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Staff Report

Applicant: Government of Yukon – Department of Highways and Public Works	
Location: Hwy #8 – Yukon Border to Inuvik	File Number(s): MV2019L8-0013 and MV2019X0027
Date Prepared: May 25, 2022	Date of Board Meeting: July 7, 2022
Subject: Permafrost Protection Plan V2	

1. Purpose

The purpose of this Report is to present to the Mackenzie Valley Land and Water Board (MVLWB/the Board) a Permafrost Protection Plan Version 1.0 (Plan) submitted by Government of Yukon – Department of Highways and Public Works (GY-DHPW) to fulfill Part O Condition 72 of Permit MV2019X0027 and Part B Condition 24 of Licence MV2019L8-0013.

2. Background

- August 31, 2020 – Issuance of Permit MV2019X0027 and Licence MV2019L8-0013;
- April 21, 2022 – Plan received;
- April 25, 2022 – Plan deemed complete and review commenced;
- May 20, 2022 – Comments and recommendations due and received;
- June 9, 2022 – Responses due;
- **July 7, 2022 – Plan presented to the Board for decision, and**
- August 20, 2025 – Expiration of Permit MV2019X0027 and Licence MV2019L8-0013.

3. Discussion

History

On August 31, 2020, GY – DHPW received a Permit and a Licence for the construction of an approximately 800-km fibre optic line from Dawson City, Yukon to Inuvik, Northwest Territories. For the purposes of the Permit and Licence Applications, the project was defined as the section of the Dempster Fibre Project (DFP) located in the Northwest Territories. The fibre optic cable will enter the Northwest Territories at the Yukon/Northwest Territories border and then travel approximately 271 km north, within the Dempster Highway right-of way to Inuvik. The project is located entirely within the Gwich'in Settlement

Area (GSA), passing through the communities of Fort McPherson and Tsiigehtchic. The project will connect to an existing terminal facility in Inuvik and to existing buildings in communities along the route to provide service to those communities. The project was determined to be transboundary as outlined in the MVLWB Governance Policies – June 2019, because it crosses territorial borders.

The purpose of this project is to tie into the existing Mackenzie Valley Fibre Line, creating a continuous network running through Yukon, Northwest Territories and Northern British Columbia. This new line will ensure Yukon, Northwest Territories, and other northern communities will have access to a secondary fibre network in the event of a service disruption. It will also benefit the northern communities that tie into the line through satellite by providing redundancy.

The proposed development includes:

- Fibre optic cable and conduit to be installed adjacent to the Dempster Highway along the Right of Way, extending from the Yukon border to Inuvik; and
- Handholes along the route.

Construction and operation of the project will require the following supporting activities:

- a) The use of water and deposit of waste;
- b) Geotechnical drilling;
- c) Use of pre-existing staging areas for equipment and materials (up to five staging areas may be used at one time);
- d) The use and storage of fuel;
- e) Construction of temporary camps to accommodate work crews;
- f) Clearing of vegetation as required in the right of way;
- g) Installation of conduits and fibre optic cable;
- h) HDD drilling and/or installation of cable at watercourse crossings; and
- i) Ongoing operation and maintenance.

Management Plans

In the initial Project Description submitted with the Applications, GY – DHPW referred to several different reports and plans (Emergency Frac-Out Response Plan, Inspection and Maintenance Plan, Permafrost Protection Plan and Construction Environmental Management Plan), this was unclear to reviewers as to why these various reports and plans were not submitted with the Application. The recommendation to the Board was to include the various reports and plans in the conditions of the authorizations. GY – DHPW agreed to submit the Plans for Board approval prior to construction. To address the comments and recommendations as well as the commitments made, the Board included conditions requiring the submission of noted Plans.

Part O Condition 72 (MV2019X0027) states:

A minimum of 90 days prior to the commencement of this land-use operation, the Permittee shall submit to the Board, for approval, a Permafrost Protection Plan. The Permittee shall not commence Project activities prior to Board approval of the Plan.

Part B Condition 24 (MV2019L8-0013) states:

A minimum of 90 days prior to the commencement of Project activities, the Licensee shall submit to the Board, for approval, a Permafrost Protection Plan. The Licensee shall not commence Project activities prior to Board approval of the Plan.

On April 21, 2022, GY-DHPW submitted the required Permafrost Protection Plan.

