ENVIRONMENTAL IMPACT REVIEW BOARD

INFORMATION REQUESTS

(Round 2)

DATE OF RELEASE: March 8, 2012

DISTRIBUTION: Developer and the Electronic On-line Registry (EOR).

PURPOSE: Information Requests (IRs) issued by the EIRB and Parties to the Review of the proposed Inuvik to Tuktoyaktuk Highway Project.

DEADLINE FOR SUBMISSION OF RESPONSES: March 30, 2012

Information Request (IR) Numbers: 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145

Information Requests

IR Number: 90

Source: EIRB

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

Subject: Permafrost and Ground Ice

Preamble

The road design calls for construction of an embankment that, initially at least, will protect the permafrost beneath the road from thaw and consequent subsidence. However, the side slopes of the embankment will not be of sufficient thickness to prevent thaw of permafrost. Thawing beneath side slopes has recently been demonstrated from Alaska by Darrow (2001). The amount of subsidence to be expected beneath the side slopes will depend on the ice content of the permafrost. Subsidence beneath the side slopes will be expected to lead to shoulder rotation and other processes that will affect the integrity of the highway. The amount of subsidence will affect the extent of maintenance required and the volume of aggregate that must be extracted for this purpose.

Request

The Geological Survey of Canada has released several Open Files during the last 10 years in which databases of near-surface permafrost and ground ice conditions in the project area were presented.

1. Using data such as presented by the Geological Survey of Canada or other agencies, please indicate to the Board the extent of subsidence expected in the side slopes of the highway embankment over the life of the project.
2. Please also estimate the volume of aggregate that will be required to remediate the side slopes and maintain the integrity of the highway. Please provide estimates of total aggregate requirements over the life of the project for each of the four terrain units described on pp. 102-105 of the EIS.

Reference

Darrow, M.M. 2011. Thermal modeling of roadway embankments over permafrost. *Cold Regions Science and Technology*, **65**: 474-487.

IR Number: 91

Source: EIRB

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

Subject: Ice Wedges and Hill Slopes

Preamble

The Developer has indicated in its response to IR 61 (pp. 176) that "significant subgrade collapse" occurred on the Dempster Highway "near Rat Pass, which led to a serious vehicle accident causing a human fatality." This collapse was due to thaw of massive ice beneath the road bed. The remedial work conducted by GNWT included a ground penetrating radar survey of the Highway to locate similar structures.

The proposed route of the Inuvik-Tuktoyaktuk Highway crosses many slopes and is aligned in upland terrain along a considerable distance. Ice wedges on hill slopes and in upland terrain are characteristically difficult to delineate from their surface expression, due to slope movement. They are, however, abundant in the project area, especially north of the tree line (Mackay 1995). They represent large bodies of massive ice near the ground surface and may present a significant geohazard to the project.

Request

The Developer has described ice-wedge polygons from lowland terrain in the EIS (p. 111).

1. Please indicate the methods, techniques, and plans for preconstruction surveys to be conducted to delineate ice wedges on hill slopes and in upland terrain along the highway alignment.
2. Please indicate the plans for monitoring the integrity of these structures beneath the road, and the integrity of the road embankment in their vicinity, during the operating life of the project.

Reference

Mackay, J.R. 1995. Ice wedges on hill slopes and landform evolution in the late Quaternary, western Arctic coast, Canada. *Canadian Journal of Earth Sciences*, **32**: 1093-1105.

IR Number: 92

Source: EIRB

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

Subject: Aggregate Requirements

Preamble

The aggregate requirements for road construction have been estimate in the EIS. The aggregate requirements for on-going maintenance of the road over the life of the project after construction, if complete, should be specified. This aggregate will be needed in summer, when access to quarries by winter road is not possible. The aggregate will be stockpiled near the road.

Request

1. Please provide the estimated volume of aggregate required for maintenance operations on an annual basis for the first fifty years of the life of the road. Indicate the gravel sources from which this aggregate is to be supplied.
2. Please provide the locations where aggregate is to be stockpiled for summer use in maintenance operations along the road.
3. Please indicate the maximum volume of aggregate to be positioned in each stockpile.
4. Please provide the plans for control of runoff from the stockpiles, especially runoff due to melting of ground ice in the aggregate.
5. Please indicate the plans for control of dust emissions from these stockpiles.
6. Please indicate the plans for prevention of excavation of dens by wildlife in the stockpiles.

IR Number: 93

Source: EIRB

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

Subject: Snow banks on Embankment Side Slopes

Preamble

Snow accumulation will be expected on the side slopes of the road embankment due to ploughing and snow drifting on the lee side of the road. Near Inuvik and in the Mackenzie delta area, snow accumulation of over 1-m depth may lead to permafrost degradation (Smith 1975; Burn *et al.*, 2009). As a result, snow accumulation on the side slopes of the embankment may alter ground temperatures and lead to enhanced requirements for maintenance, including enhanced demands for aggregate.

Request

1. Please indicate the thickness of drifts expected on the sides of the road embankment and adjacent to the embankment for both high (2 m) and low (1.4 m) configurations of the embankment. The thicknesses should be provided for typical sites along the route (a) south of the tree line; (b) in lowland terrain north of tree line; and (c) in upland terrain north of tree line. The thicknesses should be provided for road alignments parallel to prevailing winter winds and at right angles to prevailing winter winds.
2. Please describe any activities that are planned in order to (i) monitor and (ii) mitigate, if necessary, snow accumulation on the side slopes of the road embankment.

References

Burn, C.R., Mackay, J.R., and Kokelj, S.V. 2009. The thermal regime of permafrost and sensitivity to disturbance near Inuvik, N.W.T. *Permafrost and Periglacial Processes*, 20(2): 221-227. doi: 10.1002/ppp.649

Smith, M.W. 1975. Microclimatic influences on ground temperatures and permafrost distribution, Mackenzie Delta, Northwest Territories. *Canadian Journal of Earth Sciences* **12**: 1421–1438.

IR Number: 94

Source: EIRB

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

Subject: Active Layer Thickness

Preamble

Active-layer deepening is the principal cause of subsidence in permafrost terrain (Mackay 1970). The design of the road embankment, as described in the EIS, attempts to minimize the possibility of disturbance to the active layer under the road. However, this will not be possible on the sides of the embankment, especially near the toe of the side slopes, because the disturbance due to the constructed surface is not offset by the thickness of the embankment. Degradation of permafrost at the sides of the road may require remediation, involving application of granular fill.

Request

1. Please indicate the depth of the active layer anticipated beneath the road embankment along cross-sections as presented in Fig. 2.6.5-1 of the EIS.
2. Please provide such representative cross sections for the four terrain units along the proposed alignment.
3. Please include increases in active layer thickness due to snow accumulation expected on the sides of the embankment. In particular, please estimate the active layer thickness expected near the bottom of the side slopes of the embankment.
4. Estimate the shoulder rotation expected from any changes in active layer thickness, and estimate the aggregate required to maintain embankment integrity over the life of the project.

Reference

Mackay JR. 1970. Disturbances to the tundra and forest tundra of the western Arctic. *Canadian Geotechnical Journal* **7**: 420–432.

IR Number: 95

Source: EIRB

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

Subject: Climate Change

Preamble

The EIS presents climate change scenarios for the region developed more than a decade ago, and since then climate-change science has advanced considerably. In 2010 a guideline for adaptation of infrastructure design to the consequences of anticipated climate change was sponsored by AANDC and published by the Canadian Standards Association (CSA 2010). Representatives from the Town of Inuvik and EBA Engineering contributed extensively to development of this guideline. It appears that the EIS does not follow the advice presented in the guideline. In particular, the EIS does not consider climate change anticipated beyond 2039, even though the life of the project is "permanent and long term."

A comprehensive assessment of climate change and its impacts on the project is required to fully assess the aggregate requirement that the project will impose in the ISR, both for construction, and during operations. Climate change is expected to vary over the project area, due to the proximity of the northern end of the highway corridor to the Beaufort Sea. Climate change scenarios are available from Environment Canada, as indicated in CSA (2010).

Request

Please provide climate change scenarios for the project area for the first 50 years of the operational phase of the project, up to 2065. Separate scenarios should be provided for the northern and southern ends of the project area. Please incorporate expected climate variability in the scenarios, so that for this fifty-year period, the Board may assess the range of conditions that may reasonably be anticipated.

Reference

Canadian Standards Association. 2010. Technical Guide, Infrastructure in permafrost: A guideline for climate change adaptation. PLUS 4011-10. Canadian Standards Association, Mississauga, ON.

IR Number: 96

Source: EIRB

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

Subject: Climate Change and Permafrost

Preamble

The magnitude of climate change expected over the next 50 years may require reassessment of the risk basis upon which the present design is predicated. In order to make such a determination, the effect of climate change on annual thaw depth anticipated beneath the road must be assessed. Changes in annual thaw depth anticipated in natural terrain over the next century were recently summarized for Richards Island by Burn and Zhang (2010). If the current design of the road may require adjustment due to climate change effects in the future, then a greater demand on the aggregate resources of the region will be imposed than anticipated by the EIS.

Request

1. Using climate change scenarios for the next 50 years, and incorporating climate variability, please indicate the expected change in active layer thickness that may be anticipated beneath the centerline of the road alignment and beneath the side slopes.
2. Please indicate such changes in active-layer thickness for the project both north and south of the tree line.
3. Please present the changes for particularly warm and particularly cold years that may be anticipated during this period.
4. Please indicate the additional aggregate requirements along the length of the highway that may be required to manage the impact of anticipated particularly warm years.

Reference

Burn, C.R., and Zhang, Y. 2010. Sensitivity of active-layer development to winter conditions north of treeline, Mackenzie delta area, western Arctic coast. Paper 194. *Proceedings, 6th Canadian Permafrost Conference,* 12 – 16 September 2010, Calgary, AB, Canadian Geotechnical Society. pp.1458-1465

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February 29, 2012

Environmental Impact Review Board
107 – Mackenzie Rd. Suite 204
P.O. Box 2120
Inuvik, NT X0E 0T0

Attention: Eli Nasogaluak, Environmental Assessment Coordinator

RE: ABORIGINAL AFFAIRS AND NORTHERN DEVELOPMENT CANADA INFORMATION REQUESTES

Dear Eli,

Please find enclosed our requests for further information related to the Inuvik to Tuktoyaktuk Highway development as outlined in your instructions:

IR Number: 97
Source: Aboriginal Affaires and Northern Development Canada (AANDC)
To: GNWT Department of Transportation (DOT), Town of Inuvik and the Hamlet of Tuktoyaktuk
Subject: Water Quality – Borrow Pits; Project Description Report (PDR) pg.52. EIS Pg 83
Preamble
Constructing the road during the winter appears to provide advantages from the perspective of maintaining permafrost conditions in the construction zone. However, one disadvantage identified in the DAR is that excavating frozen material from the borrow pits may require use of drill and blast methods.
Using explosives introduces a risk that nitrogen compounds in blasting residue may be released to the local aquatic environment in any run off from the borrow pits. Increased concentrations of nitrogen compounds may lead to issues with nutrification in the aquatic receiving environment.
Request
Please evaluate and quantify the potential for elevated concentrations of nitrogen based compounds in run-off water from borrow pits. Please identify monitoring and mitigation strategies that could be implemented in response to increased concentration of nitrogen compounds in run-off water from borrow pits.

IR Number: 98
Source: Aboriginal Affaires and Northern Development Canada (AANDC)
To: GNWT Department of Transportation (DOT), Town of Inuvik and the Hamlet of Tuktoyaktuk
Subject: Borrow Material Ice Content – Borrow Pits; EIS 2.6.8.2 Pg 86 pg.

Preamble:
The Proponent has indicated that the construction sequence for this project will be to quarry and haul borrow material for embankment construction during the same season. "Lessons learned from the construction and maintenance of the road from Tuktoyaktuk to Source 177 are applicable to the proposed Inuvik to Tuktoyaktuk highway since the roads are to be built in the same environment using similar construction and mitigation techniques. Observations of slumping on the recently constructed Source 177 road may indicate that granular materials were not properly drained prior to their use in construction.

