust) and, to a lesser extent, the potential acidification of proximate vegetation.

Request

1. Please explain and justify how air monitoring results from the Inuvik area could be representative of air quality conditions along the proposed Highway route.
2. Please explain and describe how the effects of dust will be monitored and minimized or eliminated in the context of the proposed Development.
3. Please explain, using quantitative examples or models, how dust may affect water quality in watercourses that are affected by dust.

Developer Response: 21.1

Territorial and federal regulatory agencies have established standards and objectives to which ambient measurements were compared to determine the air quality. ENR maintains and operates the NWT Ambient Air Quality Monitoring Network, consisting of four monitoring stations located in Yellowknife, Inuvik, Fort Liard and Norman Wells. The stations in Yellowknife and Inuvik are part of the National Air Pollution Surveillance (NAPS) network. Each station is capable of continuously sampling and analyzing a variety of ambient air pollutants and meteorological conditions. The Inuvik monitoring station is located in the Town of Inuvik on the corner of Bompas Road; the access road to the recreation centre.

ENR uses the four monitoring stations to establish baseline conditions in these communities, and to monitor and track ambient trends as development proceeds. Since air emissions can impact the regional airshed, ENR uses the data to monitor ambient air quality changes. These ambient changes may be influenced by long-term or short-term events occurring both within and outside of the community. For example, the Inuvik station has historically detected ambient air quality changes from forest fire events that were occurring outside of the community.

To date, ENR has not monitored point source air quality conditions along existing NWT public highways. The Developer recognizes effects from road dust (including deposition on bordering areas such as vegetation and watercourses if dust suppression is not undertaken) and vehicle emissions could occur. However, these effects will not necessarily be detected by the ambient measurements taken at the Inuvik Station because the typical deposition range of airborne road dust is 100 m from a road (see Response 21.3). As the project starts 10 km outside of the Town of Inuvik, particulate levels from road dust are not expected to be detectable at the Inuvik monitoring station.

ENR, in its review of this Response, has confirmed it does not expect to detect ambient air quality effects at the Inuvik monitoring station from point source vehicle emissions on the proposed highway, due to the distance between them and the anticipated relatively low vehicle traffic (Stevens, A. Pers. Comm. Feb. 3, 2012). Evans et al. (2011), in a review of near-road air pollutant monitoring studies, showed that elevated concentrations of traffic-related pollutants such as ultrafine particles (UFP), black carbon (BC), NOx, and CO generally occur within 50 m and background levels are reached between 150 and 500 m from the roads. Concentrations of ultrafine particles decrease with distance from roadways to a greater extent than other air pollutants.

In Canada, near-road air quality monitoring for vehicle exhaust emissions are currently being developed in high traffic, high congestion areas (i.e. highways and major roads) in urban centres such as Toronto, Montreal and Vancouver. Vehicle volume and stagnancy in such areas can lead to localized elevations of $PM_{2.5}$, NO_x, VOCs and CO concentrations. The vehicle traffic on NWT highways is negligible in comparison to these large urban centres, and as such, it is inferred they do not warrant such detailed monitoring. With the implementation of mitigation measures as stated in the EIS, the potential residual effects on local and ambient air quality are minimal and do not warrant additional air quality measurements.

References

Evans, G. J., Cheol-Heon Jeong, Kelly Sabaliauskas, Parnian Jadidian, Stephanie Aldersley, Hugo Larocque, Dennis Herod. 2011. ***Design of a Near-Road Monitoring Strategy for Canada.*** Final report to Environment Canada.

Developer Response: 21.2

As stated in Section 4.2.2.6 of the EIS, the Developer will conform to applicable ambient air quality objectives by using pollution prevention measures and best management practices (CCME 2007), including but not limited to dust suppression practices.

For both construction and operation of the Highway, dust will only occur during the snow-free months. During construction, the GNWT DOT's contractors will be responsible for monitoring the constructed Highway sections and applying dust control measures, as needed, for the construction-related activities. The GNWT DOT and/or its contractors will be responsible for the ongoing maintenance and dust suppression along the Highway during the operations phase.

Developer Response: 21.3

As stated in Section 4.2.2 of the EIS:

> *Dust emissions are anticipated to remain primarily in the LSA. Dust, in the form of fine ($PM_{2.5}$) and coarse (PM_{10}) particulate matter and total suspended particulates, is expected to be emitted during the construction and operations phases. The review of scientific literature identified consistent factors that affect dust deposition behaviour and include the deposition load, duration, frequency, and chemical properties of the dust. Particle size also plays a role in determining how far away from a source dust effects can be expected to occur. The effects of road dust on vegetation have been detectable 100 m away (Auerbach et al. 1997), 200 m away (Santelmann and Gorham 1988; Angold 1997), and up to 400 m away from a source (Lamprecht and Graber 1996). These distances are consistent with United States Environmental Protection Agency (US EPA 1995) observations of the deposition properties of particles with various aerodynamic diameters (under more "typical" conditions).*
>
> *Larger dust particles (e.g., with aerodynamic diameters more than 100 μm) typically settle within 10 m of a source, while particles with aerodynamic diameters between 30 to 100 μm settle out within 100 m. Smaller particles than these are less susceptible to gravitational settling and can be transported over greater distances (US EPA 1995). It is anticipated that the largest effects to vegetation ecosystems and plants from fugitive dust will occur within 100 m of a dust source.*

The potential effect that dust may have on water quality in watercourses is discussed in detail in Section 4.2.4 of the EIS (Water Quality and Quantity). Dust is discussed in this section as a source of suspended sediment, and subsequent effects and mitigation measures are provided. Quantitative analysis on potential volumes of dust have not been calculated.

The volume of dust that may potentially affect water quality is based on:

- The proximity of the Highway and borrow sources to waterbodies (typically dust is deposited within 100 m);
- The number of snow-free months during that period;
- The number of vehicles using the Highway during the snow-free period; and
- The effectiveness of the proposed mitigation measures (stated in Section 4.2.4.2 of the EIS).

The Preferred Alignment, Alternative 3 (2010 Minor Realignment), is located further away from the Husky Lakes and further upstream (closer to the headwaters) of several streams compared to the Primary 2009 Route and Alternative 1 (2009 Minor Realignment). Alternative 3 is located closer to the headwaters of each stream, which means that there will likely be reduced flows, less drainage, the streams in this area will be more ephemeral, and the streams will be "flashier" (i.e., water levels increase and decrease quickly, making it less likely to be fish habitat). This, in itself, reduces the potential effects of dust on water quality, which are further reduced using the mitigation measures expressed in the EIS.

IR Number: 22

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Vegetation baseline data: rare plants, vegetation types of concern and harvested plants (EIS, Section 3.1.8.4, p.207, EIS, Section 3.1.8.5, p.210, EIS, Section 3.1.8.6, p.210 and Addendum to the Environmental Impact Statement for the Construction of the Inuvik to Tuktoyaktuk Highway, NWT, Section 2.7.7.6, p. 20)

Preamble
The Developer briefly describes and acknowledges the possibility that the Development may negatively impact rare plants, vegetation types of concern (distinct assemblages of plant species, often found under particular environmental conditions) and harvested plants. However, field surveys for vegetation community types and rare plants potentially directly impacted by the proposed Development were not scheduled to begin until 2011 and 2012, respectively. This was after the submission of the development EIS.

Request

1. Please discuss how the information being gathered will impact the current EIS predictions and any future monitoring programs.
2. Please indicate when the Developer will inform the public and other stakeholders what is to be expected in terms of the loss of rare plants, vegetation types of concern (and general vegetation community types) and harvested plants.
3. Please indicate what mitigation may be possible to reduce impacts on rare plants, vegetation types of concern and harvested plants if this information is not available until after the completion of the Review.

Developer Response: 22.1

The EIS (GNWT DOT May 2011) provides a review of known rare plants and potential uncommon plant communities. It is based on a search of NWT Environment and Natural Resources (ENR) plant species databases and information as well as information and analysis provided in the Mackenzie Gas Project EIS [IOL 2004] and the "Application for the Approval of the Development Plan For Parsons Lake Field (ConocoPhillips Canada (North) Limited 2004). The MGP work included extensive ground searches by qualified rare plant experts but only one rare plant species (Yukon stitchwort) was documented on gravel deposits. The uncommon Riparian Black Spruce / Shrub vegetation type identified in the EIS is also based on the field work and analysis of the MGP vegetation experts. ENR also maintains an "at risk" database that is updated every six months. To date, there are currently no known "may be at risk" or "at risk" plant species in the regional study area which could be affected by the Project (S. Carriere Pers Comm January 19, 2012).

In early 2005, the MGP proponents provided all their rare plant plot sheets to ENR for use in the ongoing program to assess the status of species in the NWT. The 10 new locations and other information led to a status rank of "sensitive" for the Yukon stitchwort (NWT Species 2011 – 2015: General Status Ranks of Wild Species in the Northwest Territories. 2011. Working Group on

General Status of NWT Species). The Yukon stitchwort is considered to be uncommon based on current knowledge but is not believed to be 'at risk' in the NWT.

The unique Riparian Black Spruce / Shrub vegetation type is restricted to a few river systems rather than being widespread. Exact stream crossings and crossing designs are necessary to determine the extent of impacts that could occur.

As the possible disturbance of rare plants or plant assemblages is very site specific, a field survey is required to locate and map rare plants or assemblages for the specific borrow sources and the exact highway right-of-way to determine site specific mitigations. The purpose of the planned vegetation inventory and analysis scheduled for 2012 (see Revised Section 2.7 in the Addendum and Conformity Response Request #2(b) for the final right-of-way and borrow sources will provide the opportunity to determine the actual extent of impacts and allow the application of site specific mitigations (see Response 22.3 below). The field botanist will provide an impact assessment to determine what, if any, mitigations are possible. Any impacts that could not be mitigated will be recorded. All site records will be provided to ENR including information on any impacts.

For the broader topic of harvestable vegetation, the 2012 field work will provide more detailed vegetation mapping of plant communities which will allow the inference of the presence or absence of harvestable species. In addition, the Traditional Knowledge / Traditional Land Use workshops will identify known key locations of harvestable vegetation species. The identification of site specific locations of significant concentrations of harvestable species will be used during the final alignment of the highway-right-of way.

Developer Response: 22.2

The Developer intends to report on its continued field inventory and impact assessments through the primary consultation processes including as required and annual reports to regulators [e.g. ILA, INAC] based on permit requirements, through consultations with the Inuvik and Tuktoyaktuk HTCs and provision of field data to government departments [e.g. ENR]. The Developer is committed to issuing on a regular basis a newsletter on the Project which will highlight progress and any substantive reports/information provided to public domain parties. A dedicated link to similar information will also be featured on the main DOT web site.

Developer Response: 22.3

The EIS (GNWT DOT May 2011) provides a list of vegetation mitigation/commitments (Table F – Summary of Developer Commitments (EIS p.lxxxix May 2011)). The following vegetation mitigation/commitments have been updated through further discussions with ENR rare species experts.

- The Developer commits to surveying borrow sources prior to construction for the presence of Yukon stitchwort and other rare plant species. Should rare plants be identified, they will be avoided where possible. If avoidance is not an option specimens will be collected, transferred to another suitable location, and/or donated to a reputed herbarium for research and educational purposes. Label data will be provided to ENR.
- The Developer commits to minimize direct effects to vegetation cover by limiting construction activities, to the extent possible, to the planned footprint of the Highway.

- Surveys ahead of construction in the vicinity of Holmes Creek and Hans Creek will be carried out to verify the location of the road alignment and stream crossings with respect to the unique Riparian Black Spruce/Shrub vegetation type.
- Controlling the effects of dust during construction and operation of the Highway will include applying water as needed, as per the *GNWT Guideline for Dust Suppression* (GNWT 1998).
- The Developer commits to using appropriate northern, native plant species for any deliberate re-vegetation efforts of borrow sources.
- The Developer or contractor(s) will apply strategies for mitigating potential effects to the vegetation types in the vicinity of the Highway and associated borrow operations. These Include:
    - Restricting off-site activities (e.g., ATV use) to the footprint area;
    - Ensuring machinery and equipment is clean prior to use on site;
    - Periodically monitoring roadsides for invasive species establishment;
    - Designing and engineering roadbed and drainage structures appropriately to accommodate unique environmental conditions; and,
    - Containing and cleaning-up spills immediately in accordance with the spill contingency plans.

These mitigations follow standard practice for linear development projects where the final site boundaries of disturbance cannot be determined until the planning level decisions are confirmed through an EA. For example, ConocoPhilips' mitigation commitments for rare plants (Section 5.2.6 "Application for the Approval of the Development Plan for Parsons Lake Field (ConocoPhillips Canada (North) Limited 2004)) was to conduct detailed rare plant inventories after the final approvals were received from the National Energy Board. As with archaeological sites, the ability to implement the primary rare plant mitigation [i.e. avoidance] is usually known only at the final layout stage when all design requirements are known.

IR Number: 23

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Barren-ground caribou observations (EIS Section 3.1.9.5, p.218 and Figures 3.1.9-3 - 3.1.9-4)

Preamble

With respect to winter-spring, spring migration and pre-calving caribou observations and herd ranges, the caribou observations presented appear to depict heavy concentrations of observations between roughly kilometre 110 and kilometre 120 of the proposed Highway route. Highway construction may result in this area becoming more dangerous for caribou, if they do not avoid the area entirely.

Request

1. Please explain and justify the potential implications for caribou using this area after highway construction.
2. Please include discussions surrounding mortality, avoidance and habitat fragmentation along with any other potential impacts.

Developer Response: 23.1

Based on caribou collar data (1996-2010) provided by the GNWT ENR, caribou are expected to occur along portions of the Inuvik to Tuktoyaktuk Highway particularly from mid-October to late May with larger concentrations roughly between kilometre 110 and kilometre 120. The potential for vehicle collisions exists. However, available information indicates that such incidents would be relatively rare. In the EIS, the Developer has provided a traffic volume estimate of 150-200 vehicles per day. This traffic volume estimate is based on measured traffic volumes for the annually constructed winter ice road between Inuvik and Tuktoyaktuk and adjusted 37% higher for peak summer traffic. The 37% adjustment is based on historical traffic data for the Dempster Highway and is largely reflective of increased tourism and construction related traffic during the summer months. The estimated 150-200 vehicles per day means the Inuvik to Tuktoyaktuk Highway could have hourly traffic volumes in the range of 15-25 vehicles over the core twelve (12) hour period 6:00 am to 6:00 pm. The comment regarding traffic and wildlife collisions is based on recorded collisions for the Dempster Highway, which has similar traffic volume characteristics and at 272 km long is about twice the length of the ITH.

Developer Response: 23.2

DOT has compiled wildlife collision records over a 22 year period (1989 to 2010) for the Dempster Highway. The data show seven (7) reported wildlife/traffic collisions occurring of which four (4) of these collisions involved caribou and the remaining three (3) involving moose. Although the Dempster Highway occurs mainly below the treeline, data for winter roads in the NWT that also have portions occurring above the treeline has shown similar results. For example, from 1996 to 2001, there was one (1) reported road-related caribou mortality incident along the Tibbitt to Contwoyto winter road. In March 1999, five (5) caribou were killed by a grocery truck on a portage near Gordon Lake, south of the tree line (EBA 2001). There were no vehicle-animal collisions reported on the Tibbitt to Contwoyto winter from 2000 to 2007 (E Madsen. personal

communication in Taltson 2009). The 110 km Meadowbank All Weather Permanent Access Road (AWPAR) has been in operation since April 2008. The RSA, which occurs entirely north of the treeline, has a large wintering population of caribou with over 5000 recorded during the 2008-2010 peak winter periods (Gebauer and Associates 2011). Since completion of the road two (2) road related caribou mortalities occurred in 2008 and one (1) occurred in 2010.

The Developer has proposed to implement various measures to minimize disturbance and collision mortality for caribou and other wildlife along the road:

- Caribou advisory signs will be placed along the Highway, as needed.
- Highway access may be restricted, if determined to be necessary, during peak barren-ground caribou migration periods (i.e., arrival during fall rut and departure to calving grounds in the spring).
- Signage will be placed along the highway notifying drivers that all wildlife will have the right-of-way on the ITH. Vehicles will be required to slow down or stop and wait to permit the free and unrestricted movement of wildlife across the ITH at any location.
- Caribou sightings by GNWT DOT staff will be recorded (including location data, GPS if possible) to be submitted to the GNWT DOT Planning, Policy and Environmental Division and GNWT ENR's Inuvik office to aid in monitoring and contribute to the development of adaptive management measures.
- The Developer will encourage organizations such as the HTCs, IGC, WMAC, Environment Canada and GNWT (DENR and DOT) to continue to work cooperatively to develop guidelines and conditions for use of the Highway regarding caribou management and wildlife protection.

Caribou avoidance of roads is a concern. As mentioned previously, the Meadowbank AWPAR is within barren-ground caribou winter range. Since completion of the road, caribou have been documented crossing the road including >1000 during migration which resulted in road closures during peak migration periods in 2009 and 2010 (Gebauer and Associates 2011). Although the degree of caribou avoidance of the AWPAR has not been measured, the continual caribou observations, as documented in the weekly road survey reports, and past road closures during peak migration periods suggest that avoidance of the AWPAR by barren-ground caribou is likely not significant.

With respect to habitat fragmentation, please see the response to IR number 29.

References:

EBA Engineering Consultants Ltd. (EBA). 2001. Tibbitt to Contwoyto Winter Road Environmental Setting Report. Prepared by EBA Engineering Consultants for the Tibbitt to Contwoyto Winter Road Joint Venture, Yellowknife, NWT, September 2001.

Gebauer and Associates. 2011. Meadowbank Mine 2010 Wildlife Monitoring Summary Report.

IR Number: 24

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Potential impacts to moose (EIS, Section 3.1.9.6, p.239 and Section 4.2.7.4, p. 539)

Preamble

In September 2009, during an aerial reconnaissance along the proposed Highway alignment, a total of 16 moose were observed including seven bulls, five cows, three yearlings and one calf. The Developer states that the overall effect of habitat loss to moose from the proposed Highway and the proposed gravel borrow sources should be considered to be very small and insignificant and will not affect the population at the local level. However, beyond a few coarse habitat loss estimates there is no information provided to support this statement. And, no quantitative estimates are provided with respect to moose 'populations' at the local level.

Request

1. Please explain and justify the stated conclusions about impacts to moose populations.

Developer Response: 24.1

No population estimates are available for the Project RSA. The Department of Resources, Wildlife and Economic Development (DRWED) and the Gwich'in Renewable Resource Board (GRRB) conducted moose surveys of the Inuvik-Tsiigehtchic area in 1996, 1997, 1998, and 2006 (Chetkiewicz 1998; Marshal 1998; Marshal 1999; Koizumi 2006). This area is part of the Gwich'in Settlement Area (GSA) and includes the Inuvik-Tsiigehtchic area. This area encompassed 8,884 km^2 and is mainly below the treeline. A population density of 1.62 moose/100km^2 was estimated from the data collected during the 2006 survey. In 1999, a large (1720 km^2) forest fire occurred near the centre of the Inuvik-Tsiigehtchic study which may have contributed to a lower population density estimate. Overall, the surveys found a high calf/cow ratio and low moose density. Based on the results of the 2006, survey an abundance estimate of 144 moose was suspected to occur within the Inuvik-Tsiigehtchic survey area. During the 2006 Inuvik-Tsiigehtchic study, a survey of the Mackenzie Delta was also conducted. The estimated moose abundance for the Mackenzie Delta was 189 animals and the population density for the 4,042 km^2 study area was the highest in the GSA (4.69/100 km^2). The results of these surveys also support observations made by residents of Tuktoyaktuk as they have identified the areas between Sitidgi and Husky Lakes and the Northern Mackenzie Delta as important moose habitats (Community of Tuktoyaktuk 2008).

The habitats south of the treeline provide deciduous shrubs for fall and winter food and thick conifers for winter cover (GNWT ENR 2011). Less than 8 ha of potential winter moose habitat will be directly impacted by the proposed Highway Project within the Mackenzie Delta Ecoregion of the LSA.

Small concentrations of moose are regularly found in riparian areas of lush willow growth north of the treeline during the growing season when factors related to climate and snow depths are not limiting (Britton 1983, Dussault et al. 2005, Stephenson et al. 2006). Although moose are mainly found in the Mackenzie Delta area, it is anticipated that some moose from the Mackenzie Delta and Inuvik-Tsiigehtchic area expand into the proposed Highway RSA during the summer. Observations of moose made by EBA within the LSA were mainly between Inuvik and Hans Creek (Km 56). The

majority of the proposed Highway occurs on uplands and intersects with riparian zones at major river crossings.

Riparian habitats within the study area include the Riparian Shrub and Riparian Black Spruce/Shrub Vegetation Types. Riparian habitats within the RSA account for approximately 84,230 ha of the RSA. Less than 85 ha of riparian habitat occur within the LSA. Riparian communities along the proposed road route are known only from the Hans Creek and Holmes Creek valleys. Within the LSA, these two stream crossings are limited (<36 ha). Surveys ahead of construction in the vicinity of Holmes Creek and Hans Creek will be carried out to verify the location of the road alignment and stream crossings with respect to the unique Riparian Black Spruce/Shrub vegetation type. If disturbance to this vegetation type is unavoidable, efforts will be made to maintain as much of this vegetation type intact and limiting potential fragmentation.

References:

Britton, B. 1981. The Beverly caribou winter range 1950-1981. N.W.T. Wildlife Service, Yellowknife, N.W.T. Unpubl. rep

Chetkiewicz, C.-L. B., D. Villeneuve, M. Branigan, J. Nagy, and J. P. Marshal. 1998. Population abundance and composition of moose in the Inuvik-Tsiigehtchic Region, November 1996**.** Gwich'in Renewable Resources Board, Inuvik, Northwest Territories. Report 98-04.

Community of Tuktoyaktuk, Wildlife Management Advisory Council and Joint Secretariat. 2008, April. Tuktoyaktuk Community Conservation Plan: A Plan for the Conservation and Management of Natural Resources and Lands within the Inuvialuit Settlement Region in the Vicinity of Tuktoyaktuk, Northwest Territories.

Dussault, C., Courtois, R., Ouellet, J. P., and Girard, I. 2005. Space use of moose in relation to food availability. Canadian Journal of Zoology 83, 1431-1437.

GNWT ENR 2011. Government of Northwest Territories Environment and Natural Resources Website http://www.enr.gov.nt.ca/_live/pages/wpPages/home.aspx. [Accessed: January 30, 2012].

Koizumi, Catherine L. 2006. Moose aerial survey in the Gwich'in Settlement Area, March 2006.

Marshal, J. P. 1998. Trend survey of moose in the Inuvik-Tsiigehtchic region, Northwest Territories, November 1997 and March 1998. Gwich'in Renewable Resource Board, Inuvik, Northwest Territories. Report 98-05.

Marshal, J. P. 1999. Composition survey of moose in the Inuvik-Tsiigehtchic region, Northwest Territories, November 1998. Gwich'in Renewable Resource Board, Inuvik, Northwest Territories. Report 99-04. 11pp.

Stephenson, T. R., Van Ballenberghe, V., Peek, J. M., and MacCracken, J. G. 2006. Spatio-temporal constraints on moose habitat and carrying capacity in coastal Alaska: vegetation succession and climate. *Rangeland Ecology and Management 59*, 359-372

IR Number: 25

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Spring 2010 aquatic field program (EIS, Appendix C)

Preamble

The Developer states, based on the Spring 2010 aquatic field program, that the majority of stream channels to be crossed by the proposed Highway, other than those included in the detailed fish and fish habitat surveys, were assessed to be small, ephemeral streams that generally drain terrestrial upland areas or small, shallow lakes or ponds, most of which do not provide suitable fish habitat features. Although fish surveys have been conducted previously in streams and within the Husky Lakes system along the proposed Highway route (as summarized in Rescan (1999a), Roux et al. (2010), Perrin (2007) and the Environmental Impact Statement (EIS) for the Mackenzie Gas Project (IOL et al. 2004)) it is not clear if these surveys are representative of the 46 streams that will be crossed by the proposed Highway, or how they relate to the Spring 2010 aquatic field program as these earlier studies are not referenced.

Request

1. Please explain, and provide dates when all of the necessary aquatic field data will be provided to the EIRB so the aquatic effects assessment provided in the EIS can be properly evaluated for this Review.

Developer Response: 25.1

All streams that are to be crossed by the proposed Highway have now been assessed. Those that were not described in the EIS, were investigated by IMG-Golder (2012) based on field work carried out in September, 2011. A total of 36 streams were assessed during that program to complete the inventory of streams that will be affected by the Highway. The final report for the Aquatic Field Program, conducted by IMG-Golder Corporation, was received January 31, 2012 and is now on the EIRB Project Registry.

During the IMG-Golder study, a total of 11 watercourses were assessed as being ephemeral with no defined channel, 10 were classified as intermittent, and 15 were classed as perennial.

IR Number: 26

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Disturbance to birds (EIS, Section 4.2.7, p. 519)

Preamble
The Developer states that the majority of disturbances to birds will be of a temporary nature. And that disturbance effects experienced by birds during construction (and supposedly the operation) of the proposed Highway and the physical existence of the proposed Highway afterwards are not anticipated to affect the bird populations at the local or regional level.

Request

1. Please explain and justify the conclusion that disturbance effects experienced by birds during construction and operation of the proposed Highway are not anticipated to affect the bird populations at the local or regional level.

Developer Response: 26.1

Information on bird use of areas associated with roads north of the treeline is limited. For the 110 km Meadowbank AWPAR, bird survey transects were conducted for two years prior to construction (2005-2006), during construction (2007) and during operation (2008-2009). A summary of the data collected from 2005 to 2009 found that, in general, species richness increased from 2005 to 2006 then decreased during construction (2007) and increased again in 2008 and 2009 (Gebauer and Associates 2011). In 2009, there was a minor increase in species richness. One the factors that may have contributed to this increase may be the additional species utilizing the newly created habitats along the AWPAR. Species relative abundance was generally similar for most species in 2009 compared to 2008. In previous years, overall species diversity was compared graphically. Annual results have consistently indicated that transects were dominated by relatively few species with many species only being seen occasionally.

Bird survey data and anecdotal observations collected at a tundra diamond mine site between 1995 and 2000 were provided in the EIS. In these surveys, birds typically had little or no detectable responses to stressors and that effects from mining and associated activities were negligible (Smith et al. 2005). Furthermore, despite anthropogenic disturbances, waterfowl (including loons) and shorebirds continued to utilize lakes and wetlands adjacent to roads and infrastructure (Rescan 1999b). Shorebirds such as Red-necked Phalaropes and Least Sandpipers continued to use ponds within the existing footprint. Several pairs of Semipalmated Sandpipers have nested adjacent to developed areas over the years (S. Moore, Wildlife Biologist, EBA, personal observation).

Raptors, including falcons and hawks, were commonly recorded hunting along roads and within built up areas. Bald and Golden eagles have been observed hunting in the vicinity of the diamond mine and Rough-legged Hawks and Short-eared Owls have been documented hunting within the road system (Rescan 1999b). In addition to bird information pertaining to mine related structures, information on bird use at maintenance yards and usage of roads and infrastructure, including the airport, in and around Tuktoyaktuk were also reviewed. The data suggests that the presence of the roads and infrastructure does not appear to disturb raptors, passerines or waterfowl from utilizing

adjacent habitats for nesting and rearing offspring (S. Moore, Wildlife Biologist, EBA, personal observation).

Bird mortality due to vehicle impacts could occur. Road-related wildlife mortality was recorded during the weekly wildlife monitoring program conducted during construction of the Meadowbank AWPAR beginning in 2007. In 2007, bird mortalities were limited to three passerines (cause of death uncertain). The road has been fully operational since 2008. Weekly wildlife surveys were conducted along the AWPAR from 2008-2010 with a total of eighteen (18) Ptarmigan and two (2) Lapland Longspur mortalities attributed to vehicle impacts S. Moore (Gebauer and Associates 2011).

The footprint of the proposed Highway is anticipated to be approximately 137 km long by 28 m wide. The amount of habitat lost to the proposed Highway (the Primary 2009 Route) is estimated to be 383 ha, which represents approximately 0.10% of the RSA. Based on the bird information reviewed for other Arctic road and infrastructure projects, the majority of disturbances to birds will be of a temporary nature. Disturbance effects experienced by birds during construction of the proposed Highway and the physical existence of the proposed Highway afterwards are not anticipated to affect the bird populations at the local or regional level.

IR Number: 27

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Employment Demographics (EIS Sec. 3.2.4.1, p.307)

Preamble

The EIS (p.307) states that "*In both the NWT and Inuvik, the age group with the highest employment rate was 35-44.*" In Figure 3.2.4-11, the age group with the highest employment rate in the NWT is depicted as 45-54.

Request

1. Please confirm which age group, either 35-44 or 45-54, has the highest employment in the NWT.

Developer Response: 27.1

The Developer apologizes for the error in reporting the text in the EIS. The correct statement on page 307 should be:

"In both the NWT and Tuktoyaktuk, the age group with the highest employment rate was 45-54. However, in Inuvik, the age group with the highest employment rate was 35-44."

IR Number: 28

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Housing (EIRB ToR, Sec. 9.2 EIS Sec. 3.2.5.11, p.349)

Preamble

The EIRB ToR requests that the EIS describe "*current levels of use of existing social, institutional, family, health and community services and local, regional and territorial infrastructure and the capacity of these to meet current, additional and new needs*" with particular attention given to "*housing stock, costs, and availability.*" Section 3.2.2.4 of the EIS presents information on the number of households in Inuvik and Tuktoyaktuk, and the average number of people per household. This information is repeated in Section 3.2.5.11 (Infrastructure and Institutional Capacity). It does not, however, present information on the availability of housing (i.e. levels of demand) and housing costs. This information is necessary in order to measure change in the levels of housing availability or cost that may be attributable to the development.

The Developer estimates that with additional training, approximately 70% of the construction workforce may be from local communities (EIS, Section 4.3.1.1), and further, that local workers from Tuktoyaktuk and Inuvik "…*will continue to live in their own houses and will be accommodated at the construction camps during their work schedules*" (Developer Response to 2b and 2c, Section 12.1). To mitigate potential effects to Tourism, Commercial and Public Recreational Use, the Developer states that it will accommodate winter construction crews in camps (EIS, Table 6-1). However, it is also stated (Developer Response to 2b and 2c, Section 12.1) with regard to Housing, that *"The Developer has not made commitments for this component."*

Request

1. Please provide information on housing costs and housing availability in Inuvik and Tuktoyaktuk.
2. Please indicate whether the development is anticipated to create new demand for housing in Inuvik or Tuktoyaktuk, and whether there is available housing to respond to this demand.

Developer Response: 28.1

The monthly housing costs during the winter of 2009 can be found in Table IR28-1. In both the NWT as a whole and Inuvik the greatest percentage of households occupied dwellings with a monthly cost of $1,500 or more. However in both the Beaufort-Delta as a whole and Tuktoyaktuk the greatest percentage of households occupied dwellings with a monthly cost of less than $500.

TABLE IR28-1: MONTHLY HOUSING COSTS IN THE NWT, WINTER 2009

			Monthly Housing Cost							
	All Households		Less than $500		$500 - $999		$1,000 - $1,499		$1,500 or more	
	No.	%	No.	%	No.	%	No.	%	No.	%
Northwest Territories	14,522	100	2,926	20	2,236	15	3,203	22	6,156	42
Beaufort-Delta	2,380	100	870	37	391	16	370	16	749	31
Inuvik	1,280	100	279	22	159	12	215	17	627	49
Tuktoyaktuk	283	100	160	57	51	18	39	14	33	12

Source: NWT, Bureau of Statistics. 2010. 2009 NWT Community Survey Housing Component.

The most recent information on housing availability is the 2006 Census carried out by Statistics Canada (Table IR28-2). Comparable information from the 2011 Census is not yet available but the Developer will provide an updated table at a future date.

TABLE IR28-2: SELECTED DWELLING CHARACTERISTICS – INUVIK AND TUKTOYAKTUK 2006

	Inuvik	Tuktoyaktuk
Total Private Dwellings	1,542	348
Occupied Private Dwellings	1,246	274
Unoccupied Private Dwellings	296	74
Average Value of Owned Dwellings	$143,924	$227,464

Source: 2006 Census. Prepared by NWT Bureau of Statistics

Merven Gruben, Mayor of Tuktoyaktuk, was consulted on the status of housing costs and availability in Tuktoyaktuk, the following was his response: "housing costs in Tuk at the moment vary from low or non-income who pay minimum rent of $35.00 and for high income as much as $3,500.00, that really varies on your income. There is housing available but usually you have a waiting time to get in of around two months. We have been in discussion with the Minister of Housing on the issue of building more accommodations for people coming into Tuk once the all-weather highway is open and it is being favourably addressed. As for workers that will be working on the highway, they are expected to stay and work at the camps along the route." (Mayor Merven Gruben, Pers. Comm. February 03, 2012)

Developer Response: 28.2

The creation of new demand for housing from a Project is a function of demographic changes and increased affluence from employment income. In the EIS demographic predictions are described in Section 4.3.1.1 (pages 569 – 570). For this project, the Developer intends to hire local, regional and NWT residents where possible. The Developer anticipates the majority of workers will be from Inuvik or Tuktoyaktuk. Given the predominantly winter construction and development of winter camps approach, limited migration to the communities is expected. In terms of increased affluence within the communities, the EIS provides a discussion of employment and revenue (pages 573 – 574) which indicates a short economic increase during construction, which is not expected to increase demand of existing community residents for new housing. This is further discussed in Section 4.3.4.10 of the EIS (pages 590 – 591).

At this time, there is sufficient lot developments planned to meet the ongoing demand for new housing. Infrastructure planning is a responsibility of the municipal governments and is ongoing even though the Project itself is not anticipated to increase demand.

5.0 Biophysical and Human Impact Assessment

IR Number: 29

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Caribou habitat fragmentation (EIS, Section 3.1.9.5 p. 218, Section 4.2.7.2, p. 520 and Table 4.2.7-3)

Preamble

The proposed highway alignment is located south of the traditional summer and fall caribou harvesting areas, but within the spring and winter caribou harvesting areas. As well, the alignment occurs within the Bluenose-west winter range management area. This area provides important winter habitat for the Bluenose-West caribou herd, which is valued for subsistence harvesting year-round by Inuvialuit communities and other Aboriginal communities outside the ISR.

As stated by the Developer, caribou habitat could be lost, fragmented, or degraded as a result of the proposed development. However, the Developer does not appear to have carried out any type of habitat fragmentation analysis as part of the assessment of impacts to caribou. No rationale is provided for this apparent omission, despite acknowledging that habitat fragmentation, as a result of the proposed development, could impact caribou. As a result, the Developer's residual effects assessment for caribou and caribou habitat in the RSA may be underestimating (qualitatively) the potential impacts to caribou.

Request

1. Please explain why habitat fragmentation analysis was not completed for this EIS.
2. Please provide statistically derived confidence limits for your predictions.

Developer Response: 29.1

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 29.2

Response in preparation, will be provided to the EIRB by February 9, 2012.

IR Number: 30

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Air quality impact assessment (EIS, Section 4.2.2, p. 470)

Preamble
The Developer states that the focus of the air quality assessment is on predicting changes in air quality concentrations; however, such changes are only monitored regionally, in Inuvik, and not at any points along the proposed Highway routes.

Request

1. Please explain and justify how the measurement of air quality parameters in Inuvik is representative of air quality along the proposed Highway route.

Developer Response: 30.1

Please see Developer Response 21.1.

IR Number: 31

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Air quality impact assessment - dust (EIS, Section 4.2.2.4, p. 476)

Preamble

The Developer anticipates that the largest effects to vegetation ecosystems and plants from fugitive dust will occur within 100 m of a dust source; however, they also acknowledge that the potential range of negative impacts from dust on vegetation can range between 100 m to 400 m. It is not clear why the apparent low-end of the range for known dust impacts to vegetation was selected for purposes of the impact assessment

Request

1. Please explain and justify why the apparent low-end of the known range for dust impacts to vegetation was selected for purposes of the impact assessment.

Developer Response: 31.1

The distance of 100 m away from the road edge was identified as an area where the greatest, most detectable effects of dust on vegetation are most likely to occur. It does not imply, however, that effects would not occur beyond this distance. The effects of dust on vegetation described in Section 4.2.6.2 of the EIS are applicable regardless of the distance away from a dust source.

The 100 m distance is based on the review of published literature and the anticipated nature and dispersal patterns of road dust generated from the proposed Inuvik to Tuktoyaktuk road. Given that the specific make-up of the roadbed is unknown at this time (typically studies of particle re-suspension from road surfaces are undertaken once the road has been built), consideration was given to the upper size limit of particles that can become suspended (approximately 75 μm aerodynamic diameter according to the US EPA and others), and the likely distance away from the dust source these particles would settle out at (identified in studies conducted by the US EPA and others to be 100 m).

IR Number: 32

To: Developer

Subject: Increased access to fisheries resources during Project operations (EIS, Section 4.2.5.1 - 4.2.5.3, p. 503-504)

Preamble

The Developer has identified that the greatest potential indirect impact from Highway construction is the potential increase in fish harvest pressure through domestic and sport fishing. This is due to the improved access that will be afforded by the Highway to important, but remote, fish harvest areas in some of the lakes along the proposed Highway, as well as the numerous watercourse crossings. Although the Developer recognizes that extensive consultation and public "buy-in" is required to minimize resource depletion and associated anthropogenic disturbances, the Developer also states that there may well be residual effects to fisheries resources because of improved access. Relying on extensive consultation and public 'buy-ins' is the basis for the Developer anticipating no significant adverse residual effects to fish and fish habitat. However, it is not clear how this will be accomplished or who will be responsible for carrying out any public consultation or action plan as outlined in the EIS.

The Developer has identified that the Development may result in residual effects on fish or fish habitat. However, the Developer anticipates that these effects are expected to be minor and will not significantly reduce the productive capacity of fish habitat within "*the area*".

Request

1. Please explain whether public consultation or an action plan for minimizing the potential impacts to fisheries resources that could potentially occur as a result of the proposed development is the proposed mitigation for any residual effects on fish or fish habitat.
2. If so, please provide the detailed plan. Please include methods for assessing the relative success of any public consultation or action plan.
3. If such a plan will not be developed, please explain and justify what mitigation is proposed to mitigate any potential residual effects on fish or fish habitat.
4. Please define what is meant by the phrase "*the area*" as used above.
5. Please clarify and explain how the Developer proposes to limit access in order to minimize impacts to fisheries resources.

Developer Response: 32.1

An Action Plan will be developed in cooperation with the ILA, the HTCs, the FJMC, and DFO during the period of Project construction. It is generally accepted that public involvement at all stages of this process are required to achieve resource protection and sustainability. As such, the Action Plan must integrate public, government, and NGO input, to develop strategies to limit access to sensitive water bodies, and a public education program that will increase awareness of the consequences of human harvesting activities on fish and fish habitat. Without a publicly supported Action Plan, any other mitigation measures imposed to restrict access and excessive resource

exploitation are not likely to succeed. As such, the Action Plan is the key mitigation proposed to minimize indirect residual effects on fish and fish habitat.

Developer Response: 32.2

Please see Response 32.1

Developer Response: 32.3

Please see Response 32.1

Developer Response: 32.4

The "area," as referred to in Section 4.2.5.3 of the EIS refers generally to regional waterbodies within the watersheds that may be indirectly affected by development of the Highway. Specifically, this area refers to the Husky Lakes, and other larger lakes such as Parsons, Jimmy, and Noel lakes, and their tributaries. Most of the lakes that will be within walking or ATV access from the Highway are small and shallow and are unlikely to provide interest to anglers. Similarly, the majority of streams at the Highway crossing locations are small or ephemeral and do not provide significant angling opportunities. In addition, the minimum 1,000 m setback from the Husky Lakes will be fully respected; this distance is exceeded for much of the length of the proposed alignment. The Husky Lakes, which provide habitat for several game fish species, is therefore the most critical of the waterbodies potentially indirectly affected by increased access and exploitation.

Developer Response: 32.5

Please see Response 32.1.

IR Number: 33

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Caribou habitat loss (EIS, Section 4.2.7.2, p. 520)

Preamble

The Developer provides some coarse estimates of 'habitat' loss for caribou by calculating how much of the herd ranges are directly removed by the development footprint, and reporting these numbers as percentages of the RSA. What appears not to have been provided is information on: zones of influence (ZOI) in these estimates; percentages of herd ranges lost in the LSA (where the greatest impacts to caribou will likely occur); and quantitative information about road avoidance or attraction by caribou. The Developer assumes that caribou will generally avoid the proposed Highway due to sensory disturbance, though some degree of habituation may occur. The degree of avoidance is likely to be higher once construction is complete and regular vehicle traffic commences. No quantitative estimates surrounding the degree of avoidance are provided by the Developer.

Request

1. Please provide and justify estimates of habitat loss in the LSA for caribou and incorporate an appropriate ZOI into the coarse calculations of habitat loss.
2. Please provide and justify a quantitative estimate surrounding the degree of Highway avoidance by caribou.
3. Provide data collected by GNWT Department of Environment and Natural Resources that shows caribou responses to roads or other anthropogenic disturbances.

Developer Response: 33.1

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 33.2

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 33.3

Response in preparation, will be provided to the EIRB by February 9, 2012.

IR Number: 34

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Caribou mortality (EIS, Section 4.2.7.2, p. 523)

Preamble
The Developer acknowledges that caribou mortality could increase due to vehicular collisions and increased hunting as a result of enhanced hunter access. However, no quantitative mortality estimates are provided to support this statement. Although the implementation of hunting restrictions, such as the current ban on caribou hunting in the area, and other proposed mitigation measures could be used to minimize the effects of hunting on caribou, it is currently not possible to determine whether or not such initiatives would be successful as there is no way to gauge their relative success.

