



Yamoga Building, Old Airport Road,
P.O. Box 1, Fort Good Hope, NT X0E 0H0

Tel: 867-598-2413
www.slwb.com

Fax: 867-598-2325

August 28, 2020

File: S20P-003 / S20L1-001

Mr. Mark Cliffe-Phillips
Mackenzie Valley Environmental Impact Review Board
200 Scotia Centre
Box 938, 5102-50th Avenue
Yellowknife, NT X1A 2N7

Sent by email

Dear Mr. Cliffe-Phillips,

Re: Notice of Preliminary Screening Determination –Application for Land Use Permit and Water Licence – Enbridge Line 21 Pipeline Replacement KP158 – Little Smith Creek, Sahtu Region, NWT

The Sahtu Land and Water Board (Board) met on August 28, 2020 and considered the Application from Enbridge Pipelines (NW) Inc. (Enbridge) for Type A Land Use Permit (Permit) S20P-003 and Type B Water Licence (Licence) S20L1-003 for the Enbridge Line 21 Pipeline Replacement KP158 Project in accordance with the *Mackenzie Valley Resource Management Act* (MVRMA).

The Board conducted a preliminary screening based on the public record for the proceeding. Based on the evidence provided, the Board is satisfied the screening has been completed according to section 124(1) of the MVRMA and has decided **not to refer** the project to environmental assessment. The Board's reasons for decision, as required by section 121 of the MVRMA, are attached.

If the Board does not receive notice of referral to environmental assessment, it will resume the regulatory process for this Application.

Our Board and staff look forward to continued communications throughout the pause period. If you have any questions or concerns regarding this letter, please contact Paul Dixon at (867) 598-2413 ext. 225 or email at Paul.dixon@slwb.com.

Yours sincerely,

Larry Wallace
Chair, Sahtu Land and Water Board

Copied to: Tuli't'a Distribution List
Sarah Mackenzie, Enbridge
Attached: Preliminary Screening Report and Reasons for Decision



Sahtu Land and Water Board

P.O Box 1
Fort Good Hope, NT
X0E 0H0
Phone: 867-598-2413
Fax: 867-598-2325
www.slwb.com

Reasons for Decision

Reference/File Number:	S20P-003 / S20L1-001
Permittee:	Enbridge Pipelines (NW) Inc.
Subject:	Line 21 Pipeline Replacement Project

Decision from the Sahtu Land and Water Board

Meeting of August 28, 2020

1.0 Decision

The Sahtu Land and Water Board (the Board) met on August 28, 2020 and considered a new Type A Land Use Permit and Type B Water Licence Application from Enbridge Pipelines (NW) Inc. (Enbridge) for the Line 21 Pipeline Replacement Project southeast of kilometre post (KP) 158 on the Mackenzie Valley Winter Road adjacent to Little Smith Creek in the Northwest Territories.

The Board conducted a preliminary screening of this Application based on the public record for the proceeding. Based on the evidence provided, the Board is satisfied the screening has been completed according to subsection 124(1) of the *Mackenzie Valley Resource Management Act* (MVRMA) and has decided that, in its opinion, there is no reasonable likelihood that the proposed application might have a significant adverse impact on the environment and that the proposed application is not a cause for public concern as set out in paragraph 125(1)(a) of the MVRMA.

The Board has therefore decided the following:

1. **not to refer** the Project to Environmental Assessment;
2. if no referral to environmental assessment is received by end of day September 8, 2020, it will resume regulatory process for this Application.

2.0 Background

Enbridge has held various Permits for off Right-of-Way (ROW) maintenance activities for the Line 21 pipeline that runs from Norman Wells, NWT to the Alberta/Northwest Territories border since it was constructed in 1985 by Interprovincial PipeLine (IPL). The pipeline is contained within a 20 metre right-of-way (ROW) that runs approximately 210 km within the Sahtu Settlement Area and 542 km within the Dehcho Region of the Northwest Territories. The current Permit MV2020P0006¹ for maintenance activities is managed by the Mackenzie Valley Land and Water Board (MVLWB) as a transboundary file and was renewed on July 23, 2020. On occasion, maintenance activities will identify areas that require repair.

Enbridge has submitted an Application to the Sahtu Land and Water Board (SLWB) for off ROW activities to support a horizontal direction drilling (HDD) Project that will replace, at a deeper, safer depth, a 500 metre long segment of the Line 21 pipeline within the existing Enbridge ROW. The work is required to protect Line 21 pipeline from potential impacts of slope instability at a meander bend along Little Smith Creek and to support pipeline integrity and continued safe operations.

Water withdrawal and disposal of bentonite-based slurry is required to complete drilling activity. An existing gravel pit is proposed to be used for a temporary sump for containing drill cuttings and hydrovac slurry. Enbridge is seeking approval from the Board to permit on-site disposal of the drilling Waste within the trench line created by removal of the replaced section of pipeline following the Alberta Energy Regulator (AER) Directive 050 guidelines for mix-bury-cover approach, provided that substrate testing and site conditions are suitable.

The Project will utilize the Mackenzie Valley winter road and existing accesses permitted under Enbridge's operations and maintenance land use permit MV2020P0006. Off-ROW, another 11 hectares of mostly disturbed Sahtu Private Lands will be used for temporary camps, and laydown yard for storage of equipment and fuel. Three camps will be required to support approximately 90 persons over the January to March construction period (90 days).

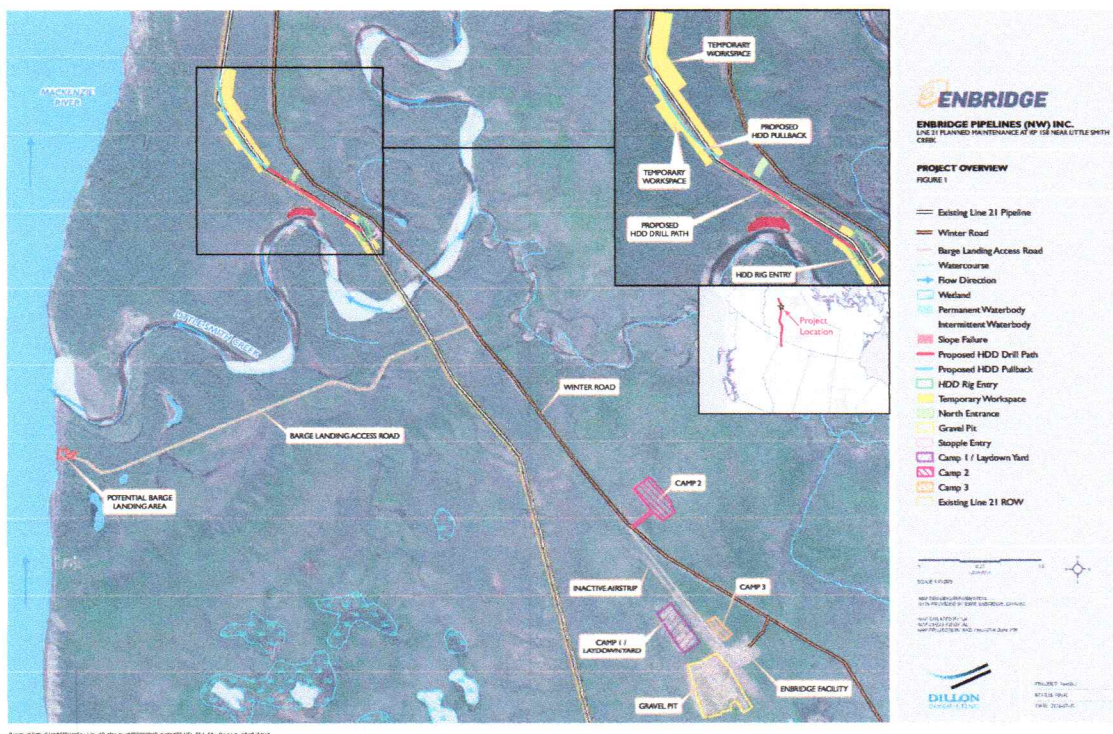
An existing barge landing on the Mackenzie River will be used for site access and mobilization of some equipment and supplies. The access will require some minor upgrades and repairs that may include brush and vegetation removal, minor cut and fill.