Request:
Can the Proponent provide information indicating whether it has considered alternative methods and/or timelines related to quarrying borrow material and its placement in a manner that allows for drainage to occur prior to embankment construction.
Or, can the Proponent indicate what borrow volumes would be needed to stockpile sufficient additional material to repair embankment sections that will be at risk of slumping.

IR Number: 99
Source: Aboriginal Affaires and Northern Development Canada (AANDC)
To: GNWT Department of Transportation (DOT), Town of Inuvik and the Hamlet of Tuktoyaktuk
Subject: Road Embankment Heights – Permafrost Retention; EIS Inuvik Tuk Highway Section 2.6.4
Preamble
The height of the embankment is a critical component of maintaining permafrost conditions below the road surface. Different embankment heights are specified depending upon the type of terrain being crossed.
The proposed embankment thicknesses range from 1.4 m for relatively dry (ice-poor) areas up to 1.8 m for peatlands and areas of ice-rich permafrost. The source of the proposed depths were not provided.
The EIS further states that, *"The routing for each Highway alignment option has been largely developed based on terrain observations in an effort to select reasonable topography* ***and avoid ice rich and other sensitive soils*** *that are likely to result in geotechnical challenges. Such challenges can be mitigated through modification of horizontal alignment to avoid ice rich terrain and considering an overall embankment fill design (rather than balancing cut and fill) with minimum embankment height defined based on the nature of the terrain type".*

Request:
1. Please provide the source of the selected embankment thicknesses and the rational used in determining that the mitigation measure is adequate.

2. Can the Proponent provide a detailed evaluation of mitigation measures (beyond increasing embankment thickness or re-routing the alignment) to prevent permafrost thaw in areas where ice-rich terrain cannot be avoided.

IR Number: 100
Source: Aboriginal Affaires and Northern Development Canada (AANDC)
To: GNWT Department of Transportation (DOT), Town of Inuvik and the Hamlet of Tuktoyaktuk
Subject: Permafrost Integrity – Permafrost Retention; EIS Section 2.2.5
Preamble
An analysis of ice-rich terrain features was conducted for two of the proposed Inuvik to Tuktoyaktuk highway routes during the summer of 2010 by INAC. Aerial photographs and field assessments by helicopter, as well as on the ground examination to verify some areas of ice-rich terrain were completed. Pg 57 of the EIS refers to this work where INAC commented that. "...approximately 10% (or 14 km of 137 km) of the Primary 2009 Route was determined to be located on confirmed or suspected ice-rich terrain and
approximately 8% (or 4 km of 45 km) of the Alternative 2 (Upland Route) was located on similar terrain".

The report also indicated that the detection of significant areas of ice-rich terrain that were not identified in the Project Description (of March 3, 2010) indicates that the Proponent needs to conduct more work to delineate ice-rich terrain and terrain hazards along the proposed route.

Request
Can the proponent confirm and/or provide a complete evaluation of ice rich terrain occurrences along the proposed Inuvik to Tuk Highway 2009 primary alignment.

IR Number: 101
Source: Aboriginal Affaires and Northern Development Canada (AANDC)
To: GNWT Department of Transportation (DOT), Town of Inuvik and the Hamlet of Tuktoyaktuk
Subject: Water Quality – Dust Control; PDR
Preamble
The PDR indicates that water will be used for dust control during highway operations. It is not clear whether dust control chemicals, such as calcium chloride, are also being contemplated for use on the road.
Request
Please confirm whether dust control chemicals may be used for dust control. If so, please identify mitigative measures that are available to minimize potential impacts to the aquatic receiving environment, particularly with respect to sensitive areas such as the Husky Lakes.

IR Number: 102
Source: Aboriginal Affaires and Northern Development Canada (AANDC)
To: GNWT Department of Transportation (DOT), Town of Inuvik and the Hamlet of Tuktoyaktuk
Subject: Developer response to IR number 11 issued by the EIRB – Use of Environmental Monitors
Preamble:
In responding to the information request relating to Environmental Monitors (EM's), the Developer has made several statements that require clarification. Statements of concern relate to the EM roles in determining compliance with AANDC authorizations as well as NWT Water Board authorizations, and actions presumed to be taken by the EM's in the course of their duties.

It should be noted that AANDC recognizes that EM's are an integral component to project development and delivery in the ISR on both Crown and Inuvialuit Private Lands, as well as within the context of water licences issued by the NWTWB. The ILA Environmental Monitor program that exists today is worthy of being held up as a model to the NWT. It is a program where local knowledge and participation is integrated with environmental protection and regulation programs carried out by Inspectors. On Crown land in the ISR, both programs work in collaboration with each other to ensure environmental impacts of projects such as this remain few.

Request:

Please clarify your understanding of the legislative authorities the ILA Environmental Monitors hold in relation to the authorizations issued by AANDC under the Territorial Land Use Regulations and the NWT Quarry Regulations on Crown Land, and the NWT Waters Act in the ISR.

Please clarify your understanding of the relationships ILA Monitors and the ILA have with AANDC Inspectors as well as the legislative mandate AANDC Inspectors hold in relation to enforcement and compliance of terms and conditions set out for projects such as this.

Please clarify your understanding of the differences between Environmental Monitors "monitoring" project activities and, "ensuring compliance with authorizations' terms and conditions".

Please clarify your understanding of the reporting relationships the EM's follow in identifying areas of concern to them while monitoring activities on Crown Land, as well as their authority to "take appropriate action" in the context of dealing with critical situations or non-compliance occurrences.

If you have any questions, or if additional information is required, please contact me at (867) 777-8901.

Regards,

Conrad Baetz
District Manager

Inuvik to Tuktoyaktuk Road
Fisheries and Oceans Information Request

IR Number: 103
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Lessons learned – Water Crossings**
- Response to the January 16th, 2012 Information requests, p.2

Preamble:

In the response to the EIRB Information Request (IR) #1, the Developer mentions that mitigation strategies.were implemented for the Tuktoyaktuk to Granular Source 177 access road that were successful in keeping silt and embankment materials from migrating into the watercourses and having impacts on fish and fish habitat. These measures included the placement of erosion matting, riprap and silt fencing around the culverts. DFO agrees that properly installed mitigation measures, such as those listed by the Developer, can help reduce or eliminate the likelihood of materials entering the aquatic environment and potentially affecting fish and fish habitat.

Despite the implementation of mitigation strategies for the Source 177 access road, DFO still observed failures at various crossing locations that resulted in blockage to fish passage as well as road fill and embankment materials entering the aquatic environment causing impacts to fish and fish habitat.

Request:

1) Based on the Developer's experience from the construction of the Source 177 access road, please provide design considerations, modifications to the construction techniques and mitigation measures that will be used to avoid similar issues from occurring at crossings for the new highway.

IR Number: 104
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Water Crossings – Fish Habitat**
- Response to the January 16th, 2012 Information requests, p.75;
- IMG-Golder Fish Habitat Assessment January 2012, Table 1, p. 4-6

Preamble:

Table 1 in the IMG-Golder January 2012 report provides an overview of the watercourse crossings that intersect the Highway's primary and alternative routes as well as summarizes results from the 2009 assessment (IMG-Golder 2009), Kiggiak EBA's 2010 assessment (Kiggiak EBA 2010 a) and data from the current 2011 fish habitat assessment completed by IMG-Golder. The Developer has also stated that "*all streams that are to be crossed by the proposed Highway have now been assessed*".

DFO has reviewed the various fisheries assessments as well as the information provided in the EIS for water crossings and is still unclear as to the names (identification) and number of crossings for the entire route.

Request:

1) In order to assist parties in understanding and reviewing potential impacts at water crossings, please provide in a table format a summary of all the information gathered to date for all crossings, including:
    a. total number of crossings for the entire route and consistent names/ID;
    b. Crossing type/design with a discussion on how each crossing design will meet the objectives at each location including ensuring no impacts to fish passage or habitat, maintaining flow, etc…
    c. Stream type with description of up and downstream connections;
    d. Flow data including at freshet;
    e. Bank-full or wetted width; and
    f. Details on habitat condition and suitability

    As per the details of the Jan 31, 2012 meeting between the Developer and DFO, plans regarding the type of crossing structures may change as compared to those suggested in the EIS, for example, changing round culverts to open-bottom culverts. This could ultimately change the impact assessment, especially as it relates to fish.
2) Please clarify the timing of each crossing installations (winter versus summer construction), as this would also changes DFO's assessment of impacts on fish and fish habitat.

IR Number: 105
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Water Crossings - Fish Passage**
- Response to the January 16th, 2012 Information requests, p.50

Preamble:

The Developer mentions various sampling programs to evaluate the effectiveness of mitigation measures, specifically measurements of turbidity, pH, dissolved oxygen, temperature and conductivity upstream and downstream of crossings over fish bearing streams.
DFO notes that the Developer has not specifically addressed how fish passage will be monitored.

Request:

1) Please provide details on how fish passage will be monitored.

IR Number: 106
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Water Crossings – Timing Window**
- Response to the January 16th, 2012 Information requests, p.140;
- EIS, Section 1.5.1.4, p.18

Preamble:

On page 140 of the January 16th responses to the EIRB, the Developer has committed to "*Constructing in non-fish bearing streams during winter*" and that "*culverts in fish bearing streams will not permitted between April 1 and July 15 for watercourses that provide habitat for spring/summer spawners.*"

On page 18 in the EIS, the Developer has listed various DFO operational statements that are applicable to the project.

Request:

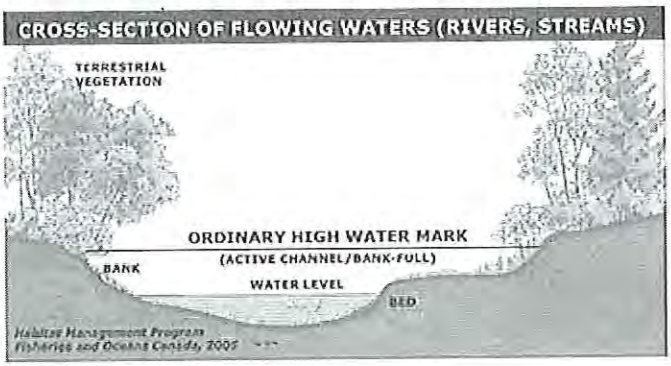
1) As discussed during the Jan 31, 2012 meeting between DFO and DoT, construction in frozen conditions causes fewer impacts in the aquatic environment than summer construction in almost all situations, including fish-bearing streams. Please provide a rationale for why the Developer only mentions construction in non-fish bearing streams in the winter. DFO also recommends that the proponent review DFO's operational statement for timing windows in the NWT (http://www.dfo-mpo.gc.ca/regions/central/habitat/os-eo/provinces-territories-territoires/nt/pdf/os-eo21_e.pdf)
2) If the Developer is considering constructing crossings during the open-water season, please describe the measures that will be implemented to ensure that flows and fish passage are maintained during works in water and that the appropriate sediment and erosion control measures are implemented.

IR Number: 107
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Water Crossings - Bridges**
- EIS, Section 2.6.6, p.72-74

Preamble:

The Developer is proposing to use the DFO clear-span bridge operational statement (OS) for the construction of bridges for the project. On page 74 of the EIS, the Developer states that "*The bridges will be designed to span stream widths, but for some crossings may encroach on the floodplain (to minimize length) with approach fill construction*".

One of the conditions in the DFO clear-span bridge OS is that the bridge must be located entirely above the high-water mark. As well the OS specifies that the bridge structure should not be located on meander bends, braided streams, alluvial fans, active flood plains or any other area that is inherently unstable and may result in the alteration of natural stream functions or erosion and scouring of the bridge structure. The figure below, taken from the OS, shows the location of a typical high water mark.



Request:

1) Please confirm if all bridge structure will meet the requirements of the OS. For the bridges that do not meet the OS, DFO will require more detailed information on each of the crossing design as well as any portion of the structure within the high water mark of the channel.

