R2-GTC-REC-08
Topic: Dealing with uncertainty in design (general comment using permafrost as an example)

Preamble from the Gwich'in Tribal Council:

Discussions from the technical session emphasized the importance of soils encountered along the finalized route and that the GNWT does not consider permafrost a significant barrier to the cross-section design of the road (e.g., PR285:119-120). GTC further understands that geotechnical studies will be undertaken once the final route selection is made and, upon establishing the thermal conditions, appropriate design features will be incorporated. The GNWT is developing a permafrost protection plan to describe how ice-laden soils will be managed over time. This plan will be subject to community collaboration and participation, though precise details are not yet known. Another concern raised at the technical session was ditching and controlling the flow of water around areas of permafrost (PR285:125). How climate change will affect soils and slumping were further causes of concern and how it might affect road safety and maintenance (e.g., PR285:128).

Of concern to GTC is that the details required to complete the plan and road design will not materialize until "well after the [environmental] assessment" (PR285:127). This appears a common theme in the EA, where most of the design (e.g., 75%) is not confirmed and uncertainty for impact predictions and baseline conditions remains high. The EA process is significantly weakened when Parties are unable to review the actual project or the plans that are intended to render it publicly acceptable. Parties are asked to put a lot of faith in the proponent to do what is right. This translates into foregoing the safety of the EA process – where Parties can raise concerns on issues of significance and expect those issues to be objectively addressed. Rather, Parties are asked to accept a premature decision by the Review Board on how the Project should proceed, and hope that future collaborations will be meaningful and Indigenous interests upheld. It is a tall ask. More so given the lack of details on how collaborations will be made meaningful or how Indigenous input will influence interactions between the Project and Indigenous rights.

It is unlikely the GNWT would accept such an imposition were it participating in the EA as a reviewer.

Request from the Gwich'in Tribal Council:

1. Using permafrost as an example, describe how conditions and understanding of the route might change between now (i.e., at 25% design phase) and start of construction (i.e., at 100% design phase).

2. Under what conditions would the assumptions used to establish the permafrost plan and its mitigations be altered?

3. How will the GNWT continue to work with interested parties to ensure their continued support of the plan should the design change? If a majority of parties disagree with the changes, how does the GNWT propose to fairly resolve this difference in opinion?

4. How does the GNWT intend to make use of traditional knowledge in the development of final road design (for example, understanding the flow of surface and groundwater flows at important water crossings)?

Response from the Government of the Northwest Territories (GNWT):

Preamble

The GNWT wishes to confirm that the detailed design of the Project will occur after the completion of the environmental assessment and that there will be opportunities for parties to review various management plans through the GNWT's engagement process and post-environmental assessment regulatory proceedings. Consistent with the GNWT's previous roads and highways that have undergone environmental assessment (e.g., Tłı̨chǫ All-Season Road [MVEIRB EA16-17], Inuvik to Tuktoyaktuk Highway [EIRB File 02/10-05]), the highway alignment undergoing assessment is defined as a route within a corridor. The use of design criteria and objectives to define the parameters that will further inform detailed design is an appropriate basis upon which to conduct the environmental assessment as additional design details will be presented over the course of the regulatory proceedings. Additional design is informed by (among other studies), geotechnical investigations, following the outcome of the environmental assessment, as is discussed in Section 5.2.4 of the Developer's Assessment Report.

Responses

1. Permafrost conditions along the Mackenzie Valley Highway route will continue to be investigated and characterized during each design phase as the project advances toward construction. In the current design phase, permafrost conditions have been characterized through the background review, terrain mapping, geophysical ground surveys, geotechnical investigations, and ground temperature monitoring completed to date. The GNWT recognizes that design refinement is an iterative process, particularly when working in complex permafrost environments. Between the current (25%) design phase and the final (100%) design phase, the following improvements in understanding permafrost conditions are expected:

    - Permafrost characterization work will include additional geotechnical investigations (e.g., permafrost soils logging, ground temperature instrumentation installations) and geophysical ground surveys (e.g., capacitively-coupled resistivity, ground penetrating radar) at selected locations along the route. The areas of investigation will be informed by the permafrost characterization work completed to date and focus on locations suspected to contain permafrost soils and/or excess ground ice along the alignment.