An approximately 2.0 km pre-disturbed access road from the proposed barge landing site on the east bank of the Mackenzie River to the winter road will be re-opened and utilized for the Project. The road will be brushed to a width of approximately 10 metres resulting in approximately 2.0 hectares of land clearing

Temporary access points will be opened from the winter road to the construction work sites (north and south) on the existing ROW. The winter access routes for the Project will be frozen-in except for a few low-lying areas where matting may be used. During the summer, the existing access trails will be evaluated

¹ See public registry for [MV2020P0006](#)

and, where necessary, soggy and wet areas will be matted. The access trails will be reclaimed following construction and will be allowed to naturally revegetate. A map with Project activity locations is provided below.



The work is expected to begin as soon as the authorizations are issued (September 2020) with the Project activity occurring in Winter 2020-2021 followed by two years of post-closure monitoring and maintenance.

In accordance with subsection 124(1) of the MVRMA, the Board must conduct a preliminary screening of the Application to determine whether the proposal (Project) might have a significant adverse impact on the environment or might be a cause for public concern.²

To assist the Board in completing a Preliminary Screening of this Application, the Board distributed the Application for public review on July 22, 2020 inviting Parties to provide comments and recommendations (e.g., on impacts and mitigation measures) using the Online Review System (ORS)³. Comments were due

² See the Mackenzie Valley Environmental Impact Review Board (www.reviewboard.ca) for the *Environmental Impact Assessment Guidelines*, 2004.

³ See SLWB Online Registry for [S20L1-001 / S20P-003](#)

August 12, 2020 with responses due August 19, 2020. The Board received comments from Fisheries and Oceans Canada (**DFO**) who had no concerns provided no in-stream works were proposed; Government of the Northwest Territories – Environment and Natural Resources and Environmental Assessment and Monitoring (**GNWT-ENR-EAM**) providing recommendations for minor revisions to the management plans, draft permit conditions, clarifications on water sources and uses, planned upgrades to the barge landing site, and questions and concerns regarding the proposed Mix-Bury-Cover method for on-site disposal of HDD drilling wastes and Hydrovac mineral wastes; the Government of the Northwest Territories Department of Lands Sahtu Region (**Sahtu-Lands**) Inspector who recommended additional Permit Conditions and commented on the security estimate; the Sahtu Renewable Resource Board (**SRRB**) who had no concerns with the Project and commended the engagement efforts; **Enbridge** submitted comments on draft condition; and Prince of Wales Northern Heritage Centre (**PWNHC**) who confirmed acceptance of the Archaeological Overview Assessment (AOA) and Archaeological Impact Assessment (AOA) and requested removal of some confidential information from documents before placing them on the public registry. No additional comments or concerns were raised by reviewers from the public review.

Since no concerns were raised about the process during the public review and no requests to extend reviewer comment deadline were received, the Board is satisfied that a reasonable period of notice was given to affected communities and First Nations, as required by subsection 63(2) of the MVRMA.

3.0 Reasons for Decision

3.1 Preliminary Screening

The Board adopted the Impact-Mitigation Table⁴ prepared by Dillon Consulting for the Enbridge preliminary screening as it included all elements required by the *Mackenzie Valley Resource Management Act* (MVRMA) 111(1) to be considered in the assessment of “impacts on the environment”.

The Board conducted its own review of the potential for project impacts from reviewing:

- other application documents including the Waste Management Plan and the Traditional Knowledge Study;
- reviewer comments and proponent responses from the Public Review;
- Inspection Reports for similar project types in the Sahtu; and
- Impact-Mitigation Table with particular attention to the final column, “Description of Residual Effects After Mitigation”.

The Board identified three Environmental Elements that may have residual environmental effects that are long term in duration, occasional in frequency, irreversible, and medium in magnitude.

⁴ See Table 8 in section 6.0 of the [Environmental and Socio-Economic Assessment](#) on the SLWB Online Registry

Based on Dillon's criteria and significance determination⁵, for environmental elements, a residual effect is considered significant if the effect is predicted to be either of the following:

- Irreversible and high magnitude; or,
- Long-term in duration, reversible, and high magnitude.

1. Degradation of the local permafrost regime

Dillon reported that Project activities may contribute to minor localized thawing of permafrost despite the implementation of mitigation measures.

Recommended Mitigation Measures

- Use thaw-stable materials as backfill, or as otherwise approved by a geotechnical professional;
- Where the soils are fine-grained and/or of high ice content on permafrost terrain, implement reclamation measures as quickly as possible after surface disturbance so as to reduce the risk of slope failure and ground subsidence. Consult a geotechnical professional, if warranted;
- Rehabilitate and stabilize organic mats, vegetation and soils that have been disturbed on permafrost terrain as soon as practicable;
- If necessary, regrade excavated areas during the first winter after construction to repair any *subsidence or to modify or remove, as appropriate, any excessively high crowns of backfill material that is placed over excavations to mitigate settlement.*

The Board questions whether bentonite is a thaw-stable material and whether there will be a qualified geotechnical professional to determine the site suitability for on-site disposal of the drilling wastes?

Enbridge's WMP described that the potential environmental impacts arising from improperly managed mineral wastes could include degradation of soil quality, water quality, and terrestrial and aquatic habitat quality.

GNWT-ENR-EAM (ID7)⁶ noted that the Closure and Reclamation Plan describes the Project area as having extensive and discontinuous permafrost, and that permafrost will be encountered by the HDD during pipeline construction. There is also evidence that the permafrost in the right of way (ROW) around KP 158 is thawing (Wood, 2018). ENR recommended that Enbridge provide additional detail on consideration for the presence of thawing permafrost when selecting a disposal method for the drilling wastes.

⁵ See Table 6 and section 4.6 of Ibid.

⁶ See SLWB Online Review – [Review Comment Table](#)

No additional information was provided from Enbridge to the Board about potential permafrost interactions. However; the Board notes that there have been more cases in the Sahtu of significant erosion occurring after trenches have been cut into permafrost areas and improperly back filled (MV Fibre-link Project; Canyon Creek All-season Access Road). Erosional thaws could result in drilling waste being released into the environment.