IR Number: 108
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Borrow Sites – Location, Mitigation and Use of Explosives**
- Response to the January 16th, 2012 Information requests, p.18-19 and Figure 2.6.8-2;
- EIS, Section 2.6.8, Table 2.6.8-1, p. 79-81

Preamble:

In response to the EIRB IR#4.2, the Developer included a map (Figure 2.6.8-2) showing approximate locations of potential borrow sources as well as in the EIS on pages 79-81 provided a description of these sites. It appears from those two documents that several of the borrow sites may be located in or near lakes and streams. On page 18 of the EIS, the Developer mentions that "*Borrow sources will not be developed within 50 m of any watercourse and 1 km of the Husky Lakes. Where blasting is required, DFO guidelines for the use of explosives will be followed (Wright and Hopky 1998).*"

Please note that based on NWT-specific monitoring results, DFO recommends the use of a lower threshold values than indicated in our guidelines to mitigate impacts associated with the use of explosives in or near water. Other mitigation should also be employed including using a series of smaller blasts, timing, and fish exclusion measures if necessary. Two useful references are:

1- **Offshore Oil and Gas Environmental Effects Monitoring: Approaches and Technologies**. Edited by Armsworthy, Shelley, Peter J. Cranford, Kenneth Lee. Cott, P., B. Hanna. 2005.
2- **Monitoring Explosive-Based Winter Seismic Exploration in Water Bodies NWT 2000- 2002**. Cott, P., B. Hanna, J. Dahl. Canadian Manuscript Report for Fisheries and Aquatic Sciences 2648. 2003. Discussion on Seismic Exploration in the Northwest Territories 2000–2003.

Request:

1 Please indicate if any of the borrow sources will be located in or near water. Even though the Developer will have a set back from watercourses and Husky Lakes, it is not clear if these setbacks also include waterbodies.
2) Please provide any associated monitoring and mitigation measures for any borrow sites in or near water. This includes measures for the use of explosives as well as sediment and erosion control measures.

IR Number: 109
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Monitoring - Turbidity**
-Response to the January 16th, 2012 Information requests, p.19-20

Preamble:

The Developer has committed to developing an Environmental Management Plan (EMP) that will include measures to avoid or minimize effects to aquatic resources. The plan will also include annual culvert inspections as well as turbidity measurements up and downstream from crossings to monitor the effectiveness of the culvert design as well as the sediment and erosion control plan.

The turbidity measurements will be done in the spring following ice-out and taken within 50 meters upstream of each crossing as well as 50 and 100 meters downstream from the crossings. The turbidity thresholds are based on the BC Ministry of Environment Ambient Water Quality Guidelines, which state:

- 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.

DFO agrees that turbidity criteria can be useful for monitoring potential impacts of the project on the aquatic environment and to trigger action if required. DFO recommends that the Developer review the following document to assist in drafting the plan:
- The Validity of Including Turbidity Criteria For Aquatic Resource Protection in Land Development Guideline (Pacific and Yukon Region. 2008. I.K. Birtwell, M. Farrell, and A. Jonsson. Canadian Manuscript Report of Fisheries and Aquatic Sciences 2852

Request:

DFO feels that monitoring should be done at all crossings until the Developer can demonstrate that crossings are stable. The plan should be implemented during construction, post-construction and if needed after major precipitation events.

1) Will all crossings be sampled for turbidity? If not, for the crossings not monitored, please provide a rationale for why they do not require sampling.
2) Will turbidity sampling also take place during construction in order to monitor the effectiveness of the sediment and erosion control measures? If so please provide more details on the sampling plan.
3) How will the Developer determine the effectiveness of the crossings designs and mitigation measures at other times of the year, including during extreme precipitation events?
4) Please clarify the differences between clear flow periods versus turbid flow periods. When on site, how will the Developer determine which turbidity thresholds to use?
5) What will be done if turbidity exceeds criteria? How will turbidity monitoring translate into corrective action if required?
6) How will the cause of the increases in turbidity be determined (e.g. poor culvert design, ineffective sediment and control measures, scouring, etc)?

IR Number: 110
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Monitoring – Impacts to Fish and Fish habitat**
- Response to the January 16th, 2012 Information requests, p.19-20
- IMG-Golder Fish Habitat Assessment January 2012, Table 1, p. 4-6

Preamble:

The Developer states in response EIRB IR#5.1 as well as other places within the document that inspections of culverts and monitoring will be carried out "*particularly in fish bearing streams*".
In the Table 1 of the IMG-Golder January 2012 report, stream crossings have been classified as either "*known or assumed fish habitat*", "*contributing to fish habitat downstream*" or as "*unknown*".

Request:

1) As with the turbidity monitoring, all streams including those considered to be "unknown" fish habitat should be monitored unless the Developer can provide adequate evidence to show that streams are not fish frequented year-round. Please confirm that the Developer will inspect culverts at all stream locations that are or likely to be fish habitat or fish migration corridors.

IR Number: \ \ \
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Increase access to fisheries resources – Action Plan**
- Response to the January 16th, 2012 Information requests, p.84-85 and p.109-111

Preamble:

Increased access to lakes and streams along the proposed highway corridor could impact the fisheries resources over the life of the project. The Developer has suggested that an Action plan be developed in cooperation with the ILA, the HTCs, the FJMC, and DFO during the period of Project construction to achieve resource protection and sustainability. The Action Plan would integrate public, government, and NGO input, and develop strategies for limiting 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.

Upon recommendation from DFO, the FJMC formed the Tuktoyaktuk-Inuvik Working Group (TIWG) specifically to deal with arising issues with regards to fisheries resources along the proposed Tuk-Inuvik Highway route. Members from the Inuvik and Tuktoyaktuk Hunters and Trappers Committee compose of the group, and the DFO fisheries biologist participates as an advisor/observer. DFO recommends that the proponent and other potential partners (e.g. ILA) work with the TIWG to create this action plan.

Request:

1) What are the expected timeframes for the development, consultation and implementation of the Action Plan? A plan should be in place prior to the opening of the road.
2) How will the Action Plan be coordinated with other existing or future Land Use and Community Conservation Plans?

IR Number: 112
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Increase access to fisheries resources – Fish Species**
- EIS, Section 3.1.7, p.150;
- Fish Habitat Assessment (January 2012)

Preamble:

Section 3.1.7 of the EIS as well as Appendix II of the IMG-Golder January 2012 describe the life history information and habitat preferences of valued fish species that are likely to be encountered along the proposed Highway. While these documents discuss the timing and required habitat of fish at different life stages, several biological characteristics associated with species-specific susceptibilities to fishing pressures are not described such as lifespan, growth rate, body size, fecundity, timing of maturity and several other life history traits. These characteristics can be used to predict species vulnerability to overharvesting.

Figure 3.2.8-16 of the EIS identifies the larger fish-bearing lakes along the highway route. The fisheries assessments along the corridor completed in 2010 and 2011 further identify fish-bearing waterbodies. It is important to note that specific streams may be affected with regards to increased angling, as well as smaller lakes may be accessed for subsistence fishing closer to the communities.

Request:

1) Based on the biological characteristics of fish present near the proposed highway, please describe how certain species may be more susceptible to overharvesting pressures.
2) Please discuss how smaller lakes and streams will also be included in the Action Plan.

IR Number: 113
Source: Fisheries and Oceans Canada
To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)
Subject: **Cumulative Effects**
- Response to the January 16th, 2012 Information requests, p.115

Preamble:

The potential future projects and activities discussed in the cumulative effects assessment in the EIS include the Mackenzie Gas project, the Tuktoyaktuk Harbour Project and possible future developments in the Husky Lakes area.

Request:

1) Please provide a rationale for why the Mackenzie Valley Highway was not included as part of the cumulative effects assessment. The new Mackenzie Valley Highway would join the Inuvik to Tuktoyaktuk Highway with existing portions of road at Wrigley. As a potential future development the new Mackenzie Valley Highway could have cumulative impacts in the local and regional study area of the project.
2) What are the potential cumulative effects of the new Mackenzie Valley Highway with respect to fish habitat, fish migration, and impacts to populations from increased access.

Environment Canada | Environnement Canada

Environmental Protection Operations
Prairie and Northern
5019 52nd Street, 4th Floor
P.O. Box 2310
Yellowknife, NT, X1A 2P7

March 6, 2012

Our File No.: 4336 001 009
Your File No.: EIRB 02/10-05

Eli Nasogaluak
EIRB Environmental Assessment Coordinator
Environmental Impact Review Board
Joint Secretariat – Inuvialuit Renewable Resources Committee
107 Mackenzie Road, Suite 204
P.O. Box 2120, Inuvik, NT
X0E 0T0

Via Email at eirb@jointsec.nt.ca

RE: EIRB 02/10-05 – Hamlet of Tuktoyaktuk, Town of Inuvik, and the Government of the Northwest Territories – Information Requests – Construction of the Inuvik to Tuktoyaktuk Highway, Northwest Territories

Dear Mr. Nasogaluak,

Environment Canada (EC) is pleased to submit the following information requests (IRs) to the Environmental Impact Review Board (the Board) as part of the environmental assessment review process being conducted for the Hamlet of Tuktoyaktuk, Town of Inuvik, and the Government of the Northwest Territories' (the Developer) Construction of the Inuvik to Tuktoyaktuk Highway (EIRB 02/10-05). The answers to these questions will assist our department in completing its review, and will help the Department provide advice to the Board on the potential for adverse environmental impacts.

Should you have any questions or wish to discuss these IRs further please do not hesitate to contact Stacey LeBlanc at (867) 669-4748 or Stacey.LeBlanc@ec.gc.ca.

Yours truly,

Cheryl Baraniecki
Regional Director, EPO

cc: Dave Ingstrup (Regional Director, CWS)
Carey Ogilvie (Head, Environmental Assessment North, EPO)
Vanessa Charlwood (Head, Western Arctic Unit, EC-CWS)
James Hodson (Environmental Assessment Coordinator, CWS)
Stacey LeBlanc (A/Sr Environmental Assessment Coordinator, EPO)
Mike Fournier (Sr Environmental Assessment Coordinator, EPO)

IR Number: 114

Source: Environment Canada

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

Subject: Cumulative effects assessment for species at risk

Preamble:

Section 10.1.5 of the Terms of Reference (TOR) for the EIS stipulates that all direct, indirect and cumulative effects should be considered for species at risk listed on Schedule 1 of SARA and those designated at risk by COSEWIC. Section 11 of the TOR directs the Developer to identify and assess the cumulative environmental and socio-economic effects of the project in combination with other past, present or reasonably foreseeable projects and/or activities within the Study Area(s). Specifically, the Developer is required to identify the sources of potential cumulative effects and to specify other projects or activities that have been or will be carried out that could produce effects on each selected VEC or VSC within the boundaries defined, and whose effects would act in combination with the residual effects of the project.

The Developer has identified an area extending from the westerly shores of the Husky Lakes to the eastern side of the Mackenzie River as the spatial boundary for their cumulative effects assessment (Response to EIRB IR 49). Potential future projects/activities that are considered in the cumulative effects assessment include the Mackenzie Gas Project, the Parsons Lake gas field, associated infrastructure and gathering pipeline, the Tuktoyaktuk Harbour Project and Husky Lakes Development.

As highlighted by the EIRB in their Information Request #48 to the Developer, the cumulative effects assessment is very qualitative in nature, and currently does not provide a quantitative assessment of the potential cumulative direct and indirect impacts of these potential future projects/activities. This includes the assessment for cumulative effects on species at risk.

Under paragraph 16(1)(*a*) of CEAA, every environmental assessment must consider "the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out" (Environment Canada and Parks Canada, 2010, pg. 39).

Since the definition of "environmental effect" includes any change a project may cause to a listed wildlife species, its critical habitat or the residences of individuals of that species, it is important that cumulative environmental effects on listed wildlife species are considered in the environmental assessment process (Environment Canada and Parks Canada, 2010, pg. 39).

SARA establishes no explicit obligations to address cumulative environmental effects on listed wildlife species. However, many listed wildlife species are at risk precisely because of cumulative environmental effects that have occurred in the past, such as gradual loss of habitat (Environment Canada and Parks Canada, 2010, pg. 39).