    - Design refinements will continue to be made to road embankment geometry, heights, and construction materials based on site-specific conditions. Drainage designs will be refined to mitigate surface water ponding along the alignment and resulting permafrost degradation.

2. The conditions for updates to the Permafrost Protection Plan (PPP) are described in Section 10 (Adaptive Management) of the Draft PPP. The assumptions used to establish the PPP and its associated mitigation measures may be modified if:

    - Field investigations reveal different soil conditions than originally anticipated; or

    - New geotechnical data indicates a higher-than-expected presence of ice-rich permafrost; or

    - Climate change projections show potential for accelerated permafrost degradation; or

    - Community and traditional knowledge provide insights into areas of concern, necessitating design changes; or

- Engineering advancements or lessons learned from other northern all-season road projects suggest improved permafrost protection techniques.

3. The GNWT intends to continue engaging with directly affected Indigenous governments and Indigenous organizations, and specific other affected parties during the design, regulatory phase, construction, and operation of the Project. Specific concerns and comments will be addressed and resolved appropriate to the concern.

   It is expected that, should the Project proceed to permitting/licensing, the submission of a PPP (and other Management Plans) will be a requirement of the Project's water licence, and the applicable Land and Water Board (LWB) will conduct a public review of the PPP and other plans prior to deciding whether to approve the PPP. It is expected that the plan will be required to be submitted a minimum of 90 days prior to construction. It is the GNWT's experience that during the applicable LWB's review, comments may be submitted on any such submitted Management Plans.

4. To supplement the input and knowledge already collected from engagement participants and Knowledge holders, the GNWT intends to continue engaging directly affected Indigenous Governments and Indigenous organizations, and specific other affected parties, during the design of the Project. This may include receiving feedback on such things as the seasonal flows at water crossings, crossing locations, routing of the highway and quarry access roads, pullout locations, and areas of icings and overflow.

R2-GTC-10

Topic: Water quality and dust suppression

Preamble from the Gwich'in Tribal Council:

The GNWT has said in PR#217:128, that it will use calcium chloride and the chemical additive DL10 in dust suppression activities.

Request from the Gwich'in Tribal Council:

1. What monitoring efforts will be taken to ensure that these chemicals do not adversely affect nearby watercourses?

2. How does the frequency of application affect risk to aquatic organisms and vegetation?

Response from the Government of the Northwest Territories:

Preamble

Fugitive dust caused by vehicle traffic along unpaved road surfaces can cause changes to water quality due to the transport of fine particulate matter (including metals and major anions) to waterbodies. Changes in water quality due to the deposition of dust can potentially cause adverse effects to aquatic life. Fugitive dust falling on roadside vegetation may also cause adverse effects to vegetation. Therefore, the suppression of fugitive dust through application of water (during construction), and dust suppressant product (during operations and maintenance) is an important mitigation measure to limit or reduce the potential effects on surface water, vegetation, fish, wildlife, and air quality (Developer's Assessment Report, Sections 10, 12, 16, 17, 18, and 19), and is considered best practice (GNWT 2013; Government of Nunavut 2023).

Calcium chloride and DL-10 are the only approved dust suppressants in the Northwest Territories (GNWT 2013). Currently, only calcium chloride is used by the Government of Northwest Territories (GNWT) on NWT highways #1-7, and DL-10 is not anticipated to be used as a dust suppressant for the Mackenzie Valley Highway.

Calcium chloride is a well-known effective dust suppressant for reducing the amount of fugitive dust generated from unpaved roadways.

Calcium chloride is hygroscopic and therefore attracts water from moisture in the air to keep roads from drying out. This helps keep dust on the road surface and therefore limits the amount of fugitive dust interacting with nearby waterbodies and roadside vegetation. Calcium chloride has been shown to be very efficient in northern climates when applied as a water-based solution (Government of Nunavut 2023).

The GNWT currently applies calcium chloride to NWT gravel highways once every year. The GNWT directs its contractors to apply calcium chloride product ("product") meeting its specifications using methods to ensure complete absorption of the product into the road surface. This includes requirements to adhere to the following:

- Sufficient water is to be applied to permit complete absorption of the product into the road surface.
- Product is not to be applied when precipitation is imminent, or when the road surface is saturated.
- Product is not applied in proximity to waterbodies, or on bridge decks.
- Product is applied over the full width of the travel surface, and product must remain on the road surface.