Dillon rated the residual effect as extended term in duration, isolated in frequency, irreversible, and low magnitude and not likely to be significant.

The Board would rate the residual environmental effect as long term in duration, occasional in frequency, irreversible, and medium in magnitude. The overall impact is not likely to be adversely significant.

2. Loss of soil productivity

Dillon reported that Project activities were not expected to create any residual effects on soil productivity which is generally defined as the capacity of soil to support healthy plant growth.

However, they also noted that the potential effects of any loss can be associated with erosion, mixing of surface and subsoil layers, compaction and rutting, or contamination. Vegetation clearing, stripping, salvage, and backfilling can increase the potential for these issues to occur.

The Board notes that soil mixing and backfilling are Project activities that could lead to either:

- poor vegetation re-establishment due to the introduction and mixing of new substances (e.g. bentonite) into the backfill material; or
- impacts on the surrounding environment from erosion.

3. Increased slope instability at the existing slope failure site

Dillon reported that Project activities may increase the instability of the slope failure site.

Recommended Mitigation Measures

- the use of ground and surface water control measures to maintain pre-construction surface and groundwater drainage conditions and reduce downslope changes and slumping or erosion on or near the Project footprint;
- the slope will continue to be monitored as part of Enbridge's O&M program.

Dillon rated the residual effect as short-term in duration, isolated in frequency, reversible, and low magnitude and not likely to be significant.

The Board disagrees with this assessment and rating for the following reasons:

- a) Enbridge did not fully consider the increased potential for erosion for Projects located in permafrost regions;
- b) In the event that erosion occurs in the backfilled trench, the effect may result in further instability of the creek bank due to the proximity of the trench to the top of bank (12 metres);
- c) If and when the creek bank fails, it is very likely that the trench and its backfilled contents would also slump towards the creek.

The Board would rate the residual environmental effect as medium-term in duration, occasional in frequency, irreversible and medium in magnitude. The overall impact is not likely to be significant because the pipeline segment that would have been affected by the failure will be replaced by the Project.

The Board, through its review, have not identified any socio-economic impacts or issues of public concern. The potential for socio-economic impacts will be reduced by completion of the Project.

5.4 Report Conclusion

Due to the small-scale, short duration, and routine nature of the Project activities, few potential residual or cumulative environmental and socio-economic effects were identified. As a result of the mitigation measures to be implemented by Enbridge in relation to the Project, as described in Table 8 and the Project-specific EPP, any potential effects arising from the Project can be mitigated with available resources and appropriate environmental protection measures.

The potential residual environmental effects from the Project, permafrost degradation, erosion, and slope instability, may interact directly and cumulatively with each other based on existing and planned activities and may be exacerbated by climate change, especially high rainfall in the spring and summer months. The effects are anticipated to be long term in duration, occasional in frequency, irreversible, and medium in magnitude. The Board does not consider these to represent adverse environmental impacts. The Board is of the opinion that the safety and integrity of the pipeline and the environment are at greater risk if the Project is not carried out. Therefore, any potential adverse environmental effects that may occur are expected to be mitigated effectively.

Based on the information provided in the application and the public review, it is the Board's view that there is not enough evidence to suggest that the proposed activities for undertaking the Line 21 Pipeline Replacement Project at KP158 adjacent to Little Smith Creek might have a significant adverse impact on the environment or might be a cause of public concern and therefore, has decided not to refer the Project to Environmental Assessment.

3.2 Application and Supporting Plan

The Board is satisfied that there are no outstanding concerns with respect to this Application because:

- a) Parties were provided the opportunity to provide comments and recommendations on the potential impacts and mitigation related to the proposed application; and

- b) The Board believes the conditions of the Permit and Licence which include requirements for completing a site-specific Environmental Protection Plan include adequate mitigations to address any potential impacts and concerns as a result of undertaking the Line 21 pipeline replacement adjacent to Little Smith creek.

The Board **approves the use of a modified mix-bury-approach** for backfilling shallow excavations that does not consist of any drilling Wastes, but rather uses local wood chips sourced from the tree and brush removal and chipped on site.

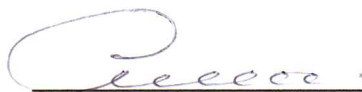
The Board **does not approve the onsite disposal of drilling Wastes**. All drilling Wastes must be stored and shipped south to an approved disposal facility.

If the Board does not receive a notice of referral to environmental assessment by end of day Tuesday September 8, 2020, it will resume the regulatory process for this Application.

Signed the 28th Day of August, 2020, on behalf of the Sahtu Land and Water Board



Witness



Larry Wallace

Chair, Sahtu Land and Water Board

PRELIMINARY SCREENING REPORT FORM

<p>PRELIMINARY SCREENER: Sahtu Land and Water Board</p> <p>REFERENCE / FILE NUMBER: S20P-004 / S20L1-003</p> <p>APPLICANT: Enbridge Pipelines (NW) Inc.</p> <p>TITLE: Line 21 Pipeline Replacement at KP158, Little Smith Creek, Northwest Territories</p> <p>DATE: August 28, 2020</p>	<p>EIRB REFERENCE NUMBER:</p>
--	--------------------------------------

Type of Development: Pipeline / Industrial

Type of Development:

- ☒ New Development
- ☐ Amend, EIRB Ref. #
- ☐ Renew, EIRB Ref. #
- ☐ Requires permit, licence or authorization
- ☒ Does not require permit, licence or authorization

Project Summary: Enbridge Pipelines (NW) Inc. (Enbridge) has submitted a complete application for a Type A land use permit (Permit) and a Type B Water Licence (Licence) each for a term of five years. The purpose of this Application is to use horizontal direction drilling (HDD) to replace at a deeper, safer depth, a segment of the Line 21 pipeline within the existing Enbridge ROW, southeast of kilometre post (KP) 158 near Little Smith Creek in the Northwest Territories. The work is required to protect Line 21 pipeline from potential impacts of slope instability at a meander bend along Little Smith Creek to support pipeline integrity and continued safe operations. The Project will require temporary use of 11 ha of previously disturbed off-right-of-way Sahtu Private Lands to support the Project activities, including the drill locations, laydown and storage areas for fuel and equipment, and camps. An existing but disused barge landing on the Mackenzie River is anticipated to be upgraded to support Project activities, with some anticipated brush and vegetation removal and minor cut and fill required. An approximately 2 km existing access road from the barge landing to the worksite will be cleared and widened to 10 metre width. An existing gravel pit is proposed to be used as a temporary sump for drill cuttings and slurry. Drill waste is proposed to be disposed of either on-site using a mix-bury cover method (preferred), or off-site if any of the following conditions are met:

1. if test results of the drill waste results exceed criteria, or
2. if local site conditions preclude the disposal of drill waste on-site (e.g presence of permafrost, higher than normal precipitation events), or
3. If the Sahtu Land and Water Board do not approve the on-site disposal of drilling wastes.