Thus, it is implicitly important in the cumulative environmental effects analysis that environmental assessments always consider the potential for cumulative environmental effects

on listed wildlife species, the residences of their individuals and their critical habitat, in the context of the combined past threats the species have faced, as well as any additional present or future threats that can reasonably be expected to occur (Environment Canada and Parks Canada, 2010, pg. 39).

The following species at risk were identified as potentially occurring within the Regional Study Area:

Terrestrial Species at Risk	COSEWIC Designation	Schedule of SARA	Government Organization with Lead Management Responsibility [1]
Horned Grebe (Western population)	Special Concern	Pending	EC
Eskimo Curlew[2]	Endangered	Schedule 1	EC
Rusty Blackbird	Special Concern	Schedule 1	GNWT
Peregrine Falcon (*anatum-tundrius* complex[3])	Special Concern	Schedule 1 - Threatened (*anatum*)	GNWT
Short-eared Owl	Special Concern	Schedule 3	GNWT
Woodland Caribou (Boreal population)	Threatened	Schedule 1	GNWT
Grizzly Bear	Special Concern	Pending	GNWT
Polar Bear	Special Concern	Schedule 1	GNWT
Wolverine (Western population)	Special Concern	Pending	GNWT

[1] Environment Canada (EC) has a national role to play in the conservation and recovery of Species at Risk in Canada, as well as responsibility for management of birds described in the Migratory Birds Convention Act (MBCA). Day-to-day management of terrestrial species not covered in the MBCA is the responsibility of the Territorial Government. Populations that exist in National Parks are also managed under the authority of the Parks Canada Agency.

[2] Eskimo Curlew could potentially occur within the project area. However, there have been no reliable sightings of Eskimo Curlew since 1998 and the National Recovery Team for this species has determined that recovery is not feasible at this time. It is EC's view that, in light of its current status, there is no need for further action with respect to Eskimo Curlew. An appropriate mitigation and monitoring plan will be developed with the Proponent if it is established that this species does occur in the area.

[3] The *anatum* subspecies of Peregrine Falcon is listed on Schedule 1 of SARA as threatened. The *anatum* and *tundrius* subspecies of Peregrine Falcon were reassessed by COSEWIC in 2007 and combined into one subpopulation complex. This subpopulation complex was listed by COSEWIC as Special Concern.

The Developer's cumulative effects assessment is currently inadequate to satisfy the requirements of CEAA subsections 16(1)(a), particularly with respect to species at risk.

A precautionary approach to predicting cumulative effects suggests that it would be conservative to assume that the Mackenzie Gas Project will proceed and that the associated Parsons Lake Gas Field and associated infrastructure and gathering lines will be built. Given that the MGP has already undergone an in-depth review, information is available on the area and location of the direct footprint of the Parsons Lake facilities and gathering pipelines as well

as the projected zone of influence due to sensory disturbance from these features. It should therefore be possible to provide a quantitative estimate of the cumulative area of habitat for each species at risk within the spatial boundaries selected for the cumulative effects assessment that will be directly or indirectly affected by infrastructure proposed for the MGP, in combination with the proposed HWY and other existing development.

The Developer has also identified a number of programs to collect further baseline data during the summer and fall of 2012 (summarized in response to EIRB IR#15) that may help to improve the prediction, mitigation and monitoring of cumulative effects to species at risk. It is currently unclear how this information will be integrated into the environmental assessment given the proposed review timeline, or how it will be integrated into refining the design of the project or in refining mitigative measures, and whether regulators will have the opportunity to review and comment on the information collected prior to the board issuing it's decision on the project.

Request

For the Developer to provide:

1. A quantitative summary of the direct footprints and indirect effects on habitat quality due to sensory disturbance (e.g. dust, noise, light) of existing and foreseeable projects within the spatial boundaries selected for the cumulative effects assessment. The projected footprints should be broken down by habitat type and expressed as a total proportion of each habitat type available in the cumulative effects assessment study area.
2. An assessment of the potential impact of cumulative direct habitat loss and indirect changes in habitat quality due to sensory disturbance for each species at risk likely to occur in the cumulative effects study area, using knowledge of current distribution and habitat associations of each species at risk to inform the impact assessment
3. Where current data is insufficient to provide an adequate assessment of the potential impact on each species at risk, provide an outline of how future baseline data collection programs will address these deficiencies, how the information obtained will be shared with the EIRB, regulators and other interested parties, and how it will be used to refine mitigation and monitoring plans

References

Environment Canada and Parks Canada, 2010, "Addressing Species at Risk Considerations under the *Canadian Environmental Assessment Act* for Species Under the Responsibility of the Minister Responsible for Environment Canada and Parks Canada". Available at: www.ec.gc.ca/nature/default.asp?lang=En&n=132ADBFC-1&parent=0C1743A2-4D49-4183-AC5F-1DE909D2FEB1

IR Number: 115

Source: Environment Canada

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

Subject: Noise impact assessment for the operation phase of the highway

Preamble:
Section 10.1.7 of the Terms of Reference for the EIS direct the Developer to describe and evaluate potential impacts of visual or auditory disturbance, including habitat avoidance and effective habitat loss in relation to Project facilities or activities, and the duration and geographic extent of such impacts. The TOR specifically mentions the distance of noise related disturbance as an example of the duration and geographic extent of an impact.

The Developer states in Sections 3.1.4. and 4.2.3 of the EIS state that ambient noise levels measured at the Inuvik Area Facility as part of baseline studies for the Mackenzie Gas Project were between 20 dBA (winter) and 31 dBA Leq (summer). It is expected that noise levels associated with passengers travelling at the speed limit will typically be within 72-74 dBA at 15 m from the vehicle and heavy-duty trucks will typically be within 84-86 dBA at 15 m from the truck. The Developer predicts that vehicles would not be expected to create excessive noise beyond the immediate vicinity of the Highway and that higher sound levels will be intermittent, short in duration, and transient in nature. However, there is no indication of the distance at which noise from vehicle traffic along the highway would be expected to attenuate to ambient levels, and therefore no quantitative estimate of the potential zone of influence for noise effects on wildlife has been provided.

Request:

For the Developer to:

1. Calculate the expected zone of influence within which noise from operation of the highway will exceed baseline ambient noise levels (i.e. provide the distance from the highway at which vehicle noise will attenuate to ambient levels).
2. Calculate the proportion of the LSA and RSA that will be within the predicted zone of influence from traffic noise during the operation of the highway.

IR Number: 116

Source: Environment Canada

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

Subject: Potential bird mortality due to vehicle collisions during the operational life of the highway

Preamble:
Section 10.1.7 of the Terms of Reference for the EIS directs the Developer to describe and evaluate potential impacts of wildlife mortality due to harvesting and vehicle collisions, including the duration and geographic extent of such impacts.

In section 4.2.7.6 of the EIS, the Developer acknowledges the potential for increased mortality through vehicular collisions but does not provide a quantitative assessment of this potential mortality. Some quantitative information was later provided in response to EIRB IR#26; however, the Developer only presents data on bird mortality from monitoring data obtained along Meadowbank gold mine's all-weather public access road (AWPAR) from 2007 to 2010. Monitoring of wildlife mortality along mine and winter roads associated with the Ekati, Diavik and Snap Lake mines has been taking place for a much longer period and could provide further information on potential bird mortality along the proposed highway during the operational period.

Request:

For the developer to provide:

1. Data on bird mortality due to collisions with vehicles from monitoring programs at other mines operating above the tree-line in the NWT and Nunavut.

2. Based on available data, estimate potential annual bird mortality due to operation of the proposed highway, accounting for expected traffic volume and the length of the highway

3. Where possible, estimate combined mortality from vehicle collisions and annual harvest rates

IR Number: 117

Source: Environment Canada

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

Subject: Potential habitat disturbance within the boreal woodland caribou range

Preamble:

The Developer has noted that the southern end of the proposed HWY may overlap with the northern limit of the range of boreal woodland caribou. Boreal woodland caribou are listed as Threatened on Schedule 1 of the federal *Species at Risk Act*.

Environment Canada posted a proposed "Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada" on the Species at Risk Public Registry on August 26, 2011. National recovery strategies for federal Species at Risk are planning documents that must identify a species' critical habitat, to the extent possible, and approaches to stop or reverse the decline of the species. The intent of the SARA is to protect critical habitat from being destroyed wherever it occurs.

The proposed recovery strategy for boreal caribou identifies two local population ranges in the Northwest Territories (NWT). The southern end of the proposed highway may overlap with the northern limit of the NWT North boreal woodland caribou range identified in the proposed national recovery strategy.

Maps of the NWT North boreal caribou local population, range attributes and a description of the biophysical attributes of critical habitat, are provided in Appendix F-1 of the proposed Recovery Strategy available at:
http://www.sararegistry.gc.ca/document/default_e.cfm?documentID=2253

The proposed national recovery strategy considers the total disturbed area in a local population range as the area of the anthropogenic footprint plus a 500 m buffer around the perimeter of the footprint (for linear features this equates to the width of the feature plus a 500 m buffer on either side), plus areas where a fire has occurred in the past 40 years (no buffer applied). EC has made the range boundaries and disturbance data (shapefiles) for boreal caribou available online at: http://www.data.gc.ca/default.asp?lang=En&n=5175A6F0-1&xsl=datacataloguerecord&metaxsl=datacataloguerecord&formid=F34DCB32-4845-4E88-B125-5AC03C6E4A7F,%20F34DCB32-4845-4E88-B125-5AC03C6E4A7F

Shapefiles are provided for both the buffered anthropogenic disturbance and unbuffered fires within each boreal caribou local population range across Canada.

Request:

For the developer to:

1. Provide a map showing whether the proposed highway alignments overlap with the NWT North boreal caribou range

2. Calculate the area of new disturbance that the highway corridor will cause, including a 500 m buffer on either side of the direct footprint from the highway right of way, if a portion of any of the proposed routes lie within the NWT North boreal caribou range.

IR Number: 118

Source: Infrastructure Canada, Program Operations Branch, West/North Directorate, Tamara Skillen, Manager, Environmental Review and Approvals, tamara.skillen@infc.gc.ca

To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Engagement with the Gwich'in Tribal Council

Preamble
The Inuvik to Tuktoyaktuk highway will commence approximately 5 kilometres from Inuvik and the highway start (kilometre 0) is located on the border of the Gwich'in Settlement Area. Although the highway will be located entirely within the Inuvialuit Settlement Region, the highway may have impacts on the Town of Inuvik and the road from Inuvik to the start of the highway, both of which are located within the Gwich'in Settlement Area.

The Developer's correspondence to date notes some involvement of the Gwich'in in community consultations and it is understood that additional efforts may be undertaken.

Request
Please summarize the Developer's engagement efforts with the Gwich'in to-date, describe any concerns that have been identified, and outline any future planned engagement efforts.

Health Canada / Santé Canada

Environmental Assessment Program
Safe Environments Directorate
HECS Branch, Health Canada
99 Metcalfe Street
Ottawa, ON K1A 0K9

February 28, 2012

Eli Nasogaluak
Environmental Assessment Coordinator
Environmental Impact Review Board
Joint Secretariat - Inuvialuit Renewable Resource Committees
107 Mackenzie Road, Suite 204
PO Box 2120 Inuvik, NT
Canada
X0E 0T0

Sent by e-mail to eirb@jointsec.nt.ca

Subject: **Health Canada's Information Requests on the *Developer Response to Health Canada* (August 2011) for Tuktoyaktuk to Inuvik Highway project**

Dear Mr. Nasogaluak:

In order to assist the Environmental Impact Review Board's (EIRB) in their review of the Developer's environmental assessment documents in support of the Tuktoyaktuk to Inuvik Highway project, please find attached Health Canada's comments on the August 2011 document *Developer Response to Health Canada.*

Health Canada provides the following information for your consideration.[1] Overall, Health Canada is satisfied with the Developer's responses (August 2011) to HC comments of June 27, 2011 on the draft Environmental Impact Statement (EIS) and suggests that these responses be incorporated into a revised EIS or that they are clearly referenced in a supporting document. Health Canada has three outstanding Information Requests for the Developer pertaining to air quality and noise that are provided in the table below.