The GNWT also requires the contractor to clean up product that travels off the road surface in accordance with its Spill Contingency Plan for the works. The GNWT monitors the application of product by requiring the contractor to provide a work schedule, results of product chemical testing, records of daily spread quantities, weather conditions, and delivery certificates.

Responses

1. In noting that calcium chloride dust suppressant is intended to stay on/in the road surface and away from water resources, potential measurable changes to water quality due to the release of product into the surrounding environment are not anticipated. The unintended release of product would be considered a spill. As such, no monitoring is proposed as part of normal operations, consistent with ongoing NWT Highway operations and maintenance. In the event of a spill, monitoring may be required as part of follow up reporting.

2. As the GNWT currently applies calcium chloride to NWT gravel highways once per year and follows additional requirements described above, there is a reduced risk to aquatic organisms and vegetation due to these infrequent and managed applications. As the calcium chloride is intended to stay on/in the road surface, potential measurable changes to water quality and nearby vegetation due to release into the surrounding environment are not anticipated, and there is no expected risk to aquatic organisms and vegetation during normal operations.

References

GNWT (Government of the Northwest Territories). 2013. Guideline for Dust Suppression. Environment Division, Department of Environment and Natural Resources. Yellowknife, NT. Available online at https://www.gov.nt.ca/ecc/sites/ecc/files/guidelines/dustsupression.pdf

Government of Nunavut. 2023. Environmental Guideline: Dust Suppressants. Prepared by the Department of Environment's Environmental Protection Division, Government of Nunavut. Available online at https://www.gov.nu.ca/sites/default/files/publications/2024-05/Dust%20Suppressants%202023-03.pdf

R2-GTC-13

Topic: Economics of the Project and reasonably anticipated forecasting Project costs

Preamble from the Reviewer:

The economic assessment of the Project is being updated and is not yet available for review. Nor is it clear when this report will become available and if will be open for comment prior to the closing of the Public Record. This limits the ability of Parties to meaningfully consider the cost and implications of the Project to the GNWT and on the residents of the NWT.

A $700 million figure was estimated in 2015, which is now outdated. Nonetheless, it is the closest figure parties have to consider for what the Project will cost. Understanding the costs of recently completed highway construction projects would be useful for Parties while waiting for the updated economic business case. More importantly, these past projects can give valuable insight on anticipated versus actual costs of a Project, and thus a practical filter through which to view the coming business case.

Request from the Reviewer:

1. Provide an update on what $700 million is in 2025 dollars, inclusive of inflation.
2. Please provide accurate numbers from recently completed infrastructure projects for Parties to consider in the context of the MVH. List the approved original budget at the start of construction and contrast it with the final cost (i.e., actual spent amount) of the completed project. Provide a break-down of this final cost by kilometre of road (i.e., $/km). Please include the following recent highway infrastructure megaprojects:

a) The Dehcho Bridge

b) The Inuvik to Tuktoyaktuk Highway

c) The Tłı̨chǫ All Season Road

Response from the Government of the Northwest Territories:

1. Inflation values are currently only available up to 2024. When accounting for inflation using the Yellowknife all-items consumer price index (CPI), $700 million in 2015 would be $858 million in 2024.

2. The costs of construction for the Dehcho Bridge, Inuvik to Tuktoyaktuk Highway, and Tłı̨chǫ Highway, recently completed by the GNWT are outlined below. It should be noted that these projects were delivered at different times and under varying conditions and, therefore, do not necessarily reflect the current economic and political conditions under which the GNWT is advancing the MVH. As such, the GNWT cautions against using these figures for direct comparison with the MVH project.

   a) Dehcho Bridge
   Budgeted Cost: $165 million
   Final Construction Cost: $234.2 million

   b) Inuvik to Tuktoyaktuk Highway – 138 Km
   Budgeted Cost: $229.4 million
   Final Construction Cost: $246.4 million
   Breakdown: $1.79 million/Km

   c) The Tłı̨chǫ All Season Road (Tłı̨chǫ Highway) – 97 Km
   Budgeted Cost: $412.8 million (construction + O&M costs) + $30 million (pre-construction costs)
   Note: The $412.8 million includes O&M component, which is being managed by a P3 partner for 25 years following construction completion.
   Final Construction Cost: $211.5 million
   Breakdown: $2.18 million/Km

R2-GTC-14

Topic: Project interactions with the Mackenzie Valley Fibre Optic Line

Preamble from the Reviewer:

During the technical sessions, the question was asked of the GNWT if they had conducted a risk assessment for direct and indirect risk to the MVFOL. They responded that they had not but would work with the owners to mitigate risks to infrastructure, and to develop a formal agreement on appropriate mitigation measures (e.g., PR283: 40). On Day 3 of the session, the GNWT acknowledged that it was the owner of the MVFOL.