Principal Activities (*related to scoping*)

<input checked="" type="radio"/> Construction	<input type="radio"/> Exploration	<input type="radio"/> Decommissioning
<input checked="" type="radio"/> Installation	<input checked="" type="radio"/> Industrial	<input type="radio"/> Abandonment
<input checked="" type="radio"/> Maintenance	<input type="radio"/> Recreation	<input type="radio"/> Aerial
<input type="radio"/> Expansion	<input type="radio"/> Municipal	<input type="radio"/> Harvesting
<input type="radio"/> Operation	<input type="radio"/> Quarry	<input checked="" type="radio"/> Camp
<input checked="" type="radio"/> Repair - Replacement	<input checked="" type="radio"/> Linear / Corridor - Pipeline	<input type="radio"/> Scientific / Research
<input checked="" type="radio"/> Water Intake	<input checked="" type="radio"/> Sewage	<input checked="" type="radio"/> Solid Waste
<input checked="" type="radio"/> Other: Fuel Storage		

Principal Development Components (*related to scoping*)

- ☒ Access Road
 - ☐ construction
 - ☐ abandonment/removal
 - ☒ modification e.g., widening, straightening
- ☒ Automobile, Aircraft or Vessel Movement
- ☐ Blasting
- ☐ Building
- ☐ Burning
- ☒ Burying
- ☐ Channeling
- ☒ Cut and Fill
- ☒ Cutting of Trees or Removal of Vegetation
- ☐ Dams and Impoundments
 - ☐ construction
 - ☐ abandonment/removal
 - ☐ modification
- ☐ Ditch Construction
- ☐ Drainage Alteration
- ☒ Drilling other than Geoscientific
- ☐ Ecological Surveys
- ☒ Excavation
- ☐ Explosive Storage
- ☒ Fuel Storage
- ☒ Topsoil, Overburden or Soil
 - ☒ fill
 - ☐ disposal
 - ☐ removal
 - ☒ storage
- ☒ Waste Management
 - ☒ disposal of hazardous waste
 - ☒ waste generation
 - ☒ drilling wastes
- ☒ Sewage
 - ☒ disposal of sewage
- ☐ Geoscientific Sampling
 - ☐ trenching
 - ☐ diamond drill
 - ☐ borehole core sampling
- ☐ Bulk soil sampling
- ☐ Gravel
- ☐ Hydrological Testing
- ☒ Site Restoration
 - ☐ fertilization
 - ☐ grubbing
 - ☐ planting/seeding
 - ☐ reforestation
 - ☐ scarify
 - ☐ spraying
 - ☒ recontouring
- ☒ Slashing and removal of vegetation
- ☐ Soil Testing
- ☐ Stream Crossing/Bridging
- ☒ Tunneling/Underground
- ☒ Water Intake
- ☐ Other

NTS Topographic Map Sheet Numbers

096C

NTS Map Sheet #s:

Latitude/Longitude and UTM System:

Project footprint - Minimum Extent (Southernmost Point) 64°25'09.8"N Latitude 124°42'58.2"W Longitude

Project footprint - Maximum Extent (Northernmost Point) 64°26'32.6"N Latitude 124°45'36.7"W Longitude

Nearest Community and Water Body:

Tulit'a

Little Smith Creek

Mackenzie River

Land Status (*consultation information*)

☒ Free Hold / Private ☐ Commissioner's Land ☐ Federal Crown Land ☐ Municipal Land

Transboundary Implications

☐ British Columbia ☐ Alberta ☐ Saskatchewan ☐ Yukon
☐ Nunavut ☐ Wood Buffalo National Park ☐ Inuvialuit Settlement Region

☒ N/A

Type of Transboundary Implication:

☐ Impact / Effect

☐ Development

☐ Public Concern ☒ N/A _____

PRELIMINARY SCREENER / REFERRING BODY INFORMATION

	RA or DRA	ADVISE	PERMIT REQUIRED
Federal			
ATOMIC ENERGY CONTROL BOARD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CANADIAN HERITAGE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CANADIAN TRANSPORTATION AGENCY	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ENVIRONMENT CANADA	<input type="radio"/>	✓	<input type="radio"/>
FISHERIES & OCEANS	<input type="radio"/>	✓	<input type="radio"/>
CROWN INDIGENOUS RELATIONS AND NORTHERN AFFAIRS	<input type="radio"/>	✓	<input type="radio"/>
INDUSTRY CANADA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NATIONAL DEFENSE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CANADIAN ENERGY REGULATOR	<input type="radio"/>	✓	<input type="radio"/>
NATURAL RESOURCES CANADA	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PUBLIC WORKS & GOVERNMENT SERVICES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TRANSPORT CANADA	<input type="radio"/>	✓	<input type="radio"/>
CANADIAN NUCLEAR SAFETY COMMISSION	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Territorial			
MUNICIPAL & COMMUNITY AFFAIRS	<input type="radio"/>	✓	<input type="radio"/>
PUBLIC WORKS & GOVERNMENT SERVICES	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ENVIRONMENT & NATURAL RESOURCES	<input type="radio"/>	✓	<input type="radio"/>
TRANSPORTATION	<input type="radio"/>	✓	<input type="radio"/>
DEPARTMENT OF HEALTH AND SOCIAL SERVICES	<input type="radio"/>	✓	<input type="radio"/>
PRINCE OF WALES NORTHERN HERITAGE CENTRE	<input type="radio"/>	✓	<input type="radio"/>
INDUSTRY, TOURISM AND INVESTMENT	<input type="radio"/>	✓	<input type="radio"/>
LANDS	<input type="radio"/>	✓	<input type="radio"/>
OFFICE OF THE REGULATOR OF OIL AND GAS OPERATIONS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Boards			
GWICH'IN LAND & WATER BOARD	<input type="radio"/>	✓	<input type="radio"/>
SAHTU LAND & WATER BOARD	✓	<input type="radio"/>	✓
MACKENZIE VALLEY LAND & WATER BOARD	<input type="radio"/>	✓	<input type="radio"/>
MACKENZIE VALLEY ENVIR. IMPACT REVIEW BOARD	<input type="radio"/>	✓	<input type="radio"/>
SAHTU LAND USE PLANNING BOARD	<input type="radio"/>	✓	<input type="radio"/>
SAHTU RENEWABLE RESOURCES BOARD	<input type="radio"/>	✓	<input type="radio"/>
SAHTU HEALTH BOARD	<input type="radio"/>	✓	<input type="radio"/>
Aboriginal / First Nation			
SAHTU SECRETARIAT INCORPORATED	<input type="radio"/>	✓	<input type="radio"/>
DELINE BAND COUNCIL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
DELINE RENEWABLE RESOURCES COUNCIL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FORT GOOD HOPE CHARTER COMMUNITY COUNCIL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FORT GOOD HOPE METIS NATION	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
FORT GOOD HOPE RENEWABLE RESOURCES COUNCIL	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
YAMOGA LAND CORPORATION	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NORMAN WELLS LAND CORPORATION	<input type="radio"/>	✓	<input type="radio"/>
NORMAN WELLS RENEWABLE RESOURCES COUNCIL	<input type="radio"/>	✓	<input type="radio"/>
TULITA RENEWABLE RESOURCES COUNCIL	<input type="radio"/>	✓	<input type="radio"/>
TULITA DISTRICT LAND CORPORATION	<input type="radio"/>	✓	<input type="radio"/>
FORT NORMAN METIS LOCAL #60 LAND CORPORATION	<input type="radio"/>	✓	<input type="radio"/>
TULITA LAND CORPORATION	<input type="radio"/>	✓	<input type="radio"/>
Local Government			
DELINE GOT'INE GOVERNMENT	<input type="radio"/>	✓	<input type="radio"/>
BEHDZI AHDA FIRST NATION BAND	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TULITA HAMLET INCORPORATED	<input type="radio"/>	✓	<input type="radio"/>
K'ASHO GOT'INE CHARTER COMMUNITY	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
TOWN OF NORMAN WELLS	<input type="radio"/>	✓	<input type="radio"/>