[1] Note that Health Canada's role is advisory only. The EIRB determines how the advice provided by Health Canada will be used in the Environmental Assessment (EA) process and makes all decisions related to the environmental assessment of the project.

Subject	Preamble	Request
Air Quality	Health Canada appreciates the Developer's response (Comment 2) providing additional details about the project's dust emissions ($PM_{2.5}$, PM_{10} and Total Suspended Particulates (TSP)) and the potential effects on health due to air quality. However, the draft EIS indicates that project emissions also include nitrogen oxides (NO_X), sulphur oxides (SO_X) and notes these contaminants may be associated with adverse health effects. However, the draft EIS or the Developer's response does not identify the potential health effects associated with the predicted levels of these contaminants.	Please include information regarding the potential health implications from the NO_X and SO_X emissions. IR # 127
Air Quality	Comment 2 of the Developer's Response responds to Health Canada's request for a discussion of potential human health effects resulting from air quality changes including PM 2.5 and PM10 to support the statement in the EIS that "no residual effects in terms of substances are anticipated". In the Developer's response, the NAAQOs and NWT Ambient Air Quality Standards are mentioned and there indicates that "***No residual effects to humans are anticipated*** ....*Other emissions that may be generated during construction and operation of the Highway are anticipated to be minimal, with air quality parameters remaining within the accepted standards and guidelines, as discussed in the EIS.*" It is important to note that air quality criteria and standards for particulate matter should not be considered as thresholds below which human health effects do not occur[2].	Health Canada suggests rephrasing the statement that "no residual effects to humans are anticipated" as there are no thresholds for particulate matter below which human health effects do not occur[3]. IR # 128

[2] World Health Organization (WHO). 2003. Health aspects of air pollution with particulate matter, ozone, and nitrogen dioxide. Report on a WHO Working Group. Bonn, Germany 13-15 January 2003. Copenhagen: World Health Organization. Retrieved December 1, 2011, from: http://www.euro.who.int/__data/assets/pdf_file/0005/112199/E79097.pdf

[3] Ibid.

Subject	Preamble	Request
Noise	The Developer's response indicated that there are some (1 or 2) residential leases within 1 km of the proposed alignments and many (19 to 33) residential leases within 5 km of the proposed alignments. IR # 129	Depending on the potential for future human use of these residential leases, Health Canada suggests that a noise assessment may be appropriate for predicting the potential effects of noise on human health. If a noise assessment is completed, Health Canada suggests including the relevant information specified in the Noise Effects section of *Useful Information for Environmental Assessment*[4]. If a noise assessment is not completed, Health Canada suggests providing a rationale for its exclusion referring to the nature of human use (likelihood of use, type of use, duration, etc) of the residential leases.

Thank you for providing Health Canada with the opportunity to comment on this project. Should you have any questions concerning Health Canada's comments or identify any other specific human health concerns with respect to this project, Health Canada would be pleased to provide expertise, upon request.

Please feel free to direct your questions or requests to the undersigned.

Sincerely,

Kathleen Hedley
Director, Environmental Health Bureau
Safe Environments Directorate, Health Canada

c.c.: Luigi Lorusso, Acting Manager, Environmental Assessment Division, Health Canada
Gregory Kaminski, Senior Environmental Health Assessment Specialist, Health Canada
Rebecca Stranberg, Environmental Assessment Coordinator, Health Canada
Wendy Harris, Environmental Assessment Officer, Health Canada

[4] http://www.hc-sc.gc.ca/ewh-semt/pubs/eval/environ_assess-eval/index-eng.php#a7

Natural Resources Canada | Ressources naturelles Canada

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March 1, 2012

Eli Nasogaluak
EIR Coordinator
Inuvik to Tuktoyaktuk Highway Project
Environmental Impact Review Board
107 Mackenzie Road, Suite 204
P.O. Box 2120
Inuvik, NT X0E 0T0

NRCan File #: NWT-155
EIRB File #: 02/10-05

Sent via e-mail: eirb@jointscc.nt.ca.

Subject: Natural Resources Canada's Information Requests for the Proposed Inuvik to Tuktoyaktuk Highway Project Environmental Impact Review

Further to the Environmental Impact Review Board's (EIRB) announcement of December 20, 2011, Natural Resources Canada (NRCan) is providing the attached Information Requests (IR) for the proposed construction of the Inuvik to Tuktoyaktuk Highway Project Environmental Impact Review.

NRCan has reviewed the Terms of Reference, draft Environmental Impact Statement (EIS) and supplementary information with respect to permafrost and terrain conditions. Our IRs are directed to the Developer (Government of Northwest Territories, Hamlet of Tuktoyakyuk, Town of Inuvik), to request clarification or additional information to understand the project's potential effects. NRCan has coordinated the development of these IRs with Aboriginal Affairs and Northern Development Canada.

Should you have any questions regarding NRCan's information requests, please do not hesitate to contact the undersigned at 613-995-7686 or john.king@nrcan.gc.ca.

Sincerely,

Original signed by

John King
Senior Policy Analyst
Environmental Assessment Division
Natural Resources Canada

Attach: (1)

c.c.: J. Clarke (NRCan), F. Schellekens (NRCan), B. Gowan (AANDC), K. Witherly (NPMO)

Canada

NRCan's IRs on the Proposed Inuvik to Tuktoyaktuk Highway Project Environmental Impact Review [02/10-05]

IR Number: 130

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Terrain conditions and sensitivity along proposed route (TOR 6, 7, 9.1, 10.1, App. A; Reference: EIS 2.1, 2.2, 2.3, 2.4, 3.1)

Preamble
Information on baseline terrain conditions and sensitivity along the proposed route is required to determine design parameters for the highway, impact assessment and to ensure impacts of the project on the environment as well as the impact of the environment on the project are minimized. The Proponent has provided a surficial geology map (Figure 3.1.1-1), the proportion of the proposed route underlain by various terrain types and general terrain descriptions for segments of the route in tabular format (section 2.3, Table 2.3-1). A map of previous landslide occurrence has also been provided (Figure 3.1.1-4). However, the Proponent has not provided any large scale alignment sheets that provide information on terrain types and potential geohazards and instability in addition to those associated with landslides. This information (such as areas of massive ice, thermokarst etc.) is required to provide more site specific conditions along the route and to identify areas where potential impacts may occur and where mitigation may be required. It is not clear whether the Proponent has produced the larger scale alignment sheets.

Request
Please clarify whether large scale alignment sheets showing terrain type and sensitivity along the proposed route have been developed. Please provide these maps if available.

IR Number: 131

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Baseline permafrost and geotechnical information (TOR 9.1, App. A; Reference: EIS Section 2.2, 2.3, 2.4, 2.7, 3.1)

Preamble

Baseline information on geotechnical and permafrost conditions is required for adequate design of the highway and for characterizing potential borrow sites. This information is also required for assessment of potential impacts and implementation of mitigation techniques. The Proponent indicates that the identification of geotechnical challenges is based on limited terrain assessments (section 2.2.5). They also indicate that field work was done in 2009 and indicate additional studies are required for detailed design of the highway (section 2.1.2. section 2.7.7). Reference is made to historical studies for which geotechnical investigations were conducted (section 2.1.2). Much historical information exists, including results of geotechnical investigations, designs, and environmental assessment material related to past highway and pipeline proposals. Much of this information (including reports for and by Public Works and INAC) has been compiled into a digital borehole database by Smith et al. (2005) and Chartrand et al. (2002), with more recent data relevant to the section of the route between Inuvik and Parsons Lake published in Wolfe et al. (2010). Information on ground ice conditions can be found in the database of Côté et al. (2003). It is NRCan's understanding that the Proponent's consultant received a CD containing historical reports from the federal lands program manager. It is not clear from the EIS how existing information has been utilized to characterize the baseline geotechnical conditions and for the impact analyses. Also, no details have been provided on the investigations conducted during the 2009 field work and the information obtained. Without information regarding what site specific (either historical or new studies) information has been utilized and where information is lacking, it is difficult to determine the completeness of the baseline environmental description (and therefore the validity of the impact assessments) and the extent of further work that may be required to support detailed design.

Request

Please provide clarification on how historical and recent geotechnical studies have been utilized to describe baseline conditions and to support the impact assessments. In particular, provide details on the location of available information (including its adequacy) and areas where information is lacking and plans to fill these gaps.

References

Chartrand, J., Lysyshyn, K., Couture, R., Robinson, S., and Burgess, M. 2002. Digital Geotechnical Borehole Databases and Viewers for Norman Wells and Tuktoyaktuk, Northwest Territory, Geological Survey of Canada Open File 3912. http://geopub.nrcan.gc.ca/moreinfo_e.php?id=213818&_h=chartrand

Côté, M.M., Wright, J.F., Duchesne, C., and Dallimore, S.R. 2003. Surficial materials and ground ice information from seismic shotholes in the Mackenzie-Beaufort region, Yukon and Northwest Territories: digital compilation. Geological Survey of Canada Open File 4490.

Smith, S.L., Burgess, M.M., Chartrand, J., and Lawrence, D.E. 2005. Digital borehole geotechnical database for the Mackenzie Valley/Delta region, Geological Survey of Canada Open File 4924. http://geopub.nrcan.gc.ca/moreinfo_e.php?id=220383

Wolfe, S.A., Smith, S.L., Chartrand, J., Kokelj, S.V., Palmer, M., and Stevens, C. 2010. Geotechnical database and descriptions of permafrost monitoring sites established 2006-10 in the northern Mackenzie Corridor, Geological Survey of Canada Open File 6677. http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&format=FLSHORTORG&search=R=287167

IR Number: 132

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Ground thermal conditions in the project area (TOR 9.1, App. A; Reference: EIS section 2.4, 2.6, 3.1)

Preamble

Information on ground thermal conditions is required for adequate design of the highway, assessment of impacts associated with the highway and granular resource extraction and also for determining the effects of climate change on the project. Some general information has been provided in the EIS (section 3.1) on regional ground temperature conditions (extracted from Burn and Kokelj 2009). There is, however, no information provided on any site specific information that may have been utilized to describe baseline conditions and the assessment of impacts. NRCan notes that there has been recent information on ground thermal conditions published which is relevant to the study area including Smith et al. (2005, 2010a,b); Ednie et al., (2011); Wolfe et al. (2010) and Stevens et al. (2011). Information is also available in the vicinity of lakes and stream crossings which is particularly relevant for delineation of taliks and design of stream crossings (eg. Kokelj et al. 2009; Wolfe et. al. 2010; Stevens et al. 2011). Additional information on active layer conditions since the 1990s can also be found in Smith et al. (200)9. It is not clear whether these and other sources of information have been utilized to describe the spatial variation in ground temperature and for characterizing ground thermal conditions of representative terrain types. It is also not clear whether the Proponent has collected any site specific information to characterize ground thermal conditions and support the impact assessment and project design. Clarification is therefore required regarding how existing and recently collected ground temperature information has been utilized to support the project design and impact assessment. NRCan did not see an assessment of where information is lacking and a description of further studies that are still required.

Request

Please provide clarification on the existing site specific ground thermal information either collected by others or the Proponent utilized in the description of baseline conditions and how this information has been utilized to support project design and impact assessment.

In addition, please provide an assessment of where information is lacking and a description of further studies to be conducted to address these gaps.

References

Ednie, M., Chartrand, J., and Smith, S.L. 2011. Report on 2010 Field Activities and Collection of Ground Thermal and Active Layer Data in the Mackenzie Corridor Completed Under N.W.T. Science Licence #14686, Geological Survey of Canada Open File 6932. http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&format=FLSHORTORG&search=R=288924

Kokelj, S.V., Lantz, T.C., Kanigan, J., Smith, S.L., and Coutts, R. 2009. Origin and polycyclic behaviour of tundra thaw slumps, Mackenzie Delta region, Northwest Territories, Canada. Permafrost and Periglacial Processes, 20(2): 173-184.