Request

1. Please provide quantitative estimates of caribou mortality from all sources in the LSA as a result of the proposed Development.
2. Please describe the range of wildlife management options available to limit harvesting within road corridors.
3. Please indicate where the identified options (in #2 above) have been used and how successful they have been.
4. Please explain and justify whether no-hunting corridors could be used as a mitigation measure.
5. Please identify, explain and justify what thresholds would be applied to the proposed development corridor to establish a no hunting or shooting corridor.

Developer Response: 34.1

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 34.2

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 34.3

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 34.4

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 34.5

Response in preparation, will be provided to the EIRB by February 9, 2012.

IR Number: 35

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Grizzly bear habitat loss (EIS, Section 4.2.7.3, p.529)

Preamble

The Developer provides coarse estimates of 'habitat' loss for grizzly bear by calculating how much 'wetland habitat', 'riparian zones' and 'berry producing habitat' are impacted by the Development's direct footprint and reporting these numbers as miniscule percentages of the RSA. What is not included or justified are: ZOIs in their estimates; percentages of habitat lost in the LSA (where the greatest impacts to grizzly bears will likely occur); and whether road avoidance or attraction by grizzly bears will occur. No quantitative estimates surrounding the degree of Highway avoidance are provided by the Developer.

Request

1. Please provide estimates of habitat loss in the LSA for grizzly bears and incorporate an appropriate ZOI into the coarse calculations of habitat loss.
2. Provide a quantitative estimate surrounding the degree of Highway avoidance by grizzly bears.
3. Based on this information, please explain and justify your statement that direct footprint impacts will not significantly affect grizzly bear.

Developer Response: 35.1

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 35.2

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 35.3

Response in preparation, will be provided to the EIRB by February 9, 2012.

IR Number: 36

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Grizzly bear and furbearer den sites – proposed effects management (EIS Section 4.2.7.3, p. 529 and Addendum to the Environmental Impact Statement for the Construction of the Inuvik to Tuktoyaktuk Highway, NWT, Section 2.7.7.7, p.22).

Preamble
The Developer states that if active grizzly bear dens (and dens of furbearers) are discovered within 500 m of Development sites, the ENR will be contacted immediately to determine the appropriate course of action. Activities may be temporarily suspended pending consultation with ENR.

Request

1. Please provide a defensible rationale for selecting what appears to be a 500 m ZOI for denning grizzly bears and furbearers in the NWT in the context of the proposed development.
2. Please explain and justify whether the Developer expects the number and location of grizzly bear dens and furbearers to fluctuate after Development construction within this 500 m ZOI in comparison to current conditions.
3. Please provide the results of the October 2011 den survey along the 2009 Preferred Route.
4. Please explain and justify the course of action that may result should an active grizzly bear or furbearer den be discovered. (This should be part of the Wildlife Management Plan for the development.)

Developer Response: 36.1

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 36.2

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 36.3

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 36.4 A

Response in preparation, will be provided to the EIRB by February 9, 2012.

IR Number: 37

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Grizzly bear habitat fragmentation (EIS Section 3.1.9.12, p.259)

Preamble

As briefly discussed by the Developer, habitat fragmentation may or may not be an issue for wildlife species (such as Grizzly bear). The Developer states: *"Historic human-caused disturbances to vegetation in the Regional Study Area were limited to small sites or resulted in minimal impacts. The level of fragmentation and connectivity are considered to be insignificant."* No scientifically-defensible rationale has been provided to support this claim and it does not appear that any type of habitat fragmentation analysis was completed as part of the assessment of impacts to grizzly bear. As a result, the Developer's residual effects assessment for grizzly bear and grizzly bear habitat in the RSA may be underestimating (qualitatively) the potential Development impacts to grizzly bear.

Request

1. Please provide a habitat fragmentation analysis for grizzly bear with associated supporting rationale for the approach taken (i.e., what is being fragmented, what is the scale of fragmentation, what is the extent of fragmentation, what is the mechanism causing fragmentation).
2. In the absence of completing a habitat fragmentation analysis, please explain and justify the conclusions in the EIS about impacts on grizzly bears using some other accepted method.

Developer Response: 37.1

Response in preparation, will be provided to the EIRB by February 9, 2012.

Developer Response: 37.2

Response in preparation, will be provided to the EIRB by February 9, 2012.

IR Number: 38

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Traffic volumes and traffic-wildlife mortality (EIS Section 2.8, p.97 and Table 5.4.1-1, p. 644)

Preamble
The Developer states that wildlife-interactions over the life of the proposed Development will not be significant as the traffic will be "*relatively minimal*" (150-200 vehicles per day), which will reduce the risk of potential traffic-related mortality of wildlife. Further, the Developer has committed to posting signage that will warn of potential wildlife crossings in areas where wildlife are known to frequent (i.e., known migration corridors). However, it is not clear how the Developer arrived at the conclusion that 150-200 vehicles per day in an area where winter road annual daily traffic is only approximately 139 vehicles per day can be classified as being "*relatively minimal*" and how this new, increased level of traffic will reduce the risk of potential traffic-related mortality of wildlife, as indicated. Further, the locations of wildlife crossing signage are not apparent.

Request:

1. Please explain and justify how traffic volume estimates reduce the risk of potential traffic-related mortality, as indicated.
2. Please provide the approximate locations of wildlife crossing signage, if potential wildlife crossing areas are known.

Developer Response: 38.1

The traffic volume estimate (150-200 vehicles per day) provided by the Developer in the EIS is based on measured traffic volumes for the annually constructed winter ice road between Inuvik and Tuktoyaktuk and adjusted 37% higher for peak summer traffic. The 37% adjustment is based on historical traffic data for the Dempster Highway and is largely reflective of increased tourism and construction related traffic during the summer months. The use of "relatively minimal" was meant to characterize the level of traffic on the proposed road in comparison to other highways of similar purpose and construction.

The estimated 150-200 vehicles per day means the Inuvik to Tuktoyaktuk Highway could have hourly traffic volumes in the range of 15-25 vehicles over the core twelve (12) hour period (6:00 am to 6:00 pm). The comment about traffic and wildlife collisions is based on recorded collisions for the Dempster Highway which has similar traffic volume characteristics and at 272 km long is about twice the length of the Inuvik to Tuktoyaktuk Highway.

Collisions records compiled by DOT for the Dempster Highway over a 22 year period (1989 to 2010) show only seven (7) reported wildlife/traffic collisions occurring. Four (4) of these collisions involved Caribou with the remainder involving Moose. It is also expected that the absence of forest cover that could obscure wildlife near the right-of-way for most of the Inuvik to Tuktoyaktuk Highway will help mitigate wildlife/traffic collisions.

Developer Response: 38.2

Wildlife crossing signage will be installed as per the Manual of Uniform Traffic Control Devices for Canada (MUTCDC) prepared by the Transportation Association of Canada. For the opening of the Highway there will be a total of six (6) wildlife crossing signs per direction (i.e., twelve (12) signs total) that will be installed. There will be signs adjacent to the Highway leaving both Inuvik and Tuktoyaktuk. The other remaining signs will be placed at approximately 25 km intervals to reinforce/remind motorists of potential wildlife crossing locations.

The locations and number of signs could change as the project proceeds and newer crossing characteristics are observed. The initial signage proposed may be supplemented for shorter periods after the Highway is opened with portable electronic variable message signs to address any unusual wildlife crossing circumstances observed.

IR Number: 39

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Tourism Opportunities and Increased Traffic (EIS Section 2.8, p.97; EIS, Sec. 4.3.2.1, p.578**;** EIS, Appendix F, p.22)

Preamble
The EIS states that —*GNWT DOT (2010) estimates that the total number of tourists to visit the Inuvik Beaufort-Delta region would increase by about 10% to 5,500 tourists per year with the construction of the highway.*

Request

1. Please explain what this estimate is based on.
2. Please provide estimated levels of tourism for each season, including details regarding anticipated mode of travel.
3. Please confirm whether the estimated increase in traffic volumes (150-200 vehicles per day from the current level of 139 vehicles per day) includes traffic from tourism.

Developer Response: 39.1

The increase of tourist visits to the region generated by the Inuvik to Tuktoyaktuk Highway is estimated to be 10% or an additional 500 tourists per year. This estimate is based on a number of annual surveys undertaken by Industry Tourism and Investment (ITI), other empirical measures as well as some subjective assumptions including the absence of a Dempster Highway - Mackenzie Valley Highway "loop". The lack of a loop tour route requires tourists to return south by the same highway (i.e. Dempster Highway). This could temper the attractiveness of driving to the Arctic Ocean for some potential tourists.

Developer Response: 39.2

Based on discussions with ITI no precise seasonal breakdown is available. ITI, Tourism and Parks (Sarah Marsh pers.com. January 31 2012) confirmed the majority of tourists arriving by road visit during the summer months. Traffic volume data collected by DOT verifies this.

Developer Response: 39.3

As stated in IR Response 38 the estimated increase in traffic volumes (150-200 vehicles per day) includes traffic from tourism.

IR Number: 40

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Project Employment by Skills Category (EIRB ToR, Sec. 10.2.2**;** EIS, Sec.3.2.4.3, p.329**;** EIS, Sec. 4.3.2.1, p.572**;** EIS, Sec.4.3.2.2, p.581)

Preamble

The EIRB ToR (10.2.2) requests the Developer to provide the following information: "*Employment and income for every year of construction and operation, with particular reference to wage and salary employment by length of employment, form of employment (full time, part-time, seasonal), skills category,…*".

The EIS (p.572) states that "*Highway construction will create 1,086 one-time jobs in the NWT and another 860 one-time jobs in the rest of Canada. In addition, Highway construction is expected to create 42 long-term jobs in the NWT and another nine in the rest of Canada*."

In terms of the skills categories, the EIS (p.329) states that "*a variety of positions will likely be available for the Highway Project, including supervisors, environmental and wildlife monitors, scouts, clerks, engineers, construction staff, labourers, heavy equipment operators, heavy duty mechanics, camp staff, and a variety of other positions*." The EIS (p.581) further states that "*The number of workers required by occupation or skill will be determined during the detailed design phase of this Project. Typical types of work and skills involved in highway construction include: surveying, environmental and wildlife monitoring, environmental field studies, heavy duty equipment operators, truck drivers, heavy duty mechanics, and camp personnel.*"

Request

1. Please identify all development-related positions by skills category.
2. Please provide an estimate of the wages for these positions.
3. Please provide an estimate of the number of jobs per skills category.

Developer Response: 40.1

The Developer expects the Inuvik to Tuktoyaktuk Highway project to generate the need for a variety of entry level, skilled/trade and professional/technical jobs. The following is a list of positions that could be realized for each of these three categories:

Professional/Technical
Project Manager
Professional Engineers
HSE Manager
Environmental Affairs Manager
Other

Skilled/Trades
Equipment Operators (Heavy Equipment)
Equipment Operators (Truck and Bus Drivers)
Heavy Duty Mechanics
Information Technologist

Survey/Drafting Technologists
Administrative Clerks
Electrician / Mechanical Trades
Catering Staff
Camp Manager

Entry
Labourer
Environmental Monitors
Wildlife Monitors
Swamper
Expeditors
Mechanics/Trades Helpers
Camp Attendants
Other

The great majority of the positions can be filled by individuals with "Less Than High School Diploma" education, training and skills, provided that they have experience and/or skills with the operation of trucks and heavy equipment.

The majority of the employment positions related to the Project would be for:

- Truck Drivers (90-140)
- Heavy Equipment Operators (60-80)
- Labourers and labour related positions including monitors, gravel checkers, etc. (20-50)
- Camp and catering Staff (20-40).

Other specialized positions will be of lower numbers including superintendents (2-4), crew leaders (4-8), surveyors (2-4), tradespersons (4-8) and engineering technicians (2-4).

Given the long experience of community residents in the region with the oil and gas industry there are significant numbers of individuals already experienced, trained and available to fill the position.

Developer Response: 40.2

Wages for all positions will reflect required experience and education. Wages may also be affected by individual arrangements made at the time of hire related to hours to be worked, opportunities for overtime, arranged accommodation, vacation time, and other matters. The Developer, based on recent experience with the Tuktoyaktuk to Source 177 Access Road, anticipates average annual construction season wages for these categories to generally be as follows:

Professional/Technical	$1.5 million per construction season
Skilled/Trades	$9.2 million per construction season
Entry	$4.6 million per construction season

Developer Response: 40.3

The Inuvik to Tuktoyaktuk Highway project will essentially be a large earth moving project with the majority of positions assigned to truck drivers and equipment operators. The number of workers required by occupation or skill will be determined during the detailed design phase of the project and what contracting/procurement process is established for this project. This will also establish the number of spreads (construction sections) that will be used during construction. Influencing these decisions will be how federal funding flows to this project.

IR Number: 41

To: The Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Education and Training as it Relates to Project Employment (EIRB ToR, Sec. 9.2; EIS, Sec.3.2.4.3, p.329-330; EIS, Sec. 4.3.1.1, p.569; EIS, Sec.4.3.2.2, p.582; EIS Sec.4.3.3.1, p.583)

Preamble

The EIRB ToR (9.2) requests the Developer to "*Describe the timing and duration of education and skills development programs that would be required for Project-related employment*."

Table 3.2.4-5 (p.329-330) lists the Aurora College Programs that are offered at Inuvik as these relate to the various NWT Occupation Categories, but these are not directly related to potential Development employment. The EIS (p.569, 581) states that "*During the Tuktoyaktuk to Source 177 Access Road construction, approximately 70% of the workers were from local communities. It is estimated that with additional training, a similar percentage may be achieved for the Inuvik to Tuktoyaktuk Highway*" (p.569, p.582). The EIS (p.583) further states that "*In anticipation of upcoming construction work, residents seeking employment may enrol in applicable training programs at Aurora College. As well, several training programs were set up specifically for the construction of the Tuktoyaktuk to Source 177 Access Road and similar training programs could be made available in association with this project.*" Table 4.3.2-8 presents the potential available labour supply (2009) for Inuvik and Tuktoyaktuk. It is noteworthy that 59.3% of the Inuvik potential labour supply and 73.8% of the Tuktoyaktuk potential available labour supply are within the "*Less than High School Diploma*" category.

Request

1. Please indicate the education, training, skills, and other requirements that are necessary to take advantage of development-related employment opportunities.
2. Given that over half of the potential labour supply are in the "*Less than High School Diploma*" category, please indicate what type of additional training would be required for the available labour supply to take advantage of employment opportunities (in the various categories of jobs), and when the additional training will need to be completed in order for interested and available candidates to take advantage of employment opportunities.
3. Please describe any efforts that have been made to provide information regarding development-related employment and the necessary training requirements to the available labour supply in Inuvik, Tuktoyaktuk, and elsewhere in the region.
4. With respect to the following statement: "*During the Tuktoyaktuk to Source 177 Access Road construction, approximately 70% of the workers were from local communities*", please confirm whether "*local*" refers to Inuvik and Tuktoyaktuk, ISR communities, or NWT communities.
5. With respect to the statement "…*similar training programs could be made available in association with this project*" please describe in detail any plans the Developer has to set up similar training programs.

Developer Response: 41.1

The great majority of the positions can be filled by individuals with "Less Than High School Diploma" education, training and skills, provided that they have experience and/or skills with the operation of trucks and heavy equipment.

The majority of the employment positions related to the Project would be for:

- Truck Drivers (90–140).
- Heavy Equipment Operators (60 - 80).
- Labourers and labour related positions including monitors, gravel checkers, etc. (20–50).
- Camp and catering Staff (20–40).

Other specialized positions will be of lower numbers including superintendents (2 -4), crew leaders (4-8), surveyors (2-4), tradespersons (4-8) and engineering technicians (2-4).

Given the long experience of community residents in the region with the oil and gas industry there are significant numbers of individuals already experienced, trained and available to fill the position.

Developer Response: 41.2

The primary emphasis would be to train additional individuals through the holding of Class 1 Driver Training Course and Heavy Equipment Operator Courses. These courses could be of between 2 weeks and 2 months duration and could be held during the fall of 2012 and in the summer of 2013 and continued in subsequent seasons.

Developer Response: 41.3

The potential contractors in the Region have made their workforce and the overall workforce in the communities aware of the potential opportunities through general meetings with their employees and community organizations and their own sponsorship of training courses continually over the past several years.

Developer Response: 41.4

The developer confirms that local means Tuktoyaktuk and Inuvik.

Developer Response: 41.5

Local contractors including E. Gruben's Transport Ltd. and Northwind Industries Ltd. in cooperation with the Inuvialuit Regional Corporation and Arctic College have each held several very successful Driver Training and Heavy Equipment Operator Training Courses over the past several years. It is our understanding that each of the organizations intend to continue to hold such courses in the future. Two examples of reports from heavy equipment and truck driver training are provided from one of the local contractors (Attachment 2).

IR Number: 42

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Tourism Opportunities (EIS, Sec. 4.3.2.1, p.578**;** EIS, Appendix F, p.22)

Preamble

The EIS states that "*GNWT DOT (2010) estimates that the total number of tourists to visit the Inuvik Beaufort-Delta region would increase by about 10% to 5,500 tourists per year with the construction of the highway.*"

Request

1. Please explain what this estimate is based on.

Developer Response: 42.1

Please see Developer Response 39.1.

IR Number: 43

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Human Health and Community Wellness – Case Studies (EIS, Sec. 4.3.5, p.591-593)

Preamble

The EIS (Section 4.3.5, p.591-593) provides a description of some of the potential effects of the Highway on individual, family, and community wellness.

Request

1. In assessing the potential impacts of the development on individual, family, and community wellness, did the Developer draw upon the assessments and post-construction experiences of other remote communities to which an all-weather road has been constructed and in operation?
2. If yes, please provide a list these communities and projects, and describe how those assessments and the subsequent experiences informed the assessment and proposed mitigation for the development.

Developer Response: 43.1

The Developer attempted to locate and use documents from other remote communities where construction of all-weather roads has occurred. However, there are very few resources available to respond to the EIRB's Terms of Reference for this Project.

Examples of past and current projects include:

Dempster Highway

The Dempster Highway, started in 1959 and completed in 1979, is likely the closest applicable project since it connected Inuvik and several Gwich'in communities to the southern Yukon and the Alaska Highway. An environmental assessment was not conducted and, since 1979, other industrial activities in the Beaufort Delta region have greatly influenced the changes in socio-economic conditions and issues that we see today. The Developer's EIS for the Inuvik to Tuktoyaktuk Project provided substantial relevant socio-economic conditions in the Baseline section.

Northern Saskatchewan Highway Projects

Two northern road project assessments are underway in Saskatchewan. The Saskatchewan Ministry of Highways and Infrastructure has proposed the construction an all-weather road from Stony Rapids to the south shore of Lake Athabasca near Fond-du-Lac (called the Hwy 905 All Weather Road) as well as an all-weather road between the existing access roads to the McArthur River and the Cigar Lake mine sites (called the Hwy 914 All Weather Road). The first project is undergoing a provincial environmental assessment. The second project is undergoing a cooperative provincial EA and federal Comprehensive Study. The Developer provided the TOR for the Hwy 914 project as part of its comments on the EIRB's Draft TOR. The TOR indicates that the Saskatchewan Ministry is required to provide socio-economic information and assess socio-economic effects but there is no requirement for the Ministry to identify socio-economic mitigations other than training and employment, worker safety, and road user safety. As well, the Ministry is not required to identify long

term socio-economic monitoring and management as it is well understood that existing provincial departments and local governments are responsible for socio-economic monitoring and issue management as part of their legislated responsibilities.

Trans Labrador Highway

One of the most comprehensive highway environmental assessments conducted in Canada occurred in Newfoundland and Labrador for the Trans Labrador Highway – Phase III. The EIS report entitled "Trans Labrador Highway – Phase III (Happy Valley – Goose Bay to Cartwright Junction) Environmental Impact Statement and Comprehensive Study Report" (Jacques Whitford Environment Limited and Innu Environmental Limited Partnership. 2003.) was prepared for Department of Works, Services and Transportation). The full environmental assessment and all related documents can be found at:

http://www.env.gov.nl.ca/env/env_assessment/projects/Y2004/1012/.

The EIS and supplemental documents included a substantial review of the socio-economic conditions baseline conditions (including Aboriginal communities) and an assessment of effect. The EIS concluded that "*Monitoring changes to the characteristics of communities and families, as well as tracking community health and social issues, is the responsibility of provincial and federal government departments. In addition, there are a number of non-government organizations that are active in the region. WST will cooperate with these departments and organizations by providing project-related information as required.*". As a result, this report also does not provide any additional insights to apply in the Inuvik to Tuktoyaktuk Highway.

Highway 114

The Highway 114 project in Nova Scotia is more typical example of an urban highway project EA. Many posted EA include only a very narrow socio-economic focus. This project limited discussion to the effects of noise and user safety. [for further details see Dillon Consulting. Environmental Impact Assessment Report Highway 114. November 13, 2009. Prepared for Nova Scotia Transportation and Infrastructure Renewal.

http://www.gov.ns.ca/nse/ea/highway113/Hwy113.2009.EA.Report.pdf

The Developer believes its approach of applying the more recent NWT EAs and government planning reports provides the most relevant information for the Inuvik to Tuktoyaktuk EIS. When researching and writing Section 4.3.5 Human Health and Community Wellness emphasis was placed on the use of information gained through community consultations (documented in Appendix B of the EIS) as well as personal communications with residents of Inuvik and Tuktoyaktuk and/or agencies and organizations working in these locations. The EIRB's TOR requested very specific information for each community and on occasion, the information could only be derived using consultation and personal communication.

Although not formally documented, the winter road that is operational between Inuvik and Tuktoyaktuk each year provided the most accurate results regarding the potential effects of the proposed Highway on Inuvik and Tuktoyaktuk residents. The question used to determine effects based on this informal case study was whether the person noticed any differences (or effects) when

the winter road is open versus when it is closed each year. The responses to this question were incorporated in the EIS.

The following is a list of the personal communications cited in Section 4.3.5:

- M. Heffel, Head Nurse, Rosie Ovayouk Health Centre, pers. Comm., January 18, 2011
- Inuvik Public Health Services, pers. comm., January 12, 2011
- Ben Kershaw, Sergeant, Tuktoyaktuk RCMP, pers. comm. January 12, 2011

Although not case studies, a variety of resources were drawn upon in assessing the potential impacts of the development on Human Health and Community Wellness. A primary resource for this section was the *Environmental Impact Statement for the Mackenzie Gas Project* (IOL et al. 2004) as it provided a large amount of socio-economic baseline data for the communities and the region. Another document cited in this section was *Income Security, Breaking Down the Barriers of Poverty, Promoting Self Reliance* (GNWT ECE 2007). This document was useful in identifying the demographic groups most vulnerable to poverty within the communities. Being aware of these groups is useful when determining mitigation measures. *Traditional Food Attributes Must Be Included in Studies of Food Security in the Canadian Arctic* (Lambden et. al. 2007) was also cited in this section as it highlights the cultural and nutritional importance of traditional food for Northern residents. Other relevant documents are cited throughout the section.

Other documents reviewed, but not necessarily used include:

Bone, R. 1984. The DIAND Norman Wells Socio-Economic Monitoring Program, Report 9-84. Prepared for Department of Indian Affairs and Northern Development.

Bone, R.M. and M.B. Green. 1984. The DIAND Norman Wells Socio-Economic Monitoring Program, Report 3-84: Analysis and Rankings of Socio-economic Impacts of the Norman Wells Pipeline Program.

GNWT. 2005. GNWT Beaufort-Delta Regional Workshop on the Social Impacts of the Mackenzie Valley Gas Project.

GNWT MACA. ND. Community Action Tool Kit: Protecting Community Infrastructure, Preparing for Resource Development.

The Developer attempted to locate formal case studies for the Dempster Highway, for the Inuvik to Tuktoyaktuk winter road, and for Saskatchewan northern roads, but without success.

Developer Response: 43.2

Please see Developer Response 43.2.

Mitigation measures were prepared based on available standards and guidelines, measures that were considered within the responsibility of the Developer and relevant information available from other environmental assessments that were not necessarily related to remote communities.

IR Number: 44

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Human Health and Community Wellness (EIS, Sec. 4.3.5, p.591-593; Addendum to the EIS, p.59; Developer Response to 2b and 2c (Sec.13))

Preamble

The EIS (Section 4.3.5, p.591-593) provides a description of some of the potential effects of the Highway on individual, family, and community wellness, in particular, the potential impact of increased income (from employment) on substance abuse. It provides a general description of potential positive impacts of the Highway on the community of Tuktoyaktuk (i.e. easier, lower-cost, and year-round access to the Inuvik primary health center.

The Addendum to the EIS (p.59) provides additional details, and states that contractors hired to construct the Highway will be required to (1) have employment policies related to alcohol and drugs on the job site, and (2) comply with all applicable legislation related to employment.

The Developer response to 2b and 2c provides further explanation of expected effects, noting that a primary concern of stakeholders is that the Highway may increase Tuktoyaktuk residents' access to alcohol. The response identifies parties responsible for addressing alcohol and substance related issues in the community, in this case, the Hamlet of Tuktoyaktuk and community wellness and support workers.

Request

1. Please explain whether, and how, the enforcement of alcohol restrictions would respond to changes in access to alcohol.
2. Please describe any policies, with regard to alcohol and other substances that will be implemented for employees residing in construction camps.
3. Please provide further details on the Developer's and any contractor's policies with regard to employment as such policies pertain to alcohol and substance abuse on the job site (i.e. zero tolerance).

Developer Response: 44.1

Alcohol is regulated in the Northwest Territories under the *Liquor Act* [SNWT 2007, c.15] and *Liquor Regulations* [r-069-2008].

The *Liquor Act* establishes a Liquor Commission and a Liquor Licensing Board and regulates the importation, transportation and sale of alcohol in the territory. Part 3 of the Act (Community Control) describes the process for a community to establish a liquor restriction or prohibition system. Communities in the Northwest Territories have options available to them regarding their liquor status. Communities in the Northwest Territories are classed as either:

Unrestricted	There are no restrictions beyond those that are described in the Liquor Act and Liquor Regulations.
Restricted	The restriction may limit the quantity and/or frequency of alcohol brought into a community; limit the quantity and hours of sale at a liquor store or

require individuals to seek prior approval from a community alcohol education committee to bring in a limited amount of alcohol into a community.

Prohibited Alcohol is prohibited.

Under the Act, a municipal council may request the Minister to hold a plebescite to determine whether the voters support the establishment, replacement, modification or cancellation of a liquor restriction or prohibition system for the community. If the majority of voters approve the establishment, replacement or modification or cancellation of a liquor restriction or liquor prohibition system, the Minister recommends a change to the regulations to implement the results.

Currently, the community of Inuvik is unrestricted. This community has licensed premises and a liquor store/liquor warehouse. The community of Tuktoyaktuk is classified as restricted. The following *Tuktoyaktuk Liquor Restriction Regulations* [R-009-2010] came into force on March 1, 2010.

The Commissioner, on the recommendation of the Minister, under sections 49 and 52 of the *Liquor Act* and every enabling power, makes the *Tuktoyaktuk Liquor Restriction Regulations.*

1. In these regulations, "restricted area" means all that portion of the Northwest Territories that lies within 25 km of the Tuktoyaktuk Hamlet Office.

2. (1) Subject to subsection (4), no person shall bring into the restricted area, at any time, a quantity of liquor that exceeds the amounts described in any one of the following combinations:

   (a) Combination 1: 1140 *ml* of spirits and 24 355 *ml* containers of beer;

   (b) Combination 2: 1140 *ml* of spirits and two *litres* of wine;

   (c) Combination 3: 24 355 *ml* containers of beer and three *litres* of wine;

   (d) Combination 4: 2280 *ml* of spirits;

   (e) Combination 5: six *litres* of wine;

   (f) Combination 6: 48 355 *ml* containers of beer.

   (2) Subject to subsection (4), no person shall, at any time, possess within the restricted area a quantity of liquor that exceeds the amounts described in any one of the combinations set out in paragraphs (1)(a) to (f).

   (3) Subject to subsection (4), no person shall operate within the restricted area a vehicle.

   (a) having one to three adult occupants and transporting a quantity of liquor that exceeds an amount determined by allocating one of the combinations set out in paragraphs (1)(a) to (f) to each adult occupant; or

   (b) having four or more adult occupants and transporting a quantity of liquor that exceeds an amount equivalent to four of the combinations set out in paragraphs (1)(a) to (f).

(4) The limits set out in the combinations described in paragraphs (1)(a) to (f) do not apply to a person authorized by the Tuktoyaktuk Hamlet Council to bring into and possess in the restricted area greater quantities of liquor for consumption at a wedding, community dance or other special event.

3. Every person who contravenes any provision of these regulations is guilty of an offence and liable on summary conviction to a fine not exceeding $500 or to imprisonment for a term not exceeding 30 days or to both.

Enforcement of the Act and Regulations is the responsibility of inspectors appointed under the Act as well as peace officers including the Royal Canadian Mounted Police.

Developer Response: 44.2 and 44.3

Upon approval of the project, policies will be developed by either the GNWT DOT or its contractors regarding alcohol and other substances. However, an example of similar policies used during construction of Tuktoyaktuk to Source 177 Road are described as follows. It is important to note that the policies relate to employees residing in construction camps and working on the job site.

During the construction of the Tuktoyaktuk to Source 177 Road, the contractor (E.Gruben's Transport Ltd. (EGT)) applied the following Substance Abuse Policy found in Section 1.4, page 9 of their Health Safety Environment (HSE) Manual:

> *E. Gruben's Transport Ltd. is committed to the health, safety and productivity of its personnel, sub-contractors, customers and the communities in and through which it operates.*
>
> *The company recognizes that the use of illicit drugs and the misuse of alcohol and medications can limit an employee's ability to properly perform his/her job and can have a serious negative impact on the health and safety of themselves and others. Therefore, as part of our overall safety policy, we have instituted this policy.*
>
> *The following standards apply to all E. Gruben's Transport Ltd. personnel, Sub-Contractor personnel, and any visitors while being transported to or from or while at any project site or premises:*
>
> - *The use, possession, distribution or sale of alcoholic beverages on worksites or in company owned, rented or leased equipment and facilities are strictly prohibited.*
> - *The use, possession, distribution or offering for sale of illegal and performance impairing drugs or drug paraphernalia is strictly prohibited.*
> - *The possession, distribution or sale of prescription medications obtained illegally and the presence on the body of illegal drugs is strictly prohibited.*
> - *If personnel have any concerns as to as to their ability to perform their jobs while taking a prescription drug or other medication, they have an obligation to report the use of the drug to a company health professional, or to their supervisor. This may result in modified work or temporary reassignment.*
> - *All persons employed by E. Gruben's Transport Ltd. and/or by any Sub-Contractor who violate these policies will be immediately removed from the worksite.*
> - *The company will institute testing for illegal drugs and/or alcohol, if deemed necessary. All personnel shall acknowledge the company's policy and note that a positive test shall be cause for immediate removal from the worksite. Testing will be performed by an approved third party firm and all results shall remain*

confidential. Testing may include Pre-Employment testing, Post-Incident testing and Reasonable Cause testing, depending upon the safety sensitivity of the position of the individual and as deemed necessary by E. Gruben's Transport Ltd. management. Reasonable Cause Testing will take place when the company supervisors and/or management determine that the behavior or appearance of an individual while on duty indicates probable alcohol or drug use.

- *E. Gruben's Transport Ltd. will review every previous Drug and/or Alcohol related violation on a case-to-case basis to determine if entry to E. Gruben's Transport Ltd. camps or worksites is appropriate.*
- *Further information can be obtained from E. Gruben's Transport Ltd. management."*

The HSE Manual was included in the orientation package provided to every E. Gruben Transport Ltd. employee and sub-contractor working on the project. Once the package was received and reviewed, employees were required to sign a form indicating their acceptance of the package and program.

The EGT substance abuse policy is signed by senior management of the company acknowledging the serious nature and importance of this policy and their determination to implement it.

The HSE Manual and Orientation Package discussed in this response is attached as an example in Attachment 3. Upon approval of the Inuvik to Tuktoyaktuk Highway, a contractor will be selected and required to produce a similar Health and Safety Manual that will include policies on substance abuse.

IR Number: 45

To: The Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Human Health and Community Wellness - Harvesting (EIS Sec. 4.3.5, p.593**;** EIS Sec. 4.3.7, p.595)

Preamble

The EIS (Human Health and Community Wellness Section, p.593) states that "*the presence of the highway may increase access to harvesting areas that were previously more difficult to access. The effects from increased access to harvesting areas include increased food security and reduced reliance on store-bought food. Further discussion regarding harvesting and access to harvest areas is found in Section 4.3.7*." The EIS (Harvesting Section, Sec. 4.3.7, p.595) repeats the statement that "*increased access could result in increased harvesting activities, which may provide increased access to country foods, increased food security, and reduced cost of living through less reliance on store-bought food. The potential effects related to wildlife from increased harvesting are discussed in Section 4.2.7 (Wildlife and Wildlife Habitat)*".

The EIS appears to assert that increased access to harvesting areas is a positive, direct effect of the Highway on harvesting. However, the ability to harvest may also be directly affected by the Highway through changes in the health (quality) and abundance (quantity) of harvested species.

Request

1. Please explain and justify how the Highway is expected to result in a change in the quality and abundance of harvested species that, while it may not be "significant" from a biophysical assessment perspective, would result in a direct benefit to harvesters.
2. Please provide case study examples of road and Highway projects that have resulted in a long term net positive effect to harvesting (i.e. same or increased levels of harvesting) through increased access to harvesting areas.

Developer Response: 45.1

In the EIS it is stated that the Inuvik to Tuktoyaktuk Highway "may increase access to harvesting areas that were previously more difficult to access." The EIS, however, did not state that the Inuvik to Tuktoyaktuk Highway is expected to result in a change in quality and abundance of harvested species that would result in a direct benefit to harvesters.

As stated in the EIS, the potential effects related to wildlife from increased harvesting potentially resulting from the Highway are discussed in Section 4.2.7. The following is a list of specific EIS sections where relevant information is located:

- Section 4.2.7.2 - describes the potential effects of the Highway directly related to Caribou.
- Section 4.2.7.3 - describes the potential effects of the Highway directly related to Grizzly Bears.
- Section 4.2.7.4 - describes the potential effects of the Highway directly related to Moose.
- Section 4.2.7.5 - describes the potential effects of the Highway directly related to Furbearers.
- Section 4.2.7.6 - describes the potential effect of the Highway directly related to Birds.

All of these sections list injury or death from collisions with vehicles and increased harvesting near the Highway as potential effects potentially resulting in changes in wildlife mortality rates. These changes could potentially affect the abundance of wildlife. Other potential effects to abundance of wildlife include habitat degradation and/or disturbance. Habitat degradation may also result in changes to the quality of wildlife.

Changes to the quality and abundance of harvested vegetation are discussed in Section 4.2.6 of the EIS.

The potential residual effects are described in Sections 4.2.6 and 4.2.7 of the EIS.

Developer Response: 45.2

It is difficult to accurately compare a case study from a different location as both wildlife populations and the management of harvesting vary across regions, provinces, and territories. As well, data regarding harvesting levels is not typically available.

A review of Section 3.2.8 of the EIS also shows the variation in harvesting levels within the region between 1988 to 1997, pre-construction of the Highway. The changes in harvesting levels may relate to several factors, such as wildlife populations, wildlife harvesting restrictions, etc. During the winter months, harvesters currently have access to the land (far beyond the proposed Highway route). The Highway would provide increased access along the Highway corridor during the summer months. It would be very difficult to accurately correlate changes in harvesting levels due to increased access that can be attributed to the Highway.

IR Number: 46

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: IFA and CCP Goals - Land Use (EIRB ToR, Sec. 9.2; EIS Sec. 3.2.3.2, p.297 **;** EIS Sec. 3.2.9.3, p.432-433**;** EIS Sec. 4.3, p.568**;** EIS Sec. 4.3.8, p.597-606)

Preamble

The EIRB ToR (9.2) requests that the Developer "*Provide a description of the local and regional economies and their performance, including: local and regional economic development goals and objectives as identified in public consultations, the Inuvialuit Final Agreement (IFA), Community Conservation Plans (CCPs)*."

The Baseline Section of the EIS (p.297-298) lists the three basic goals of the IFA, as well as the five goals upon which the overall strategy for conservation and resource management is based in the Inuvik and Tuktoyaktuk CCPs, and further (p.432-433) describes the "*Land Management Categories*" and "*Areas of High Conservation Value/Ecological Sensitivity or Importance*" as these are described in the CPPs.

Table 4.3-1 (p.568) presents the assessment summary for the VSCs. For the "*Land Designation Areas* (*as per the IFA and CCPs)*" the potential effect is assessed as "*adverse*", while the potential effect for the "*Areas of Special Ecological and Cultural Importance*" VSC is assessed as "*neutral*".

Request

1. Please provide an explanation as to how potential effects on the "*Land Designation Areas (as per the IFA and CCPs)*" VSC is "*adverse*", while the potential effect on the "*Areas of Special Ecological and Cultural Importance*" VSC is "*neutral*", given that some of the goals of the IFA and CCPs pertain to protection of such areas of ecological and cultural importance.
2. Please indicate whether any meetings have been held, or will be held, with the Inuvialuit organizations (i.e. Hunters and Trappers Committees, Community Corporations, WMAC, FJMC) that drafted and approved the CCPs in order to discuss and reconcile the Project's proposed use of Zone E which is defined in the CCPs as an area where no development should take place.

Developer Response: 46.1

According to Section 10.2.9 of the EIRB's Terms of Reference (2010), the Developer was asked to:

Discuss the conformity of proposed Project-related land uses with designated land use management areas as described in approved and draft management plans, community conservation plans and proposed land use designations. Identify areas of non-conformity.

Evaluate the potential impacts of the Project on protected areas and special management areas, including a consideration of the following:

- *Community conservation plans.*
- *Regional land use plans.*
- *Existing and proposed protected areas.*
- *Special management areas.*
- *Other proposed special management areas such as parks, sanctuaries or preserves.*
- *Implementation of plans, action plans, strategies and guidelines.*

The Developer reviewed and discussed the proposed Highway's conformity and/or non-conformity with each of the plans, protected areas, special management areas, etc. The primary determinant for an "adverse" effect designation was that the proposed Highway is located within Management Category "E". This management category refers to "lands and waters where cultural or renewable resources are of extreme significance and sensitivity. There shall be no development on these areas. These lands and waters shall be managed to eliminate, to the greatest extent possible, potential damage and disruption. This category recommends the highest degree of protection in this document."

Since the Highway is a development within this management area, the potential effects on the "*Land Designation Areas (as per the IFA and CCPs)*" was deemed to be adverse.

The Developer understands that the definition of Management Category "E" includes "lands and waters where cultural or renewable resources are of extreme significance and sensitivity". However, for the VSC "*Areas of Special Ecological and Cultural Importance",* the Developer chose to review the specific areas with ecological and cultural importance that were identified in the CCPs and through consultation.

Section 4.3.8.1 reviews the potential effects related to Traditional Use, Specific Sites or Features, and Protected Areas and Special Management Areas, and Section 4.3.8.2 describes the proposed design and mitigation measures. Since Highway routing was designed to avoid or minimize special cultural areas, access to traditional or special locations would not be restricted by the Highway. It was determined that the actual effects to ecological and culturally important areas would be neutral.

Developer Response: 46.2

Appendix B of the EIS provides records of the 2009 and 2010 consultation events. Meetings, consultations, or other communications were held with several groups, including:

- Tuktoyaktuk Hunters and Trappers Committee
- Tuktoyaktuk Community Corporation
- Tuktoyaktuk Elders' Committee
- Tuktoyaktuk Residents (community meeting)
- Tuktoyaktuk Council
- Inuvik Hunters and Trappers Committee
- Inuvik Community Corporation
- Inuvik Elders' Committee
- Inuvik Residents (community meeting)
- Inuvik Town Council
- Inuvialuit Land Administration
- Environmental Impact Screening Committee
- Environmental Impact Review Board

- Wildlife Management Advisory Council (NWT)
- Fisheries Joint Management Committee
- Fisheries and Oceans Canada
- Indian and Northern Affairs Canada (now Aboriginal Affairs and Northern Development Canada)
- Environment Canada
- GNWT Environment and Natural Resources
- Northwest Territories Water Board

As presented in the consultation summary documents in Appendix B of the EIS, no mention was made of proposed use of the land designated as Management Category "E" which is defined in the CCPs as an area where no development should take place. What was mentioned, repeatedly, was the desire for the Highway route to respect the 1 km setback from Husky Lakes.

In particular, during the October 2009 consultation in Tuktoyaktuk, a resident commented:

> *"Husky Lakes have special status under the Inuvialuit Final Agreement, Section 8(1). A plan is needed to manage development in the area. There is concern about opening access."*

The Developer's response was:

> *"The Inuvialuit Land Administration brought this to our attention in September, and indicated some of the special considerations for this area, including a 1 kilometre setback for development. [IFA Section 8 consulted with reference to the proposed project.]"*

It is important to note that at the time that the Highway was proposed, the updated version of the CCPs were not yet public. In October 2009's consultation, a comment from Tuktoyaktuk stated that:

> *"the Husky Lakes Management Plan, Environmental Standards, and the Community Conservation Plan updates are anticipated by the end of the year."*

Another comment made by DFO and FJMC stated that:

> *"Anticipate that Husky Lakes will become Category E, which restricts development."*

During the January 2010 consultation in Inuvik, the Developer stated:

> *"Ultimately, the intent is to construct a highway that is acceptable and beneficial to the Inuvialuit. It would be ideal to know if there are any issues prior to submitting the PDR to screening. This will prevent revisions later on. We have been in communication with the ILA to try to keep up with potential Management Plan terms that may affect the proposed Highway."*

The Developer received a copy of the Draft New Community Conservation Plan from the EIRB on November 3, 2009. During the preparation of the Project Description Report, which was submitted in January 2010, the 2000 edition of the CCPs were used as the community conservation plans were still in a draft state. The 2000 CCPs did not use a Management Category "E". The final version of the 2008 CCPs included Management Category "E", which was described in the EIS.