Table 8: Environmental and Socio-Economic Effects and Cumulative Effects Assessment

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Physical and Meteorological Environment	<ul style="list-style-type: none"> Disturbance of the soils and vegetative mat in permafrost areas can result in degradation (e.g., thawing) of the permafrost, which can cause subsidence of the disturbed and adjacent area affecting natural drainage patterns and contributing to erosion. In addition, changes in the pore-water pressure of soils as a result of permafrost thawing can reduce the stability of slopes. Project activities at temporary infrastructure sites (i.e., access roads, temporary HDD workspaces, potential barge landing, camps, laydown yard) will be above-ground and vegetation clearing will be minimized to the extent possible. Activities to remove the existing pipe segment (open cut trenching), or subsidence associated with the pipe removal, may further destabilize the area of slope failure at the meander bend on Little Smith Creek. All equipment will access the trench from the east side of the ROW (away from the failure). 	<ul style="list-style-type: none"> Degradation of the local permafrost regime. 	<ul style="list-style-type: none"> Terrain LSA 	<ul style="list-style-type: none"> Use chilled drilling mud during HDD construction, if feasible. Limit topsoil salvage width to only that which is required in thaw-sensitive permafrost areas. Take particular care in permafrost areas to create and maintain an adequate snow/ice pad that will limit the potential for disturbance of the vegetation mat. Conduct snow harvesting and water spraying in permafrost areas if snow accumulation is limited to maintain an adequate snow/ice pad. Where soil is fine-grained and/or of high ice content on permafrost terrain, implement erosion control measures as quickly as possible after surface disturbance. A geotechnical expert professional can provide details on the erosion control measures and materials to be used. Do not salvage surface materials on permafrost terrain at locations where a snow/ice seasonal access road is to be developed. If new all-season access roads are necessary in areas of permafrost terrain, construct them in a manner that limits damage to the vegetative mat and maintains the existing thermal regime. Consult with a geotechnical professional, if warranted. Use snow/ice pads or matting, where warranted, to reduce surface disturbance in permafrost areas. Walk down or mow shrubs and small trees rather than cutting, if feasible, to retain a vegetated mat and limit surface disturbance. Do not grub on permafrost terrain unless required. Use burning racks, sleds or sloops when burning in permafrost areas. Use snow and/or geotextile to provide a barrier between stockpiled soil materials and the ground surface. Use thaw-stable materials as backfill, or as otherwise approved by a geotechnical professional. Where spoil material has high ice content, approved imported backfill material may be required. 	<ul style="list-style-type: none"> Project activities may contribute to minor localized thawing of permafrost despite the implementation of mitigation measures. The residual effect is extended-term in duration, isolated in frequency, irreversible, and low magnitude. The residual effect is not likely to be significant. 	<ul style="list-style-type: none"> The Project will act cumulatively with existing disturbances in the RSA to degrade the local permafrost regime; however, the Project's contribution to cumulative effects will be minimal in consideration of the existing level of disturbance and the nature/scope of the Project, as well as the natural degradation of permafrost that is occurring as a result of climate warming trends. The cumulative effect is irreversible, but low magnitude, and is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Physical and Meteorological Environment (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Insulate the ground surface beneath structures associated with the Project, where possible (e.g., matting).• Locate drilling waste sumps outside of known permafrost areas, if possible.• Avoid scalping of the vegetative mat/sod layer on permafrost during backfill. Use equipment during final pass of backfilling that will reduce scalping (e.g., clean-up bucket) and is approved by the Environmental Inspector.• Leave a crown of excess spoil over excavations as appropriate to mitigate backfill settlement.• Where the soils are fine-grained and/or of high ice content on permafrost terrain, implement reclamation measures as quickly as possible after surface disturbance so as to reduce the risk of slope failure and ground subsidence. Consult a geotechnical professional, if warranted. Rehabilitate and stabilize organic mats, vegetation and soils that have been disturbed on permafrost terrain as soon as practicable. If necessary, regrade excavated areas during the first winter after construction to repair any subsidence or to remove an excessively high crown.	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• See above