Smith, S.L., Romanovsky, V.E., Lewkowicz, A.G., Burn, C.R., Allard, M., Clow, G.D., Yoshikawa, K., and Throop, J. 2010. Thermal state of permafrost in North America - A contribution to the International Polar Year. Permafrost and Periglacial Processes, 21: 117-135.

Smith, S.L., Throop, J., Ednie, M., Chartrand, J., Riseborough, D., and Nixon, F.M. 2010. Report on 2009 field activities and ground thermal data collection in the Mackenzie corridor completed under NWT Science Licence #14582, Geological Survey of Canada Open File 6695. http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&format=FLSHORTORG&search=R=287166

Smith, S.L., Riseborough, D.W., Nixon, F.M., Chartrand, J., Duchesne, C., and Ednie, M. 2009. Data for Geological Survey of Canada active layer monitoring sites in the Mackenzie valley, N.W.T., Geological Survey of Canada Open File 6287. http://geopub.nrcan.gc.ca/moreinfo_e.php?id=248197

Smith, S.L., Burgess, M.M., Riseborough, D., and Nixon, F.M. 2005. Recent trends from Canadian permafrost thermal monitoring network sites. Permafrost and Periglacial Processes 16: 19-30.

Stevens, C.W., Palmer, M., Wolfe, S.A., Kokelj, S.V., and Smith, S.L. 2011. Permafrost and Environmental Conditions at Stream Crossing Sites along the Northern Mackenzie Pipeline Corridor, Northwest Territories, Geological Survey of Canada Open File 6976. http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&format=FLSHORTORG&search=R=289554

Wolfe, S.A., Smith, S.L., Chartrand, J., Kokelj, S.V., Palmer, M., and Stevens, C. 2010. Geotechnical database and descriptions of permafrost monitoring sites established 2006-10 in the northern Mackenzie Corridor, Geological Survey of Canada Open File 6677.

http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&format=FLSHORTORG&search=R=287167

IR Number: 133

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Thermal analysis to support design and impact assessment (TOR 9.1, 10.1, 10.4, App A; Reference: EIS section 2.4, 2.6, 3.1, 4.0, 4.5)

Preamble

Thermal analyses are often conducted to determine the effects on the ground thermal regime, including changes in thaw depth (and associated ground movements) resulting from project activities such as road construction. These analyses can be utilized to support project design such as embankment height and also to determine effects of climate change on the project. The Proponent indicates that a risk-based approach has been utilized to support project design including incorporation of climate change effects (section 2.6, 4.5.1). This approach originally proposed by Environment Canada (1998) and summarized in TAC (2010) and CSA (2010) indicates that roads constructed in permafrost regions are moderately sensitive to climate change and moderate consequences are associated with failure. This classification suggests that a semi-quantitative analysis is required and NRCan suggests that thermal analysis for representative terrain types in the project area could be useful. It is not clear, however, whether any such analysis has been conducted. Although the EIS includes information on embankment heights that will be used for various terrain conditions (section 2.6.4), it is not clear how these values were determined or how climate change may have been incorporated. Disturbance to the ground surface during site preparation (disturbance to vegetation, grading, etc) and construction can cause changes in the ground thermal regime resulting in increased thaw depth, thaw settlement and changes to drainage (e.g. Smith et al. 2008; Burgess and Smith 2003; Kokelj et al. 2009). These effects can be exacerbated by climate warming (eg. Smith and Riseborough 2010). Recent research has indicated that permafrost is warming in the region at rates of 0.5 to 1° per decade (Burn and Kokelj 2009; Smith et al., 2005, 2010) and project design needs to consider this as well as the impacts of the project on the ground thermal regime.

Request

Please provide information on the analysis conducted to determine the impacts of the project on the ground thermal regime and to support the project design including determination of embankment height. Please also provide information of how climate change has been incorporated into the analysis to support project design and the impact assessment.

References

Burgess, M.M., and Smith, S.L. 2003. 17 years of thaw penetration and surface settlement observations in permafrost terrain along the Norman Wells pipeline, Northwest Territories, Canada. In Proceedings of 8th International Conference on Permafrost. Edited by M. Phillips, S.M. Springman, and L.U. Arenson. Zurich Switzerland. July 2003. A.A. Balkema, pp. 107-112.

Burn, C.R., and Kokelj, S.V. 2009. The environment and permafrost of the Mackenzie Delta area. Permafrost and Periglacial Processes, 20(2): 83-105.

Canadian Standards Association 2010. Technical Guide - Infrastructure in permafrost: a guideline for climate change adaptation, Report Plus 4011-10.

Environment Canada 1998. Climate Change Impacts on Permafrost Engineering Design, Environment Canada Environmental Adaptation Research Group.

Kokelj, S.V., Lantz, T.C., Kanigan, J., Smith, S.L., and Coutts, R. 2009. Origin and polycyclic behaviour of tundra thaw slumps, Mackenzie Delta region, Northwest Territories, Canada. Permafrost and Periglacial Processes, 20(2): 173-184.

Smith, S.L., Burgess, M.M., Riseborough, D. and Chartrand, J. 2008. Permafrost and terrain research and monitoring sites of the Norman Wells to Zama pipeline – Thermal data collection and case histories, April 1985 to September 2001. GSC Open File 5331. http://geopub.nrcan.gc.ca/moreinfo_e.php?id=224831

Smith, S.L., and Riseborough, D.W. 2010. Modelling the thermal response of permafrost terrain to right-of-way disturbance and climate warming. Cold Regions Science and Technology, 60: 92-103.

Smith, S.L., Burgess, M.M., Riseborough, D., and Nixon, F.M. 2005. Recent trends from Canadian permafrost thermal monitoring network sites. Permafrost and Periglacial Processes 16: 19-30.

Smith, S.L., Romanovsky, V.E., Lewkowicz, A.G., Burn, C.R., Allard, M., Clow, G.D., Yoshikawa, K., and Throop, J. 2010. Thermal state of permafrost in North America - A contribution to the International Polar Year. Permafrost and Periglacial Processes, 21: 117-135.

Transportation Association of Canada (TAC). 2010. Guidelines for development and management of transportation infrastructure in permafrost regions. May 2010. TAC. Ottawa, ON.

IR Number: 134

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Design values utilized for stream crossing design (TOR 6.2, 9.1, 10.4, App. A; Reference: EIS 2.6.6, 3.1, 4.5)

Preamble
Design of stream crossings requires information on expected water levels and flows, including those that may result from extreme events. The Terms of Reference requires that the description of baseline environmental conditions include climate related extreme events that may affect the project, stream flow and flood regimes (TOR App. A). This information is required to support project design and also to determine potential impacts of the environment on the project. In addition, this information is required to determine the impacts of the project on the environment and the potential for erosion. The EIS provides some information on climate variability and extreme precipitation events (section 3.1.2). The EIS (section 3.1.6) also provides some information on water flows. However, NRCan was unable to locate information regarding the variability in stream flow or how extreme events have been incorporated into stream crossing design. In addition, NRCan was unable to locate information regarding potential changes in stream flow under a changing climate or how this will be considered in project design.

Request
Please provide information on the design values (streamflow and rainfall) utilized for design of stream crossings. NRCan further requests information on how extreme weather or hydrologic events were incorporated into the design.

IR Number: 135

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Surficial geology (TOR Sections 6, 9 and Appendix A; EIS Sections 2, 3.1.1)

Preamble
The Proponent identifies that the most recent surficial geology mapping in the study area, and the one upon which almost all further surficial geological terrain characterization is based on, is that produced by Rampton (1979, 1987). Further, the Proponent indicates that "the potential for geotechnical challenges is based on the limited terrain assessment" (p51; 2.2.5 Technical Factor), and that embankment thicknesses are prescribed according to Terrain and associated sediment type (p69; Table 2.6.4-1; elsewhere through

document), the determination of which seems to principally reflect Rampton's (1987) surficial geology map.

NRCan notes that the scale of Rampton's (1987) surficial geology map is very small (depicting a large area; 1:500 000), and should only be considered a reconnaissance assessment of the terrain and its surficial geology. Typical GSC maps are at a much larger scale (1:250 000; 1:100 000; 1:50 000), while detailed terrain assessments for development proposals are typically conducted at even larger scales (e.g., 1:20 000 or even 1:5 000). Even comparing the information on Rampton (1979; a 1:250 000 scale map), to Rampton (1987; a 1:500 000 scale map), it can be recognized that there has been a great deal of generalization produced as part of the 1:500 000 compilation. Field terrain assessments reported in the EIS appear to have been focusing on issues of topography, and identification of ice-rich and other sensitive terrain, rather than testing of basic surficial geology classification. NRCan further indicates that the seismic shothole drillers' log data of Côté et al. (2003), Smith and Lesk-Winfield (2010a), and Smith (2011) could be used to evaluate the accuracy of Rampton's (1987) map units, and to further characterize the sedimentology and ice-bearing tendencies of different materials; no such indication of their utilization is indicated in the EIS.

Request
Please provide information to what degree ground surveys and additional mapping have been used to test the interpretations and representations of Rampton (1979, 1987), as so much of the terrain analysis and proposed embankment thickness is based off of these classifications.

References
Côté, M.M., Wright, J.F., Duchesne, C. and Dallimore, S.R. 2003. Surficial materials and ground ice information from seismic shotholes in the Mackenzie – Beaufort region, Yukon and Northwest Territories: digital compilation. Geological Survey of Canada, Open File 4490. 1 CD-ROM.

Rampton, V.N. 1987. Surficial Geology, Tuktoyaktuk Coastlands, Northwest Territories. Geological Survey of Canada, Map 1647A, scale 1:500,000

Rampton, V.N. 1979. Surficial Geology Mackenzie Delta, District of Mackenzie, Northwest Territories. Geological Survey of Canada, Map 32-1979, scale 1:250,000.

Smith, I.R. 2011. The seismic shothole drillers' log database and GIS for Northwest Territories and northern Yukon: an archive of near-surface lithostratigraphic surficial and bedrock geology data. Geological Survey of Canada, Open File 6833, 1 DVD-ROM.

Smith, I.R. and Lesk-Winfield, K. 2010a. A revised lithostratigraphic database of baseline geoscience information derived from seismic shothole drillers' logs, Northwest Territories and northern Yukon. Geological Survey of Canada, Open File 6049, 1 DVD-ROM.

IR Number: 136

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Massive ice (TOR Sections 6, 9 and Appendix A; EIS Sections 2, 3.1.1, 4.2.1)

Preamble
The Proponent identifies that massive ice layers exist within the development area, and are common at depths, particularly within certain sediment types [3.0 Existing Environment; 3.1.1 Terrain, Geology, Soils and Permafrost; elsewhere in the EIS]. High and low-centered polygons as being particular ice-rich terrain which is preferentially avoided in the routing of the highway are also discussed [2.6.4 Design Embankment; and elsewhere through document].

NRCan notes that the connection between the presence of massive ice and the existence of surface ice-wedge polygon networks is not an absolute. While many areas of massive ice do support surface high and low-centered ice-wedge polygons, they also support less distinct polygonal networks, and indeed can exist independently of surface polygonal ground. Massive ice poses a permafrost hazard in the development area.

Request
Please provide information on how the actual presence, developmental significance, and degree of hazard posed by massive ice within the proposed development area.
Please indicate which techniques are being used as part of the engineering site assessments to determine ice-content of materials (e.g., ground penetrating radar; resistivity mapping, drilling).

Please provide what information sources have been examined in order to identify the presence of massive ice deposits and the potential sedimentological associations with different surficial geology units and ice content. Please clarify if the following existing research and data sets were used: Chartrand et al (2002); Gowan and Dallimore, 1990; Mackay and Dallimore 1992; Côté et al. 2003; Smith et al (2005); Smith and Lesk-Winfield, 2010b.

References
Chartrand, J., Lysyshyn, K., Couture, R., Robinson, S., and Burgess, M. 2002. Digital Geotechnical Borehole Databases and Viewers for Norman Wells and Tuktoyaktuk, Northwest Territory, Geological Survey of Canada Open File 3912. http://geopub.nrcan.gc.ca/moreinfo_e.php?id=213818&_h=chartrand

Côté, M.M., Wright, J.F., Duchesne, C. and Dallimore, S.R. 2003. Surficial materials and ground ice information from seismic shotholes in the Mackenzie – Beaufort region, Yukon and Northwest Territories: digital compilation. Geological Survey of Canada, Open File 4490. 1 CD-ROM.