It is important to note that Inuvialuit interests identified Alternative 3 (2010 Minor Realignment) in 2010, and the Developer has incorporated this input into the route options presented. The GNWT is currently in negotiations with the ILA to attain land for the Highway right-of-way.

The Developer anticipates consulting with the applicable regulatory and co-management agencies as the permitting process progresses to reconcile the Project's proposed use of land within Management Category "E".

IR Number: 47

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Land and Resource Use - Traditional Culture (EIS, Table 4.3-1, p.568**;** EIS, Table 4.3-2, p.569**;** EIS, Section 4.3.7, p.595)

Preamble

The EIS (Table 4.3-1) summarizes the effect of the Highway on "*Land and Resource Use by the Inuvialuit*" as both beneficial and adverse, and on "*Land Designation Areas (as per IFA and CPPs)*" as adverse. The EIS (Table 4.3-2) summarizes the effect of the Highway on "*Traditional Culture*" as beneficial, and states (p.595) that "*The presence of the highway will create year-round access to harvesting areas that were previously accessible only during certain seasons*." Despite the increased access to harvesting areas that the Highway will provide, it is unclear how adverse effects on "*Land and Resource Use by the Inuvialuit*" and "*Land Designation Areas (as per IFA and CCPs)*" will not impact the "*Traditional Culture*" of the Inuvialuit, in general, and in particular, "*Traditional Culture*" as it relates to the ability of the Inuvialuit to harvest.

Request

1. Please explain and justify how adverse effects on "*Land and Resource Use by the Inuvialuit*" and "*Land Designation Areas (as per IFA and CCPs)*" will not (or could not be expected to) result in adverse effects on the "*Traditional Culture*" of the Inuvialuit in general, and in particular as it relates to the ability of the Inuvialuit to harvest.

Developer Response: 47.1

To respond to this question, it is important to understand the primary adverse effects attributed to each component.

The potential effect on *"Land and Resource Use by the Inuvialuit*" were determined to be beneficial and adverse. Based on the results of the consultations, and information gathered regarding land and resource use, it was determined that for some people, the Highway would provide improved access to the land for traditional or recreational use. As stated throughout the EIS, the potential increased access to the land was also considered to be a potential adverse effect due to the risk of potential increased harvesting or the risk of non-Inuvialuit accessing the land.

As discussed in Developer Response 46.1, the potential effect on "*Land Designation Areas (as per IFA and CCPs)*" was determined to be adverse primarily because the proposed Highway occurred in an area designated as Management Category "E", which states that no development should occur there.

"*Traditional Culture*" of the Inuvialuit can be discussed in terms of traditional land use (Section 4.3.8), socio-cultural patterns (Section 4.3.6), harvesting (Section 4.3.7), language (Section 4.3.3.2) and archaeological resources (Section 4.3.9). It was determined, based on an analysis of several of these factors was the Highway would result in a net benefit to traditional culture.

One could argue that the adverse effect determinations for "*Land and Resource Use by the Inuvialuit*" and "*Land Designation Areas (as per IFA and CCPs)*" could lead to an adverse effect on traditional culture. The Developer anticipates further discussions on this matter during the public hearings and as the permitting process progresses.

6.0 Cumulative Effects

IR Number: 48

To Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects assessment (EIS Section 5, pages 626-645)

Preamble
As indicated by the Developer, the cumulative effects assessment focuses only on adverse effects of the Development remaining after the application of mitigation measures; however, it was not explained by the Developer that this focused approach is based on their impact assessment predictions which have not been validated or tested. It is not clear how the relative success of the mitigation measures will be evaluated or tested with respect to cumulative effects as no specific details are provided (see Table 5.4.1-1). The Developer states that no additive or synergistic relationships between the Development and other existing or proposed developments were found to result in a significant cumulative effect on VECs or VSCs.

Although the Developer included brief descriptions of each of these past, existing and potential future projects and activities, and to what degree they may or may not contribute to a possible cumulative effect in relation to the proposed construction and operation of the Inuvik to Tuktoyaktuk Highway, the cumulative effects assessment is very much qualitative in nature. It does not appear to quantitatively assess two of the biggest concerns associated with the proposed Highway:

- future gas exploration and production in the region which may be induced by the construction of the Highway;
- increased access by people and the potential induced effects from additional hunting, fishing, camping and other similar pursuits.

The Developer is relying on the mitigation measures ('Effects Management') as presented in Table 5.4.1-1 to minimize or eliminate cumulative effects. Yet, there do not appear to be any strategies in place to evaluate the relative success of the effects management plans, mitigation measures, or assumptions regarding EIS predictions. The Developer has not presented any plans for evaluating or testing the effectiveness of the proposed mitigation measures and has not provided any definitions of what 'success' might entail in the context of cumulative effects management.

Request

1. Please describe how the relative success of the proposed mitigation of Development effects will be evaluated or tested in the context of cumulative effects.
2. Provide explain and justify the rationale for the claim that none of the past, present or future developments that were identified will interact with the proposed Development with respect to cumulative effects.
3. Explain the process behind the evaluation of synergistic or additive effects in the context of the proposed Development and cumulative effects.

Developer Response: 48.1

As noted by the EIRB, the Developer is indeed relying on the mitigation measures ('Effects Management') as presented in Table 5.4.1-1 to minimize or eliminate potential effects, including possible cumulative effects. The Developer's responses to IR Number 12 indicate how the Developer proposes to determine the relative effectiveness of the proposed environmental mitigation measures to be implemented for the proposed development.

Based on the effects identified for each of the VECs/VSCs and the associated mitigation measures and class of effects, the cumulative effects assessment resulted in a determination of no significant effects for all but one component. The magnitude of effects for all components was deemed to be low with the exception of vegetation removal for the right of way which was deemed to be low to moderate. However, it was concluded that mitigation applied at a local scale was considered to be sufficient to address possible effects at a regional scale.

It is also important to note that as described in the review of past and existing projects and activities, the proposed Highway corridor, the LSA and the RSA have not experienced any significant residual effects that could possibly contribute to a potentially cumulative effect to date. The potential future projects and activities discussed in the EIS included the Mackenzie Gas Project, the Tuktoyaktuk Harbour Project and possible future developments in the Husky Lakes area.

As stated in the EIS there still remains considerable uncertainty as to if and when the Mackenzie Gas Project may in fact proceed. It is also generally understood that possible future gas exploration and production in the Mackenzie Delta and offshore will be driven primarily by more clear indications that the MGP will proceed, or indeed the initiation of construction of the MGP and associated gas fields.

The Developer feels that it is fair to state that there has been a long history of previous failed proposed oil and gas developments in the Mackenzie Delta – Beaufort Sea area that have historically driven public perceptions and concerns. However, as most people are aware, apart from the very small Ikhil gas project that services Inuvik, none of these other proposed oil and gas developments have ever come to fruition.

As a result, the construction of the proposed Inuvik to Tuktoyaktuk Highway would represent the first significant permanent new development project in the area between Inuvik and Tuktoyaktuk. Thus, as indicated in the Cumulative Effects section (Section 5.0) of the EIS, the Developer is committed to participating with other parties in a future cumulative effects monitoring program as and when such a program may be developed.

Developer Response: 48.2

With respect, the justification and rationale for why the Developer determined that none of the past, present or future developments that were identified in the EIS will interact with the proposed Development in a cumulative manner were discussed in Section 5.3 of the EIS.

However, the Developer recognizes that there may be continuing concerns about unforeseen potential cumulative effects indirectly related to the development of the Inuvik to Tuktoyaktuk Highway such as possible future 'residential' developments in the Husky Lakes area, or possible effects that could be related to the increased access that the Highway will provide to the land and its natural resources.

As indicated in Section 5.3.2.4 of the EIS, during the January 2010 community consultations, representatives of the ILA confirmed that the Hunters and Trappers Committees, the Elders, the Community Corporations, resource management agencies, co-management bodies, the ILA and the proponents of the Inuvik to Tuktoyaktuk Highway should work together to develop the necessary management tools to minimize the potential for such concerns to be realized.

The Developer fully supports such an approach and in addition, as previously indicated, the Developer is committed to participating with other parties in a future cumulative effects monitoring program as and when such a program may be developed.

Developer Response: 48.3

As discussed in the Cumulative Effects Section of the EIS, it is recognized that potentially additive and synergistic effects of the overall residual effects, in combination with past, existing or known planned activities in the vicinity of the proposed Inuvik to Tuktoyaktuk Highway need to be considered in a cumulative effects assessment.

As defined by Cumulative Effects Assessment (CEA) practitioners, additive effects are effects that may be "equal to the sum of the parts", while synergistic effects are effects that may be "greater than the sum of the individual effects".

In discussing the known current residual environmental effects of the past and existing projects reviewed in the EIS (Section 5.3 of the EIS), it was consistently determined that there were no significant residual effects associated with any of those projects that could potentially operate in a cumulative manner (either additively or synergistically) with the insignificant residual effects predicted to be associated with the proposed Highway project. The process leading to these conclusions was based on review of the available information, the direct knowledge and experience of the EIA Project Manager who has worked in the Mackenzie Delta area since the 1970s and professional judgement.

However, recognizing that there may be continuing concerns about unforeseen potential cumulative effects indirectly related to the development of the Inuvik to Tuktoyaktuk Highway, the Developer assumes that this issue will be examined in more detail by all parties during the planned public hearings for the Highway project.

IR Number: 49

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects assessment - spatial boundaries (EIS Section 5.1, page 627)

Preamble
The Developer indicates that for purposes of the cumulative effects assessment, the spatial boundaries include the portion of the Mackenzie Delta and the Tuktoyaktuk Peninsula in the general vicinity of the proposed Inuvik to Tuktoyaktuk Highway corridor, extending between Inuvik and Tuktoyaktuk, including alternate alignments considered. In section 5.1 of the EIS, the Developer has also included a description of the RSA for the Development as being the area within 15 km of the Highway (30 km total width) and the LSA for the Development as being the area within 0.5 km of the Highway (1 km total width) but has not indicated how these areas were used in the cumulative effects assessment. As such, it is not clear what the specific spatial boundaries were for the cumulative effects assessment.

Request

1. Please describe and explain the spatial boundaries of the cumulative effects assessment.
2. Please explain and justify the rationale for selecting those spatial boundaries.

Developer Response: 49.1

As discussed in Section 5.1 of the EIS, for purposes of the cumulative effects assessment (CEA), the spatial boundaries were broadly described as including the portion of the Mackenzie Delta and the Tuktoyaktuk Peninsula in the general vicinity of the proposed Inuvik to Tuktoyaktuk Highway corridor, extending between Inuvik and Tuktoyaktuk, including alternate alignments considered. .The easterly boundary extends from the westerly shores of the Husky Lakes to the westerly boundary, which extends from the eastern side of the Mackenzie River.

The rationale for selecting this broad area was that this area encompasses the entire proposed Highway, the range of environments that could potentially be impacted by the Highway, and the past, present and future projects that may have a potential to contribute to potential cumulative effects.

Developer Response: 49.2

Please see Response 49.1.

IR Number: 50

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects assessment - temporal boundaries (EIS Section 5.2, page 627)

Preamble

The Developer indicates that for purposes of the cumulative effects assessment, the temporal boundaries included the next 4 to 10 years, during which time construction of the proposed Highway is anticipated to be completed and the Highway will have been in operation for up to 6 years. However, the rationale for selecting these temporal boundaries is not apparent. The Highway, if approved, would improve and increase access to a relatively large area for industrial and non-industrial uses over the expected lifespan of the Highway of at least 100 years.

Request

1. Please explain and justify the criteria used in the selection of the temporal boundaries for the cumulative effects assessment in light of increased access and expected Highway lifespan.

Developer Response: 50.1

As previously explained in the Developers responses to the EIRB's Part A addendum to the EIS, the rationale for selecting the 10 year temporal timeframe for the cumulative effects assessment portion of the EIS was that it included a reasonable number of years that spans both the construction (four years) and initial operation (six years) of the Highway. This timeframe also recognized a basic assumption of cumulative effects assessment that the other projects or activities to be considered should only include those projects or activities that are currently under regulatory review, or are reasonably likely to occur and are not hypothetical.

The outer limit of the temporal timeframe selected could conceivably have been extended to 20 years or more, but this was not considered to be necessary or appropriate as the assessment would need to have extended into the realm of hypothetical projects, which are not typically covered in cumulative effects assessments, and baseline environmental parameters (such as future fish and wildlife population cycles) will likely have changed in a currently unpredictable manner.

It remains the view of the Developer that the various timeframes stated in the current EIS are all appropriate in the context used and do not affect the adequacy of the information provided in the EIS or the assessment thereof. The Developer recognizes that the cumulative effects assessment did not extend for the duration of the expected lifespan of the Highway of at least 100 years, but for the reasons provided in this response, such an assessment was not attempted.

As previously indicated in response to Information Request 48, the Developer feels that it is fair to state that there has been a long history of previous failed proposed oil and gas developments in the Mackenzie Delta – Beaufort Sea area that have historically driven public perceptions and concerns. However, as most people are aware, apart from the very small Ikhil gas project that services Inuvik, none of these other proposed oil and gas developments have ever come to fruition.

As an example, the Dome et al (1982) EIS, which was reviewed by an Environmental Assessment Panel established by the Federal Environmental Assessment Office (pre-CEAA), attempted to predict the possible environmental effects, including cumulative considerations, for oil and gas

production in the Mackenzie Delta – Beaufort Sea area for the period 1982 to 2000. Needless to say, although public expectations were raised, none of that projected development activity actually took place.

As also noted in response to Information Request 48, the construction of the proposed Inuvik to Tuktoyaktuk Highway would represent the first significant permanent new development project in the area between Inuvik and Tuktoyaktuk. Thus, the implementation of this project will represent a major milestone in the future development of the Mackenzie Delta and the communities in the area. The Inuvik to Tuktoyaktuk Highway project will help to establish a new baseline condition that can be used to assess the potential cumulative contributions from future potential but, at this time, generally unknown developments and activities that may be proposed beyond the next 10 years.

However, as previously indicated, the Developer is committed to participating with other parties in a future cumulative effects monitoring program as and when such a program may be developed. The Developer also assumes that it may be beneficial for this matter to be examined in more detail by all parties during the planned public hearings for the Highway project.

IR Number: 51

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects assessment - induced effects and increased access (EIS Section 5.3.1.2, page 631)

Preamble

The Developer acknowledges that it is anticipates the completed Highway will make it easier for people to access the land for their various traditional, recreational and cultural pursuits. The Developer points out that to ensure that the environment of the area remains protected, it will be important for the users of the Highway to abide by any "management restrictions" that may need to be developed for the Highway by the resource management agencies and co-management bodies in consultation with the Hunters and Trappers Committees (HTCs) and other interested stakeholders. The Developer has not defined what those anticipated "management restrictions" might be in the EIS. It is not clear how these potential induced environmental impacts through increased access (i.e., increased harvesting of wildlife, potential damage to vegetation, increased random camping, etc.) were quantitatively factored into the cumulative effects assessment.

Request

1. Please describe and explain the anticipated "management restrictions" that may need to be developed for the Highway.
2. Please indicate when "management restrictions" will be developed, if they will be in place prior to Highway completion and who will be responsible for management enforcement.
3. Please explain and justify how "management restrictions" will be evaluated in terms of their relative success at minimizing or eliminating environmental impacts.

Developer Response: 51.1

As noted by the EIRB, the Developer acknowledges that it is anticipated that the completed Highway will make it easier for people to access the land for their various traditional, recreational and cultural pursuits. As also noted in the EIS, the Developer is responsible for management related to construction and operation of the Highway and other management agencies are responsible for resource management and land access. The Developer cannot super-cede the authority of these management agencies that are grounded in legislation.

As also noted by the EIRB, the Developer recognizes that to ensure that the environment of the area remains protected, it will be important for the users of the Highway to abide by any management restrictions that may need to be developed for the Highway by the resource management agencies and co-management bodies in consultation with the Hunters and Trappers Committees (HTCs) and other interested stakeholders.

As indicated in Section 5.3.2.4 of the EIS, during the January 2010 community consultations, representatives of the ILA confirmed that the Hunters and Trappers Committees, the Elders, the Community Corporations, resource management agencies, co-management bodies, the ILA and the proponents of the Inuvik to Tuktoyaktuk Highway should work together to develop the necessary management tools to minimize the potential for such concerns to be realized.

The resource management agencies include the Wildlife Management Advisory Council (WMAC), the Fisheries Joint Management Committee (FJMC), GNWT Environment and Natural Resources, Department of Fisheries and Oceans (DFO), Environment Canada and perhaps others. With respect, the Developer would suggest that this line of Information Requests also be directed to these agencies for their responses.

The Developer is committed to working with these agencies and other interested stakeholders such as the HTCs to develop appropriate management restrictions and tools to ensure that the environment of the area remains protected. The types of measures that the Developer can implement directly includes the provision of educational and informative signage at key points along the Highway that reminds people that the land and environment need to be protected for the benefit of future generations. An example of signage and management restrictions used for the Dempster Highway was previously provided to the EIRB in November 2011 in the Developer Response to Environment Canada.

In consultation with the resource management agencies, HTCs and other stakeholders, specific signage can be provided to address important environmental considerations, for example:

- The need to give wildlife the right-of-way
- No feeding or harassment of wildlife
- Hunting and harvesting restrictions
- Key waterfowl nesting and staging areas
- Fish-bearing streams
- Limitations on access to the land including camping, especially in the snow free months

It should be noted that existing management restrictions are currently in place for the Cape Bathurst herd (as discussed in Section 3.1.9 of the EIS and shown on Figure 3.1.9-4).

Developer Response: 51.2

The Developer would recommend that consultations and activities leading to the development of appropriate management restrictions and supporting tools be initiated within approximately 6 months of completion of the EIRB review process. The reason for this is that although it is anticipated to take about four winter seasons for construction of the Highway, it is possible that some local people may begin to utilize completed portions of the Highway as they become available. Thus it will be important to initiate these types of consultations and activities at an early date.

However, during the project implementation phase, the Developer and its contractors will be making best efforts to discourage people from using the completed sections of the Highway. It is also reasonable to assume that the full suite of management restrictions and options for achieving protection of the environment surrounding the Highway will need to be available by the time the Highway is officially opened to public traffic.

Developer Response: 51.3

It is the Developer's opinion that the success of most of the management restrictions to be developed for the Highway will need to be evaluated in terms of their relative success at minimizing or eliminating environmental impacts primarily by the responsible resource management agencies, co-management organizations and the HTCs. However, the Developer (GNWT Transportation) and its contractors, with input from the applicable organizations will retain responsibility for evaluating the usefulness and success of the Highway signage that will be placed along the road and any possible needs for improvements to its signage.

IR Number: 52

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects management – quantifiable parameters (EIS Section 5.4.1 page 643 and Table 5.4.1-1, page 644)

Preamble

In Section 4.2 and 4.3 of the EIS, the Developer states the following: *"The significance determination includes a ranking as Class 1, 2 or 3. These classes are typically based on thresholds but because the VECs/VSCs don't include readily measurable or quantifiable parameters, the Classes are used as a general guideline to rank effects."* Table 5.4.1-1 describes the different Classes of effects, as taken from Kavik-Axys 2002.

It is difficult to understand how the VECs/VSCs selected cannot be measured or quantified. The VECs/VSCs identified as having residual effects (vegetation, wildlife and land use) can be and have been measured in a number of ways for a wide-variety of parameters. It is understood that the EIRB guidance document for cumulative effects assessment provides the following guidance on estimating thresholds where they are not readily available from standards, regulations, or directives:

- During consultations with HTCs and community residents, discuss how CCPs and the community's needs and desires can contribute to an evaluation of significance.
- In the absence of established thresholds or standards, use standards and thresholds from other jurisdictions, with the proviso that geographic, ecological and social differences are taken into account.
- Use best professional judgement, including peer review and consensus.
- Keep up-to-date and informed of ongoing work by industry, government and nongovernment organizations regarding resource management and cumulative effects.

The Developer also states that "*mitigation applied at a local scale is often sufficient to address effects at a regional scale as well"*, but provides no concrete examples to substantiate this claim in the context of the proposed Development. Contrary to this assertion, effects at different scales are not necessarily linked. For example, a local scale effect may be that caribou avoid a disturbance within a few hundred meters or kilometres. This avoidance, however, may or may not be measurable in terms of regional caribou populations. Alternatively, the mitigation measures in the LSA may reduce impacts from avoidance or mortality but will unlikely remove all impacts; that is, some residual impacts will remain. These residual impacts may be deemed small on a local scale (in the LSA) but many such small impacts in the region may add up to significant cumulative effects in the RSA. This is the very foundation of cumulative effects assessments.

Request

1. Please explain and justify why the VECs/VSCs of vegetation, wildlife and land use do not include "...*readily measurable or quantifiable parameters*..." for the purposes of the proposed development.
2. Please explain how the EIRB guidance document was utilized with respect to the approach taken for the cumulative effects assessment for thresholds.

3. Please identify and discuss examples of environmental mitigation strategies that have been implemented at a local scale in the Northwest Territories that can be identified as being successful in addressing effects at a regional scale.
4. Please explain how the relative effectiveness (or 'success') of these mitigation strategies was measured.

Developer Response: 52.1

In considering the questions posed in this IR, the Developer would like to begin this response by addressing the last portion of the preamble to the IR. The EIRB consultants stated *that "Alternatively, the mitigation measures in the LSA may reduce impacts from avoidance or mortality but will unlikely remove all impacts; that is, some residual impacts will remain. These residual impacts may be deemed small on a local scale (n the LSA) but many such small impacts in the region may add up to significant cumulative effects in the RSA. This is the very foundation of cumulative effects assessments".*

The Developer fully understands these principles. However, as indicated in the EIS, based on the effects identified for each of the VECs that could be affected by the Highway and the associated mitigation measures and class of effects, the cumulative effects assessment resulted in a determination of no significant effects for all but one component. The magnitude of effects for all components was deemed to be low with the exception of vegetation removal for the right of way, which was deemed to be low to moderate. For vegetation and wildlife effects at the local scale and land use at a regional scale, the residual effects were unlikely to result in significant cumulative effect over the long term.

In leading to this basic conclusion, the assessment of the effects of past, existing and known future projects also clearly indicated that there were no significant residual effects associated with any of these projects that could possibly act in an additive or synergistic manner with the proposed Highway Project.

Turning to the request posed, the Developer acknowledges that the choice of words used in this sentence of the EIS was not entirely accurate. Readily measurable or quantifiable parameters were in fact used in the assessment where such data were available. In particular, for vegetation cover and land use, we were able to quantify the Highway footprint and provide a detailed breakdown of the types of vegetation cover that would be removed or buried by the presence of the Highway.

For example, as indicated in Section 4.2.6.1 of the EIS, the proposed Highway footprint was quantifiably predicted to disturb approximately 383 ha of vegetation cover, which represents about 2.8% and 0.1% of the LSA and RSA, respectively. The more detailed breakdown of the types of vegetation classes to be directly impacted by the presence of the Highway was presented in Table 4.2.6-1 of the EIS. .

These data were subsequently used to quantify possible effects on wildlife habitat in the LSA and RSA for Bluenose-West and Cape Bathurst caribou core winter range and Boreal caribou habitat (Section 4.2.7.2), grizzly bear habitat (Section 4.2.7.3), moose (Section 4.2.7.4), furbearer habitat (4.2.7.5) and bird habitat (Section 4.2.7.6) of the EIS.

The predicted residual effects from the effects assessment section of the EIS (Section 4.2), whether quantifiable or otherwise, were subsequently considered and evaluated in the context of their possible contribution to a potentially cumulative effect in Section 5.0 of the EIS.

Developer Response: 52.2

As indicated in Section 5.4.1 of the EIS, the cumulative effects assessment conducted for the Inuvik to Tuktoyaktuk Highway project generally followed the EIRB's guidance document. The results of the assessment were presented in Table 5.4.1-1, which as indicated in the EIS, was adapted from the EIRB guidance document.

This table summarizes the residual effects that were identified following the effects assessment completed in Sections 4.2 and 4.3. As mentioned previously, the VECs/VSCs identified as having residual effects included vegetation, wildlife and land use. For each of these components, the screening matrix considered the key anticipated effects and mitigation measures used to address those effects at a local and regional scale. Following the application of the referenced mitigation measures, the matrix included determinations, based on the effects assessment and professional judgement of the possible significance of an effect. The significance determination includes a ranking as Class 1, 2 or 3, which are defined as follows in the EIRB guidance document.

Class 1 Effect: *The predicted trend in the measurable parameter under projected levels of development could threaten the sustainability of the VEC in the study area, and should be considered of management concern. Research, monitoring and/or recovery initiatives should be considered under an integrated resource management framework. Any negative change in VEC value of greater than 25% from benchmark is considered to be a Class 1 effect, regardless of VEC trend at the time of the assessment.*

Class 2 Effect: *The predicted trend in a measurable parameter under projected levels of development will likely result in a decline in the VEC to lower-than baseline but stable levels in the study area after Project closure and into the foreseeable future. Regional management actions such as research, monitoring and/or recovery initiatives may be required if additional land use activities are proposed for the study area before Project closure.*

Class 3 Effect: *The predicted trend in the measurable parameter under projected levels of development may result in a decline in the VEC in the study area during the life of the Project, but VEC levels should recover to baseline after Project closure. No immediate management initiatives, other than requirements for responsible industrial operational practices, are required.*

These classes are typically based on thresholds but as stated previously, because the VECs/VSCs did not always include readily measurable or quantifiable parameters, the Classes were used as a general guideline to rank effects using professional judgement, internal peer review and consensus.

Developer Response: 52.3

The best examples of environmental mitigation strategies that have been implemented at a local scale in the NWT and address effects at a regional scale come from the three diamond mines in the Slave Geologic Province near Yellowknife.

For each of these major mining projects (all of which have seasonal or all-weather access road components), independent environmental monitoring boards were established to monitor the management of environmental issues by both the mining companies and the government regulatory and resource management agencies.

The following text, related to cumulative effects considerations, was extracted from the monitoring agency reports for each of these large mining projects.

Environmental Monitoring Advisory Board – Diavik Diamond Mine

EMAB continues to raise the issue of cumulative effects of development activities on wildlife, in relation to Diavik's contribution. As discussed above there is direct evidence of a cumulative effect of Diavik and Ekati on caribou.

NWT and Nunavut barren-ground caribou herds have shown a continuing drop in numbers over the last few years, ranging from 40 – 86%. The most recent information for the Bathurst herd is that there were about 32,000 in 2009, compared to an estimated 472,000 in 1986. Many possible causes have been suggested:

- Over-hunting;
- Wolf kills;
- Effects of climate change;
- Overgrazing and range deterioration;
- Industrial and other projects; and
- The winter road.

These drops in the numbers of Bathurst and other caribou herds are a huge concern for Affected Communities and this issue comes up frequently during EMAB community meetings.

These are part of the larger question of cumulative effects on caribou and other wildlife. EMAB had hoped that the recent initiative to revise the diamond mine WMPs would help to address cumulative effects, but this does not appear to have happened.

ENR initiated a study to model cumulative effects on the Bathurst caribou in 2007-08. The model was intended to predict the effects of development, including Diavik, and natural change on caribou, and was to incorporate Traditional Knowledge/Inuit Qaujimajatuqangit . A demonstration project was started but most of ENR's efforts have gone into caribou management since the herds have been declining. The results are limited because they are largely driven by satellite collar information and there are very few collared caribou (nine in February 2011). It is very difficult to pick out the effect of individual mines. They do see some avoidance of active mines.

EMAB has taken the position that cumulative effects monitoring of wildlife is the responsibility of ENR and INAC, and that they should take the lead in setting standards for monitoring as well as bringing together and analyzing existing data and developing study designs to fill gaps such as monitoring of the winter road.

EMAB continued to state the need for ENR and INAC to address cumulative effects monitoring on effects of development on caribou and other wildlife. We raised this issue during meetings between ENR and the diamond mines regarding improving the WMPs, and are hopeful that this collaboration may be a step in the development of guidelines for wildlife monitoring.

EMAB has been planning a workshop on cumulative effects on the Bathurst caribou to address this issue but our budget limitations make it likely that EMAB will have to find additional sources of funds to carry this out.

Monitoring – EMAB will continue to work with regulators to ensure timely, rigorous review for environmental management plans, environmental monitoring programs and reports, while making sure that documents submitted by Diavik are of the highest possible quality. We continue doing

technical reviews of monitoring programs and reports and management plans as needed. We continue to be concerned at the lack of progress on cumulative effects monitoring on wildlife, particularly the Bathurst caribou, and will work to find ways to make progress.

Snap Lake Environmental Monitoring Agency – Snap Lake Diamond Mine

- The term "cumulative effect" or "CEA" was not discussed in the 2011 SLEMA Annual Report.

Independent Environmental Monitoring Agency – EKATI Diamond Mine

We are still waiting for a report from the Government of the Northwest Territories, Department of Environment and Natural Resources (GNWT-ENR). It completed a pilot project to look at cumulative effects in the summer range of the Bathurst caribou herd. How do past, present and future land use activities impact caribou, especially when combined with natural factors? This is very important information as it could tell us more about how the mines impact caribou. It may also help give us more ideas about how to change wildlife monitoring programs. The report was supposed to be finished in spring 2009 but it is still not done.

The Wek'èezhìı Renewable Resources Board (WRRB) asked for a proposal on caribou management for the Bathurst herd. The Tłı̨cho̱ and NWT governments sent it to the WRRB in May 2010. A public hearing was held in August, and the WRRB released its decision in October. The decision says that Bathurst caribou numbers have dropped to very low levels. If major actions are not taken the herd might not recover. These actions include:

- No hunting by outfitters or non-Aboriginal people.
- Aboriginal hunters will not take more than 300 caribou (20% must be cows) until at least 2012-13.
- Double the wolf harvest.
- Use many different ways of monitoring to keep track of what is happening to the herd.
- A technical group with GNWT and Tłı̨cho̱ people will check the monitoring results.
- A caribou committee in each Tłı̨cho̱ community will do Traditional Knowledge research to provide more information.

The WRRB recommended that Indian and Northern Affairs Canada (INAC) and GNWT-ENR work together to find ways to protect caribou, especially during and after calving. This would include looking at how fires impact the areas caribou use. Governments should also look at the impacts of exploration, mining and other human activities on the caribou range. The WRRB gave its recommendations to INAC in October 2010 and wrote a letter in January 2011. This work is very important but INAC has still not replied.

There has been some progress on the Cumulative Impact Monitoring Program (CIMP) under the Mackenzie Valley Resource Management Act. New INAC funding paid for three new staff and some community-based monitoring projects. A website will also be created later in 2011. It will be a main place to look for environmental information in the NWT. This new funding should help to better monitor and manage cumulative effects on the Bathurst caribou herd range, including the impacts of the EKATI Mine.

Developer Response: 52.4

The effectiveness of the mitigation strategies at each mine site is assessed annually by the respective monitoring agency.

At EKATI, the Independent Environmental Monitoring Agency (IEMA) used the following methods to measure the effectiveness of mitigation measures:

- According to the Environmental Agreement (signed by IEMA, BHPB, GNWT and Government of Canada), BHPB must write an Environmental Impact Report (EIR) that discusses longer term effects of the Ekati Mine. It compares the real environmental results to what was predicted in 1995.
- Prepared a discussion paper for BHPB to help BHPB prepare upcoming EIRs, and will conduct a workshop to discuss this further.
- In the EIR, BHPB assesses the potential effects; IEMA determines whether the EIR is acceptable
- The IEMA reviews BHPB's surveys and plans and identifies any specific concerns.
- Conducted several board meetings
- Conducted a site visit to the mine
- Held a community open house and visited the schools - they met with the Kitikmeot Inuit Association staff and a Government of Nunavut regional biologist. During the open house, people discussed their concerns about environmental changes.
- Met with BHP Billiton (BHPB) to discuss the agency's review of a 2008 monitoring program.
- Conducted a workshop regarding an environmental parameter and the monitoring program.
- Met with BHPB staff and GNWT to discuss sampling techniques.
- Appeared at the Wek'eezhii Land and Water Board public hearing on BHPB's Interim Closure and Reclamation Plan.
- Participated in the Diamond Mine Wildlife Monitoring Program Review, which included a technical workshop and a community and traditional knowledge workshop.
- Attended meetings and a site visit with the Inter-Agency Coordinating Team, which is made up of the IEMA and government regulators.
- Attended meetings with IEMA, BHPB, GNWT and Government of Canada (Environmental Agreement signatories) to determine activity updates.

At Snap Lake, the Snap Lake Environmental Monitoring Agency (SLEMA) used the following methods to measure the effectiveness of mitigation measures:

- According to the Environmental Agreement, De Beers must write an Environmental Agreement Annual Report (EAAR).
- In the EAAR, De Beers provides the monitoring results and SLEMA identifies any concerns and whether the EAAR is acceptable

- Review and monitor the environmental performance of the Project using western science and traditional knowledge.
- Work with De Beers to mitigate environmental impacts of the Project thereby mitigating the potential for socio-economic effects.
- Make recommendations to anybody having regulatory or management responsibility for a matter, for the achievement of the purposes and guiding principles in this Agreement.
- Facilitate programs to provide information to and consult with the members of the Aboriginal Parties.
- Report to the Parties and the public on the Monitoring Agency's activities and the achievement of its mandate.
- Review DeBeers' applications, plans, and reports.
- Review agencies' water licences, authorizations, and inspection reports.
- Review comments from stakeholders.
- Provide a monthly environmental update that includes comments and recommendations made by SLEMA, which is distributed to stakeholders, Aboriginal communities, agencies, De Beers and stakeholders.
- Held workshops with elders from four communities

At Diavik, the Environmental Monitoring Advisory Board (EMAB) used the following methods to measure the effectiveness of mitigation measures:

- According to the Environmental Agreement, Diavik must write an Environmental Agreement Annual Report (EAAR).
- EMAB's primary role is to ensure that Diavik and the regulators do what is necessary to protect the environment.
- EMAB reviews Diavik's monitoring programs and plans and identifies any specific concerns. EMAB shares its reviews with other agencies and communities.
- EMAB monitors both Diavik and regulators regarding the commitments made in the Environmental Agreement.
- Review regulators' responses to Diavik reports.
- Meet with regulators.
- Track Diavik activities.

References:

Environmental Monitoring Advisory Board. 2011. Annual Report 2010-2011.

Independent Environmental Monitoring Agency. 2011. Plain Language Annual Report 2010-2011: A Public Watchdog for Environmental Management at EKATI Diamond Mine.

Snap Lake Environmental Monitoring Agency. 2011. 2010-2011 Annual Report.

IR Number: 53

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects management – Regional Participation (EIS Section 5.4.1 page 643 and Table 5.4.1-1, page 644)

Preamble

With respect to regional cumulative effects management, the Developer indicates that they will *"Participate in ISR cumulative effects initiatives"* but does not elaborate how their participation in regional initiatives will assist in the management of cumulative effects.

Request

1. Please explain how the Developer's participation in regional initiatives will assist in the management of cumulative effects for the development.
2. Please provide examples of tangible results for other developments from such regional initiatives in the ISR and/or the Northwest Territories.

Developer Response: 53.1

The GNWT Department of Transportation acknowledges that its departmental role in regional cumulative management is limited to its departmental mandate. The Developer is directly responsible for constructing public highways and maintaining these highways after completion. The department does engage with other agencies in research activities [for example, the effect of highways on permafrost] or vice versa that relate to management of these public assets. For this project, the role of the Developer will be to engage with other GNWT departments with mandates for effects management as requested. At this time, the Developer is committed to providing information collected in the planning and operations phases of this project to those departments or agencies or other developers that will aid them in their management activities.

Developer Response: 53.2

In the Inuvialuit Settlement Region, several planning initiatives with regional management aspirations have been underway for several years. This includes the Beaufort Sea Strategic Regional Plan of Action and the Beaufort Regional Environmental Assessment. While the Developer is not a direct participant in these strategic planning initiatives, the planned infrastructure will add to the management options available to reduce or eliminate impacts of future developments in the region. As an example, one initiative of the Beaufort Regional Environmental Assessment pertains to the regional management of upstream oil and gas wastes in the ISR and Sahtu regions. Infrastructure for transportation is an important component of waste management planning.

The Developer is aware of the Cumulative Effects Monitoring Program required under Part 6 of the Mackenzie Valley Resource Management Act. Recent workshops hosted by Aboriginal Affairs and Northern Development Canada, the federal department designated as responsible for funding and coordinating this program, indicate the overall program is under review. AANDC has not determined what, if any, role the program will have in the ISR.

IR Number: 54

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Cumulative effects assessment - land use (EIS Section 5.4.1 page 643 and Table 5.4.1-1, page 644)

Preamble

Although 'land use' has been identified by the Developer as a VC that will exhibit residual effects as a result of the Development, there is no apparent estimate of changes in land use or rates of change over time in the LSA or RSA. Table 5.4.1-1 briefly describes potential impacts to land use and associated mitigation during Development construction, not post-construction.

Request

1. Please provide an estimate of land use change (i.e., the amount of disturbance with respective to zones of influence) as a result of the construction and operation of the development (i.e., utilizing aerial photographs, satellite imagery, or government data sources for resource extraction). Please indicate whether this change is in the development RSA and/or LSA.
2. Please explain and justify the approach taken and describe and explain the results with respect to historical, current and future rates of change in land use.
3. Please explain and justify post-construction land use mitigation measures and examples of where such mitigation has been determined to be successful.

Developer Response: 54.1

The amount of disturbance is limited to the project footprint, defined in Section 4.1.3.1 as the area directly under the Highway alignment and the area used during borrow source activities. The Project footprint, shown on Figure 4.1.3-1, covers approximately 379 ha (using Alternative 3 (2010 Minor Realignment)), and an estimated 30 ha for the borrow sources.

The LSA includes a 0.5 km buffer on either side of the proposed Highway alignment, including the available borrow sites and the proposed all-season Highway. The total width of the buffer is 1 km. The LSA, shown in Figure 4.1.3-1, covers approximately 13,500 ha.

As described in the EIS, most effects are expected to occur within the Project footprint (e.g., in the form of land disturbance) or adjacent to the Highway (e.g., noise and dust), which is generally within the LSA.

Land use in the Inuvialuit Settlement Region is managed by the Inuvialuit Land Administration (ILA). The land use changes beyond the Highway footprint, borrow sources, and right-of-way are beyond the direct responsibility of the Developers.

As stated in the 2009 and 2010 consultations:

Inuvik Community Corporation comment: *The ICC is accountable to the people on the land and is responsible for helping them maintain their lifestyle.*

Inuvik Resident comment: *The co-management boards will need to decide how to protect wildlife and fish. The users will need to be responsible stewards.*

Inuvik Resident comment: *Husky Lake Access will be opened up. People will want to build cabins and boat launches there. What's to stop that from happening?*

ILA response: *The ILA will uphold the HLMP and control access to the extent that it's possible. Any sort of development will have to be approved by the ILA.*

ILA comment: *ILA has the mandate to regulate any subsequent developments, e.g., access.*

EISC comment: *Roads have the potential to generate other activities (more cabins, greater access, increased harvesting).*

ILA response: *indicating that part of the ILA's mandate is to regulate these subsequent activities.*

ILA comment: *Management plans will be required and their development should include FJMC, the Wildlife Management Advisory Committee (WMAC, NWT), and others.*

The development and/or use of land adjacent to highways in Canada is based on the permits and approvals of agencies typically unrelated to provincial and territorial departments of highways. One cannot give examples from other locations as to changes in land use in that area and compare it with the potential land use changes in the ISR.

As stated in the EIS, the Highway will provide increased access to the area between Inuvik and Tuktoyaktuk; however, the Developer suggests that it may be useful for the EIRB to direct an information request to the ILA regarding potential land use changes in the region.

Developer Response: 54.2

Please see Developer Response 54.1.

Developer Response: 54.3

As stated in Developer Response 54.1, the management of land use in the ISR is the responsibility of the ILA. However, as stated in the EIS' List of Commitments:

> *The Developer will implement mitigation measures to minimize potential land use effects such as:*
>
> - Ensuring that construction vehicles stay on access roads or the construction site at all times; and
> - Prohibiting the recreational use of the Highway by Project staff during construction, including the use of ATVs and snowmachines.
>
> *During the operations phase, the Developer will work with appropriate parties to install signage and/or develop educational materials to encourage users to stay on the Highway and not adjacent areas.*

Other mitigation measures stated in the EIS include consultation with and involvement of stakeholders and co-management boards, such as the FJMC, WMAC, and the HTCs, in identifying issues of concern and jointly developing strategies and guidelines, in conjunction with regulatory bodies, to manage resources.

An example of communication tools and signage used along the Dempster Highway was previously submitted in the Developer Response to Environment Canada, submitted to the EIRB in November 2011.

7.0 Mitigation and Remediation

IR Number: 55

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Human Environment Assessment of Effects and Mitigation (EIS, Sec. 4,3, p.568-609**;** EIS, Sec. 6, Table 6-1, p.648-650**;** Addendum to the EIS, p.58-62**;** Developer Response to 2b and 2c, p. 80-131)

Preamble

Mitigation measures which the Developer has committed to implement and will require its Contractor(s) to implement are contained in the EIS (Sec. 4.3; Table 6-1), the Addendum to the EIS (in particular, p.58-62), and in the Developer Response to 2b and 2c, (p.80-131). The following is noted:

1. Some of the mitigation measures are repeated between the separate documents, but there is no compilation of all of the mitigation measures to which the Developer has committed and will require its Contractors to commit to.

2. In the Developer Response to 2b and 2c, mitigation measures contained in the text are often not repeated in the summary tables of mitigation.

3. Parties other than the DOT are identified as responsible for the mitigation of some effects, but specific mitigation measures are not suggested or recommended to these parties.