Summary of Permafrost Protection Plan

The purpose of this plan is to outline the permafrost protection activities to be implemented throughout the duration of the Dempster Fibre Project (DFP). Permafrost protection activities will be conducted in any Project areas where permafrost is present, as well as in areas with a shallow active layer or ice-rich soil. Permafrost protection activities will support the preservation of permafrost underlying the project route. This plan is applicable to all construction crew personnel on the Project and outlines the activities associated with identifying permafrost, best practices for working in permafrost, mitigation activities for construction, and reclamation methods.

Construction of this project will require the followings activities:

Clearing:

Using low-impact mulching equipment and hand clearing, trees and brush shall be cut to a maximum height of 0.15 meters above the ground, with a maximum length of residue of 0.30 meters. All riparian area vegetation control shall be hand cleared only. No residue shall be allowed to enter water courses or water bodies, and residue will not be allowed to remain on roadway surfaces. All residue to be removed no later than the end of each workday.

Conventional Bury:

Use vibratory plow to cut and create trench at a target depth of 1.0 m. Appropriate plow train or tandem tractor configurations are allowed as necessary to complete work; configurations must ensure minimal ground disturbance.

Shallow Bury:

Use trencher (i.e. chain-wheel and/or rock-wheel) or vibratory plow to cut and create shallow trench at a depth >300 mm – 1.0 m. Appropriate plow train or tandem tractor configurations are allowed as necessary to complete work; configurations must ensure minimal ground disturbance.

Sub-Surface Lay:

Use trencher (i.e. chain-wheel and/or rock-wheel) or vibratory plow to cut and create shallow trench at a depth >150 mm – <300mm. Appropriate plow train or tandem tractor configurations are allowed as necessary to complete work; configurations must ensure minimal ground disturbance.

Surface Lay:

In ponds and waterbodies where means of burial are not feasible the facility will be laid in the surface and allowed to settle to the bottom. Only applicable in non-flowing waters.

Horizontal Directional Drilling (HDD):

HDD of all fish bearing-bearing streams, rivers, and other water bodies or challenging sections.

New Aerial:

New aerial cable installations will be installed in sensitive terrain or challenging conditions to minimized ground disturbance.

Overview of Permafrost Characteristics on the Dempster Highway

Permafrost is found along almost the entire length of the Dempster Highway, with the exception of small sections along the first 80 km. Much of this permafrost is ice-rich and sensitive to disturbance. The Dempster highway has a unique construction designed to minimize permafrost disturbance. Climate change has begun to accelerate permafrost degradation along the Dempster Highway and across northern Canada.

All Project personnel will undergo training in permafrost protection and awareness. This training will be included as part of the orientation prior to the start of construction activities, as well as new-to-site orientation. Training will be conducted on the contents of this Permafrost Protection Plan. A Qualified Environmental Professional (QEP) will conduct environmental training with all Project personnel prior to work beginning each year. The training will include outlining the concerns related to permafrost, placing emphasis on the unique characteristics along the Dempster Highway, the project tools available for identifying thaw-sensitive and ice-rich permafrost locations, mitigation measures for minimizing impact to permafrost, and reclamation measures for responding to disturbance.

Basics of Permafrost

- Permafrost is ground that stays frozen (0°C) for at least two consecutive years. It can be found in any kind of soil or rock. Permafrost is as hard as concrete when it is frozen, but ice-rich permafrost can turn into liquid mud if it thaws.
- Permafrost has ice mixed with frozen soil. Sometimes it contains more ice than soil. The ice can be small crystals in the soil, lenses of pure ice, or massive pieces of buried ice.
- Most permafrost along the Dempster Highway corridor is only a degree or two below freezing (0°C). This makes it very sensitive to thaw caused by disturbance. It is possible for permafrost to warm up, but not thaw, provided it stays below 0°C.
- Permafrost thaw happens when it warms enough so that the ice in soil melts and turns into water.
- This usually happens when the active layer thaw increases in thickness from the ground surface down. The more ice there is in the soil, the more sensitive it is to thaw. Thaw usually happens from the top downwards.
- Active Layer Above Permafrost is the thin layer of soil between the ground surface and permafrost that freezes in the winter and thaws in the summer every year.
- The depth of thaw layer thickness varies seasonally, typically beginning to thaw in spring and reaching its maximum thickness typically in late summer to early fall.
- The thickness of the active layer varies across regional and local scales in association with different latitude, elevation, aspect, slope position and shape, soil texture and drainage, snowpack and

vegetation cover. The active layer might be only 30 cm deep in areas with thick moss, and several metres thick in well drained, coarse-textured soils.