Gowan, R.J. and Dallimore, S.R. 1990. Ground ice associated with granular deposits in the Tuktoyaktuk Coastlands area, N.W.T. Proceedings of the 5th Canadian Permafrost Conference, Collection Nordicana, no. 54, 1990: 283-290.

Mackay, J.R. and Dallimore, S.R. 1992. Massive ice of the Tuktoyaktuk area, western Arctic coast, Canada. Canadian Journal of Earth Sciences, 29: 1235-1249.
Smith, S.L., Burgess, M.M., Chartrand, J., and Lawrence, D.E. 2005. Digital borehole geotechnical database for the Mackenzie Valley/Delta region, Geological Survey of Canada Open File 4924. http://geopub.nrcan.gc.ca/moreinfo_e.php?id=220383

Smith, I.R. and Lesk-Winfield, K. 2010b. Massive ground ice occurrences, and permafrost geology-related observations from seismic shothole drillers' log records, Northwest Territories and northern Yukon. Geological Survey of Canada, Open File 6472, 1 DVD-ROM.

IR Number: 137

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Frozen ground (TOR Sections 6, 9 and Appendix A; EIS Sections 1.2,2, 3.1.1, 4.2.1)

Preamble
In Section 1.2 Development Overview, p6 (and elsewhere through the EIS), it is indicated that "Placement of frozen borrow material directly onto frozen ground (with geotextile separation layer);" is to take place.

NRCan notes that seasonal freeze-back of the active layer can be quite variable, reflecting various characteristics, including sedimentology, moisture content, snow and vegetation cover, etc. Freezing also progresses from both top – down, and bottom – up; however, the last material to completely refreeze occurs at depth.

Request
Please provide information on the method that will be used to determine that the active layer has completely refrozen prior to initiation of deposition of borrow material onto the ground surface.

IR Number: "138"

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Snow Drifting/Accumulation (TOR Sections 6, 9 and Appendix A; EIS Sections 2, 3.1.1, 4.2.1 and 4.5.1)

Preamble
Snow is a critical component of permafrost dynamics, and often controls the degree to which ground surfaces are insulated from extreme cold-temperatures, contributing to the thermal regulation of ground temperatures. Difference in vegetation cover relating to success at capturing snow can strongly influence permafrost temperatures, in turn, making them more or less susceptible to climate changes and summer active layer thaw (cf., Kokelj et al. 2007; Burn and Kokelj, 2009). In addition to vegetation-induced changes to snow-capture, construction of embankments, building structures, and plowing/ snow removal practices can all contribute to enhanced snow drifting/accumulation and result in thermal alteration of permafrost (Goodrich 1982; Fortier et al., 2011). Enhanced meltwater production from snow accumulations can also affect surface erosion and permafrost stability.

Snow accumulations and handling practices are discussed on p468; 4.2.1.2 Potential Effects Due to the Physical Presence and Operations of the Highway, and p623; 4.5.1 Climate Change, and it is acknowledged by the Proponent that snowdrift accumulations along the highway embankment have the potential to affect air/surface temperature regimes beyond the toe slope.

While snowdrift accumulation along the highway embankment is acknowledged by the Proponent to become a perennial issue, there is no research conducted or described that indicates the potential magnitude, spatial variability, and issues stemming from increased meltwater production that may arise from this. Also, there is no indication that snowdrifting will be considered as part of camp design; nor is it indicated to be considered as part of alignment clearance practices, or eventual winter plowing practices of the established highway.

Request
a. Please identify the potential magnitude and impact snowdrifting and seasonal snow clearing accumulations may have on permafrost stability adjacent to the road embankment, and in areas of seasonal construction camp development.

b. Please clarify if snowdrifting is or will be taken into account as part of operational best practices and camp design.

c. Please identify areas where increased snowmelt may lead to accentuated erosion/ponding of meltwater, and provide information on what potential remediation measures/alternate snow handling practices are contemplated.

References

Burn, C.R. and Kokelj, S.V. 2009. The environment and permafrost of the Mackenzie Delta area. Permafrost and Periglacial Processes, 20: 83-105.

Fortier, R., LeBlanc, A-M. and Yu, W. 2011. Impacts of permafrost degradation on a road embankment at Umiujaq in Nunavik. Canadian Geotechnical Journal, 48: 720-740.

Goodrich, L.E. 1982. The influence of snow cover on the ground thermal regime. Canadian Geotechnical Journal, 19: 421-432.

Kokelj, S.V., Pisaric, M.F.J. and Burn, C.R. 2007. Cessation of ice-wedge development during 20th century in spruce forests of eastern Mackenzie Delta, Northwest Territories, Canada. Canadian Journal of Earth Sciences, 44: 1503-1515.

IR Number: 139

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Thaw Flow Slides (TOR Sections 6, 9 and Appendix A; EIS Sections 2, 3.1.1, 4.2.1 and 4.5.1)

Preamble

The Proponent has clearly identified the existence of and significant hazard posed by thaw flow slides within the proposed development area (e.g., p59; 2.4.2.4 Thaw Flow Slides; p624; 4.5.3 Landslides, and elsewhere throughout the EIS). It is also indicated that the proposed Highway routing has been chosen to "...carefully avoiding existing slides and steeper slopes that would be susceptible to failure."

The Proponent identifies the work of Aylsworth et al. (2000, 2001) as identifying the class and types of landslides in the development area. On p112; 3.1.1.4 Permafrost Conditions; Retrogressive Thaw Flow Slides that Figure 3.1.1-4 is indicated that "identifies the distribution of recorded landslides on the Tuktoyaktuk Peninsula and the proposed Highway alignments (Aylsworth et al. 2001); and on p624; 4.5.3 Landslides state that "Figure 3.1.1-4 compares the distribution of recorded landslides on the Tuktoyaktuk Peninsula (Aylsworth et al. 2001) to the proposed route options.

NRCan notes, this figure as drafted is both misleading and incomplete. The figure in Aylsworth et al. (2001) from which Figure 3.1.1-4 has been drafted clearly indicates that the majority of the proposed Highway alignments was outside their "limit of landslide

inventory" and therefore falsely portrays an apparent absence of retrogressive thaw flow slides in much of the central Highway alignments. Further, additional records of thaw flow slides have been omitted by the Proponent in their presentation of landslides, including those identified by Mackay (1963; the same publication from which the Proponent has drawn their pingo distribution record from: p59; 2.4.2.5 Pingos), and the detailed mapping of Lantz and Kokelj (2008) in the western and southern sections of the Highway alignment.

Request

a. Please update Figure 3.1.1-4 to include the work of Mackay (1963) and Lantz and Kokelj (2008) to more accurately portray the distribution and implied relative risk of thaw flow slides within the proposed development area.

b. Clearly outline what the minimum setback distance best practice would be from both active and stabilized thaw flow slides, and on what basis such decisions would be made (e.g., a review of regional scarp headwall retreat rates and historical extents).

c. Provide information on what contingencies will be put in place to address risks posed by thaw flow slides, and how the development of such features that may impact the developing or completed Highway will be dealt with (e.g., burial of headwall scarp to insulate ice-rich materials; stabilization of toe slopes).

d. Clarify where borrow materials would be stockpiled that would be accessible year-round if headwall scarp-burial stabilization would be required.

References

Lantz, T.C. and Kokelj, S.V. 2008. Increase rates of retrogressive thaw slump activity in the Mackenzie Delta region, N.W.T. Canada. Geophysical Research Letters, 35: L06502.

IR Number: 140

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Retrogressive Thaw Slumps – Lake Interactions (TOR Sections 6, 9 and Appendix A; EIS Sections 2, 3.1.1, 4.2.1 and 4.5.1)

Preamble

Recent research by Kokelj et al. (2009) has pointed to a dynamic link between thermal changes in slumped sediments, expansion of lake bottom taliks (areas of unfrozen ground), and changes in lake level that can drive polycyclic behaviour in thaw slumps. This research suggests increasing importance needs to be affixed to changes in lake level that may arise from Highway development/maintenance activities.

The Proponent identifies that significant volumes of water withdrawal from nearby lakes will take place for domestic camp use, construction of winter roads, and dust suppression. In Section 4.2.4 Water Quality and Quantity; 4.2.4.1 Potential Effects; Water Extraction (Construction) – p491, the Proponent indicates that "Water withdrawal will be regulated by criteria set out in the Water Licence and the DFO (2010) Protocol for Winter Water Withdrawal in the Northwest Territories…As such, no adverse residual effects are anticipated from this activity."

NRCan notes that the precautionary and regulatory approach proposed appears chiefly to address issues of fish health and fish habitat. There does not appear to be any consideration for potentially adverse environmental effects of changing lake levels either through water extraction (lowering), or increased channelling of surface water via culverts and other through-draining structures into adjacent lakes (raising). Lowering of lake levels may expose shallow, unvegetated slopes or benches to increased meltwater erosion and wave action, potentially leading to destabilization of toe slopes and reactivation of surrounding thaw slumps. Where increased drainage is diverted to lakes, lake levels may rise, leading to radial expansion of taliks, which as modelled by Kokelj et al. (2009) could lead to thawing of subadjacent ice-rich permafrost and reactivation of thaw slumping.

Request

a. Describe the potentially adverse environmental effects resulting from lake level changes brought on by pumping and/or surface flow diversions through the course of this construction and the operation of the proposed Highway.

b. Please explain, with respect to permafrost stability, what criteria may be established to determine the suitability of an individual lake to safely support water withdrawal/ diversion, and what volumetric limits/lake level changes may be implemented as part of best practices.

Reference

Kokelj, S.V., Lantz, T.C., Kanigan, J., Smith, S.L. and Coutts, R. 2009. Origin and polycyclic behaviour of tundra thaw slumps, Mackenzie Delta region, Northwest Territories, Canada. Permafrost and Periglacial Processes, 20: 173-184.

IR Number: 141

Source: Natural Resources Canada

To: Developer (Government of NWT, Hamlet of Tuktoyakyuk, Town of Inuvik)

Subject: Borrow Materials (TOR Sections 6, 9 and Appendix A; EIS Sections 2, 3.1.1, 4.2.1 and 4.5.1)

Preamble

Glacigenic sediments of various types, including ice-contact outwash and glaciofluvial sorted material, as well as sub-glacially deposited till (unsorted material) are typically mined from small, shallow borrow pits to construct road embankments and top-dress requirements of angular, sorted gravel. Glacial sediments differ in their distribution, thickness, sedimentological makeup, lithic content, and engineering suitability. Excavation and hauling of borrow materials can often comprise the greatest single cost associated with road construction, particularly in areas where suitable borrow materials are scarce and/or widely dispersed. Identification of new and/or more proximal sources of suitable borrow material have the potential to significantly reduce hauling costs and increase the pace at which construction can proceed.

In Section 2.6.8 Borrow Sources – p75 – the Proponent identifies the range of studies which have focussed on identification of granular materials in both the proposed development area and broader study region. They also indicate that these granular resource assessments have mostly been conducted between the mid-1970s to early 1990s, that it draws heavily on the work reported by Fujino (1993), and that "potential borrow sources have been identified along the Primary 2009 Route based on the granular material studies and investigations that have been undertaken over the years by ILA, INAC, Geological Survey of Canada, and Public Works Canada (3.1.1.3 Borrow Materials – p105). The EIS also identifies the types of material required for construction of the embankment and of the top-dress gravel layer, and distinguishes deposits based on criteria of "proven volume," "probably volume," and "prospective volume" as reflecting the degrees of understanding of existence, sedimentological character, and size.