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Physical and Meteorological Environment (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Increased slope instability at the existing slope failure site.	<ul style="list-style-type: none">• Terrain LSA	<ul style="list-style-type: none">• Do not operate vehicles or heavy equipment on unstable terrain.• Maintain an adequate setback distance from unstable slopes.• Re-establish surface drainage patterns; install drainage, sediment, and erosion control measures, where required.• Limit grubbing to areas where soil removal is necessary (e.g., bell holes).• Leave a crown of excess spoil over excavations as appropriate to mitigate backfill settlement.	<ul style="list-style-type: none">• Project activities may increase the instability of the slope failure site. Ground and surface water control measures will be used to maintain pre-construction surface and groundwater drainage conditions and reduce downslope changes and slumping or erosion on or near the Project footprint. The slope will continue to be monitored as part of Enbridge's O&M program. The residual effect is short-term in duration, isolated in frequency, reversible, and low magnitude.• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• The Project will act cumulatively with existing disturbances in the RSA to increase slope instability; however, the Project's contribution to cumulative effects will be minimal in consideration of mitigation measures to be implemented and in the context of the natural destabilization of the slope from erosion and permafrost degradation. The slope is on a trajectory towards further destabilization with or without the Project. The Project contribution to the cumulative effect is reversible and low magnitude, and is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Soil and Soil Productivity	<ul style="list-style-type: none">• Soil productivity is generally defined as the capacity of soil to support healthy plant growth.• Loss of soil productivity can be associated with erosion, mixing of surface and subsoil layers, compaction and rutting, or contamination. Vegetation clearing, strippings salvage, and backfilling can increase the potential for these issues to occur.• Potential contamination of soil as a result of Project activities is assessed in Accidents and Malfunctions.	<ul style="list-style-type: none">• Loss of soil productivity due to surface soil and subsoil mixing, wind or water erosion, or compaction and rutting.	<ul style="list-style-type: none">• Footprint	<ul style="list-style-type: none">• Maintain separation between the surface soil and spoil piles.• Avoid mixing snow with spoil material during backfill.• Limit grubbing to areas where soil removal is necessary (e.g., bell holes).• Suspend soil handling during high wind conditions.• Postpone construction, suspend equipment travel or utilize construction alternatives in the event of wet/thawed soils in order to reduce terrain disturbance and soil structure damage.• Initiate wet/thawed soils contingency measures outlined in the Project-specific EPP once one of the following indicators occurs: rutting of surface soil to the extent that admixing may occur; excessive wheel slip; excessive build-up of mud on tires and cleats; formation of puddles; or tracking of mud as vehicles leave the construction ROW.• If required, de-compact compacted subsoils on the construction ROW and temporary access trails, as well as soils damaged during wet weather to a target depth of 30 cm, prior to soil replacement. If soils are wet, postpone de-compaction until soils dry to ensure so that compaction alleviation measures are effective.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects on soil and soil productivity are predicted.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Vegetation	<ul style="list-style-type: none"> Vegetation will be cleared at certain locations in order to accommodate Project activities. The margins of the access road from the potential barge landing site to the winter road will require brushing, the camp sites and laydown yard will require minor clearing and grubbing, access trails to the HDD entry and exit locations will require clearing, the bell holes for the HDD work, and the trench for removal of the existing pipeline segment will require clearing. No large-diameter trees or merchantable timber occur in the Project footprint, which is mostly composed of regenerating vegetation (e.g., grasses, shrubs, and young, small-diameter trees). There are some locations of weeds and invasive plant species along existing disturbed areas in the Project footprint including the ROW, winter road, and around the Enbridge operations base. Potential contamination of vegetation as a result of Project activities is assessed in Accidents and Malfunctions. 	<ul style="list-style-type: none"> Introduction or spread of weeds and/or invasive species. Alteration or loss of native vegetation. 	<ul style="list-style-type: none"> Vegetation LSA Vegetation LSA 	<ul style="list-style-type: none"> All equipment (e.g., vehicles, materials, mats, etc.) must arrive for work in a clean condition to reduce the risk of weed introduction. Prohibit any equipment which arrives in a dirty condition to work until it has been cleaned off at a suitable location. Flag areas previously identified as having noxious and invasive weed infestations prior to commencement of site preparation (i.e., clearing, strippings salvage, grading) activities. Monitor the Project footprint for weed infestations as a part of the post-construction monitoring program. Implement post-construction vegetation and weed management as per the Enbridge LP Vegetation Management Guide. The Enbridge Environment Project Lead must ensure that the applicable permits have been obtained for chemical treatments (e.g., herbicides, pesticides) and/or burning as required by the appropriate regulatory authorities prior to undertaking weed treatments. Do not allow clearing or grubbing beyond the staked and/or flagged Project footprint boundaries. Limit clearing to the minimum necessary to safely complete the job. Clearing within additional workspace will be minimized if the entire workspace is not necessary for construction. When clearing non-merchantable timber, maintain an intact ground surface in areas where grading is not warranted. Restrict grubbing of shrubs, where feasible. It is preferred that shrubs be mowed or salvaged. Limit grubbing to areas where soil removal is necessary (e.g., bell holes, areas to be graded). In areas where strippings salvage and grading are not necessary, and in areas prone to wind erosion, consider other methods for stump removal in order to limit disturbance of the vegetative layer (e.g., mulching). Natural recovery is the preferred method of reclamation on level terrain where erosion is not expected. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects are predicted for the potential introduction or spread of weeds. Vegetation on disturbed areas will be temporarily lost/altered, however, vegetation will be allowed to naturally regenerate following construction. The residual effect is medium-term in duration, isolated in frequency, reversible, and low magnitude. The residual effect is not likely to be significant. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted. The Project will act cumulatively with existing developments to reduce/alter native vegetation in the RSA. The Project's contribution to a cumulative loss or alteration of native vegetation is considered negligible. The cumulative effect is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Wetlands	<ul style="list-style-type: none"> There are no naturally occurring wetlands located within 30 m of the Project footprint. 	<ul style="list-style-type: none"> No effects to Wetlands are expected to occur as a result of Project activities. 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A
Water Quality and Quantity	<ul style="list-style-type: none"> Changes in surface soil contours from grading, erosion rills, rutting, subsidence, or excessive crowning can cause pooling, flooding, or redirection of surface water flow. Surface water flow patterns may be temporarily impeded or altered by soil windrows, open excavations, or mats during construction. In addition, changes in soil permeability within backfilled excavations may alter surface and groundwater flow patterns. Should the potential barge landing be required, preparation of the site may result in minor sedimentation of surface water. Surface water quality could be affected by increased suspended solids at the pump intake area during withdrawal of water for hydrovac and HDD activities. Seepage of groundwater/melting permafrost is unlikely to be observed during winter construction. Frozen conditions will reduce the potential interaction with groundwater flows. Potential contamination of water as a result of Project activities is assessed in Accidents and Malfunctions. 	<ul style="list-style-type: none"> Alteration of natural surface water flow patterns. 	<ul style="list-style-type: none"> Water Quality and Quantity LSA 	<ul style="list-style-type: none"> Leave gaps in windrows and at obvious drainages to reduce interference with natural drainage patterns. Undertake all grading with the understanding that original contours and drainage patterns will be re-established during clean-up. Do not discharge hydrostatic test water to land. Hydrostatic test water will be hauled to and from the Project site. Re-establish surface drainage patterns; install drainage, sediment, and erosion control measures, where required. Remove all mats after construction so that they do not impede the restoration of natural drainage patterns. Re-grade areas with vehicle ruts or erosion gullies. Leave a crown of excess spoil over excavations as appropriate to mitigate backfill settlement. 	<ul style="list-style-type: none"> Localized alteration of natural surface water flow patterns may occur after the application of mitigation measures during construction, however, post-construction monitoring will identify any locations of altered drainage (e.g., subsidence, ponded water) and remedial work will be conducted, as needed. The residual effect is short to medium-term in duration, reversible, and low magnitude. The residual effect is not likely to be significant. 	<ul style="list-style-type: none"> The Project will act cumulatively with existing disturbances in the RSA to alter local natural drainage patterns. All areas of ground disturbance will be returned to their natural contours following construction. The Project will be monitored during post-construction monitoring and areas requiring remediation will be identified and restored. As such, the potential cumulative effect is reversible and low magnitude, and is not likely to be significant.