- The active layer is usually thicker than the largest rocks in the soil. Silt and clay, glacial till (a mix of rocks and clay), sand and gravel, and bedrock have increasingly thick active layers.
- If the active layer does not completely freeze back during the winter, underlying permafrost is thawing.

Ground Ice

Ice in permafrost soils can be invisible, small crystals, thin layers, wedges or massive bodies of buried ice leftover from past glaciers.

- Silt and clay usually contain a lot of ice. The ice can be crystals, lenses, wedges, and/or massive layers.
- Glacial till has less ice, mostly wedges and lenses with occasional pieces of buried glacier ice.
- Sand and gravel do not have much ice, but can sometimes have ice wedges.
- Bedrock does not have much ice, typically just in cracks near the surface.

Thaw Sensitivity

The sensitivity of permafrost to disturbances depends primarily on temperature, ice content and soil type. Permafrost protected by insulating ground cover, typically mossy organics, is more sensitive to surface disturbance.

- Relatively warm permafrost (i.e., warmer than -2°C) with excess ice, typically found in fine-grained sediments and/or organic material susceptible to collapse or sinking, is referred to as “thaw-sensitive”. Relatively warm permafrost is more susceptible to thaw due to localized and even minor disturbances to the ground surface, whereas cooler permafrost can withstand minor disturbances without appreciable effect. Permafrost along much of the Dempster Highway corridor is generally warmer than about -5°C. Maps will be provided to crews that present permafrost characteristics, including anticipated active layer depths, and to highlight locations where specific mitigation activities will be required.
- Permafrost that is out of equilibrium with current climatic conditions and only persists in areas of thick, mossy organic cover is more sensitive to disturbance through ground disturbance (e.g., stripping or compaction of organics).
- Permafrost within fine-grained material is more likely to contain discrete bodies of ice and is more sensitive than that within weathered bedrock. Ice-poor permafrost is comparatively insensitive to disturbance.

Identifying Permafrost

Protecting permafrost is all about recognizing sensitive permafrost and protecting vegetation. Learning how to identify areas of sensitive permafrost is critical to knowing where vegetation damage could trigger permafrost thaw.

Permafrost and Terrain

Permafrost is widespread along the Dempster Highway. Active layer thicknesses vary according to soil types, slope direction, water, and vegetation.

- North-facing slopes generally have permafrost underlying thin active layers.
- South-facing slopes generally have permafrost underlying thick active layers.
- Alpine areas above tree line almost always have permafrost.
- Valley bottoms almost always have permafrost.
- Creeks often have a small, thawed area right under the water and fresh gravel deposits, but have permafrost deeper beneath and to the sides.
- Rivers have permafrost on the banks. Permafrost may or may not be present below the river bottom.
- Lakes generally do not have permafrost under the water. Small lakes may be underlain by permafrost.
- Swamps that freeze to the bottom every year generally are underlain by permafrost.

Permafrost and Vegetation

Vegetation acts as a blanket that insulates the ground in the summer. Different types of permafrost are found under different types of vegetation. Sensitivity of permafrost to disturbance and thaw can be reasonably predicted based on vegetation.

- Preservation of moss and low grassy vegetation is critical to protecting permafrost.
- Trees shade the ground during the summer and prevent the full heat of the sun from warming the ground surface.
- Sensitive permafrost can usually be recognized by thick moss, small spruce trees tilted at odd angles, and ponded water among grassy hummocks.
- Aspen and willows are usually indicators of thicker active layers.
- Active layers are usually thick in bare gravel, sand, and bedrock, so underlying permafrost is less sensitive to surface disturbance.

Permafrost and Snow

Deep snow insulates the permafrost in the winter. Unnaturally deep accumulations can prevent the active layer from fully refreezing. During the next summer, permafrost thaw is usually apparent.

- Natural snowdrifts that form down-wind of the highway embankment, especially in areas of windswept tundra, can achieve this insulating effect.
- Deep snow can delay thaw of the active layer in the spring and form ponds when it melts.