   For example, the Addendum to the EIS (p.40-41) provides further description of the Developer's assessment approach and efforts, and refers the reader to Sec. 4.3 of the EIS, which "…*discusses the VSCs and other socio-economic components as per the Terms of Reference, and identifies potential issues and project design and mitigation measures*. *For many of the predicted effects, the mitigation measures identified are within the mandate of the other government agencies and service providers to manage, rather than GNWT DOT. The Developer has met with, and continues to meet with, relevant agencies to discuss potential effects and mitigation measures. It is anticipated that these agencies and departments will provide additional information to the EIRB in the Technical Phase*" (p.41). The Addendum to the EIS (p.58) further states that "…*several government agencies are mandated to monitor socio-economic and cultural effects in the NWT and to implement mitigation measures as necessary. The implementation of focused socio-economic measures will be the responsibility of the Developer and on-site contractors*…", and provides a list of mitigation measures that the Developer and its Contractors will be required to implement (p.58-62).

A complete listing of all socio-economic commitments to which the Developer has committed will provide a basis for understanding how the Developer intends to mitigate effects, as well as provide a reference for later discussions of management and monitoring of effects. Examples of this include (1) the "Mackenzie Gas Project Response to Joint Review Panel Information Request Round 5, Question 33" in which the proponent provided a complete and up-to-date commitments table that contained the commitments made in all previous submissions, and (2) the "Commitment Register" for the Fortune Minerals Limited Saskatchewan Metals Processing Plant (EIS, June 2-11, Sec. 15.0, p.138).

Request

1. Please provide a complete list of all general and specific mitigation measures and commitments that will be implemented by the Developer and its Contractors. For each mitigation measure and commitment, please provide the following:
    a. References to where the commitment appears in the EIS, the Addendum, and the Developer Response to 2b and 2c;
    b. The effect(s) that the mitigation measures and commitments are intended to address; and
    c. The VSCs and other socio-economic components to which they pertain.
2. As part of (1), please list all other predicted socio-economic effects for which the Developer has not proposed any mitigation measures. Indicate in each case which other parties have the mandate to monitor and manage these effects.

Developer Response: 55.1

As requested, the Developer is pleased to provide a revised version of Table F (Summary of Developer Commitments) of the EIS, with references to where each commitment appears in the EIS, the Addendum, and the Developer Response to 2b and 2c. Within each specific Biophysical and Human Environment topic (including VECs and VSCs) of the EIS and the Developer Response to the 2b and 2c submitted to the EIRB, the Developer has previously described the potential effects, the mitigation measures, and the commitments, where applicable. For a summary of the potential effects and proposed mitigation measures for each Valued Component, refer to Table 6-1 of the EIS.

As this is a living document, the Developer would appreciate if the EIRB or regulatory agencies are able to provide better wording for the commitments that express the same type of commitment.

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

Commitments	Project phase	EIS	Addendum to EIS	Developer Response to 2b/c
SOCIO-ECONOMIC				
The Developer is committed to observing the relevant economic measures of the Inuvialuit Final Agreement (IFA).	Design, Construction, Operations	1.6.3		8.1-8.2; 9.1; 9.2
The Developer is committed to preferential employment opportunities for qualified local residents and contractors.	Construction, Operations	4.3.2.1; 4.3.2.2	p. 59	8.1-8.2; 9.1; 9.2; 10.2; 14.1-14.2
The IFA guidelines for business operation will apply to this Project, giving priority hiring to companies included on the Inuvialuit Business List.	Construction, Operations	4.3.2.2	p. 59	8.1-8.2; 9.1; 9.2; 10.2; 14.1-14.2
The Developer and on-site Project contractors will be responsible for the implementation of focused socio-economic measures, including recruitment and skills training.	Construction	4.3.2.1		8.1-8.2; 9.1; 9.2; 10.1; 10.2; 11.5

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
The Developer will install educational signage related to harvesting, fishing, hunting, and responsible use of the Highway at appropriate and highly visible locations.	Operations	4.2.5.1; 4.2.7.2; 4.2.7.4; 4.3.7; 4.3.8.1; 5.4.1 (Table 5.4.1-1); 6.0 (Table 6-1)		11.5; 15.1-15.2
The Developer will require that its Project contractor(s) ensure that all heavy equipment operators are suitably trained in proper machinery maintenance and operation; that equipment is regularly inspected and serviced; and that contractor staff obey posted Highway rules (e.g., speed limits, hunting/fishing restrictions).	Construction	4.0		2.1-2.2; 3.1-3.3; 10.1; 11.2; 11.3; 13.1-13.2
The Developer will require that its contractor(s) educate their staff on the prevention of accidents and malfunctions. The training received will be outlined for the Developer, including emergency spill response.	Construction	4.0		10.1; 11.5
The Developer commits to ensuring that its contractor(s) have Health, Safety and Environment (HSE) manuals; work procedures documents; and site-specific health and safety plans.	Design, Construction	4.0; 4.4	p. 58; p. 61	3.1-3.3; 10.2; 11.3; 13.1-13.2
PLANNING AND DESIGN				
The Developer is responsible for the design and construction of the Highway, including field studies and data collection during Highway design and construction, and future operations funding, similar to other NWT highways.	Design, Construction, Operations	2.6.11; 2.7.5		
The Developer will conform to the IFA and the Tuktoyaktuk and Inuvik Inuvialuit Community Conservation Plans (CCPs) and will integrate the goals of these documents into the Project's environmental management.	Design, Construction	1.6.3		16.1-16.2; 17.1-17.2
The Developer will undertake further engineering, environmental and archaeological studies in areas scheduled for construction during that same year.	Design	ES, 7.0		
The Developer is committed to addressing the performance criteria and management goals identified in the ILA's draft Husky Lakes Special Cultural Area Criteria, pending approval.	Design	4.3.8.1; 5.3.2.4; 6.0 (Table 6-1)		16.1-16.2
On approval of the Highway, the Developer commits to further consider Alternative 3 (2010 Minor Realignment) as the final alignment for the Highway.	Design	2.1.2; 2.2		

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
The Developer commits to using, as a guideline, the design parameters and construction techniques in the Transportation Association of Canada (TAC 2010) *Development and Management of Transportation Infrastructure in Permafrost Regions*. This will include mitigation strategies such as: -Accessing and hauling from borrow sources during the winter months; -Constructing embankments during the winter months; -Conducting summer construction activities (such as grading and compacting the embankment, and placing of surfacing materials) only when the Highway can be accessed over the embankment; -Stockpiling surfacing material along the embankment during the winter for use in the summer; -Minimizing the surface area of open cut; -Grading slopes to minimize slumping; -Grading material storage and working areas to promote drainage ; -Reclaiming borrow sources when construction is complete by grading slopes to blend with the natural topography and drainage of the surrounding area; -Designing and constructing thick or high embankments to create an insulative layer that promotes the development of a frozen embankment core; -Designing the alignment to avoid unfavourable terrain, such as areas with thick organic deposits and ice-rich polygonal or patterned ground; -Installing culverts to manage seasonal overland flows; -Installing sufficient cross drainage during construction to prevent or minimize potential water ponding; and -Inspecting and maintaining culverts, as needed, in the spring and fall.	Design, Construction	2.6; 4.2.1.3; 5.4.1 (Table 5.4.1-1); 6.0 (Table 6-1)	p. 26	1.1-1.2; 11.7
CONSTRUCTION				
The Developer and its contractors will adhere to all applicable legislation, regulations, guidelines, and terms and conditions.	Construction	4.0		1.1-1.2; 3.1-3.3; 16.1-16.2; 17.1-17.2
The Developer and on-site Project contractors will implement the mitigation measures identified in this EIS.	Construction	4.0	p. 58	1.1-1.2; 3.1-3.3

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
The Developer is committed to constructing the proposed Inuvik to Tuktoyaktuk Highway, borrow sources, and associated winter access roads in a safe and environmentally responsible manner.	Design, Construction	4.0	p. 32	1.1-1.2; 11.7
The Developers and their contractors will meet the standards required for a safe work environment.	Design	2.7.4		3.1-3.3
The Developer commits to working towards achieving the Environmental Impact Review Board's goal statements for all phases of the proposed development.	Design, Construction, Operations	4.0		1.1-1.2; 16.1-16.2
Blasting, if required, will occur only during winter borrow source development.	Construction	2.6.8.6		3.1-3.3; 11.7
The Developer is committed to building the roadway with 3:1 side slopes.	Construction	1.2; 2.6; 2.6.5 (Table 2.6.5-1)		
The Developer will use winter roads to access borrow sources; permanent all-weather access roads will not be required.	Construction	2.6.8.7		1.1-1.2; 11.7; 16.1-16.2
The Developer is committed to performing the majority of the construction activities during the winter months.	Construction	2.6.2	p. 26	1.1-1.2
BORROW SOURCES				
The Developer is committed to limiting the footprint of each borrow source and minimizing the number of borrow sources developed.	Construction.	5.4.1 (Table 5.4.1-1)		1.1-1.2; 4.1-4.2; 5.1-5.3; 11.7
Borrow pits will be closed as soon as they are no longer required and reclaimed in a progressive manner, as described in the Pit Development Plan.	Construction, Operations, Reclamation	2.6.8.6; 4.3.4.7; 6.0 (Table 6-1)		1.1-1.2; 4.1-4.2; 5.1-5.3; 11.7
Pit Development Plans will conform to the approving authority's regulations and permitting requirements.	Design, Construction, Operations	2.6.8.6		1.1-1.2; 4.1-4.2; 5.1-5.3; 11.7
Pit Development Plans will include mitigation measures to address potential environmental concerns, and operational and reclamation plans. Mitigation measures include: -Developing borrow sources only during winter periods; -Maintaining an appropriate amount of undisturbed land between borrow source locations and any waterbody; and -Applying appropriate erosion and sediment control BMPs for the construction of ditches and cross drainage channels.	Construction	4.2.5.1		1.1-1.2; 4.1-4.2; 5.1-5.3; 11.7
The Developer commits to ensuring that borrow source development is monitored by environmental monitors.	Construction	4.2.5.1		1.1-1.2; 4.1-4.2; 5.1-5.3; 11.7

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
OPERATIONS				
The Developer, using local contractors, will be responsible for ongoing operation, maintenance, and safety of the Highway.	Operations	2.6.11		11.2; 11.3; 13.1-13.2
The Developer will construct and operate the Highway to GNWT DOT standards and guidelines for public highways.	Construction, Operations	ES		1.1-1.2
Should the Mackenzie Gas Project proceed, the Developer will work with the Mackenzie Gas Developers to ensure that increasing traffic on the Highway is effectively managed.	Operations	2.8		
MANAGEMENT PLANS				
An Environmental Management Plan (EMP) will be prepared prior to construction, and will be submitted for regulatory approval prior to use. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.	Construction	4.2.4.2; 7.0		1.1-1.2; 5.1-5.3; 6.1-6.2; 11.2; 11.3; 13.1-13.2
The EMP will contain the following types of plans: -Environmental management; -Spill contingency; -Erosion and sediment control; -Pit development for borrow sources; -Fish and fish habitat protection; -Wildlife management; -Health and safety; -Waste management; -Hazardous waste management; and -Archaeological site(s) protection. Where necessary, the Developer and its contractor(s) will seek approval for the plans prior to use.	Design, Construction	2.7.7	p.23	1.1-1.2; 5.1-5.3; 6.1-6.2; 11.2; 11.3; 11.5; 11.7; 13.1-13.2
SPILL CONTINGENCY PLAN				
The Developer will require that Project contractors prepare spill contingency plans, outlining spill reporting, containment, and clean-up, in accordance with INAC's *Guidelines for Spill Contingency Planning* (1987).	Design, Construction	4.4		4.1-4.2; 5.1-5.3
The Developer will ensure that the Project contractor has appropriate spill response equipment on-site.	Construction	4.0		4.1-4.2; 5.1-5.3
The Developer's contractors will report all spills greater than 5 litres to the GNWT Spill Line and other appropriate agencies.	Construction	4.2.7.2 (Table 4.2.7-1)		4.1-4.2; 5.1-5.3

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
In the event of a spill, the Developer's contractors will respond according to the site-specific spill contingency plan and the contractor's HSE manual and procedures.	Construction	4.2.6.6 (Table 4.2.6-2)		4.1-4.2; 5.1-5.3
The Developer will develop and implement an erosion and sedimentation control plan as part of the EMP. The plan will comply with appropriate erosion and sediment control guidelines, GNWT best management practices (currently being prepared in coordination with DFO), and measures outlined in the DFO (1993) *Land Development Guidelines for the Protection of Aquatic Habitat*. Some measures that will be followed include: -Limiting the use of construction equipment to the immediate footprint of the Highway or borrow source; -Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations and borrow sources; -Keeping ice bridge and ice road surfaces free from soils and fine gravel that may be tracked out by vehicles; -Avoiding the use of heavy equipment in streams or on stream banks during summer months, and the adherence to the DFO *Operational Statement for Temporary Stream Crossings* (DFO 2008), where this is deemed necessary; -Installing silt fencing and/or checking dams, and cross drainage culverts as necessary to minimize siltation in runoff near waterbodies; and -Appropriately sizing and installing culverts, based on hydrological assessments and local experience, to avoid backwatering and washouts.	Design, Construction	4.2.4.2		4.1-4.2; 5.1-5.3
The Developer commits to ensuring that any exposed areas will be suitably stabilized prior to the spring thaw period.	Construction	4.2.5.1		4.1-4.2; 5.1-5.3
The Developer is committed to using heavy equipment during Highway embankment construction through the winter months when all watercourse crossing locations are frozen.	Construction	4.2.5.1		5.1-5.3
FISH AND FISH HABITAT				
No instream work will occur in fish bearing streams during critical time periods.	Construction	4.2.5.1		5.1-5.3
Where critical fish habitat cannot be avoided, mitigation will be incorporated into the design.	Construction	4.2.5.1		5.1-5.3

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

Commitments	Project phase	EIS	Addendum to EIS	Developer Response to 2b/c
Individual site-specific circumstances might preclude complete adherence to DFO Operational statements. In such cases, DFO will be consulted in advance to discuss and approve of proposed plans, which will include mitigation measures necessary to prevent or minimize effects.	Construction	4.2.4.1		5.1-5.3
In accordance with DFO (2009a), the installation of culverts in fish bearing streams will not permitted between April 1 and July 15 for watercourses that provide habitat for spring/summer spawners.	Construction	4.2.5.1		5.1-5.3
The Developer will consider, at a minimum, stream category when determining the type of structure to be placed at stream crossings.	Construction	3.1.7.10		
The Developer will develop and implement a fish and fish habitat protection plan in consultation with DFO that will include mitigation measures such as: -Designing appropriate crossing structures based on site conditions; -Completing primary construction activities during winter months; -Applying erosion and sediment control measures and best practices -Minimizing riparian disturbance (footprint); -Following the DFO *Operational Statement for Clear-span Bridges* (DFO 2009b) where appropriate; -Placing abutments at a sufficient distance from active stream channels; -Employing best management practices for culvert installation; Annually monitoring for culvert subsidence or lifting; -Constructing in non-fish bearing streams during winter; -Sizing culverts appropriately based on hydrological assessments and local experience; -Maintaining equipment away from waterbodies; -Having on-site spill containment equipment and operators trained to handle spills; Reported spills will be contained by trained maintenance crews; -Maintaining a sufficient buffer of undisturbed land between borrow sources and waterbodies; -Following DFO *Guidelines for the Use of Explosives In or Near Canadian Fisheries Waters* (Wright and Hopky 1998); -Following DFO (2010) *Protocol for Winter Water Withdrawal in the Northwest Territories*;	Design, Construction, Operation	4.2.5.1 (Table 4.2.5-1)	p.6; p.7; p.26	5.1-5.3

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
-Allowing filtration by natural vegetation; -Installing silt fences at each road-stream intersection; -Building regularly spaced cross-drainage culverts; -Following the DFO *Operational Statement for Culvert Maintenance* (DFO 2009b) where applicable; -Applying spill response measures according to an approved spill contingency plan -Creating and enforcing Regulations or guidelines on fish harvest by FJMC with input from DFO, local fisherman and Hunters and Trappers Committees;				
(continued)… -Posting signage at regular, visible intervals on Highway; -Constructing or installing stream crossing structures to avoid the impingement of active stream channels; -Effectively suppressing dust (i.e., through the use of water trucks) during the dry season; and -Following the recommendations of the Water License (once approved)	Design, Construction, Operation	4.2.5.1 (Table 4.2.5-1)	p.6; p.7; p.26	5.1-5.3
WILDLIFE AND WILDLIFE HABITAT				
General				
The Developer will develop and implement species specific Wildlife Management Plans (WMP) that will include specific mitigation measures for Species at Risk, caribou, grizzly bears, moose, furbearers, and birds.	Design, Construction	4.2.7; 5.4.1 (Table 5.4.1-1); 6.0 (Table 6-1)		7.1; 7.2; 7.3; 7.4; 7.5; 7.6
The Developer or its contractor(s) will develop Bear Safety Guidelines and will educate staff accordingly.	Design, Construction	4.2.7.3 (Table 4.2.7-4)		7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 11.2; 11.3; 13.1-13.2
The Developer's contractor(s) will be responsible for educating and training staff on applicable practices contained within the Wildlife Management Plans and the Bear Safety Guidelines, including the proper use of non-lethal wildlife deterrent materials (e.g., bear spray).	Construction	4.2.7.3 (Table 4.2.7-4); 4.2.7.5 (Table 4.2.7-10)		7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 11.2; 11.3; 13.1-13.2
Camps and associated infrastructure will be designed to incorporate features that ensure safety for both personnel and wildlife, including installing adequate lighting, implementing proper waste management, cleaning and maintaining the kitchen and dining area, and implementing appropriate wildlife detection and deterrent strategies.	Design, Construction	2.6.9.6; 4.2.7.3 (Table 4.2.7-4); 4.2.7.5 (Table 4.2.7-10)		7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 11.3; 13.1-13.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

Commitments	Project phase	EIS	Addendum to EIS	Developer Response to 2b/c
Pre-disturbance surveys for critical habitat features (e.g., dens, nests) will be conducted prior to construction, in cooperation with GNWT ENR, as required.	Design, Construction	4.1		7.1; 7.2; 7.3; 7.4; 7.5; 7.6
All wildlife encounters and mortalities will be reported to the environmental monitor, Safety Advisor, and GNWT ENR	Design, Construction, Operations	4.2.7.2 (Table 4.2.7-1)		7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 11.2; 11.3; 13.1-13.2
The Developer will implement general wildlife protection measures along the proposed Highway as follows: -Minimizing loss of habitat and the reduction of habitat effectiveness through Project design; -Educating users of the Highway that wildlife have the right-of-way at all times; -Posting signage along the Highway, emphasizing areas of high wildlife use; -Implementing a policy whereby Project personnel and contractors will not disturb any wildlife or critical habitat features such as dens or nests; -Implementing a system during the construction phase that serves to notify workers of wildlife presence in or near construction areas; -Hiring environmental monitors to during construction to watch for wildlife; -Adhering to spill contingency plans, as required, in a timely manner; -Conducting follow-up monitoring of spill sites to verify effectiveness; -Utilizing clean equipment, particularly when deployed in or near water; -Implementing appropriate dust control measures to minimize effects to habitat and forage quality; -Adhering to waste management plans and procedures to avoid attracting wildlife; -Timing construction activities to avoid critical periods; -Applying and conforming with pre-determined setback distances from key wildlife habitat features; -Implementing a "no hunting" policy for Highway construction and maintenance workers; and -Working with agencies such as the HTCs, WMAC and GNWT ENR to develop guidelines and conditions for Highway usage and follow-up with monitoring of harvesting activities.	Design, Construction, Operations	4.2.7.2 (Table 4.2.7-1); 4.2.7.3 (Table 4.2.7-4); 4.2.7.4 (Table 4.2.7-7); 4.2.7.5 (Table 4.2.7-10)		7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 15.1-15.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
Types of Mitigation for Caribou				
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on caribou are: -Limiting blasting activities, if required, to borrow sites and will only occur when caribou are >500 m from the blast site; -Working with agencies such as the HTCs, WMAC, and GNWT ENR to develop guidelines for periodic Highway closures, if required, as a way of minimizing the disruption of migration patterns to barren-ground caribou; -All sightings of caribou will be reported to environmental staff on-site; -Maintaining a minimum distance of 500 m between field operations and caribou for the duration of construction; -Caribou sightings will be recorded (including a GPS location if possible) and be submitted to the GNWT DOT Planning, Policy and Environmental Division and GNWT ENR upon completion of construction; and -Caribou crossing signs will be placed along the Highway, as needed.	Design, Construction, Operation	4.2.7.2 (Table 4.2.7-1)		7.2
Types of Mitigation Measures for Grizzly Bears and Furbearers				
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on grizzly bears and furbearers include: -Freshly dug dens will be mapped such that construction activities will avoid active dens during the hibernation period; -If possible, no activities will occur within 500 m of an active den during the denning period (October to April); and -No blasting will occur if active bear dens are confirmed within 500 m of a proposed blasting area.	Construction	4.2.7.3 (Table 4.2.7-4); 4.2.7.5 (Table 4.2.7-10)		7.3; 15.1-15.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
-Maintaining a minimum distance of 500 m between identified grizzly bear/wolverine den sites and personnel during construction; -Dens (grizzly bear, wolverine) discovered within 500 m of the Highway after the pre-construction survey will be reported immediately to GNWT ENR to determine the appropriate course of action; -Providing the wildlife monitor and designated, trained staff access to non-lethal deterrent materials (e.g., bear spray). The use of any deterrent method on wildlife will be reported to GNWT ENR;	Construction	4.2.7.3 (Table 4.2.7-4); 4.2.7.5 (Table 4.2.7-10)		7.3; 15.1-15.2
-Minimizing and properly disposing of wildlife attractants such as garbage, food wastes, and other edible and aromatic substances; -Storing all food, grease, oils, fuels, and garbage in bear/wolverine-proof containers and/or areas; -No waste will be incinerated on- or off-site; and -Transporting waste to Tuktoyaktuk and/or Inuvik municipal solid waste facilities for disposal. Disposal of wastes at these facilities will follow the specified terms and conditions for use.	Construction	4.2.7.3 (Table 4.2.7-4); 4.2.7.5 (Table 4.2.7-10)		7.3; 15.1-15.2
Types of Mitigation Measures for Birds				
Types of mitigation measures that the Developer will integrate into the Project design, construction, and anticipated future operational practices to reduce or minimize potential impacts of the proposed Highway on birds include: -Conducting pre-disturbance bird nest surveys in June-July to document use by nesting birds; -Avoiding conducting Project activities within 500 m of an active raptor nest during nesting season; -Designing structures in a way that limits or prevents their potential use as nesting structures; and -Allowing nesting birds who have utilized structures to remain in place.	Design, Construction	4.2.7.6 (Table 4.2.7-13)		7.6

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
Types of Mitigation Measures for Peregrine Falcons				
The Developer will incorporate the following mitigation measures for Peregrine Falcons including: -Lights will be positioned to shine down or will be fixed with shielding to direct light downward on buildings and other infrastructure sites, wherever possible; -Lighting will be switched off, whenever possible (i.e., when camps and facilities are not in use); -Conducting an aerial survey of the final alignment and borrow sources to identify areas where Peregrine Falcons could be nesting that may require mitigation; and -Appropriate federal (CWS) and territorial (GNWT ENR) authorities will be contacted immediately before continuing work if a Peregrine Falcon nest is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).	Design, Construction	4.2.7.6 (Table 4.2.7-14)		7.6
Types of Mitigation Measures for Bird Species At Risk				
The Developer will incorporate additional mitigation measures for bird Species at Risk including: -Immediately contacting appropriate federal (CWS) and territorial (GNWT ENR) authorities if a nest of a key bird species is identified within predetermined set-back distances (as determined through consultation with CWS/ENR).	Construction	4.2.7.6 (Table 4.2.7-14)		7.1; 7.6
WASTE MANAGEMENT				
The Developer will develop a waste management plan for all wastes associated with pre-construction and construction activities. The waste management plan will apply to the Developer and all associated Project contractors involved in the generation, treatment, transferring, receiving, and disposal of waste materials for the Project.	Design, Construction	4.4.3.1		11.5

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
The Developer commits to the following steps prior to disposal of waste: -Obtaining approval from the Town of Inuvik and Hamlet of Tuktoyaktuk to use their sewage lagoon and solid waste disposal facilities; -Providing an estimate of the amount and type of domestic waste generated by the Project compared to the facility's available capacity; -Following all applicable Licence, Permits, and/or municipal bylaws regarding the use of the facility in Inuvik and Tuktoyaktuk; and -Recording the amount of domestic waste shipped to the landfills.	Construction	4.4.3.7		11.5
The Developer will develop and implement a hazardous waste management plan (HWMP). The HWMP will encompass all pre-construction and construction phases of the Project and will apply to the Developer and all Project contractors involved in receiving, transferring, and transporting hazardous waste for the Developer's activities on land, water, and air.	Construction	4.4.3.6		11.5
FUEL MANAGEMENT				
The Developer commits to storing fuel used for borrow source and Highway construction activities in double-walled fuel storage tanks, and in accordance with CCME guidelines.	Construction	2.6.10.3		4.1-4.2
All vehicles and equipment will be refueled at least 100 m from water bodies following INAC (DIAND) fuel storage guidelines.	Construction	2.6.10.5		4.1-4.2
WATER QUALITY AND QUANTITY				
The Developer will ensure that the DFO water withdrawal protocol criteria are followed.	Construction	4.2.4.1		4.1-4.2; 11.5
The Developer is committed to carrying out bathymetric surveys on all lakes proposed for water extraction.	Construction	4.2.5.1		4.1-4.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

Commitments	Project phase	EIS	Addendum to EIS	Developer Response to 2b/c
The Developer will minimize effects to water quality and quantity as a result of Highway design through the design and use of crossing structures that are appropriate for site-specific flow conditions; by employing erosion and sediment control best management practices and DFO *Operational Statements* (where possible) as per approved Environmental Management Plans; installing appropriately sized culverts to divert and manage Highway and surface drainage flows; and undertaking primary Highway embankment construction activities during the winter months.	Design, Construction	4.2.4.1	p. 26	4.1-4.2
The Developer is committed to completing hydrological assessments prior to bridge design to determine suitable span widths and abutment placement.	Design, Construction	4.2.5.1		4.1-4.2
During the bridge design of the Project, should individual site-specific circumstances preclude complete adherence to the DFO *Operational Statements*, the Developer will consult with DFO in advance to discuss and approve of proposed plans.	Design	4.2.5.1		4.1-4.2
Some of the mitigation measures for water quality and quantity effects the Developer will follow include: -Limiting the use of construction equipment to the immediate footprint of the Highway or borrow source; -Minimizing vegetation removal and conducting progressive reclamation at the clear-span abutments, culvert installations, and borrow sources; -Keeping ice bridge and ice road surfaces free from soils and fine gravel that may be tracked out by vehicles; -Avoiding the use of heavy equipment in streams or on stream banks during summer months, and the adherence to the DFO *Operational Statement for Temporary Stream Crossings* (DFO 2008), where this is deemed necessary; -Implementing the erosion and sediment control plan to be developed as part of the overall EMP; -Appropriately sizing and installing culverts based on hydrological assessments and local experience, to avoid backwatering and washouts.	Construction	4.2.4.2		4.1-4.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
-Completing Highway embankment construction during winter months; -Adhering to the DFO *Operational Statement for Clear-Span Bridges* for all applicable activities; -Implementing appropriate dust control measures to minimize effects to waterbodies and aquatic habitat; -Following the DFO *Operational Statement for Culvert Maintenance* (DFO 2010) where necessary; -Maintaining equipment away from waterbodies; and -Adhering to spill contingency plans, as required, in a timely manner	Construction	4.2.4.2 (Table 4.2.4-1)	p. 26	4.1-4.2
STREAM CROSSINGS				
The Developer (under appropriate seasonal conditions), will conduct further assessments of the proposed water crossing locations and will provide information about watercourse characteristics and proposed crossing structure designs sufficient to meet the requirements of the Northwest Territories Waters Regulations.	Design, Construction	1.5.1.3	p. 6	4.1-4.2; 5.1-5.3
The Developer is committed to working closely with DFO to design appropriate crossing structures for each stream and to obtain Fisheries Authorizations, if determined to be required.	Design, Construction	ES		4.1-4.2; 5.1-5.3
The Developer will install culverts according to established guidelines and will follow culvert installation guidelines such as those contained within the DFO Land Development Guidelines (1993) and the INAC Northern Land Use Guidelines for Roads and Trails (INAC 2010).	Construction	4.2.4.1		4.1-4.2; 5.1-5.3
The Developer will install appropriately sized culverts to minimize changes in water flow pattern and timing.	Construction	4.2.4.1		4.1-4.2; 5.1-5.3
The Developer will not install culverts in critical aquatic habitats.	Construction	4.2.5.1 (Table 4.2.5-1)		5.1-5.3
The Developer will carry out routine monitoring and inspections at watercourse crossings and culverts, including reporting on culvert performance and maintenance requirements.	Construction, Operations	4.2.5.1		4.1-4.2; 5.1-5.3
The Developer will ensure that maintenance requirements for culverts will adhere to the DFO Culvert Maintenance Operational Statement.	Operations	4.2.5.1 (Table 4.2.5-1)		4.1-4.2; 5.1-5.3
The Developer will ensure that when crossings are completed, disturbed materials will be replaced with similar-sized substrates and the bed and banks of the watercourse are stabilized and restored.	Construction	4.2.4.1		4.1-4.2; 5.1-5.3

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
VEGETATION				
The Developer commits to surveying borrow sources prior to construction for the presence of Yukon stitchwort and other rare plant species. Should rare plants be identified, they will be avoided where possible. If avoidance is not an option specimens will be collected, transferred to another suitable location, and/or donated to local herbaria for educational purposes.	Design, Construction	4.2.6.1		6.1-6.2
The Developer commits to minimize direct effects to vegetation cover by limiting construction activities, to the extent possible, to the planned footprint of the Highway.	Construction	ES		6.1-6.2
Surveys ahead of construction in the vicinity of Holmes Creek and Hans Creek will be carried out to verify the location of the road alignment and stream crossings with respect to the unique Riparian Black Spruce/Shrub vegetation type.	Construction	4.2.6.1		6.1-6.2
Controlling the effects of dust during construction and operation of the Highway will include applying water as needed, as per the *GNWT Guideline for Dust Suppression* (GNWT 1998).	Construction	4.2.6.6		6.1-6.2
The Developer commits to using appropriate northern, native plant species for any deliberate re-vegetation efforts of borrow sources.	Construction, Operations	4.2.6.6		6.1-6.2
The Developer or contractor(s) will apply strategies for mitigating potential effects to the vegetation types in the vicinity of the Highway and associated borrow operations such as: -Restricting off-site activities (e.g., ATV use) to the footprint area; -Ensuring machinery and equipment is clean prior to use on site; -Periodically monitoring roadsides for invasive species establishment; -Designing and engineering roadbed and drainage structures appropriately to accommodate unique environmental conditions; and -Containing and cleaning-up spills immediately in accordance with the spill contingency plans.	Design, Construction	4.2.6.6 (Table 4.2.6-2)		6.1-6.2
AIR QUALITY				
The Developer will conform with applicable ambient air quality objectives by using pollution prevention measures and best management practices.	Construction	4.3.8.2		2.1-2.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
Mitigation measures for air quality during the construction phase will include: -Applying water as per the GNWT's *Guideline for Dust Suppression* (GNWT 1998) during summer months; -To the extent possible, aggregate stockpiling activities will be conducted well downwind of potentially sensitive receptors (based on prevailing winds); -Closing and progressively reclaiming borrow pits as soon as they are no longer required to reduce potential fugitive dust; -Ensuring proper maintenance of heavy equipment to minimize air emissions; and -Restricting speed limits along the access roads and Highway during construction to minimize dust production.	Construction	4.2.2.6		2.1-2.2
The Developer will be responsible for the ongoing maintenance of the Highway during the operations phase and will conform to the GNWT's *Guideline for Dust Suppression* (GNWT 1998).	Operations	4.2.2.6		2.1-2.2
LAND USE				
The Developer will implement mitigation measures to minimize potential land use effects such as: -Ensuring that construction vehicles stay on access roads or the construction site at all times; and -Prohibiting the recreational use of the Highway by Project staff during construction, including the use of ATVs and snow machines.	Construction	4.3.8.2		6.1-6.2; 16.1-16.2
During the operations phase, the Developer will work with appropriate parties to install signage and/or develop educational materials to encourage users to stay on the Highway and not adjacent areas.	Operations	4.3.8.1; 6.0 (Table 6-1)		6.1-6.2; 15.1-15.2; 16.1-16.2
NOISE				
The Developer will consult with wildlife experts to minimize noise effects on wildlife, particularly blasting activities.	Construction	4.2.3.4		3.1-3.3
The Developer will use appropriate design, scheduling, logistics, and maintenance measures to reduce the effects of noise.	Design, Construction	4.2.3.4		3.1-3.3

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS				
Commitments	**Project phase**	**EIS**	**Addendum to EIS**	**Developer Response to 2b/c**
Project contractors will be directed to apply reasonable mitigation measures to reduce possible effects associated with construction noise, including adequate maintenance of construction equipment and provision of appropriate mufflers for all internal combustion engines.	Construction	ES; 4.2.3.4		3.1-3.3
Blasting activities, if required, will be timed to avoid periods when sensitive wildlife species are in the area.	Construction	ES		3.1-3.3
ARCHAEOLOGY				
The Developer will hire a qualified archaeologist to perform an Archaeological Impact Assessment within a 100 m wide corridor along the alignment and all associated components such as borrow source access roads, work staging areas, and construction camps.	Design, Construction	4.3.9.2		17.1-17.2
Mitigation measures for archaeological sites at risk of impact from the development will be designed on an individual basis, and require approval by the Prince of Wales Northern Heritage Centre.	Construction	4.3.9.2		17.1-17.2
The Developer will, on recommendation from the contract archaeologist or Prince of Wales Northern Heritage Centre, implement avoidance or mitigation measures to protect archaeological sites or to salvage the information they contain through excava tion, analysis, and report writing.	Construction	4.3.9.2		17.1-17.2
The Developer will prepare an archaeological site(s) protection plan to facilitate the continued protection and management of archaeological resources during the construction phase of the Project.	Construction	4.3.9.2		17.1-17.2
The Developer and its Project contractors will make every effort to avoid and protect recorded and unrecorded archaeological and heritage resources in accordance with the terms and conditions of the Northwest Territories archaeological regulations during the Project.	Construction	4.3.9.2		17.1-17.2
MONITORING				
The Developer requires that Project contractors employ an adaptive management approach to ensuring sensitive species/ species at risk are adequately protected during all phases of construction.	Construction	4.2.7.6		1.1-1.2; 2.1-2.2; 3.1-3.3; 4.1-4.2; 5.1-5.3; 6.1-6.2; 15.1-15.2

TABLE F: SUMMARY OF DEVELOPER COMMITMENTS

Commitments	Project phase	EIS	Addendum to EIS	Developer Response to 2b/c
The Developer is committed to hiring environmental monitors to ensure the application of prescribed mitigation, identify unforeseen and potential erosion sites that could lead to the discharge of sediment to surface or groundwater, and prevent erosion and subsequent sedimentation.	Construction	4.2.4.1		1.1-1.2; 2.1-2.2; 3.1-3.3; 4.1-4.2; 5.1-5.3; 6.1-6.2; 15.1-15.2
Compliance and effects monitoring activities will be conducted to ensure the terms and conditions set out in regulatory approvals, licences and permits, the EMP, and in the commitments are met, and to check the effectiveness of mitigation measures in avoiding or minimizing potential effects.	Construction, Operations	7.0	p. 47	
The Developer will prepare an effects monitoring table and an inspection table prior to construction. The effects monitoring table will describe the indicators and parameters to be monitored and the target or management goal. The inspections table will describe the types of inspections required, the frequency of the inspections, and which phase of the Project the inspection will occur.	Design, Construction	7.0		
Environmental and wildlife monitoring will be carried out by third party monitors supplied by the ILA (environmental monitors) and the HTC (wildlife monitors), and will be funded by the Developer and/or Developer's contractor(s).	Construction	7.1.1		1.1-1.2; 2.1-2.2; 3.1-3.3; 4.1-4.2; 5.1-5.3; 6.1-6.2; 15.1-15.2
The Developer will conduct post-construction monitoring according to the extent, frequency and duration required by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.	Operations	4.2.5.2		1.1-1.2; 2.1-2.2; 3.1-3.3; 4.1-4.2; 5.1-5.3; 6.1-6.2; 15.1-15.2
The Developer will require that Project contractors work closely with the environmental and wildlife monitors during construction.	Construction	4.4		1.1-1.2; 2.1-2.2; 3.1-3.3; 4.1-4.2; 5.1-5.3; 6.1-6.2; 15.1-15.2
The Developer is committed to participating with other parties in a cumulative effects monitoring program.	Construction, Operations	5.4.1		1.1-1.2; 2.1-2.2; 3.1-3.3; 4.1-4.2; 5.1-5.3; 6.1-6.2; 8.1-8.2; 9.1; 9.2; 10.1; 10.2; 15.1-15.2

Developer Response: 55.2

As stated in Section 4.3 Human Environment Components of the EIS, the Developer expects the project to provide substantial socio-economic benefits. Table 4.3.1 in the EIS also identifies that any adverse effects for the VSC's identified will have a moderate/low magnitude and that Territory and ISR partners have the capacity to manage any effects. The predicted effects and residual effects of an array of socio-economic variables are described on pages 569 to 594.

On Tuesday January 31, 2012, GNWT Departments that could be affected by this project met to discuss the socio-economic effects of this project on the residents of the ISR and how these will be monitored and managed. At this meeting there was a general consensus that adverse socio-economic effects of this project will be negligible and that departments will continue to monitor and conduct social programme activities for the communities affected by the project.

The GNWT social programming departments provided an overview of their socio-economic programme mandates as well as identifying the related authorities responsible for carrying out programme activities. These are included in a letter to the Developer dated November 18, 2011. Department Business Plans typically provide an indication of these programs and capacity to deliver. Business Plans are reviewed and approved by the Legislative Assembly of the Northwest Territories and are typically available on-line.

The Developer also contacted the Inuvialuit Regional Corporation (IRC) for additional information on social programming activities. The IRC is very involved in efforts to improve the social and economic conditions in the region. Over the last two years IRC has made number of inroads in addressing some of the issues surrounding drugs and alcohol access and use. Firstly, IRC conducted their own Mental Health and Addictions Study (attached) where we identified key area's both (directly and indirectly) that exacerbated or contributed to substance use/misuse as well as developed a mental health and addictions model for the region.

Pre and post study the IRC developed a partnership between themselves and the Beaufort Delta Health and Social Services (BDHSSA), and formed the Mental Health and Addictions Steering Committee (To R attached).

During Steering Committee meetings, the two parties collaborated on a number of the recommendations set out in the IRC study and continue to do so as the long term goal is to improve the quality of life of Inuvialuit through an improvement in mental health and addictions services. For example: identifying gaps in services, ensuring they are community based, culturally appropriate and on a higher level identifying /improving/ developing policies that direct those services.

Secondly, IRC continues to work on adding and improving on the Inuvialuit Indicators Website www.inuvialuitindicators.com. This website contains over 20 years of data uploaded annually as a result of a data sharing agreement with the NWT. Through the website we will have the capacity to monitor changes for the Inuvialuit some which will be related to alcohol and substance use and misuse.

The IRC is also very involved in preparing for future developments including the Mackenzie Gas Project and offshore oil and gas exploration in the Beaufort Sea. The IRC representatives chair a socio-economic committee for the Beaufort Regional Environmental Assessment which continues to focus on monitoring changes in socio-economic conditions.

The GNWT departments also identified a number of ongoing program activities of federal agencies in monitoring a variety of social and economic conditions. In particular, the role of Statistics Canada and the periodic national census is vital to monitoring changes.

The GNWT also provided the EIRB of an update on the vision and strategic planning process for the Legislative Assembly. The GNWT expects a draft strategic plan will be issued in March 2012. Once the strategic plan is finalized, the Developer will provide it to the EIRB.

Addictions and Mental Health Steering Committee

Draft Terms of Reference

Beaufort Delta Agenda Mission Statement

HEALTH AND WELLNESS

To promote Healthy Lifestyles by providing an environment where people are able to make productive and healthy lifestyle choices and have the opportunity to become meaningful participants in the economy and society.

Purpose

The Addictions and Mental Health Steering Committee is founded based on a mutual interest and need for government and Inuvialuit to address chronic and on-going issues with addictions and resulting mental health issues within the ISR communities.

Objectives:

- ✓ Increase cooperation between social agencies to coordinate programs and services
- ✓ Enhance the ability of Beaufort Delta residents to own, design, and manage programs and services in the Region
- ✓ Increase capacity to support healthy lifestyles choices and to respond to wellness related demands and needs at a community and regional level
- ✓ Increase resources and capacity to prepare for the social, cultural and economic impacts from resource development
- ✓ Improve the stability and effectiveness of health care treatment and aftercare plans, programs, and facilities in the Beaufort Delta Region.

Steering Committee

The business for the Steering Committee will be conducted in the following manner:

- ✓ The Steering Committee operates by consensus. Any issues not resolved at the Steering Committee level will be referred to political leadership.
- ✓ The Steering Committee will hold meetings at least twice per year, interchanging, to consider past results and future plans.

- ✓ The Steering Committee will report on an annual basis to the GNWT Minister and regional leadership. Reporting will incorporate consideration of organizational and program and service structural change in the Beaufort Delta region and how such change might better support the priorities and goals of the Inuvialuit and GNWT.