		<ul style="list-style-type: none"> Alteration of natural groundwater flow patterns. 	<ul style="list-style-type: none"> Water Quality and Quantity LSA 	<ul style="list-style-type: none"> Backfill excavated material in lifts and compact after each lift. Return all native material back into the excavation during backfilling. If fill is required, the permeability of the fill material must be consistent with native materials. If springs or groundwater are encountered during excavation, Enbridge and the Contractor will review the area and determine the appropriate mitigation. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects are predicted for the potential alteration of groundwater flow patterns. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Water Quality and Quantity (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Temporary increase in suspended solids and reduction of surface water quality at select locations (Mackenzie River potential barge landing site and water withdrawal sites) during construction.	<ul style="list-style-type: none">• Fish and Fish Habitat LSA	<ul style="list-style-type: none">• Do not permit pumped water to flow directly into any watercourse.• Conduct water withdrawal in compliance with site-specific approval conditions.• The Contractor will elevate the pump intake to minimize the pumping of sediment.• Install erosion and sediment controls as directed by the Environmental Inspector.• Develop water quality monitoring plans to monitor for sediment events during in-stream construction activities, where required, by the applicable regulatory approvals. If monitoring reveals sediment values are approaching threshold values, the water quality monitors will alert the Environmental Inspector and work with them to develop corrective actions. If corrective actions are not successful, construction activities will be temporarily suspended until effective solutions are identified.• Place only imported clean coarse material (gravel or rock), or native material for fill.• Install sediment curtains around the work area before starting work and during installation and removal of temporary barge landing structures to prevent sediment from being suspended and spreading to adjacent areas. Inspect regularly and repair when warranted. Remove accumulated sediment within the work area, to the extent practical, before removing curtains and place onshore in a location where sediment will not enter surface waters.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects are predicted for the potential temporary increase in suspended solids during construction.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Fish and Fish Habitat	<ul style="list-style-type: none">• Fish and fish habitat sensitivity for all species is generally highest during spawning, egg incubation, and emergence, and at other times when fish concentrate in spatially restricted habitats (e.g., winter). During the spawning and emergence period, fish require suitable habitat, including clean, well-oxygenated water which is when eggs and fry of some species can be particularly susceptible to the effects of sedimentation.• Water withdrawal required for hydrovac and HDD activities will occur in the winter, and either the Mackenzie River or Little Smith Creek may be used. Water withdrawal activities will adhere to DFO's Interim End-of-Pipe Fish Screens Code of Practice (2019d).• Potential effects on aquatic species at risk are assessed under the Species at Risk element.• Potential contamination of fish habitat as a result of Project activities is assessed in Accidents and Malfunctions.	<ul style="list-style-type: none">• Alteration or loss of in-stream habitat.	<ul style="list-style-type: none">• Fish and Fish Habitat LSA	<ul style="list-style-type: none">• Prevent or control soil erosion and water siltation immediately and proactively to the satisfaction of the Environmental Inspector. Make available sufficient personnel and equipment to control erosion when warranted.• Monitor temporary erosion control structures on a regular basis and repair, if warranted. Conduct repairs immediately if erosion into a waterbody is imminent.• Do not wash equipment or machinery in watercourses. Control wastewater from construction activities, such as equipment washing or hydrovac slurry, to avoid discharge directly into any body of water.• Conduct in-stream works in accordance with applicable existing territorial and federal guidelines, as well as mitigation measures and conditions stipulated by regulatory approvals.• Abide by applicable in-stream restricted activity timing windows. No in-stream construction activity will occur within the in-stream restricted activity timing windows at any watercourse, unless the watercourse is dry or frozen to the bottom at the time of construction or approval has been granted by the qualified fish biologist and the appropriate regulatory agency.• A water quality monitoring plan should be developed and implemented by a qualified fisheries biologist to coincide with in-stream activities. Turbidity levels and total suspended solids (TSS) concentrations should not exceed applicable water quality guidelines.• Place pump intakes to avoid or reduce disturbance to the streambed and screen them with a maximum mesh size of 2.54 mm as per the DFO Interim End-of-Pipe Fish Screens Code of Practice (2019d). Monitor and maintain the screens to be free of debris.	<ul style="list-style-type: none">• No residual effects on in-stream habitat are predicted for water withdrawal activities. Project activities at the potential barge landing site on the Mackenzie River may temporarily alter in-stream habitat. The alteration will be localized and habitat loss is not expected with the implementation of restorative measures following construction. The residual effect is short-term in duration, isolated in frequency, reversible, and low magnitude.• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• The Project will act cumulatively with existing disturbances in the RSA to alter in-stream habitat, however, in the context of the Mackenzie River, the Project's contribution to cumulative effects will be localized and negligible. The cumulative effect is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Fish and Fish Habitat (cont'd)	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> Place only imported clean coarse material (gravel or rock), or native material for fill in-stream. Re-contour the streambed to approximate the pre-construction profile and channel configuration to maintain flow patterns. Watercourses are not to be realigned or straightened in any way nor have their hydraulic characteristics changed. Install sediment curtains around the work area before starting in-stream work and during installation and removal of temporary barge landing structures to prevent sediment from being suspended and spreading to adjacent areas. Inspect regularly and repair when warranted. Remove accumulated sediment within the work area, to the extent practical, before removing curtains and place onshore in a location where sediment will not enter surface waters. Use inert materials for construction of temporary barge landings. Do not use treated wood products or other materials that may allow deleterious substances to leach into the water. During restoration, replace or relocate rocks, stumps or logs required to be moved from the watercourse bottom or foreshore during construction to an area of similar depth. 	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> See above
		<ul style="list-style-type: none"> Alteration or loss of riparian habitat. 	<ul style="list-style-type: none"> Fish and Fish Habitat LSA 	<ul style="list-style-type: none"> Delay grading, if practical, on the approach slopes to watercourses until immediately prior to the commencement of construction. Install temporary berms on approach slopes to watercourses, and erect silt fence or an equivalent temporary erosion/sediment control device near the base of approach slopes to watercourses immediately following grading. Monitor the temporary erosion control structures on a regular basis and repair, if warranted. 	<ul style="list-style-type: none"> Access from the potential barge landing site will disturb the riparian area of the Mackenzie River, however, the site is previously disturbed and will be restored following construction. The residual effect is medium-term in duration (as it will take approx. 2-5 years for vegetation to naturally regenerate), isolated in frequency, reversible, and low magnitude. The residual effect is not likely to be significant. 	<ul style="list-style-type: none"> The Project will act cumulatively with existing disturbances to reduce/alter riparian habitat in the RSA, however, use of an existing, previously disturbed access trail reduces the cumulative effect to a negligible level. The cumulative effect is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Fish and Fish Habitat (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Fish injury or mortality.	<ul style="list-style-type: none">• Fish and Fish Habitat LSA	<ul style="list-style-type: none">• Assign a qualified fish biologist to salvage fish from the isolated area prior to and during dewatering where isolation is required for construction. Fish salvage activities will need to be conducted in accordance with applicable approvals.