Methods for Identifying Permafrost

- The following methods and tools will be implemented to ensure construction crew and personnel have the knowledge and resources available to identify areas with a high potential for permafrost prior to conducting installation activities.
- Understanding the nature and distribution of thaw-sensitive permafrost along the highway corridor is critical to optimization of fibre optic cable (FOC) installation and the management of

risk to permafrost. The project-specific Engineering and GeoTechnical Design provided by the Yukon Government will be used as a planning tool to identify areas that are likely to have permafrost. This information will be used to indicate areas where pre-probing will be conducted prior to installation.

- Distinguishing where thaw sensitive and thaw-stable permafrost is located is critical to protecting permafrost and installing buried cables. Environmental Monitors will conduct pre-probing of the planned route every 100m to determine achievable depths in ice-rich permafrost areas. In areas that are likely to have ice-rich permafrost, pre-probing will be conducted every 10-20m. This information will be used to support determining the timing of installation for achieving maximum burial depth and the method of installation to be used. Probing is conducted with a steel rod (<1.5 m long) that is pushed by hand into the active layer until it stops on permafrost. The probing by environmental monitors is the primary method that will be used in the field to follow the design methods. Engineering and Geotechnical design and research to identify thaw sensitive and thaw-stable permafrost was conducted and incorporated as part of the design process for the Project.
- Site supervisors will conduct visual examinations using the above discussed terrain and vegetation features to identify landscape features that support a high potential for permafrost along the Project route. Sites identified during visual inspections will be assessed with pre-probing prior to installation.
- Inference of general characteristics of ground ice can be made in areas with ice-wedge polygons, retrogressive thaw slumps, and areas already exhibiting permafrost thaw activity (e.g., thaw ponds). Where there are no surface indicators of ground ice, however, field investigations are required to assess ground ice conditions.

During construction, areas of sensitive or special concern and areas of ice-rich permafrost with a shallow active layer where installation has occurred will be visually monitored by environmental monitors on a minimum of a monthly basis to review the sites for signs of thaw or degradation related to project activities. These sites will be revisited in the following year after snow melt to review the site and to take additional probe depth measurements. These depths will be compared with previous years' measurements to determine whether thickening of the active layer has occurred. Visual inspections of adaptive management is an approach that links monitoring to management actions. Adaptive management for the Dempster Fibre Line project will combine knowledge collected from mitigation and effects monitoring, Indigenous Knowledge, and input from regulatory agencies to continuously improve management practices that protect permafrost from potential effects of the Dempster Fibre Line Project.

The purpose of monitoring active layer and permafrost conditions is to provide an opportunity to detect early, and respond to, any issues of concern. The appropriate response depends primarily on the type and rate of the documented change in relation to 'control' sites beyond the influence of existing highway (or other) infrastructure or FOC installation. It also depends on the sensitivity of the site and its surroundings, considering the proximity to highway infrastructure or sensitive habitat. Prompt action is critical to avoid significant thermokarst development, which is challenging to control once initiated.

Mitigation Measures Related to Horizontal Directional Drilling

This section outlines the permafrost protection activities to be implemented as part of horizontal directional drilling (HDD) activities:

- HDD may, in some cases, be used in areas where pre-probe data and ground conditions indicate a heightened risk of permafrost disturbance.
- Once a permafrost area has been identified where an HDD crossing will occur, the drilling crew will set up rig mats if necessary to protect the organic layer from damage from the drill.

Mitigation Measures Related to Placement of Vaults and Tie-Ins

- This section outlines the permafrost protection activities to be implemented as part of the placement of vaults and tie-ins:
- A backhoe or small excavator will peel off the organic layer, trying to keep it intact as much as possible and set to the side of the work area.
- Once a tie-in or vault has been completed, the backhoe or excavator will back fill and then place the organic material back to its pre-construction location as best as possible. Care will be taken to ensure no soil is exposed following the re-placement of the organic layer.
- When placing handholes in the active layer, the handholes will be placed at grade to minimize disturbance of the organics and the active permafrost. The handholes will have fill placed around them to offer protection against movement and to minimize water pooling inside.

4. Comments

Not applicable.

5. Public Review

On April 25, 2022, the Plan was circulated for public review on the Online Review System (ORS). By May 20, 2022, comments and recommendations were received from the Government of the Northwest Territories – Environment and Natural Resources and the Gwich'in Tribal Council.

In response to the comments and recommendations put forward by the reviewers, an updated Permafrost Protection Plan was submitted.

6. Security

The status of security for this Project will not be affected by the Board's decisions related to the Plan.

7. Conclusion

Board staff conclude that the Plan, as submitted, is in conformity and the requirements of Permit MV2019X0027 and Licence MV2019L8-0013 and can be approved.