- ✓ Steering Committee Membership is open to those entities that have an interest or expertise that can add value to improving addictions and mental health services to clients. Currently membership includes:

    1. Inuvialuit Regional Corporation,
    2. Beaufort Delta Health and Social Service Authority
    3. Department of Health and Social Services

Workplan

PROJECT TITLE: ADDICTIONS AND MENTAL HEALTH PROGRAMMING
Location: all Inuvialuit communities **Goal:** High levels of mental health and well-being are reflective of healthy communities overall. All residents should be able to access supports to enhance and maintain their mental health and well-being. For those experiencing mental health issues, culturally relevant and locally accessible addictions treatment should be available.

Project Description:

An extensive research and consultation process was undertaken by Inuvialuit Regional Corporation (IRC) and Beaufort Delta Health and Social Service Authority (BDHSSA) personnel with regards to how to approach the challenging issue of providing treatment and support for residents with addictions issues and determine gaps or barriers in current Inuvialuit and GNWT program and services.

As a result of the research and consultation process the Steering Committee shall develop and work toward the establishment of an Addictions and Mental Health Program Model that encompasses the following major components: a regional addictions treatment centre incorporating a detox unit, locally based aftercare programs, and a variety of connected support programs designed to prevent relapse.

Other key components of the treatment centre approach include open-ended treatment model, professional staff, elders as traditional counselors and the ability to treat the entire family. The aftercare programs include several innovative aftercare features at a

community level: a 24/7 support line, an identified professional in each community to act as a link, drop-in centre for sober association, alcohol and drug education programs, after hours intervention outreach program, cultural and recreational programs, and a ceremony of honour.

ACTION PLAN: ADDICTIONS AND MENTAL HEALTH STEERING COMMITTEE TREATMENT AND AFTERCARE PROGRAM

GOALS	ACTIONS	TIMETABLE
• Develop treatment and aftercare program • Develop and seek approval of a workplan to establish the treatment and aftercare program	• Identify gaps in program and services by client surveys and research of successful delivery approaches	Spring 2010
	• Identify and agree on program and service model	Summer 2010
	• Develop plans or approaches to address gaps, including pilot projects	Fall 2010
	• Implement workplans and evaluate pilot projects or approaches	Winter 2010 - 2011

IR Number: 56

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Water quality – validating mitigation success (EIS, Section 4.2.4, p. 487)

Preamble

The Developer states that following the application of suitable mitigation, Highway construction and operation is not expected to result in adverse residual effects to water quality or quantity. The Developer does not appear to have provided any methods or plans for testing or validating this claim; presumably, water quality testing will occur during the construction and operations phases of the development, with the results being compared to baseline conditions so as to test the EIS predictions.

Request

1. Please explain and justify how the relative success of the proposed water quality mitigation measures will be evaluated or tested.

Developer Response: 56.1

The response to this question is provided in the Developer Responses 5.1 and 5.2, which are repeated below:

The installation of culverts and the construction of bridges will be guided by an Environmental Management Plan (EMP), which will include construction scheduling restrictions, environmental construction guidelines, methods to prevent spills of deleterious substances, erosion and sediment control plan, and a monitoring plan. The implementation of the measures contained in the EMP is intended to avoid or minimize effects to aquatic resources.

Potential effects on fish and fish habitat, in the absence of appropriate mitigation measures or due to culvert failure, would occur due to obstruction of fish passage at culvert crossings and downstream sedimentation caused by bank or stream bed erosion. Inspection of culverts, particularly in fish bearing streams, will be carried out annually following construction to ensure compliance with fish passage requirements. Since unanticipated post-construction effects downstream would be restricted to those resulting from localized sediment transport and deposition, mitigation measures can be readily applied to remedy these situations at the source, if determined to be necessary.

The following measures are proposed to monitor and test the efficacy of construction and operation environmental protection measures:

- Sampling will be conducted within 50 metres upstream of each crossing site and 50 and 100 metres downstream of each crossing site (i.e. three measurement sites per stream).
- Parameters that will be measured: turbidity (Nephelometric Turbidity Units (NTU); pH; dissolved oxygen; conductivity; temperature.
- Sampling will occur in spring, following ice-out, which is the time of freshet when there is the greatest risk of erosion and sediment transport.

Turbidity measurement comparisons between sites upstream and downstream of road crossings will be used as indicators of erosion and sedimentation, effectively providing a control-impact

monitoring design. Turbidity can be measured on site, allowing rapid identification of deteriorated water quality conditions and the timely application of remediation measures. The threshold turbidity levels that will be followed for the implementation of remediation are based on the BC Ministry of Environment Ambient Water Quality Guidelines (MOE 2001[2]), as follows:

- During clear flow periods: background levels should not be exceeded by more than 8 NTU.
- During turbid flow periods: background levels should not be exceeded by more than 5 NTU at any time when background turbidity is between 8 and 50 NTU. When background exceeds 50 NTU, turbidity should not be increased by more than 10% of the measured background level at any one time.

[2] MOE. 2001. Ambient water quality guidelines (criteria) for turbidity, suspended and benthic sediments. BC Ministry of the Environment. Accessed at http://www.env.gov.bc.ca/wat/wq/BCguidelines/turbidity/turbidity.html.

IR Number: 57

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Potential negative effects from culvert installation (EIS, Section 4.2.4.1, p. 490)

Preamble
The Developer states that routine monitoring and inspections at watercourse crossings will be carried out to confirm the proper performance of each culvert. However, the management process and responsibility is not clear.

Request

1. Please explain and justify the expected management process and responsibility associated with ensuring that culverts are performing as needed in the context of the proposed Development.

Developer Response: 57.1

As indicated in Responses 5 and 56, water quality monitoring will be carried out following a control-impact design, involving upstream-downstream water quality sampling and *in situ* analysis. Such monitoring will identify unanticipated impacts on stream water quality resulting from erosion caused by improperly installed stream crossing structures and/or ineffective erosion control measures. In addition, culverts installed in fish bearing streams will be assessed annually for three years by a Qualified Environmental Professional (QEP) to verify that they continue to provide free access to fish passage, particularly during migration periods. Culverts in fish bearing streams will be installed according to appropriate guidelines, such as the Northern Land Use Guidelines (INAC 2010[3]) and the DFO Land Development Guidelines (DFO 2003[4]), adapted for use in northern latitudes.

In addition to inspections by QEPs, watercourse crossing structures will be regularly inspected by road maintenance contractors or by DOT staff, since road surface integrity and highway safety can be compromised by failing culverts and embankment erosion. Maintenance activities requiring substantial repairs to crossing structures, except in the case of an emergency, will require a notification to DFO and application of the DFO Operational Statement for culvert maintenance.

[3] INAC. 2010. Northern land use guidelines, Access: roads and trails. Indian and Northern Affairs Canada (now, Aboriginal Affairs and Northern Development Canada).
[4] DFO. 1993. Land development guidelines for the protection of aquatic habitats. Accessed at: http://www-heb.pac.dfo-mpo.gc.ca/publications/pdf/165353.pdf.

IR Number: 58

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Borrow site reclamation (EIS, Section 4.2.6.6, p. 516)

Preamble

The Developer states that even with the application of reclamation measures, areas used for borrow material will not be completely restored to their previous state due in part to the alteration of local surface topography resulting from excavation. Re-vegetation efforts, combined with 'slow' natural re-vegetation processes, will lead to the 'slow' re-establishment of vegetation characteristic of naturally granular upland areas. Temporal scenarios associated with borrow site reclamation and examples of where borrow sites have been 'successfully' reclaimed are not apparent in the EIS.

Request

1. Please provide examples of borrow site reclamation and examples of borrow site reclamation success in the Northwest Territories.
2. Please describe and justify the criteria used to determine borrow site reclamation success.

Developer Response: 58.1

The most relevant examples of reclamation of disturbed terrain that have some applicability to the Highway project are those associated with the historic reclamation of exploration drilling camps and sumps in the Mackenzie Delta. A report to AANDC prepared by Kokelj and GeoNorth (2002) provides the most useful information.

This report, which can be accessed from the internet, reported on site investigations undertaken for 23 camp sumps in the Mackenzie Delta. Although the study determined that 15 out of the 23 camp sumps examined in this study (mostly in the outer delta area, which is not representative of the Highway corridor) had totally collapsed, the results recorded for the Parsons Lake area were of particular relevance to this response.

At Parsons Lake, the three camp sumps surveyed in this area were found to be intact. Provided below are two photos, extracted directly from this report, complete with their original photo descriptions. As can be noted in Photo 7a, the bright green, relatively square area shown in this photo represents the reclaimed gravel pad constructed at the Siku C-11 location for the camp, sump and drill site when drilling took place in the 1970s.

Photo 8 shows the footprint of the reclaimed gravel pad for the camp, sump and drill site at the Ogeoqueoq J-06 site. As noted in the caption for Photo 8, the sump cap was largely un-vegetated and the area was well-drained.

Photo 7a.
Subsidence and ponding on sump cap, (Gulf Mobil Siku C-11) Parsons Lake area.
Photograph: Summer 2000

Photo 8.
An intact sump (Gulf Mobil Ogeoqueoq J-06) in the Parsons Lake area. Note that the sump cap is largely un-vegetated and that the site is well-drained. Photograph: Summer 2000.

These photos generally indicate that in well-drained areas, that are typical of the gravel deposits that will be used as borrow source material for the Highway, it is expected that effective reclamation of the borrow sites can be accomplished over an extended period of time.

Other experience related to northern reclamation was accessed from work done for the Ekati Diamond Mine, where a long-term reclamation research program was developed that involved conducting a variety of experiments testing top-dressings and different plant materials for promoting re-vegetation of mine disturbances. Tasks carried out for BHP Billiton by an Alaskan consulting firm (ABR Inc.) included overseeing fertilization, seeding, and planting efforts; monitoring of soil and vegetation response in reclaimed areas; and assessing the potential of local plant species for use in re-vegetation. ABR also provided recommendations and implemented re-vegetation plans for abandoned sites and wrote a review of performance criteria to be used as part of the evaluation of mine reclamation at closure.

ABR was also involved in is conducting a number of long-term land rehabilitation, re-vegetation, and bioremediation projects in the Kuparuk Oilfield, on Alaska's North Slope. A number of these projects focus on rehabilitation of gravel substrates, the most common surface disturbance on the North Slope. Several experimental plots were monitored to determine the relative efficacy of different combinations of fertilizer, soil amendments, and the long-term survivorship of various native plants cultivars. Wetland creation techniques were evaluated at experimental sites (created ponds) and at natural tundra areas re-vegetated with aquatic grasses.

References

http://www.abrinc.com/projects/ecological-restoration-and-reclamation.htm

Kokelj V. and GeoNorth Ltd. 2002. Drilling Mud Sumps in the Mackenzie Delta Region: Construction, Abandonment and Past Performance. Report Prepared for Indian and Northern Affairs Canada.

Developer Response: 58.2

Consistent with AANDC's Northern Land Use Guidelines for Pits and Quarries (2010), the overall reclamation objective for borrow sites will be to return the disturbed areas to a stable, useable condition. As indicated in the guidelines, where several future land use options exist, the highest and most productive use should be chosen. Environmental limitations, nearby communities, land users, site visibility and existing regional land use plans will all influence the reclamation objectives that will be determined by the land use regulator.

As per the guidelines, the overall reclamation objective for the majority of pit or quarry sites in the Northwest Territories and Nunavut is to return the site to a natural condition that blends in with the existing topography and surrounding landscape. Land use permits may also contain specific conditions regarding reclamation.

Once a closure and reclamation plan is approved, progressive reclamation may be conducted during operations at areas of the site that are no longer used. This will reduce the amount of reclamation required when operations are completed, will allow for evaluation of reclamation techniques, and could reduce reclamation costs at the end of operations by using equipment and resources that are already on-site.

When operations are complete, the site must be reclaimed as per the reclamation objectives outlined in the closure and reclamation plan. Monitoring will be required for several years after the reclamation work was conducted to ensure that the reclamation objectives are being met. If the reclamation objectives are not being met, proponents will be required to return to the site to carry out further reclamation work. Once the land use regulators are satisfied that the site is stable and the reclamation objectives have been met, a letter of final clearance will be issued indicating that the permit holder is no longer responsible for the pit or quarry site.

As indicated in the guidelines, the Developer will be consulting with the ILA and AANDC during the licensing/permitting period for each specific borrow site to be used for construction of the Highway to establish site- specific reclamation objectives and criteria which will be used to determine borrow site reclamation success for each site.

At this time, as discussed in the EIS, borrow source areas will be re-contoured progressively once activities are completed. Currently, the principal means of re-vegetation associated with the closure and reclamation of borrow sources will be by natural colonization. Those areas that could support deliberate re-vegetation efforts will be scarified and seeded with appropriate northern, native plant species.

However, it is understood that even with the application of reclamation measures, areas used for borrow material will not be completely restored to their previous state due in part to the alteration of local surface topography resulting from excavation. Re-vegetation efforts, combined with slow natural re-vegetation processes, is expected to lead to the slow re-establishment of vegetation characteristic of naturally granular upland areas.

IR Number: 59

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Roadway culverts and mitigation of known issues EIS Section 5.3.1.2 Page 631)

Preamble
The Developer states that most of the streams crossed by the Tuktoyaktuk to Source 177 Access Road are ephemeral but for potentially fish-bearing streams, the stream crossings were constructed in conformance with Department of Fisheries and Oceans (DFO) Operational Procedures designed to protect fish habitat. Areas with surface runoff were addressed with the installation of standard diameter (800 mm to 2,000 mm) roadway culverts. Follow-up monitoring during the spring/summer of 2009 determined that some areas of ponding occurred and plans were implemented to mitigate these minor issues. These 'issues' are of interest in the context of this Review.

Request

1. Please provide additional, detailed information regarding the pooling/ponding that occurred as noted during the follow-up monitoring during the spring/summer of 2009.
2. Please explain why the pooling/ponding was regarded as an issue in the context of protecting fish habitat.
3. Please explain what actions and plans were implemented to mitigate these problems.
4. Please explain and justify how similar issues will be minimized or eliminated for the proposed development?

Developer Response: 59.1, 59.2, 59.3, 59.4

The following response addresses Information Requests 59.1 through 59.4. The Developer and DFO met on January 31, 2012 to discuss how to manage/mitigate future issues related to stream crossings. Coming from this meeting as reflected in attached meeting minutes are a number of actions that should resolve the few remaining past issues/concerns related to the construction of some of the small stream crossings associated with the Tuk Access Road.

Inuvik to Tuktoyaktuk Highway

Stream Crossing Design Consultation Meeting

January 31, 2012

Lahm Ridge Tower Large Boardroom

In Attendance

Amanda Joynt, Fisheries and Oceans Canada

Corrie Gibson, Fisheries and Oceans Canada

Julia Krizan, IMG Golder Corporation (by telephone)

Ann Lanteigne, Department of Transportation

Rhonda Batchelor, Department of Transportation

Brian Collins, Department of Transportation

Meeting Convened at 1:30 pm

Ann Lanteigne (AL) began by giving a summary of the planned approach to stream crossing design.

- Single span structures will be used where fish habitat has been identified as present. No binwalls will be used for abutments.
- Pile foundations will be used for bridges which will be driven into the banks (i.e. no instream foundations are planned) and backwalls will be affixed, in most cases, to those pilings to prevent scour at the piles. With the exception of culvert installations, efforts will be made to avoid instream work.
- Armour-flex will be avoided where possible. Where it is used, special site preparation will be required to avoid creating a scour at the interface of that material and the sideslope/abutments.
- Arched culverts (similar to those designed for Bob's Canyon and Strawberry Creek) will be used in other fish habitat crossings where a bridge is not used. These installations will "arch over" the stream and avoid any disturbance of the stream and, therefore, fish habitat.

DFO would like to have as much "up-front" information as possible. Including how many crossings will have bridges and how many will have culverts. It would also be useful to include as much information about the crossing locations including photos that indicate the stream locations and associated riparian zones. In the likely event that riprap is not available for abutment and inlet/outlet dressing, armour flex,

gabion baskets, or some other suitably stabilizing material will be placed. DoT undertakes to consult with DFO on this matter when the crossing designs have advanced.

ACTION: DoT to provide design information to DFO as early as possible.

Amanda Joynt (AJ) suggested a jointly-funded trip with identified design personnel to key crossing locations on the route to discuss design considerations. Best time to arrange the trip would be during freshet (likely early May). DFO and DoT will propose preferred crossings and AJ to make trip arrangements on a cost shared basis.

ACTION: DoT and DFO to identify preferred crossings to visit.

DoT to identify design personnel to accompany DFO.

DFO (AJ) to make trip arrangements Agreed. The idea was for DFO () (AJ) to come along on the DoT freshet survey, and for both parties to collaborate on site selection beforehand. DFO can contribute to helicopter time.

Installation elevations were discussed. DFO would like to see culverts embedded to ensure fish passage and natural substrate to be allowed to infiltrate the culvert to mimic the natural substrate. Using this method would disturb or alter fish habitat, rather than destroy it to the extent of the culvert footprint. Infilling around the culvert will be considered destruction of available habitat.

DFO identified some problems with overflow culverts on the Tuktoyaktuk to Source 177 road. Requested that design and construction methods be implemented that avoid this problem from occurring on the highway. DOT agreed that 'overflow' pipes will be installed in such a way that the invert of the pipe is not at a lower elevation than the Ordinary High Water Mark of any channel (as the channel changes due to the culvert, DFO would recommend that the inlet of the pipe be determined based on the appropriate flow of the main culvert.

A commitment to design crossings to ensure unrestricted fish passage would provide DFO with some comfort as to the appropriateness of the design approach. DoT and DFO agreed that juvenile burbot will be the 'design fish' to determine appropriate culvert dimensions. It will also be important to ensure erosion and sediment control best practices are followed. (Mention of the erosion and sediment control guide developed by DFO and DoT)

DFO would like to see the construction season clearly defined. Fish windows are potentially quite large during the summer. Likely the best month for summer construction will be late June/July, but DFO also noted that soil conditions will likely not be optimal for structural installation activities in and near water channels. Owing to the fine grained soils at or in most water channels, DFO felt that sedimentation control would be difficult, particularly in light of the real possibility at that time of year for sudden flood events. Other months can present problems as there may be fish passage during rain events from August through to October.

DFO noted culverts that were incorrectly aligned with channels during winter construction on the Tuk-177 Access Road due to the absence of any flow or clear channel delineation at the time of construction. Culverts were, in some cases, significantly offset from the streambed. This can be overcome by securing markers, such as flagged rebar, in streambeds during the summer to allow clear identification of proper culvert placement during the winter.

Additional, more specific, questions regarding stream crossings will follow from DFO during the Information Request process within the EIRB review.

ACTION: DFO to provide additional stream crossing questions to DoT

DFO would like to have the Tracking Table and the Habitat Assessment Table in Excel format.

ACTION: IMG-Golder to provide Habitat Assessment Table to DFO in Excel format

DoT to provide Tracking Table to DFO in Excel format

DoT to provide, as soon as possible, electronic copies of IMG-Golder's Final Fisheries Assessment Report, Including all Appendices.

Meeting adjourned at 3:15 pm

IR Number: 60

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Third Party Responsibility for Monitoring and Mitigation (Addendum August 2010 pages 42 to 46 Table 4)

Preamble
In response to EIRB deficiency item #13 the Developer provided a draft table setting out current proposals for environmental and socio-economic effects monitoring programs. Table 4 identifies a number of third parties as the "responsible party" for a variety of project effects monitoring programs. They range from the ILA to Environmental Monitors, to HTCs and Co-Management agencies. Also included are federal government departments such as DFO, AANDC and the Prince of Wales Heritage Center.

The Developer's Response on page 42 of the Addendum sets out that: "The majority of regional and socio-economic effects monitoring efforts will be conducted by other government agencies and organizations according to their mandate". The response goes further and states "The Developer has no plans to monitor the possible socio-economic effects of the project, as these are within the mandate of territorial, Inuvialuit and federal responsibilities and programs."

These assertions are inconsistent with the "polluter pays" principle and widely based practice to require developers to monitor the effects which are the result of their projects. The Developer's answer assumes that other agencies not only should take responsibility for project effects but should pay for monitoring the effects of the Developer's project.

Request

1. Please provide examples from other major development projects in the north where responsibility for effects monitoring has been accepted by third parties (other than the developer). Provide a description of such projects, the monitoring programs undertaken by third parties, and provide documentation to explain the agreements or arrangements between the proponent and the third parties to undertake these monitoring programs.

2. Provide the results of any specific discussions between the Developer and third parties listed in Table 4 about effects monitoring programs. Provide any documentation available which indicates that these third parties have accepted responsibility for monitoring the effects of the project.

3. Where third parties have agreed to monitor the effects of the project provide specifics of the proposed relationship between the third party monitor and the Developer. Describe how and when the monitoring will take place and which party will be responsible for follow up action. If a written agreement has been reached with any of the third parties listed in Table 4 file it with the Board. If no agreements have been reached please advise the Board accordingly and describe any plans to negotiate such agreements.

Developer Response: 60.1

Socio-economic Monitoring by Third Parties

A developer's responsibility for monitoring socio-economic effects for major development projects in the NWT is limited to monitoring, and reporting on, matters within its direct control. Most

aspects of socio-economic effects are already within the mandate of territorial, self-government or federal government departments to monitor and, as necessary, to manage. The GNWT provided a review of the socio-economic programming of its primary social programming departments on November 18, 2011.

However, for major resource developments, the GNWT may also enter into agreements with developers to codify a developer's commitments and determine what monitoring and reporting may be performed by the GNWT. Currently, there are five socio-economic agreements in place as described in Table IR60-1. These agreements have a number of common elements but provide the basis for determining the responsibilities of the proponents and the responsibilities of the GNWT, including a description of the indicators and reporting frequency of the GNWT. All agreements can be downloaded at http://www.iti.gov.nt.ca/strategiesagreements/.

TABLE IR60-1: SUMMARY OF CURRENT SOCIO-ECONOMIC AGREEMENTS IN THE NWT

Name of Agreement	Signatories	Relevant Sections for Monitoring / Reporting	Date Signed
Socio-Economic Agreement – BHP Diamonds Project	GNWT – BHP Diamonds Inc	Section 5.0 – Social Issues, Section 8.0 Monitoring, Schedule D – Indicators of Community Health and Wellness, Schedule E – Baseline Data for the 14 Indicators of Health and Wellness, Schedule H	Signed October 22, 1996
Diavik Diamond Project – Socio-economic Monitoring Agreement	Diavik Diamond Mines Inc. GNWT, Aboriginal Signatories	Article 2.1 Diavik Project Communities Group Advisory Board, Article 3.4 Reporting, Article 4.4 Reporting (Procurement), Article 6.1 Monitoring and Mitigation,	Signed October 2, 1999
Snap Lake Diamond Project – Socio-economic Agreement	De Beers Canada Mining Inc, GNWT	Article 8 De Beers Socio-economic Monitoring Agency, Article 9 Monitoring,	Signed 2004
Mackenzie Gas Project – Socio-economic Agreement	GNWT, Imperial Oil Resources Ventures Limited, ConocoPhillips Canada (North) Limited, Shell Canada Energy	Section 8.4 NWT Oil and Gas Socio-economic Advisory Board, Section 8.5 Indicators and Reporting by the Parties	January 12, 2007
Prairie Creek Mine Project – Socio-economic Agreement	Canadian Zinc Corporation, GNWT	Article 8 Prairie Creek Mine Socio-economic Advisory Committee, Article 9 Monitoring, Article 9.2 Reporting by Parties	August 22, 2011

For the Mackenzie Gas Project, the federal government agreed many of mitigations of socio-economic effects of the Project were beyond the mandate of the Proponents. The federal government enacted the Mackenzie Gas Project Impacts Act in 2006. This $500-million Fund was intended to support regional projects that would alleviate socio-economic impacts on the NWT communities affected by the proposed MGP, during the planning, construction and operation of the

project (AANDC accessed January 23, 2012[1]). This fund will also deal with existing conditions that may be affected by the Project. The release of funding is contingent on the MGP proceeding. Under the Act, a Territorial Organization and four regional organizations will be established to administer the funding based on a project proposal basis.

As the Mackenzie Gas Project would have the greatest relevance to the communities in the ISR involved in this EIR should the project proceed, the following describes the obligations of the GNWT in monitoring and reporting:

a. Employment
    a. Employment/unemployment rates; and
    b. Annual work patterns
b. Educational attainment
    a. Current education attainment
    b. School enrolments and
    c. Graduation rates
c. Economic effects
    a. NWT economic accounts (e.g. gross domestic product, etc)
    b. Labor income
    c. Investment
    d. Economic activity by sector (e.g. retail, wholesale, etc)
    e. Inflationary impacts and
    f. Business activity
d. Health and social well-being
    a. Family and community stress
    b. Family structure
    c. Children receiving services
    d. Substance use, addictions and impacts

[1] http://www.aadnc-aandc.gc.ca/eng/1100100016358

    e. Spending patterns

    f. Crime and justice

    g. Communicable diseases

    h. Non-communicable diseases

    i. Premature deaths (e.g. accidents, homicides, suicides)

    j. Injuries, and

    k. Housing

e. Income

    a. Employment and total income

    b. Family and household income and

    c. Income security

f. Population

    a. Population

    b. Births and

    c. Migration

g. Traditional practices

    a. Hunting and fishing

    b. Trapping

    c. Consumption of country foods and

    d. Cultural knowledge (aboriginal language use)

h. Net effects on government

    a. Use of government systems including the public safety, transportation, health care and social services, and municipal infrastructure systems and

    b. System costs

i. Sustainable development

This project is NOT like a private sector development as the lead Developer is a department within the territorial government. Coordination with other departments is expected to occur without the need for a socio-economic agreement. As described in the GNWT's contribution on November 18, 2011, the GNWT is responsible for a wide variety of social programming and undertakes ongoing monitoring of changes and, in response, determines changes in its programming. This is done on a system-wide basis and not on a development-by-development basis.

Biophysical Monitoring by Third Parties

Biophysical monitoring is typically performed by developers for site specific variables. Regional monitoring is not the responsibility of a developer. One of the best example of such requirements for a proponent are described by the terms and conditions set by the National Energy Board for the Mackenzie Gas Project.

It is clear the Developer's responsibilities must be primarily directed to the mitigating and monitoring direct impacts on the land and water [e.g. erosion and sedimentation, fish habitat changes, etc]. Some monitoring requirements are expected to be included in future authorizations. However, the Developer does not expect any regional assessments to be done by third parties. Much of the project effects monitoring will occur during the construction phase.

Developer Response: 60.2

The question posed by the EIRB indicates the "Responsible Party" column of Table 4 is not clear. The primary responsibility for the monitoring identified in the table belongs to the Developer. At times, the monitoring field activities will be carried out by ILA Environmental Monitors [see IR Response 11.2] or the Developer's contractors. However, the column "Responsible Party" also indicates the department or agency that will receive the monitoring results and, in many cases, will be consulted regarding the results. For example, the primary party to be consulted regarding archaeological sites will be the Prince of Wales Northern Heritage Centre. The column does not signify a responsibility by these parties to accept any responsibility for monitoring by their department. It is expected, however, that Environmental Monitors will be paid for by the Developer but will be hired by the ILA.

Developer Response: 60.3

The Developer anticipates continued collaboration with ENR in the monitoring of project effects on wildlife. ENR, working with renewable resources boards, is responsible for regional management of wildlife populations. It is in the mutual interest of the Developer and ENR to collaborate on effects monitoring. Discussions to date with ENR have resulted in modifications to the department's approach to barren-ground caribou monitoring activities scheduled in the Caribou Forever: A Barren-ground Caribou Management Strategy 2011-2015. ENR intends to place 60 satellite collars on Cape Bathurst and Tuktoyaktuk Peninsula herd animals in March 2012. This will allow for the monitoring of movement patterns these herds prior to construction and during construction. The Developer and ENR are continuing to discuss collaborative effects monitoring opportunities for grizzly bear, wolf and wolverine. ENR and appropriate renewable resources boards (e.g. WMAC) will continue to lead regional discussions on best practices and wildlife management approaches with renewable resources committees (e.g. HTCs) and federal departments (e.g. EC).

No other agreements have been negotiated with third parties. It is expected some agreements will be reached with the ILA and/or federal/territorial regulators during the regulatory authorization phase.

8.0 Follow-up and Monitoring

IR Number: 61

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Environmental Management Plans (EMP) and Monitoring (EIS Sec. 7.0)

Preamble
The Developer relies a great deal on existing Environmental Management Plans and guidelines, as well as its own experience in listing mitigation measures: "…*environmental management plans will be developed for several Project components. The EMPs will clearly define compliance monitoring requirements, responsibilities, requirements for training, and reporting during construction*." (EIS Sec. 7.0, p.651). Examples of EMPs are presented in Appendix E. While these EMPs list procedures that help to mitigate the potential effects, they do not show the monitoring of the effectiveness of these mitigation procedures. Evidence for the success of EMPs in mitigating potential effects is required.

Request

1. Please show how monitoring was applied to measure the effectiveness of mitigation required under other EMPs of similar developments in tundra environments.
2. Please show how these effects were mitigated if monitoring indicated that there were unexpected effects.
3. For each of the two requests above (i.e. how was the effect measured and how was adaptive management applied), please discuss at least one example for each of the items listed in Table 7.3-1:
    a. Snow, Permafrost and Ground Ice
    b. Water Quantity
    c. Water and Sediment
    d. Fish Habitat, Population and Harvest
    e. Fish Quality
    f. Moose
    g. Caribou
    h. Terrestrial Mammals
    i. Avian Wildlife
    j. Marine Mammals
    k. Vegetation
    l. Climate
    m. Air Quality

Developer Response: 61

With respect, this IR is a challenging one for the Developer to respond to as for a number of the parameters identified, these types of monitoring activities have not typically been undertaken for any other northern public highways. However, the Developer believes that the EIRB review process can assist in identifying appropriate future environmental monitoring initiatives that could be undertaken by the Developer, natural resources management agencies, the co-management bodies, or other parties in relation to the proposed Inuvik to Tuktoyaktuk Highway.

To the extent possible, each of the following responses serve to address each of the three IR items above.

a. Snow, Permafrost and Ground Ice

Snow – Daily, weekly and long term forecasts provided by Environment Canada, are typically used by the RCMP and DOT, to determine the condition and operational safety of existing highways in the North to determine highway closure or precautionary use periods during blizzards and whiteout periods. As a current example, we understand that the Dempster Highway has been closed for 21 of the last 27 days due to severe winter conditions (M. Gruben, Mayor of Tuktoyaktuk, personal communication Jan 27 2012).

Designating the temporary closure or precautionary use for northern highways during severe winter conditions is a common practice intended to ensure public safety and to permit snow clearing operations to proceed in as efficient a manner as possible.

Permafrost and Ground Ice – Limited permafrost monitoring programs have been conducted in relation to the existing highways in the north that have some applicability to the proposed Inuvik to Tuktoyaktuk Highway project as most of these studies have been done in areas characterized by warmer permafrost.

During the period 2003 to 2008, a ground temperature monitoring system was implemented by EBA on behalf of GNWT Transportation, to track the response of the relatively warm permafrost located below the reconstructed 100 km section of Highway 3 west of Yellowknife. (McGregor et al. 2008). For this project the ground temperatures within and below the new highway embankment were monitored at several locations characteristic of the permafrost terrain over a period of 4 years.

This monitoring program was able to measure a slow and predictable regression of the permafrost at all sites monitored. In some cases the permafrost had been retained but the permafrost temperature was demonstrated to be increasing. In every case, the side-slopes usually experienced some distress as a result of permafrost thaw after the first year. However, it was also noted that the soils below the core of the embankment had retained permafrost for the monitoring period. The program determined that the reduced rate of thaw and settlements had retained the embankment integrity sufficiently well to allow the road to be comfortably driven at 90 km/h (McGregor et al. 2008).

For the Dempster Highway, EBA conducted a ground penetrating radar survey in the mid 1980s for GNWT Transportation along the NWT portion of the highway from Rat Pass to Fort MacPherson to determine the condition of the permafrost and ground ice beneath the highway in this area. (Hayley 2005) This work had been commissioned due to a significant subgrade collapse that had occurred near Rat Pass which led to a serious vehicle accident causing a human fatality.

Yukon Highways and Public Works has undertaken an extensive research project aimed at finding cost-effective construction techniques to reduce permafrost thawing underneath sections of the Alaska Highway in Yukon (Reimchen et al. 2009). Several test sections along a 600 m length of highway were constructed in 2008. Mitigation techniques being tested include: air convection embankments, heat drains, longitudinal air ducts, light-coloured aggregate surfacing, side slope snow clearing and snow sheds. The test sections were instrumented with thermistors, surface temperature loggers, and weather monitoring equipment. The primary goals of the research are to find methods suitable for the rehabilitation of existing embankments, thereby reducing the ongoing maintenance cost over the life cycle of the highway and improving the ride and safety of the highway (Reimchen et al. 2009).

The lessons learned from studies such as these have all been incorporated into the Transportation Association of Canada Guidelines for the Development and Management of Transportation Infrastructure in Permafrost Regions (TAC 2010). As indicated in the EIS the Developer has committed to employ these guidelines in the design and construction of the Inuvik to Tuktoyaktuk Highway.

References

Hayley D. 2005. Northern transportation infrastructure construction and operational challenges. Presentation prepared for the Northern Transportation Conference, November, 2005.

McGregor, R. V., M. Hassan and D Hayley. 2008. Climate change impacts and adaptation: Case studies of roads in Northern Canada. Paper prepared for the Northern Transportation Conference, 2008.

Reinchen, D., G. Dore, D. Fortier, B. Stanley, and R. Walsh. 2009. Cost and constructability of permafrost test sections along the Alaska Highway, Yukon. . Paper prepared for the Northern Transportation Conference, 2009.

Transportation Association of Canada (TAC). 2010. Guidelines for the Development and Management of Transportation Infrastructure in Permafrost Regions.

b. Water Quantity/Quality

As noted in the modified Item b title above, this part of the response discusses water quantity and quality.

Water quality monitoring (but not quantity) of the major streams crossed by bridges associated with the Meadowbank Gold Project All Weather Private Access Road (AWPAR) was conducted in 2009 and 2010 and reported in appendices to their annual reports to NIRB (Meadowbank 2009, 2010). This program is the most relevant one to draw from for this response.

The annual water quality management program consisted of routine and event inspections at all of the crossings (pre-freshet, and post-freshet) for potential or current erosional issues at all stream crossings, regular water quality monitoring at all major crossings from July to September, and surface water sample collection at HADD crossings and representative watercourses.

The 2009 monitoring results did not indicate erosional issues or inputs due to preceding or current bridge construction or road activity. Due to winter construction of the R02 habitat compensation area, localized turbidity plumes were observed following rain events, immediately downstream of the compensation structures in June, July and August. Follow-up turbidity monitoring and surface water quality sampling confirmed the plumes isolation, as surface water quality sample results approximately 300 m downstream of the construction activity and immediately downstream of the bridge crossing were similar to reference conditions. HADD crossings R02, R06, R09, and R15 water quality results suggested a slight improvement from historical water quality data with bridge and road activity causing no significant effects on the receiving environment.

The 2009 AWPAR report recommended that a similar monitoring program be implemented in 2010. Priority should be placed on visual identification and turbidity monitoring to evaluate road-related inputs. Unless turbidity issues were observed, surface water quality sampling was deemed not necessary at non-HADD crossings. No further mitigation was required in relation to any of the stream crossing monitored since there were no unexpected effects.

For the proposed Inuvik to Tuktoyaktuk Highway, as indicated in Section 3.1.5 of the EIS, Kiggiak-EBA and INAC conducted field based water quality testing at select watercourse crossings along the proposed route in early June and late September 2010, respectively. In addition, INAC collected water quality samples and had them analyzed at Taiga Environmental Laboratory.

Field sampling by INAC was carried out using a portable Oakton pH/Conductivity meter. Water quality parameters tested were compared against the Canadian Council of Ministers of Environment (CCME) Water Quality Guidelines for the Protection of Freshwater Aquatic Life (CCME 2002, 2007) to determine potential background level exceedances.

While Kiggiak-EBA's field work was timed to coincide with spring freshet, high water levels actually occurred prior to the spring 2010 field program. Field water quality testing was carried out using a YSI 550A Temperature Conductivity meter and a WTW 340i pH Conductivity meter. Values for pH were within CCME water quality guidelines for all stream crossings sampled, while dissolved oxygen levels were lower than the cold water guideline of 6.5 mg/L for all watercourses except 5, 10, 13A, 17 and 18.

Values for all parameters represent natural background within these watercourses in spring and fall since sampling was carried out in the absence of any development within Project area watersheds. These data provide an excellent baseline for future water quality monitoring associated with the construction and operation of the proposed Inuvik to Tuktoyaktuk Highway.

c. Water and Sediment

Since water related matters were discussed in response b, the following discussion addresses sediment quality. The Developer was unable to find any other EMPs for a road development that monitored the quality of the stream sediments crossed by bridges or culverts, including the available Meadowbank Access Road monitoring reports.

However, it is anticipated that stream sediment quality should not be an issue for the proposed Inuvik to Tuktoyaktuk Highway crossings because the Highway embankment material consists of the natural sands and gravels obtained from the local borrow sites. Regarding sediment release monitoring and resultant effects on water quality, this subject was addressed in response b above and as indicated in several other responses in this document, will be a key component of the stream crossing water quality monitoring program to be conducted for the Highway project.

As indicated in Section 4.2.4.1 of the EIS, silt fences will be installed at each road-channel intersection to prevent sediment releases to streams. Silt fences will be left in place until roadways are compacted and stable, and will be routinely monitored and maintained. Cross drainage culverts, which will be installed at regular intervals, will channel road drainage away from streams and allow filtration by natural vegetation. Because of these measures, no residual effects on water quality due to road drainage are anticipated.

d. Fish Habitat, Population and Harvest

Fish habitat compensation was required for one stream crossing (R02) related to the construction of the Meadowbank Access Road. The compensation habitat consisted of a series of berms installed in the stream to decrease natural water flows to provide refugia and depths suitable for arctic grayling spawning. Monitoring of the compensation habitat a year following construction of the habitat indicated that although the effectiveness of the compensation area was difficult to quantify, the larval drift data provides some of the best evidence of arctic grayling utilization. By comparing *equal catch per unit efforts*, the 2010 data showed an increase in arctic grayling larvae collected throughout the R02 stream reach, and as a comparison, a greater number of larvae collected downstream of the berms as compared to upstream. This indicated that the spawning substrate and water depth at the R02 compensation area appeared to be suitable for spawning and nursery.

It is anticipated that for the proposed Inuvik to Tuktoyaktuk Highway, habitat compensation may not be required. As indicated in Section 1.5.1.4 of the EIS and elsewhere, the various stream crossings that will be necessary as part of the proposed Highway will be sited and designed to avoid or mitigate adverse effects on fish and fish habitat (i.e. HADD), wherever possible. As such, it is expected that most of the Project can be completed through the issuance of Letters of Advice by DFO, or by application of relevant Operational Statements.

Where a HADD is unavoidable, DFO will be consulted to discuss and determine suitable compensation strategies so that the necessary application for Authorization pursuant to Section 35(2) of the Fisheries Act can be submitted. Such situations arise, for example, due to the installation of culverts in fish-bearing streams, where the culvert results in the direct loss of spawning or rearing habitat. Once the final route is determined, conceptual plans for each crossing will be provided to DFO (and other regulators), which will include assessments of habitat type, quality, and quantity. These assessments will form the basis for Authorizations and compensation plans.

As indicated in the preamble to Information Request 32, the Developer has identified that the greatest potential indirect impact from Highway construction is the potential increase in fish harvest pressure through domestic and sport fishing. This is due to the improved access that will be afforded by the Highway to important, but remote, fish harvest areas in some of the lakes along the proposed Highway, as well as the few fish-bearing watercourse crossings.

The Developer has indicated that the ILA, the HTCs, the FJMC, DFO and GNWT DOT will need to work together to develop strategies to limit access to sensitive water bodies, and a public education program that will increase awareness of the consequences of human activities on fish and fish habitat. The Developer was unable to identify any other similar road developments in tundra environments that have implemented a monitoring program to measure the effectiveness of mitigation for potential overharvesting. However, the Developer is aware that many of the existing northern mines prohibit fishing by their employees at their mine sites to prevent possible overharvesting of the sentinel fish species (e.g. lake trout, whitefish) in their project-area lakes.

e. Fish Quality

The EIS does not predict that the construction or operation of the proposed Inuvik to Tuktoyaktuk Highway will have any effect on fish quality. Unlike mining projects that may release contaminants of concern into the receiving environment that could potentially contaminate fish or affect the quality of fish, no such linkage exists between the ITH and the fish in the relatively few fish-bearing streams to be crossed by the Highway. As discussed in the EIS, the Highway will be constructed of natural, uncontaminated sands and gravels extracted from local borrow sites. Major fish-bearing streams will be crossed by single span bridges to avoid to the extent possible the creation of a HADD.

The Developer was unable to identify any other similar developments in a tundra, or other northern environment that required monitoring of the effects of a road on fish quality.

f. Moose

Moose typically occur below the treeline but when factors related to climate and snow depths are not limiting, small concentrations of moose are known to expand above the treeline during the growing season (Britton 1983). In these areas moose are regularly found in riparian areas of lush willow growth (Dussault et al. 2005, Stephenson et al. 2006). There is very little data on vehicle-related collisions with moose in tundra ecosystems. Records compiled by DOT for the Dempster Highway over a 22 year period (1989 to 2010) show only seven (7) reported wildlife/traffic collisions occurring. Four (4) of these collisions involved caribou with the remaining three (3) involving moose. Mitigation measures for moose implemented on the Dempster Highway include advisory signage, particularly near riparian areas where moose are known to congregate. Signage at key riparian areas along the ITH such as Hans Creek and Holmes Creek are anticipated to limit vehicle-related collisions along the ITH. It is also expected that the absence of forest cover that could obscure wildlife near the right-of-way for most of the Inuvik to Tuktoyaktuk Highway will help mitigate wildlife/traffic collisions.