Recent research by the Geological Survey of Canada has digitally compiled all available/existing seismic shothole drillers' log records from continental Northwest Territories and northern Yukon in database and various thematic geoscience reconstructions. Of direct relevance to the proposed Highway development, an assessment of potential granular aggregate resources (gravel; gravel + sand; sand) has been publicly released (Smith and Lesk-Winfield, 2009; and updated to the final shothole database compilation in Smith et al., 2011). There is no indication that this available data (both preceding and following compilation of this EIS) has been considered as part of the borrow material assessment. Success in using drillers' log records to identify unknown and buried granular aggregate deposits was proven in northeastern British Columbia (Best et al. 2006). It is unknown why such information was not considered by the Proponent in relation to this proposal. The seismic shothole data are also the only regional source of lithostratigraphic information that permits an *a priori* generalized assessment of sedimentological composition (i.e., relative proportion of gravel, sand, fines), thicknesses, and lateral extents of both specific deposits and the character of different surficial geology units as otherwise represented in the EIS (e.g., Table 2.3-1 Terrain Conditions Along the Primary 2009 Route – p55; Table 2.6.8-1 Information on Borrow Sources Along the Primary 2009 Route – p79).

NRCan suggests that the seismic shothole drillers' log-based reconstructions of potential granular aggregate deposits (Smith et al., 2011) be integrated into the regional assessment of borrow materials to be utilized for Highway construction and ongoing maintenance. NRCan further notes that in areas of petroleum exploration and access road development in sporadic discontinuous permafrost terrain of northern British Columbia, Alberta and southern Northwest Territories, the clay rich till (informally referred to as "blue clay") is the preferred material for road bed construction, particularly in wet terrain. Desirable characteristics of this material are its widespread distribution and thickness, its ability to be highly compacted, its structural integrity, and the fact that it is relatively impermeable to water seepage, hence less susceptible to seasonal frost heave.

Request

a. Please explain if clay-rich tills from the area could be suitable embankment construction material.

b. Please clarify if any study included an examination of the sedimentological character and road embankment suitability of the regional till deposits.

c. Please clarify if the seismic shothole drillers' log-based reconstructions of potential granular aggregate deposits (Smith et al., 2011) will be integrated into the regional assessment of borrow materials to be utilized for Highway construction and ongoing maintenance.

References

Best, M.E., Levson, V.M., Ferbey, T. and McConnell, D. 2006. Airborne electromagnetic mapping for buried Quaternary sands and gravels in northeast British Columbia, Canada. Journal of Environmental and Engineering Geophysics, v. 11, p.17-26.

Smith, I.R. 2011. The seismic shothole drillers' log database and GIS for Northwest Territories and northern Yukon: an archive of near-surface lithostratigraphic surficial and bedrock geology data. Geological Survey of Canada, Open File 6833, 1 DVD-ROM.

Smith, I.R. and Lesk-Winfield, K. 2009. An integrated assessment of potential granular aggregate resources in Northwest Territories. Geological Survey of Canada, Open File 6058, 1 DVD-ROM.

Smith, I.R., Bednarksi, J.M., Deblonde, C., Duk-Rodkin, A., Huntley, D. and Kennedy, K.E. 2011. Potential granular aggregate resources in Northwest Territories and northern Yukon: an updated assessment integrating seismic shothole drillers' logs and surficial geology maps. Geological Survey of Canada, Open File 6849, 1 DVD-ROM.

Transport Canada / Transports Canada

P.O. Box 8550
3rd Floor, 344 Edmonton Street
Winnipeg, Manitoba
R3C 0P6

Your file Votre reference
02/10-05

Our file Notre reference
R 7075-70-2-56

February 29th, 2011

Eli Nasogaluak
Environmental Assessment Coordinator
Environmental Impact Review Board (EIRB)
Joint Secretariat – Inuvialuit Renewable Resources Committees
107 Mackenzie Road, Suite 204
P.O. Box 2120 Inuvik, NT
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eirb@jointsec.nt.ca

Re: Transport Canada's Information Request (IR) Pertaining to the Construction of the Inuvik to Tuktoyaktuk Highway

Dear Mr. Nasogaluak,

Transport Canada – Prairie and Northern Region offers the following information request (IR):

IR Number: 142

Source: Transport Canada – Environmental Affairs, Prairie and Northern Region, John Cowan, Environmental Officer
john.cowan@tc.gc.ca

To: Developer (Government of Northwest Territories, Hamlet of Tuktoyaktuk, and Town of Inuvik)

Subject: Navigable Waters Protection Program (NWPP) Applications

Preamble

A definitive route for the all-weather highway would assist in identifying the terrain, watercourse crossings, construction practices and the environmental factors that are to be considered for this project. The Navigable Waters Protection Program (NWPP) ensures the public's right to navigate Canada's waters without obstruction through the administration of the *Navigable Waters Protection Act* (NWPA). Transport Canada (TC) is a likely Responsible Authority for the

environmental assessment of this project, as watercourse crossings that intersect this proposed all-weather highway may require approvals according to the NWPA.

Request

The Developer (GNWT, Hamlet of Tuktoyaktuk, and Town of Inuvik) will need to submit formal applications to the NWPP in order to obtain NWPP's approval, promulgation, or exemption for each specific work. The Developer shall also inform the NWPP of any design, construction, or operational changes accordingly. Please refer to the NWPP Internet site or contact the NWPP office for application requirements.

http://www.tc.gc.ca/eng/marinesafety/oep-nwpp-menu-1978.htm

Transport Canada
Navigable Waters Protection Program
Canada Place
1100 - 9700 Jasper Avenue
Edmonton, Alberta
T5J 4E6
Phone: 780-495-8215

Should you require any further discussion or clarification on these comments, please contact me by email at john.cowan@tc.gc.ca or by telephone at 204-983-1139.

Sincerely,

John Cowan
Environmental Officer
Prairie and Northern Region

Tuktoyaktuk – Inuvik Working Group

To ensure the Fisheries resources of the Husky Lakes and area are sustainably managed.

C/o Fisheries Joint Management Committee
PO Box: 2120
Inuvik, NT
X0E 0T0

IR Number: 143

Source: Tuktoyaktuk – Inuvik Working Group
PO Box 2120
Inuvik, NT X0E 0T0

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

Subject: Source 177 Access Road – Lessons Learned (EIS Section 1.5.1 p. 15)

Preamble:
The all-weather access road from Tuktoyaktuk to Granular Source 177 was identified as the "pilot project" for the currently proposed Inuvik to Tukoyaktuk highway construction project in terms of Regulatory Approvals, Environmental Management, etc (p. 15) by the developer. In their response to the Environmental Impact Review Board's information request 59 the developer did provide some information for the lessons learned during the "pilot project" with respect to the monitoring of impacts on fish and fish habitat. It is expected that increased access to fisheries resources will result from the construction of the Inuvik to Tuktoyaktuk highway. This increased access could have negative impacts on the quality, quantity and sustainability of fishery resources of the area, in addition to the use of traditional fishing practices/areas of the local Inuvialuit. Consideration must also be given to the possible negative impacts the project poses to traditional and cultural fishing practices and attention must be given to monitoring these impacts as they will influence future fisheries management in the area.

Request:

1. Please identify and provide a description of the impacts of Source 177 on the cultural fishing practices (i.e. how traditional fishing practices have been affected, etc) and traditional fishing areas (i.e. how family fishing camps have been affected) that arose from increased access.
2. Please provide detailed information on any monitoring program(s) conducted during and following the construction of Source 177 that evaluated the impacts of increased access to the fishery resources on the cultural fishing practices and traditional fishing areas.
3. Please identify any "lessons learned" during the "pilot project" with respect to the management and monitoring of impacts to cultural fishing practices and traditional fishing areas of the Inuvialuit and explain how these "lessons learned" will be applied to management and monitoring programs during and after the construction of the proposed Inuvik to Tuktoyaktuk highway project.
4. Please explain how the developer has worked with local communities and organizations to mitigate, manage and monitor impacts to Inuvialuit traditional fishing practices and areas during the construction of Source 177 that resulted from increased access.
5. Please explain how the proponents plan to minimize and mitigate these impacts during construction of the Inuvik to Tuktoyaktuk highway project and;
6. Please explain how the proponents plan to work with local communities and organizations before, during and following construction to mitigate and manage the possible impacts resulting from increased access.

Tuktoyaktuk – Inuvik Working Group

To ensure the Fisheries resources of the Husky Lakes and area are sustainably managed.

C/o Fisheries Joint Management Committee
PO Box: 2120
Inuvik, NT
X0E 0T0

IR Number: 144

Source: Tuktoyaktuk – Inuvik Working Group
PO Box 2120
Inuvik, NT
X0E 0T0

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

Subject: Fisheries Management Post Construction (Sections 4.3.7 and 4.2.5 of the EIS)

Preamble:
The Developer discusses in Section 4.3.7 of the EIS the potential effects of the project on harvesting and identifies that the highway will afford increased year round access to wildlife and fish resources and therefore could result in increased harvesting activities (p. 595). Furthermore it is stated that the management of wildlife and fish resources along the highway will remain with the regional co-management bodies post construction and in Section 7.1.2 (Operations) the developer identifies that they are willing to cooperate with these agencies in their monitoring activities. It is understood and outlined in the potential effects and mitigation measures (Section 4.2.5.1) portion of the EIS that because the project spans over the course of two years that this will allow for adaptive management. In order to ensure the successful management of fisheries resources post construction an understanding of the baseline conditions for fisheries populations prior to construction is needed as well as a clear conception of how the various agencies will collaborate on future management and monitoring. It should be noted that there are two types of fisheries management that apply to the Inuvik to Tuktoyaktuk highway; 1) the management of sport fishing done by non-Inuvialuit (I.e. Tourists), and 2) the management of the subsistence fishery done by the Inuvialuit in the area. Pressure on both the above mentioned fisheries are expected to increase as a result of the highway construction and will require very different management regimes – Sport Fishing management and monitoring on crown lands within the ISR is the responsibility of GNWT ENR and is done through sport fishing licenses and on Inuvialuit Private Lands sport fishing monitoring is the responsibility of the local HTC's and the FJMC through applications to fish on Inuvialuit private lands. The subsistence fishing activities of the Inuvialuit are co-managed and monitored by the local HTC's, the FJMC and DFO, the management and monitoring of the subsistence fisheries within the ISR are lengthy process that require many resources (i.e. money, man hours, etc) and involve cooperation with the communities.

Request:

1. Please explain in more detail how the developer proposes to work with regional co-management partners to ensure the impacts with respect to increased access to fisheries resources from the project are minimized during construction.
2. Please provide evidence that consideration has been given to the impacts of the project on the future management of the subsistence fishery at and around Husky Lakes due to increased access and;
3. Explain how the developer plans to work with the communities and co-management partners in the development of future fisheries management plans, etc to ensure successful management of the subsistence fishery post highway construction.

Tuktoyaktuk – Inuvik Working Group

To ensure the Fisheries resources of the Husky Lakes and area are sustainably managed.

C/o Fisheries Joint Management Committee
PO Box: 2120
Inuvik, NT
X0E 0T0

IR Number: 145

Source: Tuktoyaktuk – Inuvik Working Group
PO Box 2120
Inuvik, NT
X0E 0T0

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

Subject: Residual effects assessment for fish and fish habitat (Section 4.2.5.3 p. 504)

Preamble:
In Section 4.2.5.3 of the EIS the developer discusses the residual effects of the project on fish resources in the project area. These sections were reviewed and considered with specific attention given to the increase in harvesting pressure on fish resources as a result of increased access when discussing the Information Request phase of the public review. It was identified that the magnitude and duration of the residual impacts to fish resources would depend on how successful the developer is in the effective and swift mitigation of these issues (i.e. the magnitude of impacts to fish populations during the construction phase, and resulting from increased access, will depend on how efficiently the developer identifies and successfully reports the issue to the responsible management bodies). It would be prudent to identity how any impacts resulting from increased access to fish resources will be communicated from the field to the responsible management agencies during the construction phase.

Request:

1. Please outline any assumptions used in the residual effects assessment and justification as to why they were applied during the assessment.
2. Identify how the developer plans to communicate (in real time) the "lessons learned" during the construction phase regarding the mitigation and monitoring of project impacts on fish and fishing practices to the responsible management agencies to support adaptive management.