Board staff conclude there are no outstanding issues or concerns with this Plan.

8. Recommendation

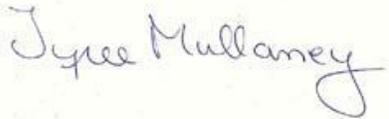
Board staff recommend the Board **make a motion to approve the Permafrost Protection Plan V2** as required by Land Use Permit MV2019X0027 and Water Licence MV2019L8-0013.

A draft decision letter is attached.

9. Attachments

- [MV2019X0027](#)
- [MV2019L8-0013](#)
 - [Permafrost Protection Plan V2](#)
- Review Comment Summary Table and Attachments
- Draft Decision Letter from the Board

Respectfully submitted,

A handwritten signature in blue ink that reads "Tyree Mullaney". The signature is written in a cursive style and is positioned above the printed name and title.

Tyree Mullaney
Regulatory Specialist

Reviewer Comments and Proponent Responses

Project: Dempster Fibre Project

Board: Mackenzie Valley Land and Water Board

Organization: Government of Yukon - Department of Highways and Public Works

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
GNWT-ENR - EAM (Environmental Assessment and Monitoring) - Erin Goose					
1	Summary of Project Activities	ENR notes that the Permafrost Protection Plan (the Plan) document would benefit from a brief summary of the project activities at the beginning of the document. This would assist in providing context for the later sections of the document regarding risks to permafrost, and the associated mitigation activities that are discussed.	ENR recommends that the Government of the Yukon, Department of Highways and Public Works (GY-DHPW) include an introductory section to briefly describe and summarize the activities associated with the project (clearing, trenching, etc.)	An introductory section will be added to the Permafrost Protection Plan that provides a summary of project activities and the associated construction activities that will be carried out during implementation. The associated mitigation measures for the construction activities are described in Section 3.0 of the plan.	Proponent response satisfactory.
2	Adaptive Management	The Adaptive Management section does not contain sufficient detail regarding the different action levels that could be triggered, and their associated response actions. ENR notes that the Plan discusses many mitigation measures that could be used, but they have not been compiled into an adaptive management response framework. An approved framework would clearly identify actionable responses	ENR recommends that GY-DHPW develop an adaptive management response framework for inclusion in the Plan. This will allow for quick response time to signs of permafrost degradation occurring and ensure that the appropriate mitigation actions are implemented promptly to prevent further issues.	An adaptive management framework will be included in the Permafrost Protection Plan that will outline the strategy to be implemented in the event that signs of permafrost degradation associated to impact from project activities is identified.	Proponent response satisfactory.

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		for various signs of potential permafrost degradation. It would also allow for a more proactive response, rather than being reactive to an issue developing, which results in a shorter response time and less impact to permafrost.			
D3	Probing	The term “pre-probing” is mentioned in the Plan prior to describing what “probing” entails. ENR notes that for clarity, “probing” should be described when it is first mentioned in the Plan.	ENR recommends that GY-DHPW described the purpose of probing, and the planned probing methodology. These details should be provided at the first use of the term in the Plan.	"Pre-probing" refers to probing activities occurring prior to the installation of the fibre optic cable to identify the depth of the active layer. A description of probing is included in the Permafrost Protection Plan under "Methods for Identifying Permafrost" in Section 2.0. The discussion of probing notes that Environmental Monitors will conduct pre-probing of the planned route every 100m to determine achievable depths in ice-rich permafrost areas. In areas that are likely to have ice-rich permafrost, pre-probing will be conducted every 10-20m. This information will be used to support determining the timing of installation for achieving maximum burial depth and the method of installation to be used. Probing is conducted with a steel rod (<1.5 m long) that is pushed by hand into the active layer until it stops on permafrost	Proponent response satisfactory.
4	Monitoring	ENR notes that while visual monitoring is mentioned in the Plan, there is no specific	ENR recommends that regular monitoring for any signs of permafrost	During construction, areas of sensitive or special concern and areas of ice-rich permafrost with a shallow active layer	Proponent response satisfactory.