References:

Britton, B. 1981. The Beverly caribou winter range 1950-1981. N.W.T. Wildlife Service, Yellowknife, N.W.T. Unpubl. rep.

Dussault, C., Courtois, R., Ouellet, J. P., and Girard, I. 2005. Space use of moose in relation to food availability. *Canadian Journal of Zoology 83*, 1431-1437.

Caribou

As indicated in IR 23, the Meadowbank All Weather Permanent Access Road (AWPAR) has been in operation since April 2008. As with the proposed ITH, the Meadowbank AWPAR is similar in length and also occurs entirely north of the treeline. The Meadowbank RSA has a large wintering population of barren-ground caribou with over 5,000 animals recorded near the mine site during the 2008-2010 peak winter periods. In addition, caribou have been documented crossing the road including >1,000 during migration (Gebauer and Associates 2011).

Since completion of the road, two (2) road related caribou mortalities occurred in 2008 and one (1) in 2010. In these instances a driver education program was expanded. Road users were notified of operational procedures when caribou were observed near the road. Drivers were encouraged to

communicate via radio to other road users when wildlife was observed within 100 m of the road. During peak migration periods temporary road closures were implemented. When the road was reopened during the migration period, wildlife monitors were stationed at high concentration areas to monitor if additional road closures were warranted and also to educate drivers on site specific instructions to prevent vehicle related wildlife mortalities.

The Developer has proposed to implement various measures to minimize disturbance and collision mortality for caribou and other wildlife along the road:

- Caribou advisory signs will be placed along the Highway, as needed.
- Highway access will be restricted during peak barren-ground caribou migration periods (i.e. arrival during fall rut and departure to calving grounds in the spring).
- Signage will be placed along the highway notifying drivers that all wildlife will have the right-of-way on the ITH. Vehicles will be required to slow down or stop and wait to permit the free and unrestricted movement of wildlife across the ITH at any location.
- Caribou sightings by GNWT DOT staff will be recorded (including location data, GPS if possible) to be submitted to the GNWT DOT Planning, Policy and Environmental Division and GNWT ENR's Inuvik office to aid in monitoring and contribute to the development of adaptive management measures.
- The Developer will encourage organizations such as the HTCs, IGC, WMAC, Environment Canada and GNWT (DENR and DOT) to continue to work cooperatively to develop guidelines and conditions for use of the Highway regarding caribou management and wildlife protection.

It is anticipated these precautionary measures will limit vehicle-related wildlife mortalities.

References:

Gebauer & Associates 2011. Meadowbank Mine 2010 Wildlife Monitoring Summary Report.

h. Terrestrial Mammals

From 2008 to 2010 weekly road surveys of the Meadowbank AWPAR documented vehicle-related mortalities to thirty-four (34) terrestrial mammals (not including caribou). These mortalities included Arctic fox, Arctic hare, Arctic ground-squirrel and lemmings. Twenty (20) of the mortalities were recorded during the first year of the road being completed (2008). Vehicle-related wildlife mortalities declined in 2009-2010. This was attributed to the expanded driver education program originally implemented to address the three (3) reported caribou mortalities (Gebauer & Associates 2011). It is anticipated that the precautionary measures for caribou will limit vehicle-related wildlife mortalities for other terrestrial mammals.

References:

Gebauer & Associates 2011. Meadowbank Mine 2010 Wildlife Monitoring Summary Report.

i. Avian Wildlife

The weekly road surveys for the Meadowbank AWPAR (2008-2010) documented twenty-one (21) vehicle-related avian mortalities which included nineteen (19) ptarmigan (Gebauer & Associates

2011). Seventeen (17) vehicle-related avian mortalities were recorded during the first year of the road being completed (2008). As with terrestrial mammals, vehicle-related avian mortalities also declined between 2009 and 2010. This decline was also attributed to the expanded driver education program that was implemented to address the three (3) reported caribou mortalities indicated in IR 61 g. It is anticipated that the precautionary measures for caribou will also limit vehicle-related avian mortalities on the ITH.

References:

Gebauer & Associates 2011. Meadowbank Mine 2010 Wildlife Monitoring Summary Report.

j. Marine Mammals

The only type of marine mammal that may be directly impacted by the ITH is the polar bear (*Ursus maritimus*). As indicated in the Developers Part A addendum to the EIS, dated August, 2011, very few polar bears have ever been seen in the inland portions of the Mackenzie Delta, but they have been known to occasionally wander into the area.

As indicated in the Part A response, the general mitigation measures that are proposed for grizzly bear would be applied in the event of a polar bear encounter. In particular, anyone sighting a polar bear in the vicinity of the future Highway will be encouraged to contact GNWT ENR immediately who would determine and implement the appropriate measures to protect the bear and return it to its more natural environment (arctic coast/Beaufort Sea area).

We were unable to identify any other similar development that may have implemented a monitoring and mitigation program related to polar bears. The mitigation measure described in the Part A response referenced in this section (tranquilization, trapping and relocation to the arctic coast) seemed to work well and was considered by ENR to be the best solution. Similar mitigation measures have and are employed in Churchill Manitoba, when polar bears begin to pose a risk to humans in this community

k. Vegetation

During the Meadowbank environmental assessment process a habitat mapping program was developed to describe the overall area of different Ecological Land Classification (ELC) units lost due to mine-related activities. This program included vegetation mapping of the AWPAR and assessed losses during construction, operational, decommissioning and post-closure phases of the project (Gebauer & Associates 2011).

In addition to habitat mapping, plant (i.e., lichen, berry and sedge) tissue samples were collected (2005, 2006, 2008 and 2011) and an evaluation of the effects of airborne dust and emissions was conducted with the objective being to provide a comprehensive set of baseline data. This baseline information is to be used to measure changes, if any, in potential contaminant exposure to vegetation communities and wildlife populations during mine operations. The results of these analyses are not yet available (Gebauer & Associates 2011).

The primary objective of the habitat mapping and plant tissue monitoring programs was to confirm that estimated habitat losses associated with mine site and AWPAR construction have not exceeded the threshold limits identified in the Meadowbank 2005 Terrestrial Ecosystem Impact Assessment (Azimuth 2006).

The terrestrial habitat loss for the Meadowbank AWPAR was estimated at 282 ha. A threshold of >5% habitat loss from the predicted values was used to determine if and when adaptive management procedures would be required. Adaptive management procedures for contaminants would be implemented if the threshold of >20% increase over baseline levels was measured during the life of the project (Gebauer & Associates 2011).

For the Meadowbank project the habitat loss threshold for the AWPAR was not exceeded therefore no adaptive management procedures were implemented. The monitoring program for baseline tissue sampling and evaluation of the effects of airborne dust and emissions on vegetation is still ongoing at Meadowbank and therefore the determination if any threshold limits have been exceeded to date is not yet applicable (Gebauer & Associates 2011).

For the ITH project, any implementation of adaptive management strategies will likely involve site specific thresholds that could be developed in cooperation with the Developer and interested responsible parties. Alternatively, adaptive management strategies may be developed and implemented using a proactive approach to prevent significant residual effects from occurring. Adaptive management is an ongoing process that will continue to evolve throughout the life of the ITH project. Over time, information from future projects of a similar nature, will be utilized to develop better and more effective adaptive management options in a process that is designed to be iterative and continually improving.

References:

Azimuth Consulting Group Inc. 2006. Wildlife screening level risk assessment for the Meadowbank Gold Mine Project. Prepared for Cumberland Resources. March 2006.

Gebauer & Associates 2011. Meadowbank Mine 2010 Wildlife Monitoring Summary Report.

I. Climate

As indicated earlier in response 61 a, daily, weekly and long term forecasts provided by Environment Canada, are typically used by the RCMP and DOT, to determine the condition and operational safety of existing highways in the North and to determine highway closure or precautionary use periods during extreme weather periods. Designating the temporary closure or precautionary use for northern highways during extreme weather periods is a common practice intended to ensure public safety and to permit the necessary maintenance operations (e.g. snow clearing, embankment/culvert maintenance, etc.) to proceed in as efficient a manner as possible.

m. Air Quality

As indicated in the Developers response to Information Request 21.1, GNWT ENR maintains and operates the NWT Ambient Air Quality Monitoring Network, consisting of four monitoring stations located in Yellowknife, Inuvik, Fort Liard and Norman Wells. Each station is capable of continuously sampling and analyzing a variety of air pollutants and meteorological conditions. The Developers (which include the GNWT DOT, the Town of Inuvik and the Hamlet of Tuktoyaktuk) feel that it is fortunate to have a monitoring station located within such close proximity (between 5 km and 135 km) to this proposed public infrastructure Project that measures air quality in Inuvik.

GNWT ENR has been using these four monitoring stations to establish baseline conditions and to monitor and track trends as development proceeds. As stated in the EIS, with the implementation of mitigation measures, the potential residual effects on air quality are minimal and do not warrant the need for additional air quality measurements to be taken beyond the regional measurements that will continue to be collected at the existing Inuvik monitoring station.

The Developer is not aware of any other similar northern public road developments where air quality monitoring has been required.

IR Number: 62

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Adaptive Management Planning (EIS Commitments Table – Monitoring page xci, Table F of EIS, page 43 and Table 4)

Preamble

The EIS Commitments Table and the Addendum page 43, in answer to EIRB Deficiency item #13 indicate that "contractors will be required to employ an adaptive an adaptive management approach". Table 4 sets out VCs, effects, monitoring programs, indicators, measurement parameters, management goals and the responsible party. Page 43 of the Addendum refers to an "adaptive management program".

Request

1. Please indicate where in the evidence filed to date the Developer sets out the details of the Adaptive Management Program mentioned on page 43 of the Addendum.

2. How does this program and the monitoring and other commitments made by the Developer to date relate to adaptive management planning?

3. Please indicate the Developer's expectations for the use of the effects monitoring data. How will the information resulting be used to validate impact predictions? What thresholds are appropriate as a basis for an adaptive response by the Developer?

4. Please provide an outline of an Adaptive Management Plan, in sufficient detail to satisfy the EIRB that the results of the effects monitoring programs set out in Table 4 will be utilized for environmental protection, the improvement of mitigation actions and for compliance and enforcement by regulators.

Developer Response: 62.1

For Biophysical effects, the term "adaptive management program" as used by the Developer, is defined as: "Adaptive management is a process for applying remedial methods and procedures when there is a failure in the predicted performance of designs and measures intended to protect environmental values" (see IR Response 16.2). This includes the concepts of "continual improvement" and "resolving issues that arise" through to more complicated "research and problem resolution".

The Environmental Management Plan will include an adaptive management component, which will reference appropriate BMPs, guidelines and techniques relevant to construction in northern latitudes. It will also indicate how they are to be applied under specific circumstances (i.e. to deal with the most common types of erosion issues). As the project will be constructed over several winters, there is an opportunity to "adapt" construction processes or determine new monitoring needs. As stated on page 43 of the Addendum "a list of outstanding or new environmental issues that require further action or monitoring will be compiled at the end of each winter". Based on this, construction season and environmental management plans will be updated as needed. In summary,

the Developer is not proposing a stand-alone 'adaptive management program' as the Preamble and question implies.

Developer Response: 62.2

In the EIS and Conformity Responses, the Developer's emphasis is clearly focused on the biophysical effects of the project and clearly intends specific details to be included in topic specific plans. The list of topic specific plans for the construction phase can be found on pages 23 to 24 of the Addendum. Operations phase plans will be prepared closer to the opening of the highway and will build on the Developer's understanding of the issues determined during construction as well as requirements in regulatory authorizations.

Developer Response: 62.3

The Developer's application of the effects monitoring data will depend on the topic or specific issue. As an example, for potential erosion and sedimentation effects monitoring, the Developer will use the monitoring to detect erosion and will take corrective actions. Should the actions undertaken not be effective (see Table F for a range of mitigations), the Developer will undertake to develop and implement additional mitigations including any revisions made by regulators to their guidelines or guidance documents. In addition, the development of best practices is being supplemented by GNWT DOT's forthcoming manual entitled *Environmental Best Practices for Erosion and Sediment Control: A Manual for Transportation Maintenance and Construction* (see p. 10 and Table 1 in the Addendum). In this example, the prediction is the construction practices will minimize erosion during construction and the management threshold is intended to be "respond to any detected erosion". During operations, the effects monitoring is intended to "detect and rectify issues" over the life of the highway rather than to assess "results against predictions".

Developer Response: 62.4

It is the Developer's intention to provide topic specific guidance and best practices for effects monitoring and effects management in the array of construction and operations management plans within topic specific plans rather than a standalone adaptive management program.

It is worth noting that two diamond mines in the NWT have prepared Adaptive Management Plans in response to requirements from regulators. During the review of these draft plans an expert reviewer contracted by the Department of Fisheries and Oceans concluded "*Adaptive Management may not be the best approach*". The expert reviewers [ESSA Technologies 2008[1]] stated "*the process of monitoring under the AEMP [Aquatic Effects Monitoring Plan], identifying when monitoring results indicate a problem, and then taking action has been mistaken for AM [Adaptive Management].*" The reviewers stated that "*AM is in fact a systematic and rigorous approach for learning through deliberately designing and applying management actions as experiments, as defined and used by leading practitioners* (Murray 2008[2]).

[1] Review of the David and EKATI Adaptive Management Plans. C. Murray and M. Nelitz. 2008. Report prepared for Fisheries and Oceans Canada.
[2] Murray, C. 2008. BC Ministry of Forests and Range Workshop: Understanding & Enabling Adaptive Management in Natural Resource Management. Participant Binder. Training workshop prepared by ESSA Technologies Ltd. for BC MOFR.

Given the type of project and effects monitoring and management required, the Developer believes its definition of adaptive management [see IR 16] is appropriate for its type of project. The TOR for the EIS focused on ensuring identifying mitigations and expectations for implementation of commitments [including the requirements of guidance and guideline documents identified in Conformity Response #2 and Table 1 of the Addendum]. The TOR did not reference a requirement for an AM Plan. The Developer believes, for most of the management of environmental issues for the construction and maintenance, Adaptive Management as described in the literature is not appropriate for this project. The Developer's commitment to an Environmental Management System is more appropriate to the intended issue raised throughout the IRs of the EIRB.

IR Number: 63

To: The Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Monitoring (EIS Sec. 7.0, p. 651)

Preamble
Monitoring plans will need to be ready for contractors because the Developer states that contractors "*will be required to comply with the EMP*" (EIS Sec. 7.0, p. 651). This implies that the EMPs and the monitoring programs will need to be fully developed before the contractors can start their work. Moreover, the EMPs must clearly indicate what the adaptive management action might be if the mitigation measures listed in the EMP are not effective.

Request

1. Please provide the schedule of the regulatory and development execution process showing a clear commitment for the development of EMPs and the monitoring programs contained therein.
2. Discuss the thresholds which will be used to indicate when proposed mitigation measures will be determined to have failed and when adaptive management actions will need to be implemented.

Developer Response: 63.1

As requested, the Developer is pleased to provide the following GANTT Chart which identifies the major anticipated Project milestones and associated regulatory approvals schedule. these timelines should be considered to be "fluid" until a final contracting process is established later this Spring. Also as key activities/milestones change the Developer commits to transmitting any future revised GANTTs to EIRB.

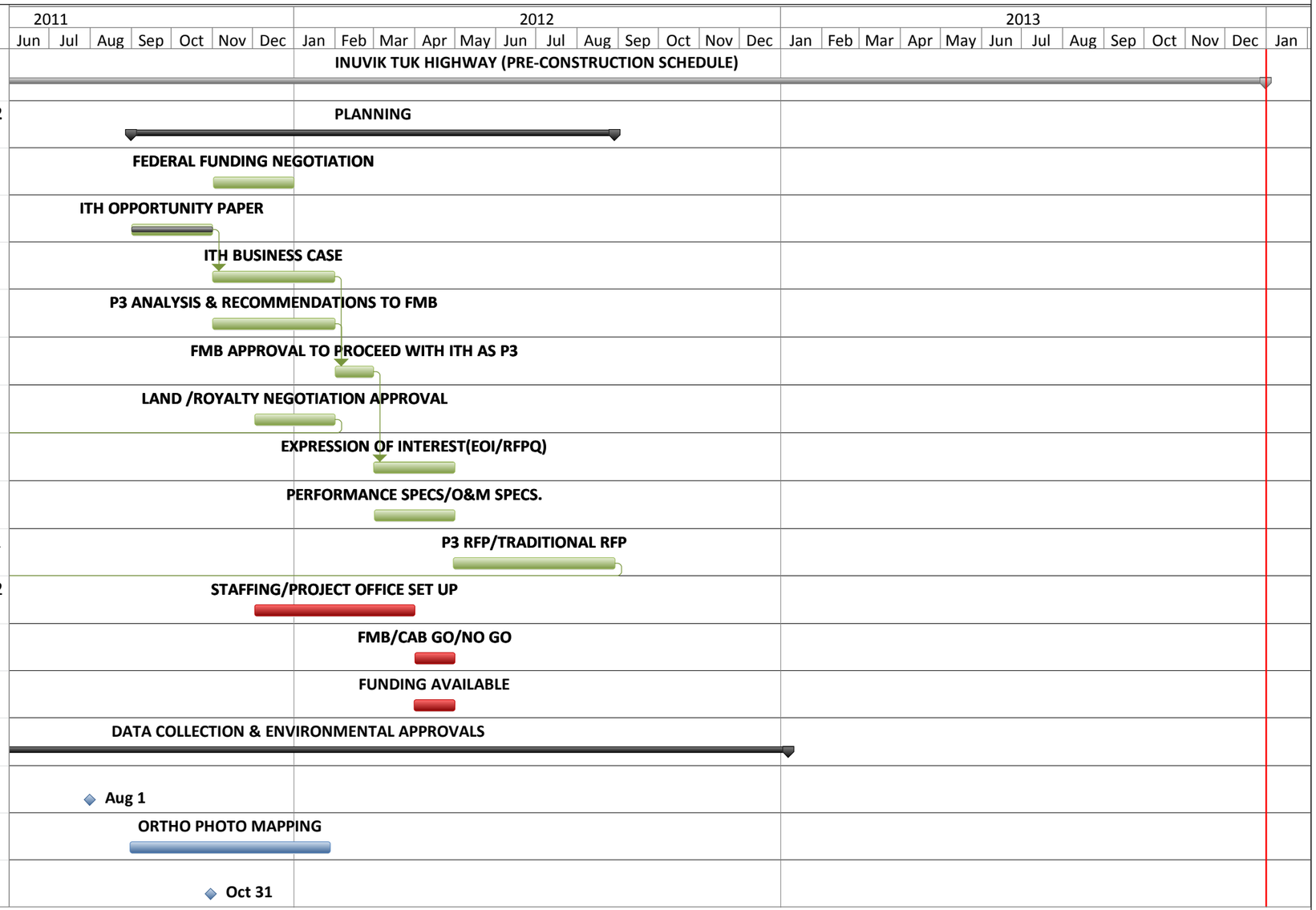
Commitments made by the Developer to prepare the necessary EMPs and monitoring programs have been previously identified in the EIS and follow-up documentation provided to the EIRB, including the Developers responses to the EIRB round 1 responses included in this document.

Northwest Territories Transportation

INUVIK- TUKTOYAKTUK HIGHWAY

TOTAL LENGTH=137 KM
ESTIMATED COST=$ 300 MILLION
CONSTRUCTION COMPLETION TIME=4 YEARS

ID	Task Mode	Task Name	Duration	Start	Finish
0		**INUVIK TUK HIGHWAY (PRE-CONSTRUCTION SCHEDULE)**	**36.51 mons**	**Dec 31 '10**	**Dec 31 '13**
1		**PLANNING**		**Sep 1 '11**	**Aug 29 '12**
2		FEDERAL FUNDING NEGOTIATION	2 mons	Nov 1 '11	Dec 31 '11
3		ITH OPPORTUNITY PAPER	2.03 mons	Sep 1 '11	Oct 31 '11
4		ITH BUSINESS CASE	3.06 mons	Nov 1 '11	Jan 31 '12
5		P3 ANALYSIS & RECOMMENDATIONS TO FMB	3.06 mons	Nov 1 '11	Jan 31 '12
6		FMB APPROVAL TO PROCEED WITH ITH AS P3	0.97 mons	Feb 1 '12	Feb 29 '12
7		LAND /ROYALTY NEGOTIATION APPROVAL	2 mons	Dec 2 '11	Jan 31 '12
8		EXPRESSION OF INTEREST(EOI/RFPQ)	2.03 mons	Mar 1 '12	Apr 30 '12
9		PERFORMANCE SPECS/O&M SPECS.	2 mons	Mar 1 '12	Apr 30 '12
10		P3 RFP/TRADITIONAL RFP	4.06 mons	Apr 30 '12	Aug 29 '12
11		STAFFING/PROJECT OFFICE SET UP	4 mons	Dec 2 '11	Mar 31 '12
12		FMB/CAB GO/NO GO	1 mon	Mar 31 '12	Apr 30 '12
13		FUNDING AVAILABLE	1.03 mons	Mar 31 '12	Apr 30 '12
14		**DATA COLLECTION & ENVIRONMENTAL APPROVALS**	**24.55 mons**	**Dec 31 '10**	**Jan 7 '13**
15		AERIAL PHOTOGRAPHY	0 mons	Aug 1 '11	Aug 1 '11
16		ORTHO PHOTO MAPPING	5 mons	Aug 31 '11	Jan 28 '12
17		LIDAR	0 mons	Oct 31 '11	Oct 31 '11



Project: INUVIK TUK HIGHWAY (P
Date: Jan 5 '12

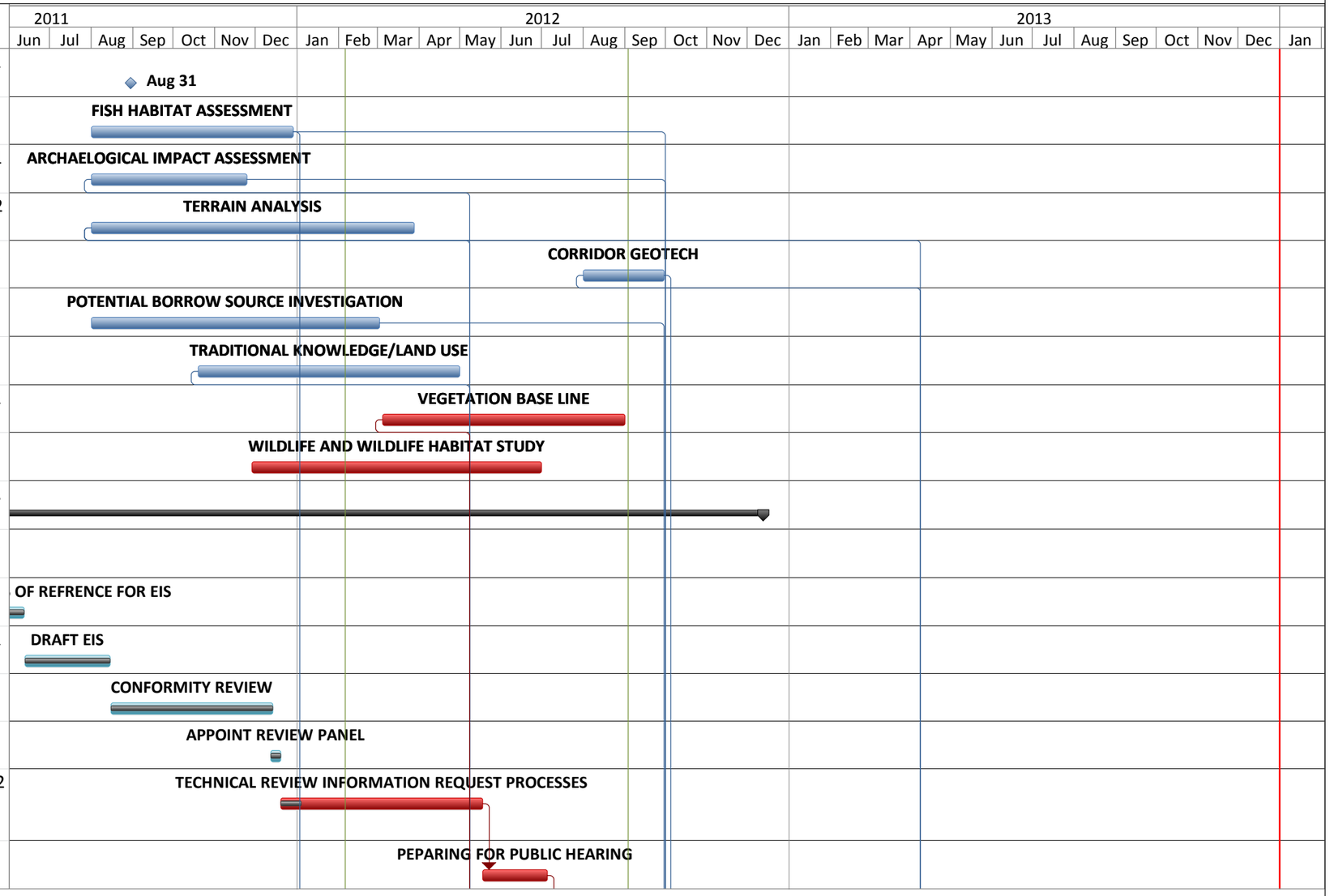
Task	Project Summary	Inactive Summary	Start-only	Progress
Split	External Tasks	Manual Task	Finish-only	
Task Already completed	External Milestone	Duration-only	Deadline	
Milestone	Inactive Task	Manual Summary Rollup	Critical	
Summary	Inactive Milestone	Manual Summary	Critical Split	

Northwest Territories Transportation

INUVIK- TUKTOYAKTUK HIGHWAY

TOTAL LENGTH=137 KM
ESTIMATED COST=$ 300 MILLION
CONSTRUCTION COMPLETION TIME=4 YEARS

ID	Task Mode	Task Name	Duration	Start	Finish
18		POTENTIAL BORROW SOURCE IDENTIFICATION	0 mons	Aug 31 '11	Aug 31 '11
19		FISH HABITAT ASSESSMENT	5 mons	Aug 1 '11	Dec 29 '11
20		ARCHAELOGICAL IMPACT ASSESSMENT	3.86 mons	Aug 1 '11	Nov 24 '11
21		TERRAIN ANALYSIS	8 mons	Aug 1 '11	Mar 28 '12
22		CORRIDOR GEOTECH	2 mons	Aug 1 '12	Sep 30 '12
23		POTENTIAL BORROW SOURCE INVESTIGATION	7.16 mons	Aug 1 '11	Mar 2 '12
24		TRADITIONAL KNOWLEDGE/LAND USE	6.47 mons	Oct 19 '11	Apr 30 '12
25		VEGETATION BASE LINE	6 mons	Mar 4 '12	Aug 31 '12
26		WILDLIFE AND WILDLIFE HABITAT STUDY	7.16 mons	Nov 28 '11	Jun 30 '12
27		**ENVIRONMENTAL IMPACT REVIEW**	**23.72 mons**	**Dec 31 '10**	**Dec 13 '12**
28		Referral, PLANNING & SCHEDULING	1.4 mons	Dec 31 '10	Feb 11 '11
29		SCOPING AND DEVELOPMENT OF TERMS OF REFRENCE FOR EIS	4 mons	Feb 11 '11	Jun 11 '11
30		DRAFT EIS	2.1 mons	Jun 12 '11	Aug 14 '11
31		CONFORMITY REVIEW	4 mons	Aug 15 '11	Dec 13 '11
32		APPOINT REVIEW PANEL	0.25 mons	Dec 12 '11	Dec 19 '11
33		TECHNICAL REVIEW INFORMATION REQUEST PROCESSES	5 mons	Dec 20 '11	May 18 '12
34		PEPARING FOR PUBLIC HEARING	1.6 mons	May 18 '12	Jul 5 '12



Project: INUVIK TUK HIGHWAY (P
Date: Jan 5 '12

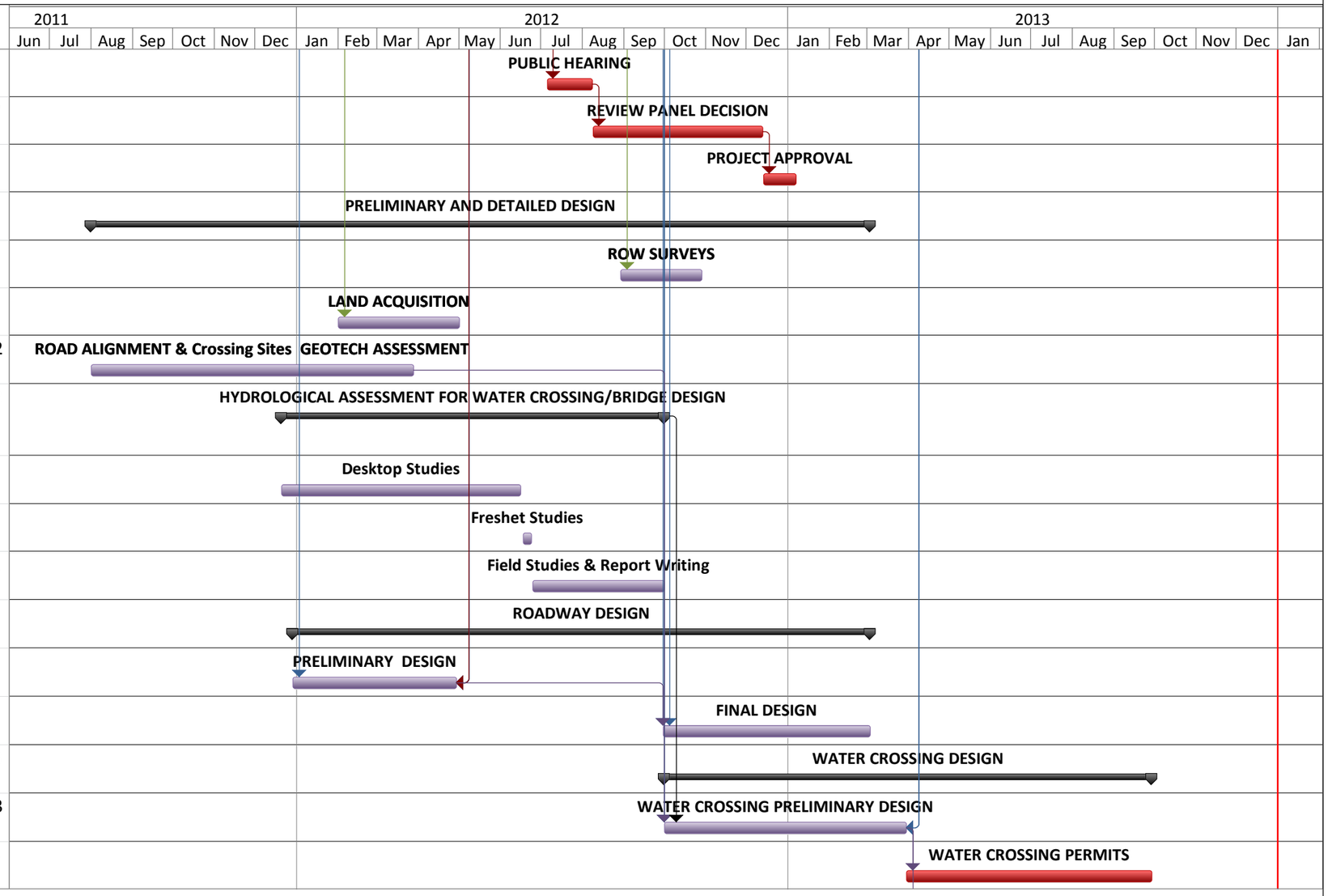
Task	Project Summary	Inactive Summary	Start-only	Progress
Split	External Tasks	Manual Task	Finish-only	
Task Already completed	External Milestone	Duration-only	Deadline	
Milestone	Inactive Task	Manual Summary Rollup	Critical	
Summary	Inactive Milestone	Manual Summary	Critical Split	

Northwest Territories Transportation

INUVIK- TUKTOYAKTUK HIGHWAY

TOTAL LENGTH=137 KM
ESTIMATED COST=$ 300 MILLION
CONSTRUCTION COMPLETION TIME=4 YEARS

ID	Task Mode	Task Name	Duration	Start	Finish
35		PUBLIC HEARING	1.1 mons	Jul 6 '12	Aug 8 '12
36		REVIEW PANEL DECISION	4.2 mons	Aug 9 '12	Dec 13 '12
37		PROJECT APPROVAL	0.8 mons	Dec 14 '12	Jan 7 '13
38		**PRELIMINARY AND DETAILED DESIGN**	**19.32 mons**	**Aug 1 '11**	**Mar 3 '13**
39		ROW SURVEYS	2 mons	Aug 29 '12	Oct 28 '12
40		LAND ACQUISITION	3 mons	Feb 1 '12	May 1 '12
41		ROAD ALIGNMENT & Crossing Sites GEOTECH ASSESSMENT	8 mons	Aug 1 '11	Mar 28 '12
42		**HYDROLOGICAL ASSESSMENT FOR WATER CROSSING/BRIDGE DESIGN**	**9.49 mons**	**Dec 21 '11**	**Sep 30 '12**
43		Desktop Studies	5.93 mons	Dec 21 '11	Jun 15 '12
44		Freshet Studies	0.2 mons	Jun 18 '12	Jun 23 '12
45		Field Studies & Report Writing	3.26 mons	Jun 25 '12	Sep 30 '12
46		**ROADWAY DESIGN**	**14.32 mons**	**Dec 29 '11**	**Mar 3 '13**
47		PRELIMINARY DESIGN	4.06 mons	Dec 29 '11	Apr 29 '12
48		FINAL DESIGN	5.13 mons	Sep 30 '12	Mar 3 '13
49		**WATER CROSSING DESIGN**	**12.1 mons**	**Sep 30 '12**	**Sep 29 '13**
50		WATER CROSSING PRELIMINARY DESIGN	6 mons	Sep 30 '12	Mar 30 '13
51		WATER CROSSING PERMITS	6.1 mons	Mar 30 '13	Sep 29 '13



Project: INUVIK TUK HIGHWAY (P
Date: Jan 5 '12

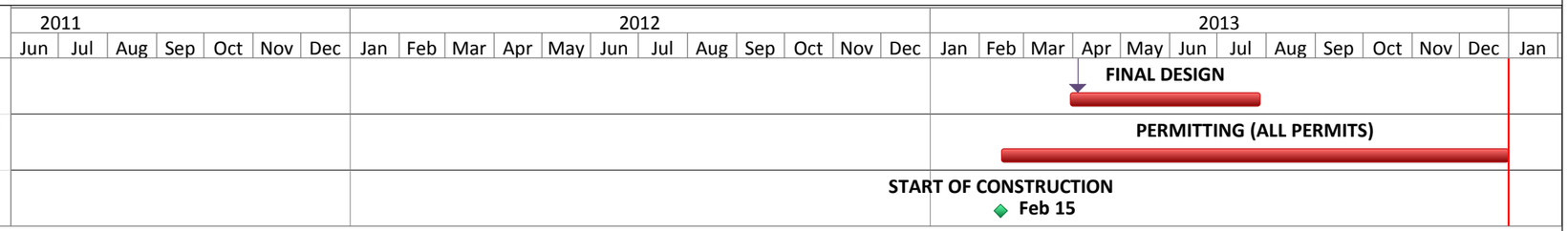
Task	Project Summary	Inactive Summary	Start-only	Progress
Split	External Tasks	Manual Task	Finish-only	
Task Already completed	External Milestone	Duration-only	Deadline	
Milestone	Inactive Task	Manual Summary Rollup	Critical	
Summary	Inactive Milestone	Manual Summary	Critical Split	

INUVIK- TUKTOYAKTUK HIGHWAY

Northwest Territories Transportation

TOTAL LENGTH=137 KM
ESTIMATED COST=$ 300 MILLION
CONSTRUCTION COMPLETION TIME=4 YEARS

ID	Task Mode	Task Name	Duration	Start	Finish
52		FINAL DESIGN	4 mons	Mar 30 '13	Jul 28 '13
53		PERMITTING (ALL PERMITS)	10.66 mons	Feb 15 '13	Dec 31 '13
54		START OF CONSTRUCTION	0 mons	Feb 15 '13	Feb 15 '13



Project: INUVIK TUK HIGHWAY (P
Date: Jan 5 '12

Task	Project Summary	Inactive Summary	Start-only	Progress			
Split	External Tasks	Manual Task	Finish-only				
Task Already completed	External Milestone	Duration-only	Deadline				
Milestone	Inactive Task	Manual Summary Rollup	Critical				
Summary	Inactive Milestone	Manual Summary	Critical Split				

Developer Response: 63.2

As discussed in IR Response 62, it is the Developer's intention to provide activity-specific guidance and best practices for effects monitoring and management in the construction and operations management plans. Thresholds signalling changes in construction or maintenance activities are expected to be defined by regulators and will be incorporated into the activity-specific plans as necessary.

The Developer acknowledges that some planning for and development of mitigation measures will need to be prepared in consultation and/or collaboration with territorial and federal departments as well as ISR co-management groups. Some management actions will need to be developed and implemented by those groups. However, the Developer will continue to engage and collaborate with those groups as possible within its mandate.

IR Number: 64

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Example EMPs - Meadowbank Gold Project: transportation Management Plan, All Weather Access Road (Developer Response to 2b and 2c, Cover Letter attachments)

Preamble

The Developer submitted the Meadowbank Gold project EMP and Monitoring Plan to demonstrate to the EIRB that other road projects in the north rely on their management and monitoring plans. These plans show examples of what can be done in follow-up programs in road projects in the north. The plans, however, do not appear to provide any information on the lessons learned. This is because the plans show the well-intended mitigation that was planned, but they do not show whether or not the mitigation was successful. Having a plan in itself is not sufficient demonstration that the mitigation within the plan actually achieved the intended reduction of adverse impacts.

Request

1. Please explain if these or similar projects in the north show whether the mitigation measures under the Management and Monitoring Plans have been effective at keeping the impacts at or below predicted levels.

Developer Response: 64.1

The Meadowbank All Weather Permanent Access Road (AWPAR) has been in operation since April 2008. As with the proposed ITH, the Meadowbank AWPAR is similar in length and also occurs entirely north of the treeline. In accordance with the Terms and Conditions and Proponent Commitments issued as part of the Nunavut Impact Review Board's (NIRB) Project Certificate for the Meadowbank Gold Mine the proponent (Agnico-Eagle Meadowbank) agreed to terms and conditions as set out in the Projects Environmental Management Plans (EMPs) for various components of the mine and AWPAR.

During road construction items relating to compliance as set out in the Project EMPs were encountered and implemented where required. When mitigation measures set out in the EMPs were not deemed effective, Agnico-Eagle Meadowbank (AEM), in consultation with the stakeholders from the Baker Lake community, Government of Nunavut (GoN) and NIRB, developed and implemented adaptive management measures to remedy deficiencies within the EMP.

During road construction in 2007 bridge installation was done in accordance to the EMP and in close cooperation with the Project fisheries biologists, in order to minimize effect on fish habitat. The protocols established with DFO were followed. A protocol was established by Project wildlife biologist for the monitoring and protection of birds nests during the nesting season. As per the EMP the road alignment was changed in some instances to protect nests that were detected on the original road alignment (NIRB 2008).

In the 2007 Project Monitoring Report NIRB identified three (3) outstanding compliance issues with the construction of the AWPAR.

1. Environmentally protective dust suppression techniques were to be employed to suppress all ground dust. No dust suppression techniques were being undertaken as part of the AWPAR construction.
2. A commitment to effectively communicate the private nature of the AWPAR and place notices on the television and radio indicating this fact. No radio or television ads had been implemented as of the Monitoring Officer's site visit. The users encountered during the visit indicate that the public were utilizing the AWPAR.
3. The Air Traffic Management Plan was to be updated to include an AWPAR Management Plan as well as to facilitate monitoring of the environmental and socio-economic impacts of the AWPAR. These updates remain an outstanding issue.

AEM submitted an updated EMP for the AWPAR in December 2007. A Dust Suppression Protocol was submitted in July 2008 and a site inspection by NIRB confirmed that the activities described in the protocol were met (NIRB 2008). The implementation of these measures limited impacts related to dust from the AWPAR in order to not exceed thresholds set out in the EMP.

Unauthorised public access of the AWPAR was evident during construction. Upon discussions with community and GoN, AEM applied for an amendment of the EMP to include a manned gatehouse at each end of the road to restrict access. As part of the amended EMP, permitting through the HTO and registration at the gatehouse was implemented for hunters (on ATVs only) from Baker Lake to access the AWPAR (NIRB 2008; AEM 2010).

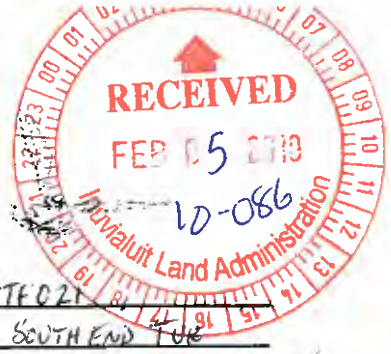
With cooperation from the HTO and GoN, hunting regulations were implemented along the AWPAR and a Hunter Harvest Survey of the community of Baker Lake was also implemented with particular focus of use of the AWPAR in order to facilitate monitoring of the environmental and socio-economic impacts (AEM 2010). The implementation of permitted access, hunting regulations and a Hunter Harvest Survey served to educate the Baker Lake community of issues related to access, hunting regulations and wildlife management issues as identified in the EMP.

Since completion of the road two (2) road related caribou mortalities occurred in 2008 and one (1) in 2010. In these instances a driver education program was expanded. Road users were notified of operational procedures when caribou were observed near the road. Drivers were encouraged to communicate via radio to other road users when wildlife was observed within 100 m of the road. During peak migration periods temporary road closures were implemented. When the road was reopened during the migration period wildlife monitors were stationed at high concentration areas to monitor if additional road closures were warranted and also to educate drivers on site specific instructions to prevent vehicle related wildlife mortalities (Gebauer and Associates 2011).