As the owner, the GNWT is well positioned to gauge the risk of the line to linear disturbances and construction activities. It is also well positioned to report on the risks associated with maintenance or breaks of the MVFOL. If the GNWT is unable to respond to these questions now, GTC seeks a commitment for the information to be included in the updated DAR Addendum.

Request from the Reviewer:

1. Please provide an economic risk assessment of a line break to the Mackenzie Valley Fibre Optic Line through the lifetime of the Project. This would include:

   a. The anticipated frequency of line breaks or maintenance issues due to construction activities or due to accidents or increased access along the road during operations;

   b. The average cost to date to fix a generic break, and the average duration of lost- or reduced service until the line is restored.

   c. An estimate of the induced loss to businesses (e.g., from loss of network access and lost productivity during the length of the break)?

Response from the Government of the Northwest Territories:

1. An economic risk assessment is not something that can be accurately produced with respect to the potential for line breaks and their impact. It should be noted that new redundancy measures have been implemented that will reroute Mackenzie Valley Fibre Link (MVFL) traffic minimizing the impact of breaks for customers. Further, the Department of Infrastructure has procedures in place to ensure fibre line locates are completed. These are considered in both the design and construction phases of the Mackenzie Valley Highway (MVH).

a) The risk of fibre line break or maintenance issues due to construction activities is negligible as the fibre line locate procedure will ensure that the construction considers the fibre line's location. The designs of the MVH will consider the location of the existing MVFL and will avoid cuts or relocations of the fibre network. The location of the MVFL project was completed in 2017 and considered the location of a future highway in the design.

b) There is no average cost to fix a fibre line break, or average duration of lost or reduced services until the fibre line is restored. The cost to repair a break varies on many different components including geographic location, road access or fly-in only, number of locations impacted, extent of the damage, ground conditions (underwater, frozen ground, permafrost presence), availability of replacement equipment and fibre cable, technician and construction crew availability, and if the repair is a permanent or temporary solution. Given that the components of a fibre break vary, the associated cost of repair also varies.

   There is also no average duration of lost or reduced services until restoration is complete. The duration also varies based on the components of the fibre break for repair, and mitigation plans and efforts in place. The GNWT always looks to minimize the duration of lost or reduced services and as such can range from a few minutes to a few days in most situations. The duration can also be impacted by environmental conditions such as wildfire, flood, smoke, and dangerous conditions on the ground.

c) The GNWT is finalizing the path of telecommunications networks connecting the MVFL to other fibre lines to improve reliability through redundancy. The MVFL is currently connected to the Dempster Fibre Line in Inuvik which runs along the Dempster Highway ending in Dawson, Yukon. In Dawson, the Dempster connects to the existing Northwestel network from Dawson to Whitehorse, on to Watson Lake and ending in Fort Nelson. Should an outage occur between McGill Lake and Inuvik, access to the Dempster line now has improved redundancy through the ability to redirect MVFL traffic down the Yukon line.

   In addition to the improved redundancy through completion of the Dempster fibre line, the GNWT is negotiating an improved Indefeasible Rights of Use agreement with Northwestel that provides data transmission over an incremental fibre line between the MVFL originally terminating at McGill Lake to High Level, Alberta. The new second path which is under consideration will be from McGill Lake, through Fort Nelson, and Fort St. John, BC, ending in Edmonton, Alberta. The improved reliability from this enhancement will further minimize disruptions to the fibre telecommunications service should outages occur.

   There is no estimate of induced loss to businesses from loss of network access and lost productivity during the fibre line break. This is difficult to substantiate as GNWT as the owner of the fibre-line has federal government, local and international corporate customers, who rely on the MVFL for varying needs. End users of the fibre telecommunications for household or business needs and loss would vary and would be determined by the Internet Service Provider.