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		section to describe the different types of monitoring that will take place during and after construction. In addition, the Plan does not currently include associated monitoring frequencies.	degradation should occur both during and after construction. ENR recommends that GY-DHPW compile all planned monitoring during and after construction so that the schedules and frequency of monitoring are clearly presented.	where installation has occurred will be visually monitored by environmental monitors on a minimum of a monthly basis to review the sites for signs of thaw or degradation related to project activities. These sites will be revisited in the following year after snow melt to review the site and to take additional probe depth measurements. These depths will be compared with previous years' measurements to determine whether thickening of the active layer has occurred. Visual inspections of these sites will continue to occur throughout the subsequent construction seasons. After construction, inspection and monitoring of the fibre line will be completed following NWTel's Inspection and Maintenance Program.	
5	Cover Letter	Comment Letter	N/A		
Gwich'in Tribal Council - Lands and Resources - Kanda Gnana					
1		Permafrost protection awareness Training: The plan did not provide sufficient information on what training will consist of. More details about this training are required.		Training will be conducted on the contents of the Permafrost Protection Plan. A Qualified Environmental Professional (QEP) has been engaged for the entirety of the Project. The QEP will conduct environmental training with all Project personnel prior to work beginning each year. The training will include outlining the concerns related to permafrost, placing emphasis on the unique characteristics along the Dempster Highway, the project tools available for identifying thaw-sensitive and ice-rich	Proponent response satisfactory.

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
				permafrost locations, mitigation measures for minimizing impact to permafrost, and reclamation measures for responding to disturbance.	
2		<p>Thaw Sensitivity</p> <p>Permafrost along much of the Dempster Highway corridor is generally warmer than about -5°C. (Page 5 of PPP). This appears to be a gross generalization, and the characteristics of permafrost in the Gwich'in Settlement Region should be explored. A detailed description of soil characteristics is important to determine areas where specific mitigation activities are required. A transect outlaying these characteristics is advisable</p>		<p>An Environmental Consulting firm, with extensive experience conducting permafrost studies along the Dempster Highway, has been engaged to conduct permafrost mapping along the Project route to outline these characteristics and highlight locations where specific mitigation activities will be required. These maps will be produced prior to construction activities occurring in sensitive permafrost areas. This work is not scheduled to begin in 2022.</p>	Proponent response satisfactory.
3		<p>Permafrost and Snow</p> <p>Deep snow insulates the permafrost in the winter. Unnaturally deep accumulations can prevent the active layer from fully refreezing (page 6). Considering the elevated snowpack accumulation observed this year, extra caution should be undertaken throughout the</p>		<p>Site supervisors will conduct scouting ahead of the construction crews and will identify areas with elevated snowpack accumulation. In these areas, only low-ground pressure equipment will be used to minimize the compaction or organics and impacts to the active layer. In areas of particular sensitivity concern, horizontal directional drilling will be used. Lastly if an area is too sensitive to be crossed with the LGP unit and cannot be drilled, network alignment can be altered to cross the road to a less sensitive area.</p>	Proponent response satisfactory.

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		<p>construction phase as impacts to the active layer and permafrost/water table from increased insulating factors is likely to occur. These potential impacts to the active layer and permafrost are concerning and additional mitigation measures should be explored to reduce any further impacts.</p>			
4		<p>Methods for Identifying Permafrost</p> <p>The plan stated that: The following methods and tools will be implemented to ensure construction crew and personnel have the knowledge and resources available to identify areas with a high potential for permafrost prior to conducting installation activities but seems to limit these methods and tools to site identification and ground probing by the construction crews.</p> <p>This is confusing as the project design (engineering and Geotechnical design) should have identified thaw sensitive and thaw-stable</p>		<p>The project-specific engineering and geotechnical design provided by the Yukon Government will be used to as the primary method to identify thaw sensitive and thaw-stable permafrost areas for design purposes. As described in the permafrost protection plan, pre-probing will be used to determine the depth of the active layer. This information will be used to determine the timing of installation for achieving maximum burial depth and the method of installation to be used. The probing and environmental monitors are the primary methods used by the proponent in the field follow the design methods. Engineering and Geotechnical design and research has already been reviewed to this point.</p>	<p>Proponent response satisfactory.</p>

No.	Topic	Reviewer Comment	Reviewer Recommendation	Proponent Response	Board Decision
		<p>permafrost areas. Especially with regards to the extensive research that has already been conducted and published within the GSA, that specifically addresses permafrost. Ground probing by construction crews and environmental monitors should constitute an additional contribution to protecting permafrost, not the primary detection tool.</p>			
5		<p>Best Practices for Permafrost Reclamation</p> <p>This section is satisfactory. The same approach should have been implemented as a proactive step to identify the different types of permafrost along the Highway corridor prior to executing project activities.</p>			Proponent response satisfactory.