The weekly road surveys for the Meadowbank AWPAR (2008-2010) documented twenty-one (21) vehicle-related avian mortalities which included nineteen (19) ptarmigan (Gebauer & Associates 2011). Seventeen (17) vehicle-related avian mortalities were recorded during the first year of the road being completed (2008). As with terrestrial mammals vehicle-related avian mortalities also declined between 2009 and 2010. Although these vehicle-related avian mortalities did not exceed thresholds set in the EMP, the expanded driver education program that was implemented to address the three (3) reported caribou mortalities indicated in IR 61.3 g were attributed to the decline in avian vehicle-related mortalities and is an example of a proactive mitigation measure.

To address the concerns from the Baker Lake community and NIRB, AEM implemented adaptive mitigation measures relating to road access and wildlife management. As indicated in the NIRB 2010 Monitoring Report, AEM is likely to encounter unique environmental challenges with this shift in project activities; the NIRB will continue to depend upon AEM's established practice of effectively communicating and cooperating in a proactive approach to environmental protection. AEM appeared to be in compliance with the majority of the terms and conditions contained within the Meadowbank Project Certificate and with the monitoring and mitigation plans and procedures in place for the Project.

Regarding the Tuktoyatuk to Source 177 Access Road, Appendices E2 (Construction Phase Environmental Management Plan) and E3 (Wildlife Management Plan) were provided in the EIS. An example of the wildlife monitoring and mitigation implemented during construction of the access road is provided as follows:



INUVIALUIT LAND ADMINISTRATION
ENVIRONMENTAL MONITORING
DAILY REPORT

LD-086

DATE: ~~WED~~ THURS. FEB. 7 /19 **ILA RIGHT/ INAC PERMIT #:** ILA 08TF021

RIGHT HOLDER: HOT DOT GNWT **LOCATION:** GRANULAR SOURCE 177 SOUTH END TUK

CONTRACTOR: E. GRUBEN'S TRANSPORT **WEATHER:** -30°C SOUTH WIND AT 25 KM/H = -48°C W/C

EM NAME: SPENCER MANGELANA **WM(S) NAME:** WAYNE THEASHER

Terms & Conditions Compliance* - Monitoring Notes**

1. Location and Area

- The Right holder is conducting activity on lands designated in approved application.

SAME AS LAST SEASON. SAME SOURCES.

- The Right holder is conducting operations at correct distances from waterbodies, residential leases, etc.

FOR GRANULAR PROJECT IT IS NECESSARY TO UTILISE ELEMENTS ON ROAD CONSTRUCTION.

- The camp is located in an appropriate area (on durable land, at an existing campsite, insulated pad, etc.).

2. Type and Size of Equipment

- The Right holder is using approved equipment listed in the accepted application.

YES AFTER STORM PERSONNEL BOOSTED FOR SNOW REMOVAL ON ACCESS ROAD TO QUARRY.

3. Methods and Techniques

- Vehicular/Machinery travel is occurring on roads or areas with appropriate snow cover.

YES. ALL TIME WHILE EQUIPMENT IS CONSTRUCTING RAMPS PREPARING FOR GRAVEL HAUL.

- Lines, trails and right-of-ways are created with acceptable widths, turns, doglegs, etc.

YES.

- The Right holder is not clearing areas larger than identified in the approved application.

NO, NOT AFTER STORM. ROADS ARE PLOWED OPEN

- The Right holder is storing materials in properly designated areas (stockpiles, storage on ice, etc.).

YES.

5. Operation of Facilities

- Lines, trails, right-of-ways, etc. are marked appropriately (ex. seismic markers, access road signage, etc.).

YES.

- The Right holder is ensuring the land use area is clean at all times (ie. general housekeeping of the worksite).

ON A DAILY BASIS.

*This list captures some of the environmental terms and conditions of regular land use activities on Private Land. It is, by no means, a complete list and ALL terms and conditions, specific to the project, should be checked for compliance on a daily basis.

**Notes should detail the compliance or non-compliance of the land use activity. N/A should be written where the activity does not apply.

INUVIALUIT LAND ADMINISTRATION
ENVIRONMENTAL MONITORING
DAILY REPORT

6. Ponding, Flooding, Etc.

- Slopes, grades or inclines are constructed according to authorized specifications. (This applies to excavations, embankments, stream crossings, etc.)

ALL NECESSARY MEASURES ARE FOLLOWED.

- The project is not altering or obstructing the course of natural drainage.

NO.

- The Right holder is ensuring erosion prevention/control throughout the land use operation.

YES.

- The Right holder has prepared the work site to ensure that the ground surface is thoroughly protected.

THOROUGHLY, YES.

- Overland travel is occurring without disturbing the ground surface (i.e. rutting, gouging, exposed vegetation, etc.)

ON ROAD CONSTRUCTION IT IS NECESSARY FOR ACTION IN THIS SUBJECT.

7. Chemical or Toxic Material

- The Right holder (including any contractor) is using only those chemicals designated in the approved application.

YES.

- All parked vehicles and equipment is sufficiently protected to contain drips or leaks (ex. haz-mats/drip trays).

DURING SHIFT CHANGE AND REFUELING PROCESS.

- All waste (drilling fluids, petroleum products, chemicals, etc.) shall be properly contained and disposed of according to the methods approved in the application.

YES.

8. Wildlife and Fisheries Habitat

- Project activities are conducted so as to minimize adverse impacts on wildlife and fish habitat (cleared areas minimized, reduced obstruction of fish passageways, adequate water intake screens, etc.).

YES.

9. Refuse/Sewage Handling

- All refuse, sewage and/or grey water is contained and ultimately disposed of properly, according to the methods in the approved application (incinerated, removed to proper disposal area/community, etc.).

YES.

10. Historical/Archaelogical

- Distance restrictions are abided by for known or suspected archeaological, historical and traditional sites.

YES.

*This list captures some of the environmental terms and conditions of regular land use activities on Private Land. It is, by no means, a complete list and ALL terms and conditions, specific to the project, should be checked for compliance on a daily basis.

**Notes should detail the compliance or non-compliance of the land use activity. N/A should be written where the activity does not apply.

INUVIALUIT LAND ADMINISTRATION
ENVIRONMENTAL MONITORING
DAILY REPORT

- Proper procedures are known and followed if an archaeological, historical or traditional site is encountered.
PAPER WORK IS IN THE SLEEPS FOR NOW ON THIS SUBJECT.

11. Fuel Storage

- Fuel cache location(s) should be located on stable, level land (at the appropriate distance from water - 100 m).
STABLE LEVEL GROUND IS CONSTRUCTED AND APPR. DISTANCE FROM WATER BODIES (SURROUNDING).

- Fuel containers/caches to have adequate secondary containment when necessary (based on fuel amounts).
YES

- The Right holder is ensuring regular inspections are performed of the fuel containers/caches to check for leaks and necessary maintenance is carried out when required.
ON A DAILY BASIS.

- Fuel containers should be properly labelled with the Right holder's name and permit number, fuel type and year purchased or filled. Fuel caches should be properly marked (flags, posts, etc.) so that they are visible at all times.
HAND BOMBED SIGNS ARE BUILT.

12. Debris and Brush Disposal

- Clearing of vegetation is kept to a minimum. Wherever possible the natural vegetation shall be preserved.
YES.

- Disposal is occurring appropriately and in a manner consistent with the project's terms and conditions.
YES. WILL BE.

13. Restoration of the Lands

- The Right holder is restoring the land use area according to their approved decommissioning plans with ILA.
AT LATER DATE.

- Areas of land disturbance have been reclamated (ex. shot holes plugged, tundra damage repaired, water crossings restored, all debris removed, etc.).
YES.

14. Display of Permits

- The Right holder is displaying a copy of the land use authorization (permit, license, lease,etc.) throughout the duration of the project.
YES.

- Project personnel are informed of the ILA's authorization and kept aware of the associated terms and conditions.
YES.

*This list captures some of the environmental terms and conditions of regular land use activities on Private Land. It is, by no means, a complete list and ALL terms and conditions, specific to the project, should be checked for compliance on a daily basis.
**Notes should detail the compliance or non-compliance of the land use activity. N/A should be written where the activity does not apply.

INUVIALUIT LAND ADMINISTRATION (ILA)
ENVIRONMENTAL MONITORING DAILY REPORT

ILA RIGHT/INAC PERMIT #: ILA 08TF021
RIGHT HOLDER: ~~EGT~~ / HOJ / DOT / GNWT
CONTRACTOR: EGT

ENVIRONMENTAL MONITOR: SPENCER MANGELANA
WILDLIFE MONITOR: WAYNE THRASHER
LOCATION: GRANULAR SOURCE 177

JAN. JANUARY

JAN 27 TO FEB. 3

DATE	~~JAN 26~~	~~JAN 27~~	FEB 2	27	28	29	30
DAY	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
WEATHER/TEMPERATURE/WIND	-25°C STORM W AT 50	-30°C CALM CLEAR	-30°C CLEAR	DRIFTING SNOW -24°C E	DRIFTING SNOW -24°C E40	-27°C EAST WIND 32 = -40°	-25°C ESE WIND 30 = -37°C

CHECKLIST (√ / X)

STORM DAY

LOCATION AND AREA							
Activity on lands designated in approved application?	✓	✓	✓	✓	✓	✓	✓
Operations greater than 50m from waterbodies?	✓		✓				
Operations greater than 300m from cabins/private residences?	✓	✓	✓	✓	✓	✓	✓
	✓						
TYPE AND SIZE OF EQUIPMENT							
Equipment in use as in approved application?	✓	✓	✓	✓	✓	✓	✓
			✓				
METHODS AND TECHNIQUES			✓				
No ground rutting or gouging from traveling vehicles?	(1) X	(1) X	(3) X	(1) X	(1) X	(1) X	X
Using dogleg lines to approach lakes/streams/public roads?	✓	✓	✓	✓	✓	✓	✓
Size of cleared land area as in approved application?	✓	✓	✓	✓	✓	✓	✓
Vehicles traveling on appropriate amount of snow?	✓	✓	✓	✓	✓	✓	✓
			✓				
OPERATIONS OF FACILITIES			✓				
Are trails and access roads marked appropriately?	✓	✓	✓	✓	✓	✓	✓
Is land use area kept clean?	✓	✓	✓	✓	✓	✓	✓
			✓				
PONDING, FLOODING, ETC.			✓				
Is the minimum incline being used to approach lakes/streams?	✓	✓	✓	✓	✓	✓	✓
Is natural drainage flowing as usual?	✓	✓	✓	✓	✓	✓	✓
Are any deposited materials/debris removed from water bodies?	(2) X	(2) X	(2) X	(2) X	(3) X	(2) X	(3) X

CHEMICAL OR TOXIC MATERIAL	✓	✓		✓	✓	✓	✓
Are all chemicals used approved in the application?							
WILDLIFE AND FISHERIES HABITAT							
Minimal damage/impacts to wildlife or fish habitats?	✓	✓		✓	✓	✓	✓
HISTORICAL/ARCHAEOLOGICAL/TRADITIONAL SITES							
Are proper procedures being followed if site is encountered?	✓	✓		✓	✓	✓	✓
FUEL STORAGE							
Where needed, is secondary containment being used for fuel containers/caches?	✓	✓		✓	✓	✓	✓
Are fuel caches visibly marked?	✓	✓		✓	✓	✓	✓
Are fuel caches greater than 100m from waterbodies?	✓	✓		✓	✓	✓	✓
All fuel containers labelled with "name, permit number, fuel type and year purchased/filled?	✓	✓		✓	✓	✓	✓
DEBRIS AND BRUSH DISPOSAL							
Are all willows being avoided?	(3) ✗	(3) ✗		(3) ✗	(3) ✗	(3) ✗	(3) ✗
DISPLAY OF PERMITS							
Is land use authorization being displayed during entire project?	✓	✓		✓	✓	✓	✓
Are all project personnel aware of all Terms and Conditions?	✓	✓		✓	✓	✓	✓
ADDITIONAL CONDITIONS (PROJECT SPECIFIC)							
Operations greater than 300m from active bear dens?	✓	✓		✓	✓	✓	✓
Operations greater than 500m from caribou?	✓	✓		✓	✓	✓	✓
Are waterbody crossings for road 5m or less?	(4) ✗	(4) ✗		(4) ✗	(4) ✗	(4) ✓	(4) ✗
Does each camp have 50 personnel or less?	✓	✓		✓	✓	✓	✓
Is daily water use less than 100L?	(5) ✗	(5) ✗		(5) ✗	(5) ✗	(5) ✗	(5) ✗

QUESTIONS (answer/describe)

LOCATION AND AREA

What type of ground are the camps built on? CAMP (WARM-UP SHACK IS ON GRANULAR SOURCE.

Sunday	TODAY WARM UP SHACK HAS BEEN RELOCATED AT STAGE AREA
Monday	SHACK IS AT CO-ORDINATES AS LAST SEASON.
Tuesday	
Wednesday	AT GRAVEL PIT.
Thursday	" "
Friday	" "
Saturday	" "

METHODS AND TECHNIQUES

Where are materials being stored?

Sunday	INSIDE GENERATOR TRAILER.
Monday	GEN. SHACK.
Tuesday	
Wednesday	MATERIALS ARE STORED AT GENERATOR SHACK (OIL, FLUID, SOAK PADS, GREASE).
Thursday	" " " " "
Friday	" " " " "
Saturday	" " " " "

PONDING, FLOODING, ETC.

What erosion prevention/control measures are being taken (ie. Installing erosion control structures)?

Jan 31 Sunday	BERMS ARE CONSTRUCTED FOR STAGE AREA, FUEL SLOOP
Feb 1 Monday	" " " " "
2 Tuesday	
Jan 27 Wednesday	N/A
28 Thursday	N/A
29 Friday	N/A
30 Saturday	NATURAL CONTROL (SELF EXPLANATORY) FOR THAW SEASON

How is the worksite prepared to protect the ground surface (ie. Insulation)?

Sunday	RAMPS ARE BUILT WITH WATER & SNOW FOR APPROACHES TO GRAVEL SOURCES
Monday	AND TO SECTION C. OF PROJECT.
Tuesday	
Wednesday	PROTECTION OF GROUND SURFACE IS CONSTRUCTED WITH SNOW AND WATER [redacted] EQUIPMENT OPS.
Thursday	" " " " "
Friday	" " " " "

Saturday SNOW AND WATER UTILIZED FOR OPERATION.

CHEMICAL OR TOXIC MATERIAL

What are parked vehicles using to prevent leaking (ie. Haz-mats, drip trays)?

Sunday UTILIZED BETWEEN SHIFT CHANGES.
Monday 〃
Tuesday
Wednesday HAZ-MATS ARE UTILISED FOR VEHICLES AND HEAVY EQUIPMENT.
Thursday 〃
Friday 〃
Saturday 〃

How are chemical and petroleum products being disposed of?

Sunday TRANSPORTED BACK TO E.G.T SHOP.
Monday 〃
Tuesday 〃
Wednesday CHEMICAL AND PETROLEUM PRODUCTS ARE TRANSPORTED BACK TO E.G.T SHOP FOR PROPER DISPO.
Thursday 〃
Friday ↑
Saturday ↑↑↑

REFUSE/SEWAGE HANDLING

How is sewage and grey water disposed?

Sunday SEWAGE IS CONTAINED WITH FLUSH FOIL WASTE BAGS (TRANSPARENT)
Monday 〃
Tuesday 〃
Wednesday SEWAGE IS CONTAINED AND TRANSPORTED BACK TO TOWN FOR DISPOSAL. (PACTO TOILETS).
Thursday 〃
Friday SAME AS ABOVE
Saturday 〃

How is garbage and debris disposed?

Sunday BACK TO MUNICIPAL WASTE SITE.
Monday 〃
Tuesday 〃
Wednesday GARBAGE AND DEBRIS ARE TRUCKED BACK TO TOWN.

Thursday	SAME AS USUAL.
Friday	" "
Saturday	TRANSPORTED TO TOWN.

HISTORICAL/ARCHAEOLOGICAL/TRADITIONAL SITES

Describe any historical, archaeological or traditional sites in land use area.

Sunday	NO ARCHY SITES YET.
Monday	" " " "
Tuesday	" " " "
Wednesday	AS OF THIS YEAR, NO HISTORICAL SITES HAVE BEEN ENCOUNTERED YET.
Thursday	" " " " "
Friday	↑ ↑ ↑ ↑ ↑
Saturday	" " " " "

Distance from historical, archaeological or traditional sites (m)?

Sunday	N/A.
Monday	N/A
Tuesday	N/A
Wednesday	GRANULAR SOURCE AND PROJECT ARE APPROX. 70-100 M FROM HUSKY LAKE TRAIL.
Thursday	" " " " "
Friday	SAME AS ABOVE.
Saturday	" " "

FUEL STORAGE

What type of ground are the fuel cache(s) stored on?

Sunday	AT THE GRAVEL SITE
Monday	" "
Tuesday	" "
Wednesday	FUEL CACHE(S) ARE STORED AT GRANULAR SOURCE.
Thursday	" " " "
Friday	SAME AS ABOVE.
Saturday	GRAVEL PAD. OR PIT.

How often are fuel caches inspected?

Sunday	DAILY BASIS
Monday	" "

Tuesday	" " " "
Wednesday	IT IS INSPECTED TWICE A DAY (SHIFT CHANGE).
Thursday	TWICE DAILY.
Friday	TWICE DAILY.
Saturday	ON A DAILY BASIS

DEBRIS AND BRUSH DISPOSAL

How much vegetation is being cleared?

Sunday	LOW SHRUB CLEARED FOR CONSTRUCTION.
Monday	" " " "
Tuesday	" " " "
Wednesday	NO VEGETATION IS CLEARED YET.
Thursday	" " "
Friday	" " "
Saturday	" " "

How is vegetation disposed?

Sunday	VEGETATION IS IN LOW DISTURBANCE FOR CONSTRUCTION.
Monday	" " " " "
Tuesday	" " " " "
Wednesday	N/A
Thursday	N/A
Friday	N/A
Saturday	VEGETATION IS PROTECTED WITH GEOTEXTILE ALONG WITH GRAVEL DURING TRANSPORT.

RESTORATION OF THE LANDS

What is being done to clean-up and restore the land to it's original state?

Sunday	ON A DAILY BASIS EMPLOYEES ARE ENSURING THAT THAW FOR RESTORATION OF LAND (TECHNIQUE).
Monday	" " " " " " "
Tuesday	" " " " " " "
Wednesday	NATURAL LIGHT WILL BRING BACK THE LAND TO IT'S ORIGINAL STATE. (THAW SEASON)
Thursday	" " " " "
Friday	" " " " "
Saturday	" " " " "

OTHER DETAILS/ELABORATE ON ANY "X" ON CHECKLIST

(1) CUTTING AND GOUGING ARE A NATURAL OCCURRANCE FROM EQUIPMENT ON CONSTRUCTION OF ALL WEATHER ROAD

(2) NATURALLY DEPOSITED SNOW IS UTILISED FOR CONSTRUCTION OF STAGE SITE AND OVERLAND APPROACHES AT GRANULAR SOURCE.

(3) NO. WILLOWS AND SHRUBS ARE CLEARED FOR THE GEOTEXTILE TO BE LAYED OUT BY LABOUR CREWS PRIOR TO GRAVEL DEPOSIT ON LICENSED LAND APPLICATION.

~~(4) CAMP HAS LESS THAN 50 PERSONNEL AT GRANULAR SOURCE THROUGHOUT DURATION OF PROJECT~~

(4) MORE THAN A HUNDRED LITRES OF WATER IS NECESSARY FOR OVERLAND APPROACHES AND STAGING AREA. TO BE FRANK, IT IS IMPERATIVE!

~~[illegible] EXCEEDING LIMITATIONS FOR EQUIPMENT UTILISATION~~

COMPANY REPRESENTATIVE: [signature]

ENVIRONMENTAL MONITOR: Spencer Magula

DATE: FEB 4 / 2010.

References:

AEM 2010. Meadowbank Gold Project Transportation Management Plan: All Weather Private Access Road

NIRB 2010. The NIRB's 2009-2010 Annual Monitoring Report for the Meadowbank Gold Project.

NIRB 2008. The NIRB's 2007 - 2008 Monitoring Report for the Meadowbank Gold Mine Project

NIRB 2007. 2007 Annual Monitoring Report for Agnico-Eagle Mines Ltd.'s Meadowbank Gold Mine Project

IR Number: 65

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Monitoring - Regional and Local Economies (Developer Response to 2b and 2c, p. 83-86)

Preamble

Section 9.1.2 (Developer Response to 2b and 2c, p. 83-84) lists and describes residual effects of the Development on the local and regional economies, and includes tourism. Section 9.1.4 (Developer Response to 2b and 2c, p. 85-86) states that "*Contribution to GDP* [Gross Domestic Product] *and Direct Taxes is related to aspects of the Tourism, Commercial and Public Recreational Use Valued Component*" and includes Table 4 of the previously submitted Addendum, which lists the indicators and measurement parameters for monitoring Tourism, Commercial and Public Recreational Use. There are, however, no corollary tables to list the indicators and measurement parameters to monitor the other residual effects described in Section 9.1.2. Section 9.1.4 (Developer Response to 2b and 2c, p. 85-86) also provides a list of agencies and organizations and their responsibilities related to "*…administering related legislation, providing funds or public services, and/or conducting monitoring.*"

Request

1. For the other residual effects described in Section 9.1.2, please provide the indicators and measurement parameters that will be used to monitor the accuracy of the impact predictions and the effectiveness of the mitigation measures.
2. If the indicators and measurement parameters for the other residual effects described in Section 9.1.2 are listed elsewhere in the application, please provide references to them.
3. Please indicate which of the agencies and organizations referred to in Section 9.1.4 are responsible for monitoring the effects described.
4. Please explain how the various agencies and organizations will monitor the accuracy of the impact predictions and the effectiveness of mitigation. Include, if possible, the indicators and parameters that will be used.

Developer Response: 65.1

As stated in Section 9.1.4 of the Developers Response to 2b and 2c, several agencies and/or organizations have existing responsibilities related to administering related legislation, providing funds or public services, and/or conducting monitoring. Although the Developer is pleased to provide the following information for potential indicators and measurement parameters (Table IR65-1), the Developer cannot commit another agency or organization to use these indicators or measurement parameters, or to monitor the effectiveness of the mitigation measures.

TABLE IR65-1: PROPOSED INDICATORS AND MEASUREMENT PARAMETERS FOR CONTRIBUTION TO GROSS DOMESTIC PRODUCT AND DIRECT TAXES

Residual Effect	Indicators	Measurement Parameters	Responsible Party
Construction and operation of the Highway are expected to result in a net positive economic benefit construction-related employment procurement of goods and services during construction and operations indirect and induced employment and purchases net increase in GDP	Effects predictions Change in tourism, commercial and recreational businesses and revenues	Gross domestic product (NWT, Canada) Community and regional employment statistics (labour force) Project-specific employment and procurement statistics	Statistics Canada GNWT Bureau of Statistics Developer/Contractor(s)
Potential increase in standard of living	Effects predictions Change in income, number of people requiring income assistance, and prices	Living cost difference Food price index Personal income Income assistance GDP per capita	Statistics Canada GNWT Bureau of Statistics
Potential loss of revenue to the airline industry, but increased revenue for the ground transportation industry	Effects predictions Change in commercial transportation businesses and revenues	Industry-specific revenue Industry-specific employment	NWT Airline Industry NWT Ground Transportation Industry

Developer Response: 65.2

Please see Developer Response 65.1 and Section 7.2.1 of the EIS.

Developer Response: 65.3

Please see Developer Response 65.1.

Developer Response: 65.4

Please see Developer Response 65.1 for the indicators and measurement parameters used.

Most of the measurement parameters are regularly collected and reported by Statistics Canada and GNWT Bureau of Statistics, except for industry-specific revenue and employment data.

As stated in Section 7.2 of the EIS:

The Developer will require the contractor(s) to report on various parameters related to their activities. Parameters include:

- *ISR hiring/contract preferences;*
- *Employment:*
  - Number of workers employed;
  - Employee gender;
  - Location of employee residence; and
  - Wages paid.
- *Training:*
  - Types of training provided;
  - Number of employees trained;
  - Employee gender; and
  - Location of employee residence.

The Developer is willing to provide this information to related monitoring programs, upon request.

Although the Developer is pleased to provide the list of indicators and measurement parameters, the Developer cannot commit another agency or organization to use these indicators or measurement parameters, or to monitor the effectiveness of the mitigation measures.

IR Number: 66

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Monitoring and Valued Socio-economic Components (EIS Sec. 4.1.2, p.462**;** EIS Sec. 4.3, p.568-569**;** Addendum to the EIS, Table 4, p.45-46; Developer Response to 2b and 2c, p.80-131)

Preamble

Table 4.1.2-1 (EIS p.462) lists the Valued Social Components (VSCs) for the Human Environment. Table 4.3-1 presents a summary of the predicted effects for these VSCs, while Table 4.3-2 (EIS p.569) presents a summary of the predicted socio-economic effects for "other socio-economic components" assessed within the Human Environment Section.

Table 4 of the Addendum, titled "*Proposed Biophysical and Socio-economic Effects Monitoring Programs*" refers only to monitoring for the VSCs as they are listed in Table 4.3-1of the EIS, and does not describe monitoring for the "other socio-economic components".

The Developer response to 2b and 2c (p.80-131) describes the Developer's commitments to monitor and report on some specific effects (i.e. employment and training). It also identifies other parties that routinely undertake monitoring activities, but does not explicitly state which development-specific effects these parties will monitor, how effects will be monitored (i.e. using which indicators), and how the results of monitoring will be used to adapt mitigation, as necessary.

Request

1. Please indicate whether any monitoring programs are proposed for the other "*Socioeconomic Components*" (as listed in Table 4.3-2 of the EIS), and if so which agency is taking responsibility.
2. For each of the predicted effects, please indicate which party (or parties) are responsible for monitoring, and explain how the effects will be monitored (i.e. using which indicators, and how the results of monitoring will be used in adaptive management.

Developer Response: 66.1

The Developer will not undertake any monitoring programs for the Socio-economic Components of:

- Regional Economy
- Infrastructure
- Individual, Family and Community Wellness
- 67.Traditional Cultures

However, as indicated in the response to IR 60, the GNWT is committed to monitoring and reporting on the following socio-economic components and indicators in the Mackenzie Gas Project Socio-economic Agreement.

j. Employment
    a. Employment/unemployment rates; and
    b. Annual work patterns

k. Educational attainment
    a. Current education attainment
    b. School enrolments; and
    c. Graduation rates
l. Economic effects
    a. NWT economic accounts (e.g. gross domestic product, etc)
    b. Labor income
    c. Investment
    d. Economic activity by sector (e.g. retail, wholesale, etc)
    e. Inflationary impacts; and
    f. Business activity
m. Health and social well-being
    a. Family and community stress
    b. Family structure
    c. Children receiving services
    d. Substance use, addictions and impacts
    e. Spending patterns
    f. Crime and justice
    g. Communicable diseases
    h. Non-communicable diseases
    i. Premature deaths (e.g. accidents, homicides, suicides)
    j. Injuries; and
    k. Housing
n. Income
    a. Employment and total income
    b. Family and household income, and
    c. Income security
o. Population
    a. Population
    b. Births; and
    c. Migration
p. Traditional practices
    a. Hunting and fishing
    b. Trapping
    c. Consumption of country foods; and
    d. Cultural knowledge (aboriginal language use)
q. Net effects on government
    a. Use of government systems including the public safety, transportation, health care and social services, and municipal infrastructure systems; and
    b. System costs
r. Sustainable development

As indicated in the GNWT's letter of November 18, 2011, most of these indicators are within the normal program monitoring and/or periodic surveys of the GNWT. It is anticipated that the components cited in the EIS will be monitored by the GNWT with co-management partners in the ISR including the Inuvialuit Regional Corporation and communities.

Developer Response: 66.2

The specific indicators to be monitored by the GNWT and co-management partners are listed in 66.1. The results of the monitoring will be used as part of the normal business planning process of the GNWT. The planning process of the GNWT is described in the GNWT's letter of November 18, 2011.

IR Number: 67

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Accidents and Malfunctions (EIS, Section 4.4)

Preamble
The Developer has committed to providing a number of plans such as a spill contingency plan, a waste management plan, and Health, Safety and Environmental (HSE) policies. The Developer notes that Environmental Monitors will ensure that contractors abide by these plans.

It is unclear how, and when these plans will be finalized and who the authorities might be to approve these plans. Clarity on the process of developing these plans is required, particularly in light of a tight construction schedule and the need to have these plans in place before construction starts.

Request

1. Please list in tabular format the plans that will be developed to deal with Accidents and Malfunctions.
2. Please describe the milestones and deadlines for the development of the plans, and describe how and by whom the plans will be approved before construction starts.
3. Please describe the process of ensuring compliance with any given plan.
4. Please indicate how non-compliance will be dealt with; this description should focus on the reporting structure, specifically noting the responsible authority, and the actions that could follow from the reporting of non-compliance.
5. Provide a schedule for submission of the final, development specific plans.

Developer Response: 67.1

The specific plans to be developed to address possible Accidents and Malfunctions will be as follows:

Spill Contingency Plan - The Developer will require that Project contractors prepare spill contingency plans, outlining spill reporting, containment, and clean-up. These will be completed by contractor(s) at least three months prior to the start of construction (i.e. October 2012).

Health and Safety Plan - The Developer commits to ensuring that its contractor(s) have Health, Safety and Environment (HSE) manuals; work procedures documents; and site specific health and safety plans. The Developer or its contractor(s) will develop Project-specific Bear Safety Guidelines and will educate staff accordingly including the proper use of non-lethal wildlife deterrent materials (e.g., bear spray). These will be completed by contractor(s) at least three months prior to the start of construction (i.e. October 2012).

Hazardous Waste Management Plan - The Developer and/or contractor(s) will develop a hazardous waste management plan (HWMP) as part of land use permitting applications to the ILA and AANDC. The HWMP will encompass all pre-construction and construction phases of the

Project and will apply to the Developer and all Project contractors involved in receiving, transferring, and transporting hazardous waste for the Developer's activities. These will be completed by September 2012 or as specified by the regulator.

Waste Management Plan - The Developer and/or contractor(s) will develop a waste management plan for all wastes associated with preconstruction and construction activities as part of land use permitting applications to the ILA and AANDC. The waste management plan will apply to the Developer and all associated Project contractors involved in the generation, treatment, transferring, receiving, and disposal of waste materials for the Project. These will be completed by September 2012 or as specified by the regulator.

Developer Response: 67.2

As previously discussed in Section 2.7.7.10 of the Part A Addendum dated August, 2011, the Developer has committed to the preparation of an Environmental Management Plan (EMP) prior to construction. Certain component plans will be submitted for regulatory approval.. The EMP will clearly define expectations for compliance monitoring, responsibilities, requirements for training, and reporting.

The EMP will contain the plans identified in response to IR 67.1 and the following additional plans:

Erosion and Sedimentation Control Plan - The Developer and/or contractor(s) will provide an erosion and sedimentation control plan to the ILA and AANDC as part of land use permitting. These plans will also be reviewed by DFO as part of fish and fish habitat protection planning. This plan will be completed by September 2012 or as specified by the regulator.

Fish and Fish Habitat Protection Plan - The Developer will develop and implement a fish and fish habitat protection plan in consultation with DFO that will include mitigation measures and adherence to Operational Statements or other direction by DFO. These will be completed by September 2012 or as specified by DFO.

Wildlife and Wildlife Habitat Protection Plan - The Developer will develop and implement a wildlife (i.e. mammals and birds) and wildlife habitat protection plan in consultation with GNWT ENR, Environment Canada, WMAC, and HTCs. This plan is anticipated to be completed by September 2012.

Archaeological Site(s) Protection Plan - The Developer will prepare an archaeological site(s) protection plan to facilitate the continued protection and management of archaeological resources during the construction phase of the Project. This will be completed by October 2012.

Pit Development Plan – The Developer will provide pit development plans to the ILA and AANDC as part of the quarry permitting process. Site specific pit developments plans will be phased over three years ahead of each year of construction. The first plans are anticipated to be completed by September 2012.

The Developer also anticipates developing an Environmental Management Plan for the operations phase of the Highway. The operations EMP will be completed six months prior to the opening of the Highway to the public. This EMP will be developed in consultation with agencies such as the HTCs, WMAC, Environment Canada and GNWT ENR. The focus will be on operational guidelines and procedures relevant to the mandate of GNWT DOT. The EMP will include guidelines and public education related to Highway usage and monitoring of highway user activities.

In addition, the Developer anticipates developing a post-construction monitoring plan in consultation with or directed by regulators to evaluate the success of mitigation measures and to identify required modifications, repairs, or maintenance.

Developer Response: 67.3

As discussed in a number of the other IR responses during the seasonal construction phase, all Highway construction and related activities will be undertaken by independent environmental monitors provided by the Inuvialuit Lands Administration (ILA) and wildlife monitors provided by the Tuktoyaktuk and Inuvik HTCs, to ensure the application of prescribed mitigation measures as necessary. This approach is consistent with the construction-phase environmental and wildlife monitoring that was conducted for the recently completed construction of the Tuktoyaktuk to Source 177 Access Road.

During the following spring break-up and summer periods, the construction Contractors will be required to undertake follow-up monitoring, maintenance and mitigation work as may be necessary on culverts and bridges installed the previous winter and the Highway embankment.

In addition, the Developer will be working as necessary with the ILA, the Tuktoyaktuk and Inuvik Hunters and Trappers Committees; the Wildlife Management Advisory Committee (WMAC), the Fisheries Joint Management Committee (FJMC) the GNWT Department of Environment and Natural Resources (ENR), and selected environmental consultants to monitor stream crossing water flows, water quality, terrain, vegetation and wildlife habitat to validate conformance with the mitigation measures contained in the Wildlife Management Plan and the various licenses and permits that will be issued for the Highway construction project.

The various monitoring reports will be made available as necessary to the appropriate regulatory agency from whom the licenses, permits, authorizations and approvals were obtained. These agencies will include the Inuvialuit Lands Administration (ILA), Aboriginal Affairs and Northern Development (AANDC), Fisheries and Oceans Canada (DFO), the Northwest Territories Water Board (NWTWB), Transport Canada (TC) and the Prince of Wales Heritage Museum (PWNHC). These agencies will ultimately be responsible for determining compliance with their licenses, permits, authorizations and approvals.

It has also been noted that for the Meadowbank Gold Project All Weather Private Access Road (AWPAR), the Nunavut Impact Review Board (NIRB) has also required Annual Monitoring Reports, which address compliance with terms and conditions specified for the AWPAR in the NIRB Project Certificate

Developer Response: 67.4

Although the Developer and it contractors will be fully committed to complying with the terms and conditions of all licenses, permits, authorizations and approvals, items of non-compliance or concern will be dealt with immediately on site during project construction or as soon as practical thereafter. Two examples of how issues of non-compliance or concern were addressed by the Developer were discussed in the IR 59 and IR 64 responses.

Developer Response: 67.5

The estimated schedules for preparing each of the plans described in IR responses 67.1 and 67.2 are included in those respective responses. It should be noted that most of those plans will be required in support of applications for the various necessary licenses, permits, authorizations and approvals, and will typically be approved for use by the applicable regulatory agencies

This approach is similar to the environmental impact review of the Mackenzie Gas Project. The Joint Review Panel made recommendations regarding the content requirements of various plans. The National Energy Board, in turn, refined the JRP recommendations in its terms and conditions for each of the five components of the MGP. It is expected that other regulators will require additional plan and programs in their application processes or in their terms and conditions. For effects monitoring during operations, the MGP proponents also postponed defined any monitoring plan development until more specific requirements could be defined during project construction.

IR Number: 68

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Effects of the Environment on the Project (EIS, Section 4.5)

Preamble
The Developer recognizes the challenges surrounding climate change: "*The design parameters and construction techniques take into account consideration of these risks and provide mitigative approaches in the Highway design.*" (p.623)

However, no parameters of climate change are provided. Climate change may affect the construction, operation and maintenance of the highway. It may further increase the risk of spills during the ice-free period if climate change causes the extension of the ice-free period. Landslides are also a related problem. Finally, both climate change and landslides may cause an accelerated degradation of the road potentially resulting in safety concerns. Moreover, degraded roads would also present an increased risk of accidents in diesel fuel transportation.

Request

1. Please provide the parameters of climate change over the life of the development, showing the expected changes in temperature, precipitation, and extension of the ice-free period.
2. Pease explain how these parameters may relate to the risks of degraded road conditions, safety concerns, and potential spills.

Developer Response: 68.1

As discussed in Section 3.1.2.9 of the EIS, information collected over many years at northern climate stations, indicates that the climate in the Mackenzie Delta and the Mackenzie Valley region has been changing. Communities and other stakeholders are concerned about the potential effects of climate change on the northern environment and the economy.

Natural variability, expressed as averages over the last 30 years, shows variations in average annual temperatures of 3˚C to 6˚C in the Mackenzie Delta. Depending on the climate model scenario used, these exceed (by two to three times) the average annual temperature increases obtained from the model. Nonetheless, based on observed trends and future modeled predictions, there is a consistent and gradual warming trend. Generally, modeling results indicate a warming trend in air temperature of up to 2.5˚C and an increase in precipitation of up to 11.8% in the 30 years between 2010 and 2039 (IOL et al. 2004).

Table 3.1.2-6, extracted from the EIS, summarizes the current climatic conditions as well as past and future climate trends in the Inuvialuit Settlement Region. Expected future temperature changes will be comparable to the changes that have occurred over the last 30 years. For example, the future predicted change in average temperature is between +1.3˚C and +2.5˚C. These values are similar to the +1.5˚C increase observed between 1971 and 2000. The current average annual temperature is -10.3˚C and the annual average winter temperature is -26.5˚C (IOL et al. 2004). Possible extensions

of the ice-free period in the future have no direct bearing on the proposed construction and future operation of the Highway.

TABLE 3.1.2-6: CLIMATE CONDITIONS AND CHANGE IN THE INUVIALUIT SETTLEMENT REGION

Parameter	Current[1] Conditions	Trend (1971-2000)	Forecasted Trend[2] (2010- 2039)		
			Low	Medium	High
Average annual temperature (˚C)	-10.3	+1.5	+1.3	+1.6	+2.5
Average winter temperature[3] (˚C)	-26.5	+2.1	+1.3	+2.1	+2.2
Total precipitation[4,5] (mm)	191.0	+5.2	+2.1%	+7.4%	+11.8%

Developer Response: 68.2

As indicated in the EIS, the Developer fully understands that employing a risk-based approach for incorporating climate change into the design of highway infrastructure on permafrost is now recommended practice. The challenge for design and construction over thaw sensitive permafrost terrain is to balance the capital cost of constructing the Highway, against long-term maintenance implications. The design parameters and construction techniques consider these risks and provide mitigative approaches in the Highway design. These are discussed further in Sections 3.1.1 and 4.2.1 of the EIS.

In particular, the current approach to highway design and construction in permafrost regions is documented in the national guidelines entitled Development and Management of Transportation Infrastructure in Permafrost Regions published by the Transportation Association of Canada (TAC) in May 2010. The design parameters and construction techniques presented as mitigative measures in the EIS are based on the Developers experiences with highway construction and operation in northern Canada and the case studies and lessons learned as presented in the TAC guidelines.

As indicated in the EIS, the Developer is committed to employing these guidelines in the design and construction of the Inuvik to Tuktoyaktuk Highway to minimize possible risks of degraded road conditions, driver safety issues and potential road-related spill incidents.

9.0 Worst Case Scenario

IR Number: 69

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Worst Case Scenario (EIS, Section 4.4.5 pages 614 to 622)

Preamble
The Inuvialuit Final Agreement (IFA) in paragraph 13(11)(b) requires that developers provide evidence to enable an estimate of "the potential liability of the developer, determined on a worst case scenario". This is *in addition* to evidence about both actual and future wildlife harvest loss which may result from a worst case scenario. Inuvialuit have a right to compensation for both actual and future harvest loss based on section 13(15) of the IFA. Further, the IFA specifies that where there is more than one developer they are jointly and severally liable. The IFA also sets out that future harvest loss includes damages to habitat and disruption of future harvesting activities.

The EIS makes no attempt to estimate total clean up costs of the proposed worst case scenario. The estimate of liability is based only on losses (or replacement value) of fish and some fishing gear for one season and does not address impacts on fish habitat or the effects of a spill on future Inuvialuit harvesting in the affected area or future harvest losses if Inuvialuit harvesters avoid the affected area in the future.

Request

1. Have the Developers negotiated or discussed the negotiation of a Wildlife Compensation Agreement with the Inuvialuit Game Council? If such an agreement exists please file a copy with the Board.

2. Please provide an estimate, complete with supporting analysis, of the total cost of cleaning up a full "B" train load of diesel fuel spilled in the worst case situation described in the EIS. Include post clean up monitoring costs in this estimate.

3. Please evaluate the impact of the worst case scenario on the fish habitat and populations in the streams, water courses and Husky Lakes. Provide an estimate of the cost of remediating these affected habitats.

4. Review the estimate of actual harvest loss and equipment in light of the answers to questions (2) and (3). Adjust your estimate accordingly, or if no change is warranted, explain and justify why.

5. Based on traditional knowledge and community consultation evidence developed during the preparation of the EIS and any other relevant sources of information, please advise the Board about the likelihood that Inuvialuit harvesters would avoid the area affected by the worst case scenario spill. How long might these harvesters be displaced? Estimate the additional cost to Inuvialuit harvesters of being displaced in terms of both travel costs to alternative fishing areas and the likelihood that harvests will not be as successful in alternative areas.

6. Estimate future harvest loss to traditional users of the Husky Lakes area based on your answers to (3) and (5) and any other relevant information.