June 3, 2022

Attention: AlecSandra Macdonald, Gwich'in Land and Water Board

**RE: MV2019X0027, MV2019L8-0013 -Dempster Fibre Line _Government of Yukon
- Department of Highways and Public Works**

Dear AlecSandra,

On behalf of the Gwich'in Tribal Council (GTC), I would like to thank you for the opportunity to provide feedback regarding the following plans inherent to the Dempster Fibre Line Project:

- **Closure and Reclamation Plan**
- **Emergency Frac-Out Response Plan**
- **Environmental Management Plan**
- **Heritage Resource Management Plan**
- **Inspection and Maintenance Plan**
- **Permafrost Protection Plan**
- **Sediment and Erosion Control Plan**
- **Wildlife Management and Monitoring Plan**

The submission below summarizes GTC's comments and recommendations regarding specific aspects of these Plans.

Mahsi (thanks) for your time and attention to this matter. Please do not hesitate to contact me should you have any questions.

Sincerely,

Kanda Kola Gnama
Transboundary Specialist

cc. Leigh-Ann Williams Jones, GTC Manager of Lands and Resources

GTC's comments and recommendations

- **Closure and Reclamation Plan**

Clearing

Progressive reclamation should be contemplated in areas where natural revegetation may be inhibited.

- **Emergency Frac-Out Plan**

No concerns regarding this plan.

- **Environmental Management Plan**

Section 4.2 clearing and brushing.

Progressive reclamation should be implemented in areas where natural revegetation may be inhibited to reduce the impacts of edge effects, prevent habitat fragmentation and to decrease the potential for preferential use by predators. Special attention should also be paid to key nesting and burrowing wildlife species that may be impacted through ground compaction and/or habitat loss. Restricting activity periods during peak migration times or implementing stop work orders should be contemplated when key wildlife species are present within close range to work sites, including but not limited to Moose, Porcupine Caribou, Boreal Woodland Caribou, etc.

4.5 Horizontal Directional Drilling

For Horizontal Directional Drilling Mitigation Measures, it is quite concerning that the proponent contemplates disposing of drill waste in natural depressions, irrespective of how inert the by-products may be. It is concerning to the GTC that project proponents would even contemplate such a disposal method in Arctic Regions, given the ecological sensitivity of many areas, which are continually experiencing permafrost degradation, changes in drainage patterns due to increased flooding events and runoff, and vegetation loss due to changing thermal regimes and disturbance. GTC is strongly against any deposition of any wastes within the Gwich'in Settlement Region (GSR) and would expect that all wastes be trucked outside of the GSR.

Noise disturbance: noise disturbance is lacking in this plan.

The GTC believes that noise disturbance will occur during the project construction phase and requests that mitigation measures related to this disturbance be developed to avoid potential effects on wildlife and nearby communities as required. Special consideration should be given to areas where subsistence harvesting is being conducted by Participants, including hunting, trapping, berry picking and fishing.

- **Inspection and Maintenance Management Plan**

No concerns regarding this plan.

- **Sediment and Erosion Control Plan**

Summary of the drainage conditions

The proponent did not provide a summary of drainage conditions to be encountered along the Dempster highway in the ESC. This summary is required in the Plan.

Conventional Burry (page 5 of the plan)

The proponent has proposed using vibratory plow or trencher for conventional bury. The GTC is of the opinion that to minimize ground disturbance and the project's environmental footprint; only vibratory plows should be used for this project. This is particularly important as the plan did not outline a detailed method for **dispersion of surface water**, should water begin to pond or begin to preferentially follow the trench/slice within which the FOC will be installed. Given the current challenges that our Region faces with regard to flooding and drainage, any activity that has the potential to exacerbate this challenge should be adequately scrutinized to ensure any potential negative impacts to drainage systems are sufficiently mitigated.

Surface Lay (page 5 of the plan)

The plan did not outline the potential environmental consequences of this method. GTC requests that the proponent provides more details of potential impacts.

- **Wildlife Management and Monitoring Plan**

Section 1.2 - Engagement

This section indicates that GTC and Tetlit Gwich'in Council in Fort McPherson will review this Plan. The GTC requests that the proponent reaches out to the Gwichya Gwich'in Council in Tsiigehtchic and the Nihtat Gwich'in Council in Inuvik for review and feedback.

Overall, GTC reiterates the concerns raised by the GRRB regarding this plan, especially caribou hunting along the Dempster Highway by Gwich'in participants. Caribou is a significant part of local diets and is equally important for food security. The proponent must consult with the local Renewable Resources Councils to ensure that activity periods do not coincide with subsistence harvesting and will minimize any disruption to harvesting practices, including trapping, hunting and berry picking. As per section 12.4.13 of the Gwich'in Comprehensive Land Claim Agreement (GCLCA), if a land-use conflicts with harvesting activities, the Proponent is required to consult with the GTC, as well as provide notification to any Renewable Resource Council for the area in which the land is situated.

Failure to do so, would be considered an infringement on Gwich'in hunting rights and cultural practices along the Dempster highway.

- **Heritage and Resources Management plan**

The Chance find protocols/procedures

The Chance find protocols/procedures are not written in plain language (the Yukon Government ones are, however). If these will be reviewed and used by non-technical workers, it would be beneficial if these guidelines were written in plain language.

Flagging any “chance find” sites might attract looting or even simple damage from curious members of the public who may stop and explore, especially considering this is along the highway. Can another way to identify sites be used instead? If there will be a lot of other flagging, and the flagging tape doesn't specify that it's heritage materials, then this is less of a concern.

Human remains

Covering human remains with a tarp or blanket may not be the best practice, and the RCMP and Teet'it Gwich'in should be consulted to confirm this practice before this guide is finalized.

- **Permafrost protection plan.**

Permafrost protection awareness Training:

The plan did not provide sufficient information on what training will consist of. More details about this training are required.

Thaw Sensitivity

Permafrost along much of the Dempster Highway corridor is generally warmer than about -5°C. (Page 5 of PPP).

This appears to be a gross generalization, and the characteristics of permafrost in the Gwich'in Settlement Region should be explored.

A detailed description of soil characteristics is important to determine areas where specific mitigation activities are required. A transect outlaying these characteristics is advisable.

Permafrost and Snow

Deep snow insulates the permafrost in the winter. Unnaturally deep accumulations can prevent the active layer from fully refreezing (page 6).

Considering the elevated snowpack accumulation observed this year, extra caution should be undertaken throughout the construction phase as impacts to the active layer and permafrost/water table from increased insulating factors is likely to occur. These potential impacts to the active layer and permafrost are concerning and additional mitigation measures should be explored to reduce any further impacts.

Methods for Identifying Permafrost

The plan stated that: *The following **methods and tools** will be implemented to ensure construction crew and personnel have the knowledge and resources available to identify areas with a high potential for permafrost prior to conducting installation activities* but seems to limit these methods and tools to site identification and ground probing by the construction crews.

This is confusing as the project design (engineering and Geotechnical design) should have identified thaw sensitive and thaw-stable permafrost areas. Especially with regards to the extensive research that has already been conducted and published within the GSA, that specifically addresses permafrost. Ground probing by construction crews and environmental monitors should constitute an additional contribution to protecting permafrost, not the primary detection tool.

Best Practices for Permafrost Reclamation

This section is satisfactory. The same approach should have been implemented as a proactive step to identify the different types of permafrost along the Highway corridor prior to executing project activities.



May 20, 2022

Tyree Mullaney
Regulatory Specialist
Mackenzie Valley Land and Water Board
P.O. Box 2130
4922-48th Street 7th Floor YK CENTRE MALL
YELLOWKNIFE, NT X1A 2P6

Dear Tyree Mullaney,

**Re: Dempster Fibre Project, Permafrost Protection Plan Version 1.0
(MV2019X0027, MV2019L8-0013)**

The Department of Environment and Natural Resources, Government of the Northwest Territories has reviewed the application at reference based on its mandated responsibilities under the *Waters Act* and has included comments or recommendations for the consideration of the Board at this time.

If you have any technical questions please contact Laura Malone, Regulatory and Science Advisor, Water Management and Monitoring Division at email Laura.Malone@gov.nt.ca.

Should you have any general questions, please contact Erin Goose in the Environmental Assessment and Monitoring unit at email gnwt_ea@gov.nt.ca.

Sincerely,

Erin Goose
Environmental Regulatory Analyst
Environmental Assessment and Monitoring Section
Environmental Stewardship and Climate Change Division
Department of Environment and Natural Resources
Government of the Northwest Territories