7. Provide evidence of the financial responsibility (capacity) of the Government of the Northwest Territories, Town of Inuvik and Hamlet of Tuktoyaktuk to address the combined costs of the worst case scenario and actual and future harvest losses. Separate evidence must be provided for each of the Developers.

Developer Response: 69.1

At this time the Developers have not yet had any discussions with either the Inuvialuit Game Council or the Wildlife Management Advisory Council regarding a possible Wildlife Compensation Agreement. However, such discussions and negotiations, as appropriate, could be undertaken during the multi-year construction period prior to completion of the Inuvik-Tuktoyaktuk Highway.

However, the Developers would wish to note that for a potential worst case spill incident involving a third- party transporter of fuel on the Highway, the Developers (as represented by the Hamlet of Tuktoyaktuk, the Town of Inuvik and the GNWT Department of Transportation) would typically not have any direct liabilities associated with the spill incident. Such liability would rest primarily with the third-party company or organization that transported the fuel and caused the incident.

Developer Response: 69.2

Section 4.4.5.6 of the EIS provided an estimate of the potential monetary value associated with the loss of an entire summer season of fishing from the Husky Lakes for all residents involved in fish harvesting in the Husky Lakes area. The cost for such a possible loss was estimated to be in the order of $486,025.

Information Request 69.2 focusses on the potential costs associated with the cleanup of such a spill incident. In attempting to respond to this request, the Developer would wish to note that the Kiggiak- EBA team responding to this IR has had extensive, recent and ongoing experience with spill response and cleanup activities in northern Canada that is directly relevant to addressing this matter.

The primary reason for noting this point, is that the potential costs associated with any fuel spill incident cleanup that may occur along the future Inuvik to Tuktoyaktuk Highway will be directly influenced by a myriad of currently unknown time and site-specific environmental, organizational, logistical, operational and other factors that will be in effect during that particular time-frame.

However, as discussed in Section 4.4.5.2 of the EIS, diesel fuel is typically a light, refined petroleum product. According to the National Oceanic and Atmospheric Administration (NOAA), small diesel spills (2,000 L to 20,000 L) will typically evaporate and disperse within a day or less, even in cold water; therefore, seldom is there any fuel on the surface to recover (NOAA 2006). Heavier intermediate fuel oil may persist longer when spilled.

The characteristics of diesel and small diesel spills include:

- Diesel oil has a very low viscosity and is readily dispersed into the water column;
- Diesel oil is readily and completely degraded by naturally occurring microbes, under time frames of one to two months;
- Diesel oil is much lighter than water (including seawater); it is not possible for this oil to sink and accumulate on the seafloor as pooled or free oil unless it adheres to fine-grained suspended

sediments (adsorption), which can settle out and get deposited on the seafloor. This process is not likely to result in measurable sediment contamination for small spills; and

- Diesel oil is not very sticky or viscous, and tends to be washed off by waves and shoreline clean-up is usually not needed (NOAA 2006).

To demonstrate how quickly a typical diesel fuel spill could be dissipated, an-oil weathering model available from NOAA's Office of Response and Restoration called ADIOS® 2.0 (Automated Data Inquiry for Oil Spills) was run using typical winter or summer diesel fuels at a nominal temperature of 10°C and light winds. The resultant graph shown in Figure 4.4.5-1 of the EIS, showed that approximately 50% of winter grade arctic diesel would be expected to evaporate within about 24 hours and 80% of this fuel would likely dissipate within about a week. A summer grade of diesel fuel is projected to degrade somewhat more slowly (~ 50% in one week). Winter mix diesel fuel is a lighter mix of diesel used to maintain flow and avoid freezing; it has a pour point of -36°C. Summer mix diesel fuel is a heavier mix that can be used during warmer months; it has a pour point of -7°C. The typical fuel used in Inuvik and Tuktoyaktuk is winter mix diesel.

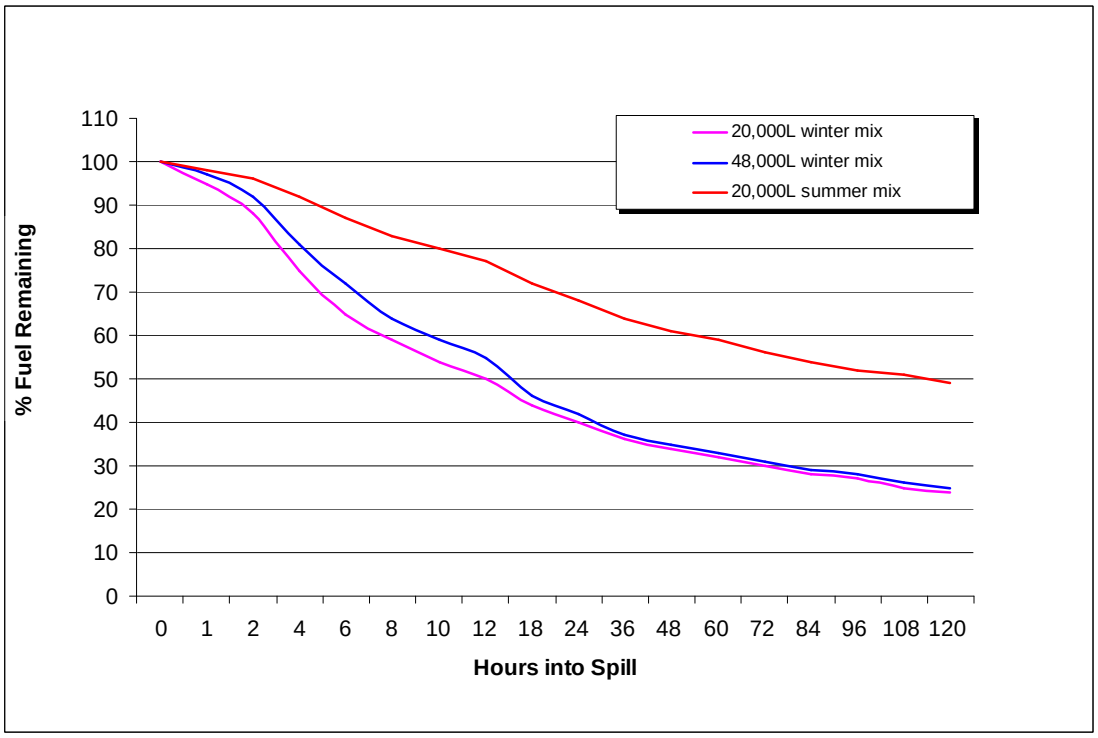


Figure 4.4.5-1.
Dissipation rates of 20,000 L and 48,000L Winter Mix Diesel Spills in Cold Water (10°C) and 20,000 L Summer Mix Fuels in Cold Water (10°C)

This is a very important consideration for any spill response actions to be undertaken because it indicates that any such actions would need to be implemented almost immediately. This factor alone would make it a challenge to effectively respond to such a potential spill incident. As indicated in the Developers response to IR 70.2, apart from the immediate actions that the third-party company that caused the spill incident may implement immediately, such as efforts to contain any diesel fuel spilled on the land adjacent to the stream, it is anticipated that most of the follow-up spill

response and mitigation actions that would need to be implemented downstream would fall to one or more of the agencies identified in the IR 70.2 response.

In particular, for a potential fuel spill associated with the Highway in the Husky Lakes area, it is anticipated that the Inuvialuit Lands Administration (ILA), Aboriginal Affairs and Northern Development Canada (AANDC) and the Canadian Coast Guard (CCG) would be among the Lead Agencies assisting with responding to the spill incident.

Although coordinating, organizing and implementing a rapid response with a number of parties involved is anticipated to take some time, the following discussion focuses on the types of spill response activities that could be undertaken relatively quickly and associated costs in relation to a potential worst case diesel spill incident.

Drawing on the direct experience of EBA in effectively responding to a 19,000 litre diesel fuel spill onto the land and into a lake in the late spring (June 16) of 2004 at a remote mineral exploration camp in Nunavut, the most effective mitigation measures employed related to that incident were containment at and near the source (using hydrocarbon-absorbent booms), and *in situ* combustion (burning) of the diesel fuel that had spilled onto the rapidly degrading ice surface and into associated melt pools.

Given the remote nature of this site and the need to respond quickly and effectively, EBA recommended that for diesel fuel which had moved down-gradient onto the surface of the melting lake ice, that *in situ* burning be employed to eliminate the risk of fuel oil spreading further into the lake water and potentially impacting the lake and its associated aquatic habitats.

Authorization for incineration was obtained from the on-site regulatory authorities before the operation was initiated. The selection of an appropriate time to initiate incineration was also critical to the success of the operation due to the nature of the activity. In particular, wind velocity and direction were key factors that needed to be considered.

At 12:30 a.m. on June 20, 2004, when environmental conditions were considered to be ideal for the operation, the free diesel fuel present on the surface of melt-pools on the lake ice was ignited. The approximate volume of free diesel fuel burned off by in situ incineration was estimated to be in the range of 2,750 to 5,500 litres and the operation took 45 minutes to completely burn off the diesel. It should be noted that if a larger quantity of free diesel had been available for combustion, the additional time needed to burn of this larger amount would have been within the same time-frame. Subsequent water sampling of the water in the melt-pools following the burn off reported that residual hydrocarbon concentrations were below laboratory detection limits.

This experience clearly demonstrated that one of the more effective (including cost-effective) spill response and mitigation options that should be considered for the elimination of concentrated pockets of diesel fuel would be *in situ* burning. Subsequently, the company was charged for a violation of subsection 36(3) of the Fisheries Act, entered a guilty plea, and was fined $100,000 in Nunavut Territorial Court in Cambridge Bay on March 16, 2007 (Environment Canada 2007).

The penalty included a fine of $10,000 and a payment of $90,000 to the Environmental Damages Fund. The Fund, administered by Environment Canada, serves as a special holding or trust account to manage funds received as compensation for environmental damage. The Fund directs fines towards future projects that contribute to the mediation of the damage to the environment in a cost-effective way, and deter other parties from causing damage in the future.

Turning to the Worst Case scenario, it is assumed that, *in situ* burning of diesel fuel would be employed in circumstances where it was determined by the response team and the Lead Agencies that this response technique would be effective in reducing the amount of free diesel remaining in the receiving environment.

Concurrently, the response team would arrange for locally available booms from the CCG depot in Tuktoyaktuk and the Mackenzie Delta Spill Response Corporation (as discussed in the Developers response to IR 70.2) to be deployed to the most appropriate locations, as determined by the response team, to either assist in capturing some of the free diesel, or to serve as protection for priority environmentally sensitive shoreline areas. Given the anticipated short time-frame for movement of diesel fuel spilled into a stream flowing towards the Husky Lakes (assumed to be less than 1 day), it may well be more likely that most of the booms would be deployed to protect priority shoreline areas, while free diesel continued to rapidly evaporate and dissipate from the surface of the lake.

In order to estimate the possible costs associated with the worst case situation described in the EIS, the assessment team considered the locally available spill response equipment, human and logistical resources located in Inuvik and Tuktoyaktuk and our experience in carrying out work in the Delta area.

Based on these considerations, cost estimates were generated for a possible 5 day spill contingency response operation and a 10 day response operation respecting free diesel within the aquatic environment and the costs presented in Tables IR69-1 and IR69-2.

TABLE IR69-1: ESTIMATED COST FOR A 5 DAY SPILL RESPONSE AND CLEANUP OPERATIONN

Item	Unit	# Units	Cost per Unit per Day ($)	Number of days	Total Cost ($)
Labourers	1 labourer	10	400.00	5	20,000.00
Management/ Technical personnel	1 Technical	10	800.00	5	40,000.00
Helicopter + pilot	1 Helicopter	3	4,500.00	5	67,500.00
Boat	1 Boat	6	1,000.00	5	30,000.00
Spill Response Equipment	1 Container	2	10,000.00	5	100,000.00
Pick-up Trucks	1 Truck	4	150.00	5	3,000.00
Estimated Total					**260,500.00**

TABLE IR69-2: ESTIMATED COST FOR A 10 DAY SPILL RESPONSE AND CLEANUP OPERATION					
Item	**Unit**	**# Units**	**Cost per Unit per Day ($)**	**Number of days**	**Total Cost ($)**
Labourers	1 Labourer	20	400.00	10	80,000.00
Management/ Technical Personnel	1 Technical	10	800.00	10	80,000.00
Helicopter + pilot	1 Helicopter	3	4,500.00	10	135,000.00
Boat	1 Boat	6	1,000.00	10	60,000.00
Spill Equipment	1 Container	2	10,000.00	10	200,000.00
Trucks	1 Truck	4	150.00	10	6,000.00
Estimated Total					**561,000.00**

As indicated in these tables, the estimated range of physical response and clean-up activities is projected to be in the range of approximately $260,000.00 for a 5 day spill response operation, and $561,000.00 for a 10 day spill response operation.

Environmental monitoring anticipated to be associated with the spill response operations would focus primarily on water sampling to determine diminishing hydrocarbon concentrations in the aquatic receiving environment over time as the diesel fuel evaporates and dissipates, and the evaluation of possible environmental impacts associated with diesel fuel stranded in shoreline riparian areas.

Following cessation of spill response activities and the anticipated rapid dissipation of the free diesel fuel from the aquatic environment, sampling of selected local fish species of particular importance to the fish resource harvesters of the Husky Lakes area would likely need to be undertaken to demonstrate that the fish of this critically important water body remain healthy and have not become contaminated by the anticipated relatively short-term, but never-the-less very significant worst case spill incident as discussed herein.

The estimated costs associated with conducting an appropriate environmental monitoring program such as described above is expected to be in the range of $50,000 to $100,000.

References

Environment Canada. 2007. http://www.ec.gc.ca/default.asp?lang=En&n=714D9AAE-1&news=FCD1C8E7-C449-4AE6-B6A9-5CFE08B0DA31

Developer Response: 69.3

As discussed in the EIS and in response 69.2, diesel spilled into an actively flowing stream heading towards the Husky Lakes is expected to move at the speed of the stream flow and reach the Husky Lakes within a few hours to less than one day. Very little diesel fuel is expected to be "captured" by the riparian vegetation along the shores of the affected stream, although some diesel may be "painted" on to exposed vegetation at the surface level of the flowing water. Once the diesel enters the Husky Lakes area, the diesel is expected to spread out across the surface of the lake water very

rapidly, which is anticipated to speed up the evaporation and dissipation of the free diesel within 5 to 10 days.

Based on this scenario, it is our professional judgement that fish habitat and the existing fish populations in the affected stream and Husky Lakes are not likely to be measurably impacted by such a potential spill incident.

Developer Response: 69.4

Please refer to the Developers responses to 69.2 and 69.3 above.

Developer Response: 69.5

As was indicated in Section 4.4.5.6 of the EIS the assessment of the worst case scenario assumed that

- The spill of diesel fuel into a fish-bearing watercourse and ultimately into Husky Lakes would result in residents avoiding consumption of fish because of the perception that the fuel would taint the fish, and
- The fish harvest season from Husky Lakes would be lost as a result of the diesel fuel input to Husky Lakes.

It was also indicated that only a few residents, on average two or three people, currently fish the Husky Lakes in the summer period. However, it can be assumed that in the future, with completion of the Highway, more residents may choose to spend some time during the seasonal open water period at their existing or perhaps new cabins that may be constructed in the area in the years ahead.

Based on the Developers understanding of the residents, particularly the residents of Tuktoyaktuk, we have acknowledged that Inuvialuit harvesters who may be active in the area during the period of time when such a spill scenario could occur would likely choose to avoid consuming the fish from that area and that they may be reluctant to fish in that area for the rest of the open water season.

To minimize the levels of anxiety and concern that the Developer would anticipate could arise over such an incident, if one were to occur, it will be essential that the Lead Agencies responsible for overseeing the spill response, mitigation and monitoring activities incorporate a transparent and effective public communications program to regularly update the communities and general public on the progress of these activities and associated results.

Based on the general understanding that any free diesel entering the Husky Lakes is anticipated to evaporate and dissipate within approximately 5 to 10 days, with no measurable effects on the fisheries resources, the Developer is of the opinion that the harvesters will probably come to understand, when presented with reasonable and objective information, that the fisheries resources of the Husky Lakes area remain healthy, and that they can resume their traditional harvesting activities later in the same open water season.

On this basis, with respect, it is the Developers opinion, that the magnitude of costs to the fish harvesters that may be active in the Husky Lakes open water period, as presented in the EIS, remain appropriate.

Developer Response: 69.6

Please refer to the Developers responses to 69.2, 69.3 and 69.5 above.

Developer Response: 69.7

1. Provide evidence of the financial responsibility (capacity) of the Government of the Northwest Territories, Town of Inuvik and Hamlet of Tuktoyaktuk to address the combined costs of the worst case scenario and actual and future harvest losses. Separate evidence must be provided for each of the Developers.

The Inuvik to Tuktoyaktuk Highway will be a public highway regulated by the *GNWT Public Highways Act*. This places authority/responsibility for construction, maintenance and operation of the highway solely with the GNWT. The Town of Inuvik and Hamlet of Tuktoyaktuk have no direct responsibility/liability for this highway and related operations.

In the event of a worst case scenario it would be expected that the carrier as per GNWT and federal legislation pertaining to the transportation of dangerous goods would immediately initiate required emergency response and spill response plans. Related costs for these activities and other proven losses would be covered by the carrier's insurance.

The GNWT Main Estimates for the Fiscal Year 2011/2012 (available at http://www.fin.gov.nt.ca/documents/budgetdocuments/mains/2011-12mains.pdf) shows revenues available to the GNWT to be in the order of $1.3 Billion. This revenue is applied to a number of operational activities including compensation and benefits, grants and contributions, other expenses and amortization. The magnitude of this revenue could allow for a reallocation of funding to address a worst case scenario if required.

However, as noted in the response to 69.1, the Developers (as represented by the Hamlet of Tuktoyaktuk, the Town of Inuvik and the GNWT Department of Transportation) are not typically expected to have any direct liabilities associated with a spill incident. Such liability would rest primarily with the third-party company or organization that transported the fuel and caused the incident.

It is also anticipated that the third-party companies that may be involved in the future transportation of fuel along the Highway when completed, will most likely be small to intermediate Inuvialuit businesses yet to be defined.

In any event, unless the future third-party company has a substantial insurance policy to cover the range of worst case costs projected in the EIS and in this series of responses, the conditions in Section 13(16) of the Inuvialuit Final Agreement would most likely apply.

As stated in this section of the IFA:

> *If any Developer (in this case a trucking company) "fails to meet his responsibilities" for actual or future harvest loss, Canada, "where it was involved in establishing terms and conditions for the development (the Highway), has a responsibility to assume the Developer's (the trucking company), liability for mitigative and remedial damages to the extent practicable." This means that a federal agency or regulatory authority would be responsible for site cleanup and restoration.*

IR Number: 70

To: Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Fish Health – Worst Case Scenario (EIS, Section 4.4.5)

Preamble
The Developer states: "*One of the objectives of the Inuvialuit Final Agreement (IFA) is to prevent damage to wildlife and its habitat and to avoid disruption of Inuvialuit harvesting activities by reason of development (IFA Section 13.(1)(a)). As such, when a development is proposed, the EIRB must establish limits of liability for a project proponent or developer. Section 13.(11)(b) of the IFA requires an "estimate of the potential liability of the developer, determined on a worst case scenario, taking into consideration the balance between economic factors, including the ability of the developer to pay, and environmental factors." The proposed Highway from Inuvik to Tuktoyaktuk is subject to these terms*."(p.614)

Given that the objective is to prevent damage to wildlife and its habitat, it is unclear what mitigation measures and road design elements are proposed to prevent such damage. The Developer argues in Section 4.4.5 that a year-round supply of diesel fuel would be more cost-effective for Tuktoyatuk than the current situation and that during the winter conditions spills can be cleaned up easily and effectively. Additionally, the potential risks from petroleum hydrocarbon spills, including diesel, during the ice-free period appear to be dismissed because *"small diesel spills (2,000 L to 20,000 L) will typically evaporate and disperse within a day or less, even in cold water; therefore, seldom is there any fuel on the surface to recover (NOAA 2006)"* and because "*Small spills (<20,000 L) in open water are so rapidly diluted that fish kills have never been reported, except when small spills occur in confined, shallow water the number of marine birds typically affected is small due to the short amount of time the diesel oil is on the water surface*." (p.616).

However, the Developer has provided no concrete evidence or data to support these statements. No surveys and monitoring programs on fish health, embryonic development, or bird and mammal mortality are reported to support the Developer's arguments. There are examples of incidents that have occurred over the past two years in other jurisdictions that show diesel spills along highways have occurred, often in volumes much smaller than those stated by the Developer, including one near High River, Alberta where a Transportation Company pleaded guilty to violating subsection 36(3) of the *Fisheries Act* and was fined for spilling just 550 liters. Given the evidence regarding lack of due diligence and failure to prevent spills, and the recurring violations noted by Environmental Canada under the *Fisheries Act, Migratory Birds Convention Act,* 1994, and any applicable territorial or provincial legislation, diesel and other contaminant spills are a very serious matter and should be adequately and pro-actively addressed.

Although the Developer calculates the amount for the potential liability of a potential spill, the liability calculation only serves to provide a yardstick by which, presumably, compensation to traditional land users would be established after a spill would occur. No specific measures to prevent spills are proposed other than speed limits.

Request

1. Please provide examples of the results of post-spill monitoring programs and surveys on fish health (including sublethal effects), fish embryonic development, and bird and mammal mortality that evaluate the magnitude of effects resulting from spills from other jurisdictions.
2. Please provide specific mitigation measures that are part of the road design and part of the contingency plans which would prevent spills from entering water bodies during the ice-free period for this proposed development.

Developer Response: 70.1

As indicated in Section 4.4.5.2 of the EIS, the largest spill reported in the Inuvik region occurred on December 22, 2001 when 7,000 litres of diesel fuel leaked from a storage tank. The largest truck spill reported in the Inuvik region was 700 litres on August 16, 2007 and occurred approximately 80 km south of Inuvik (GNWT ENR 2010e). Thus, it is apparent that spills as a result of truck accidents are relatively uncommon.

However, as requested by the EIRB, we searched the available literature on the potential environmental impacts associated with diesel fuel spills in other areas. Based on our search, it seems that the available literature contains few site specific, science based assessments of diesel fuel spills. The following provides a summary of those cases and investigations that identified some adverse effects:

- A spill of 26,500 L of diesel fuel occurred due to a train de-railment in New York State in 1997, resulting in a fish kill involving rainbow trout, white sucker, blacknose dace, and darters. It was estimated that the spill caused a decrease of 92% of total fish abundance in a first order tributary stream to Cayuga Lake. A study (Lytle and Peckarsky 2001[1]) was conducted following this incident to determine the temporal and spatial effects on the stream invertebrate community resulting from the spill. This study showed a 90% reduction in the density of invertebrates and a 50% reduction in taxonomic richness at least 5.0 km downstream. However, density recovered within a year.
- In 1993, a pipeline failure in Indiana resulted in a spill of 30,000 gallons (113,562 L) of diesel fuel in a crop field. Some of the fuel found its way via a ditch to Fish Creek, a small to medium size, warm water stream with a modest gradient. A site assessment (U.S. Fish and Wildlife Service et al. 1997[2]) indicated that a substantial quantity of undiluted diesel fuel reached Fish Creek, causing mortalities to fish, macro-invertebrates, mussels, turtles, frogs, muskrats, wood ducks, and kingfishers along the lower 7 miles of Fish Creek. The report authors also suggested the possibility of long-term impacts to the Fish Creek ecosystem due to the persistence of water-soluble, polycyclic aromatic hydrocarbons (PAH) in sediments, possibly resulting in long-term exposure of Fish Creek biota to PAHs.

[1] Lytle, David A. and Barbara L. Peckarsky. 2001. Spatial and temporal impacts of a diesel fuel spill on stream invertebrates. Freshwater Biology (2001) 46, 693-704

[2] U.S. Fish and Wildlife Service, Indiana Department of Environmental Management, and Ohio Department of Natural Resources. 1997. Joint environmental assessment and restoration plan for the Fish Creek #2 diesel fuel spill. Accessed at http://restoration.doi.gov/Case_Docs/Restoraton_Docs/plans/IN_Fish_Creek_RP_02-97.pdf.

- Diesel fuel may impair the hatchability of bird eggs (Kopischke 1972[3]).
- According to the U.S. National Oceanic and Atmospheric Administration (NOAA [date unknown][4]) "…small diesel spills (500-5000 gallons; 1,893-18,927 L) can affect marine birds by direct contact, though the number of birds affected is usually small because of the short time the oil is on the water surface. Mortality is caused by ingestion during preening as well as to hypothermia from matted feathers. Experience with small diesel spills, is that few birds are typically directly affected. However, small spills could result in serious impacts to birds under the "wrong" conditions, such as a grounding right next to a large nesting colony or transport of sheens into a high bird concentration area." This publication by NOAA also indicates that "…in terms of toxicity to water-column organisms, diesel is considered to be one of the most acutely toxic oil types. Fish, invertebrates and seaweed that come in direct contact with a diesel spill may be killed. However, small spills in open water are so rapidly diluted that fish kills have never been reported. Fish kills have been reported for small spills in confined, shallow water." However, due to the low specific gravity of diesel fuel, it does not sink, and is therefore rapidly exposed to weathering and dispersion.

Developer Response: 70.2

As discussed in Section 4.4.4 of the EIS, safety measures to prevent vehicle accidents related to the proposed Highway have been and will continue to be incorporated into the Highway design. According to the GNWT DOT, there were 861 vehicle collisions in 2008, 179 or 21% of which occurred on highways in the NWT, the remaining accidents were in urban centres or involved all-terrain vehicles (GNWT DOT 2009a, 2009b).

Measures to avoid or minimize accidents will include posted speed limits, adequate signage alerting drivers to Highway curves and upcoming bridges. Bridge design will incorporate guardrails to prevent a vehicle from going off the Highway and into a watercourse in the event of an accident. The bridge crossings will be appropriately signed at frequent intervals along the bridge approaches, to warn drivers to reduce speed. As indicated in the EIS, the key strategy will be to prevent accidents and malfunctions through education, monitoring, and follow-up.

The contractor(s) hired to construct the Highway will be required to prepare project specific Spill Contingency Plans that will conform with the NWT Department of Environment and Natural Resources *Spill Contingency Planning and Reporting Guidelines*, which were provided in Appendix E1 of the EIS. All plans will be required to meet the commitments set out in the EIS, the Project's environmental management plans, applicable guidelines, and the terms and conditions required under the regulatory process. The plans will highlight the importance of training in spill prevention and management for all personnel involved in the transportation of potentially toxic materials. In addition, fuel trucks will be required to carry appropriate spill clean-up materials, a suitable depot will be established to store spill containment and absorption equipment and materials in the event of large spills, and communication and equipment transport procedures will be established to efficiently

[3] Kopischke, Earl D. 1972. The effect of 2,4-D and diesel fuel on egg hatchability. The Journal of Wildlife Management 36(4): 1353-1356.

[4] NOAA. [date unknown]. Fact sheet: small diesel fuels (500-5000 gallons). NOAA/Hazardous Materials Response and Assessment Division. Accessed at http://response.restoration.noaa.gov/book_shelf/974_diesel.pdf.

respond to spills. All spills greater than 5 litres will be reported to the GNWT Spill Line and other appropriate agencies.

To gain a greater understanding of the roles of other federal and territorial departments that may be involved in responding to a typical spill response incident in the future in relation to the Highway, the Developer is pleased to provide the following additional information on these organizations, their responsibilities and capabilities.

To set the stage, in May 2011, GNWT ENR released an updated document entitled "Lead Agencies for Spills in the NWT". The lead investing agencies for spills on land and in water in the NWT were identified in Table IR 70-1

TABLE IR 70- LEAD INVESTIGATING AGENCIES DESIGNATED AUTHORITY FOR SPILLS ON LAND AND ON WATER IN THE NWT*

	Lead Agency	Designated Authority
LAND	Government of NWT	Spills on Commissioner's Land, Territorial highways and in communities.
	AANDC	Spills at facilities authorized under federal legislation and section of Territorial highways on ice surfaces and for spills on Territorial (Crown) lands in the NWT.
	Environment Canada	Spills at federal facilities, other than those authorized under federal legislation, and spills in National Parks.
	National Energy Board	Spills at oil and gas exploration and production facilities.
	Inuvialuit Land Administration	Spills on land in the NWT set aside under the Inuvialuit Land Claim Agreement.
WATER	AANDC	Spills on water in the NWT.
	Transport Canada	All ship source spills.
	Canadian Coast Guard	Lead Response Agency ensuring spills from ships and barges (including Oil Handling Facility re-supply) and mystery spills on water are addressed.
	National Energy Board	Spills on water at oil and gas exploration and production facilities.

*Information adapted from GNWT ENR May 2011.

The typical sequence of events following a spill onto land or water includes the following steps: the spill is identified and reported by the polluter to the GNWT 24-hour spill line operator, who in turn identifies and notifies the appropriate lead agency. An officer appointed by the lead agency deals directly with the polluter and monitors the spill response and cleanup initially implemented by the polluter and provides continual updates to other agencies (INAC 2003).

The responses of the lead agency to any particular incident will typically be dependent on a number of factors including, the magnitude of the incident, the effectiveness of initial responses implemented by the party responsible for the spill incident, the nature of possible environmental consequences, and other site-specific considerations. The types of responses to be initiated by the lead agency could include:

1. Monitoring only, provided the party responsible for the spill incident is effectively handling the spill and response;

2. Assistance, provided the party responsible for the spill incident is doing what it can to handle the spill but, requires additional expertise or resources. Materials, equipment or labour costs are typically recovered by the lead agency, and;
3. Control, when the party responsible for the spill incident cannot or will not respond, or when the source is unknown then the incident is taken over by the lead agency (INAC 2003).

- Responses to spills into the marine environment in the vicinity of the proposed Highway are anticipated to be collectively managed by the Inuvialuit Lands Administration, the Department of Indian Affairs and Northern Development (now AANDC) and the Canadian Coast Guard.. Each of these response organizations has a plan in place to effectively respond to marine spill emergencies (INAC 2003). In addition, the lead agency(s) may call upon support or assistance as may be required from any or all of the following agencies and organizations:

- Inuvialuit Lands Administration;
- Inuvialuit Regional Corporation;
- Inuvialuit Game Council;
- Environment Canada;
- Department of Fisheries and Oceans;
- GNWT Environment and Natural Resources
- Department of National Defence;
- Office of Critical Infrastructure Protection and Emergency Preparedness;
- Royal Canadian Mounted Police;
- Department of Public Works and Government Services;
- Health Canada;
- Justice Canada (INAC, 2003).
- Canadian Broadcasting Corporation;
- Government of the Yukon.

In addition to the various agencies and organizations identified that may be involved in responding to a spill incident associated with the future Inuvik to Tuktoyaktuk Highway, the Developer investigated and identified the key sources of available spill response equipment and personnel that could be rapidly accessed and deployed from locations in the Mackenzie Delta area.

Mackenzie Delta Spill Response Corporation

The Mackenzie Delta Spill Response Corporation (MDSRC) is a not-for-profit coop of "Member Companies" including BC Canada Energy Resources, Chevron Canada Resources, ConocoPhillips, Devon Canada Corporation, MGM Energy Corp and Shell Canada Limited, who provide a pool of response equipment to be drawn from should any one of them require it (MDSRC 2011). The MDSRC has recently begun to include outside "Associate Members" of which there are currently 4 including the GNWT Department of Transportation, who can access equipment and technical assistance at reduced rates (Ian Lambert, Riverspill Response Canada, Pers. Comm).

The MDSRC also conducts regular training for members, local organizations such as the ILA and Gwich'in Land and Water Board, government bodies such as AANDC, Parks Canada and Canadian Coast Guard, and private companies such as Akita Drilling, Gruben's Transport and Inuvialuit Transportation & Services Co-op (MDSRC 2011).

The MDSRC maintains a large inventory of spill response equipment at a site in Inuvik as summarized in Table IR 70-2.

TABLE IR 70-2 GENERAL MDSRC SPILL RESPONSE EQUIPMENT LOCATED IN INUVIK, NWT

Container Number	Spill Response Equipment
1 – 7	Nuisance spills – for relatively small spills
8	Winter spill equipment
9	Mechanical equipment/hoses
10 – 14	For future expansion
15	Spare container
16	Boom support/boom vane
17	Safety/decon equipment
18	Sorbents
19	Waste management equipment
20	Cargo component – field command post

*From MDSRC 2011

In addition, the MDSRC has a fully equipped trailered jet boat for rapid deployment and most containers have skids and can therefore be hauled along ice or put onto trucks and barges as necessary (Ian Lambert, Pers. Comm). Co-op members can request specific containers to take with them when conducting activities in the Delta region, or can request specific items, such as skimmers or storage bladders, to be sent to their site (Ian Lambert, pers. comm.).

The general inventory for land, open water and ice/winter response equipment stored by the MDSRC in Inuvik is summarized in Table IR 70-3.

TABLE IR 70-3 SUMMARY OF MDSRC INVENTORY OF SPILL RESPONSE EQUIPMENT LOCATED IN INUVIK, NWT

Equipment Category	Examples
Anchors, buoys and paravane floats	boom support, boom vane storage includes 6 anchor types, various buoys and paravane floats
Booms, bridles, boomvane and connector pins	10" x 50' yellow boom fences, 6" x 6" red river booms (50' sections), shallow water boomvane, various bridles and connector pins
Electrical equipment and generators	20 and Field command post – extension cords of various lengths, generators of various size and output, light stands and plugs
Fuel, gas, oil, lubes and additives	gas line anti-freeze, diesel, gasoline, hydraulic oil, oil etc.
Helicopter Equipment	fuel easy
Hoses	50' and 25' lengths of varying diameter discharge hose, and miscellaneous other hose equipment
Ice equipment	Augers, auger bits, chain saws and equipment, shovels, water velocity meter

TABLE IR 70-3 SUMMARY OF MDSRC INVENTORY OF SPILL RESPONSE EQUIPMENT LOCATED IN INUVIK, NWT	
Equipment Category	**Examples**
Miscellaneous	Batteries, brooms, cables, cameras, air compressor, ¾ ton come along, Rubbermaid containers of various volumes, decon kits, detergents, drills and drill bits, 45 gall drums, various hand tools, tarps, propane torches, signs, radios,
Pumps	Diesel and gasoline pumps of various sizes
Ropes and rope reels	Various thicknesses and lengths of floating and non-floating ropes, e.g. ½" x 100' floating
Safety equipment	Air horns, roadside emergency kits, first aid kits, fire extinguishers, windoscks
Safety equipment personnel	Blankets, boots, bug jackets, tyvec overalls, earplugs, floater coats, goggles, gloves, hardhats, respirators, sunscreen, vests, waders etc.
Sampling equipment	Coolers, packing tape, ice packs, notebooks, trowel, distilled water, sampling jars and bottles, ziplock bags, latex gloves etc.
Skimmers	Varieties of disc, multi-head, rope mop and skim pack skimmers
Sorbents	8" x 10' oil only (white) and universal (gray) booms (bags of 4), loose oil snare pom poms, oil only (white) and universal (gray) pads in 100 or 200 bales, oil only sorbent rolls, socks, sawdust
Tanks and related	1500 and 2500 imp. gall tanks, fittings, and repair kits
Totes	Tote tank drain assemblies
Vehicles	Field command post/cargo trailer, boat trailer

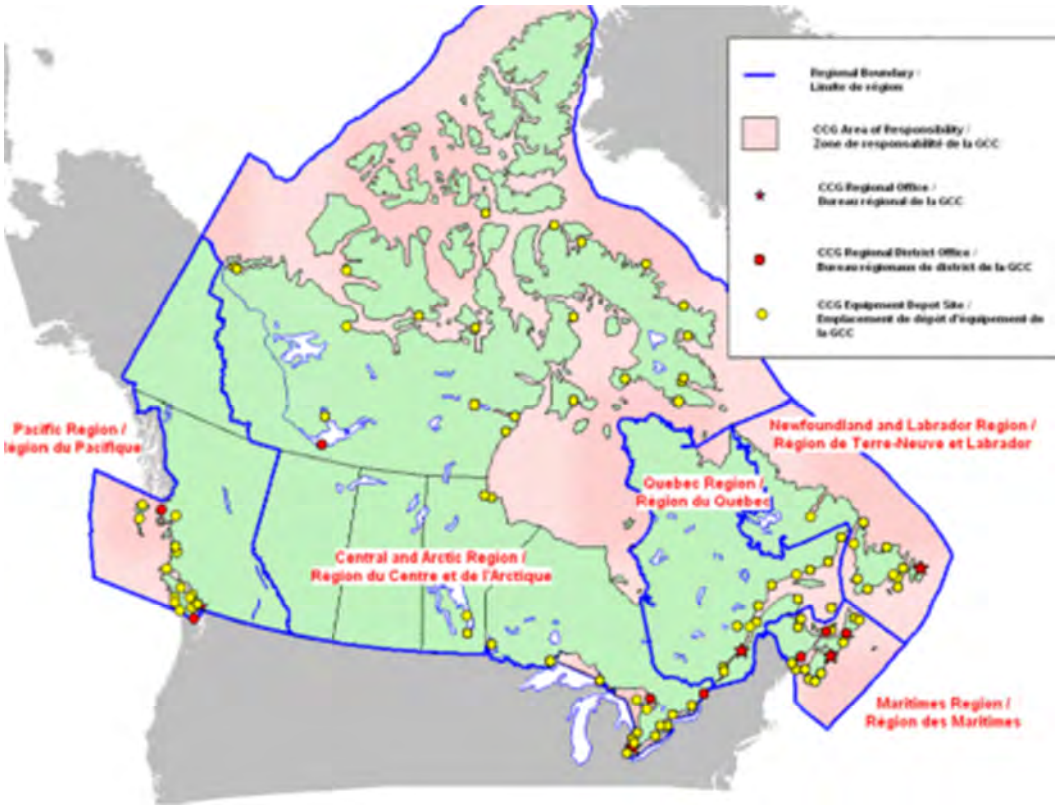
*Equipment inventory provided by Ian Lambert, Riverspill Response Canada

Government of NWT, Environment and Natural Resources

The GNWT ENR, as a lead agency does not typically respond directly to spill incidents, but this Department does deal with the regulatory aspects of the spill investigation, cleanup and monitoring (Jamie Chambers, Pers. Comm.). The GNWT maintains the 24-hour emergency spill line and the public database of reported spills (GNWT, ENR 2011). ENR also has the responsibility for coordinating any GNWT investigations. Mr. Paul Voudrach of ENR Inuvik reported that the MDSRC operates within Inuvik, providing local agencies and companies training and expertise for spill response (Pers. Comm.).

Canadian Coast Guard (CCG)

The CCG becomes the lead agency when spills occur into Canadian waters from ships and barges, and spills that occur during ship-to-shore oil transfers (INAC 2003). The CCG also responds when the source of a spill to water is unknown. The CCG has 22 of its 80 response equipment depots in the Arctic, including one based in Tuktoyaktuk (DFO 2011 and Figure IR 70-1). Each depot generally includes equipment that can be deployed for the containment, recovery and storage of spilled products (DFO 2011). In addition, the CCG fleet includes vessels and helicopters that can be used for response services but, these are not necessarily located at the depot sites.



*Canadian Coast Guard Offices and Equipment Depots. From Fisheries and Oceans Canada, April 2011.

Environment Canada (EC)

Environment Canada can call upon the Regional Environmental Emergencies Team (REET) which includes environmental expertise from federal, territorial and Aboriginal organizations to provide the lead agency with integrated environmental advice with the objective of minimizing impacts to the sensitive resources of the northern ecosystem (INAC 2003). Other resources include technical advice, monitoring equipment, impact evaluation and scientific or technical expertise for court purposes (EC webpage).

Aboriginal Affairs and Northern Development Canada (AANDC)

The AANDC is the lead agency when dealing with spills for sections of Territorial highways on ice surfaces and spills on Territorial lands or water (Conrad Baetz, Pers. Comm.) As lead agency, the AANDC does not respond with personnel or equipment but, the Department provides regulatory advice and ensures that appropriate investigations and monitoring occur to the satisfaction of other agencies and parties.

Helicopter Resources

Within the Inuvialuit Settlement Region, the primary helicopter service is provided by Aklak Canadian Helicopters (ACH) in partnership with the Inuvialuit Development Corporation (IDC 2012). ACH has supported the response training exercises conducted by MDSRC by supplying helicopters and pilots (MDSRC 2011). The CCG also has helicopters at their disposal but, use for assistance would be limited to that of a resource sharing agreement.

References

Personal Communications:

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Jamie Chambers – GNWT, ENR Yellowknife personal communication

Paul Voudrach – GNWT, ENR Inuvik personal communication

Other Resources:

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Government of Northwest Territories, Environment and Natural Resources. May 2011. Lead Agencies for Spills in the NWT, obtained from: http://www.enr.gov.nt.ca/_live/pages/wpPages/Spills.aspx

Indian and Northern Affairs Canada. 2003. Working Together, What Government and Other Agencies Do if Canadian Arctic Waters are Threatened by a Spill. Ministry of Indian Affairs and Northern Development, Ottawa. http://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-HQ/STAGING/texte-text/wkto_1100100036935_eng.pdf

Inuvialuit Development Corporation. 2012. Aklak Canadian Helicopters. http://www.idc.inuvialuit.com/our-companies/transportation/aklak-canadian-helicopters/

Mackenzie Delta Spill Response Corporation, 2011. http://deltaspillresponse.ca

ATTACHMENT 1

EIS CONTRIBUTOR CVs

ATTACHMENT 2:

Heavy Equipment Operator's Training Program (EGT09HEOFinalReportA.pdf)

Class 1 and Class 3 Driver's Training Program (EGT09TrainingClass1FinalReportA.pdf.)

ATTACHMENT 3

TYPICAL CONTRACTOR HSE MANUALS