• Take all reasonable measures to abide by applicable in-stream restricted activity timing windows. No in-stream construction activity will occur within the in-stream restricted activity timing windows at any watercourse, unless the watercourse is dry or frozen to the bottom at the time of construction or approval has been granted by the qualified fish biologist and the appropriate regulatory agency.• A water quality monitoring plan should be developed and implemented by a qualified fisheries biologist to coincide with in-stream activities. Turbidity levels and TSS concentrations should not exceed applicable water quality guidelines.• Place pump intakes to avoid or reduce disturbance to the streambed and screen them with a maximum mesh size of 2.54 mm as per the DFO Interim End-of-Pipe Fish Screens Code of Practice (2019d). Monitor and maintain the screens to be free of debris.• Place pump intakes to avoid potential overwintering habitat.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects are predicted for potential fish injury or mortality.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Wildlife and Wildlife Habitat	<ul style="list-style-type: none">• The Project footprint and Wildlife LSA provides suitable habitat for a wide variety of species and the existing ROW, access roads, and the valley of Little Smith Creek are likely used as movement corridors by large mammals.• Sensory disturbances (e.g., noise, light) and ground disturbance during construction may have an effect on wildlife movement and may result in minor alterations to wildlife habitat. In addition, the construction camps and vehicle use may increase opportunities for wildlife-human interactions, which may increase the risk for wildlife injury or mortality.• Some clearing and construction is currently planned within the migratory bird nesting period for the area (May 4 to August 22; ECCC 2018) in association with the potential barge landing site, access road, camp sites, and laydown yard set-up planned for summer 2020.• Potential contamination of wildlife habitat as a result of Project activities is assessed in Accidents and Malfunctions.	<ul style="list-style-type: none">• Alteration of wildlife habitat.	<ul style="list-style-type: none">• Footprint	<ul style="list-style-type: none">• In the event that clearing or construction activities occur within the migratory bird nesting period (May 4 to August 22), Wildlife Resource Specialists will use non-intrusive methods to conduct an area search for evidence of nesting (e.g., presence of territorial males, alarm calls, distraction displays, adults carrying nesting material/food) a maximum of 7 days prior to construction activity to identify active nests. In the event that an active nest is found, it will be subject to site-specific mitigation measures (e.g., clearly marked species-specific buffer around the nest or non-intrusive monitoring).• Suspend the work activity in the event that an area to be cleared is found to contain an active bird nest, burrow or den. Report sightings of wildlife species of concern to the Environmental Inspector or Enbridge designate. Implement applicable contingency measures associated with the discovery of species of concern during construction (e.g., seasonal timing constraints within the recommended set back distances).• Consider the wildlife setbacks and sensitive periods recommended in Table 4 of the Sahtú Land Use Plan if suitable habitat (e.g., dens, nest sites) is identified in proximity to the Project footprint prior to clearing or construction.• Undertake all grading with the understanding that original contours and drainage patterns will be re-established during clean-up.• Restrict all construction activities to the approved Project footprint.• Limit clearing to the minimum necessary to safely complete the job. Clearing within additional workspace will be minimized if the entire workspace is not necessary for construction.• Natural recovery is the preferred method of reclamation on level terrain where erosion is not expected.	<ul style="list-style-type: none">• The Project will temporarily alter wildlife habitat in the Project footprint due to vegetation clearing. The Project footprint is mainly disturbed and offers distinct edge habitat, particularly around the existing ROW and access roads. The Project will not alter the existing open and edge habitat that is currently available on the footprint, although it does temporarily affect habitat use. Minimal Vegetation clearing will be minimized to the extent possible, limiting the potential alteration of wildlife habitat. The residual effect is medium-term in duration, isolated in frequency, reversible, and low magnitude.• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• The Project will act cumulatively with existing disturbances in the RSA to alter wildlife habitat. Vegetation clearing will only be conducted where required and is not anticipated to have a noticeable impact on habitat availability at the RSA scale. The Project contribution to a cumulative change in wildlife habitat is medium-term in duration and reversible. The magnitude is considered negligible, in the context of existing anthropogenic disturbances. The cumulative effect is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Wildlife and Wildlife Habitat (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Changes to wildlife movement.	<ul style="list-style-type: none">• Wildlife LSA	<ul style="list-style-type: none">• See measures above regarding migratory birds.• Consider the wildlife setbacks and sensitive periods recommended in Table 4 of the Sahtú Land Use Plan if suitable habitat (e.g., dens, nest sites) is identified in proximity to the Project footprint prior to clearing or construction.• Maintain noise-abatement equipment (i.e., mufflers) on machinery and vehicles in good working order to limit noise emissions and air pollution.• Where practical, turn off equipment when not in use. Enclose noisy equipment, as needed, to limit the transmission of noise beyond the construction-site. Replace or repair equipment parts generating excessive noise, if practical.• Limit the length of open excavations as much as practical to lessen the potential for interference with wildlife movement.• Lighting will be restricted to the minimum required to complete the works safely.• Lighting will be directed to the work area to reduce light pollution during dark hours to the extent feasible.	<ul style="list-style-type: none">• The Project will temporarily impact wildlife movement in the Wildlife LSA, as sensory disturbance will deter wildlife from utilizing habitat in and around the Project footprint and ground disturbance may provide barriers to wildlife movement. The residual effect is short-term in duration, isolated in frequency, reversible, and low magnitude.• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• The Project will act cumulatively with existing disturbances in the RSA to alter wildlife movement. Project construction may act cumulatively with other existing developments (e.g., winter road use); however, no interaction with reasonably foreseeable developments is anticipated, given the remote setting and the nearest foreseeable development being located approximately 20 km away. The Project contribution to a cumulative change in wildlife movement is short-term in duration and reversible. The magnitude is considered low, in the context of existing anthropogenic disturbances. The cumulative effect is not likely to be significant.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Wildlife and Wildlife Habitat (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Wildlife injury or mortality.	<ul style="list-style-type: none">• Footprint	<ul style="list-style-type: none">• See measures above regarding migratory birds.• Transport workers to and from the work site by multi-passenger vehicles to the extent practical.• Unanticipated wildlife issues encountered during construction will be discussed and resolved by the Environmental Inspector or Enbridge designate and the responsible regulatory agencies, if necessary.• Prohibit Project personnel from hunting on the Project footprint, and from harassing, feeding, collecting, or possessing wildlife species.• Do not permit construction personnel to have dogs on the Project footprint.• Firearms are not permitted in Project vehicles or on the Project footprint, or at associated Project facilities, except by Wildlife Monitors/Bear Watch personnel.• Prohibit the recreational use of ATVs or snowmobiles by construction personnel on the Project footprint.• Report any incidents with wildlife to the Environmental Inspector immediately.• Establish construction traffic speed limits on access roads to reduce the risk of collisions with wildlife.• Examine excavations on a regular basis for wildlife that may have become trapped overnight. Report the location and species of wildlife trapped in the excavation, if present, to the Environmental Inspector or Enbridge designate prior to commencing any construction activities. The Environmental Inspector or Enbridge designate will contact the applicable regulatory authority.• Domestic wastes will be collected and contained in wildlife-proof containers and will be disposed of in accordance with the Project-specific Waste Management Plan.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects are predicted for potential wildlife injury or mortality.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Species at Risk or Species of Special Status and Related Habitat	<ul style="list-style-type: none">• There is low potential for rare plants or plant species at risk to occur in the Project footprint and Vegetation LSA, and no rare plants or plant species at risk were observed during the field assessments conducted for the Project.• Bull Trout, an aquatic species at risk, was observed in Little Smith Creek and is known to occur in the Mackenzie River (COSEWIC 2012). There is suitable spawning, rearing, and overwintering habitat in Little Smith Creek. Aside from potential water withdrawal activities, no in-stream work will occur in Little Smith Creek.• The potential for Project interactions with Bull Trout is limited to potential barge landing construction on the Mackenzie River and water withdrawal activities in the Mackenzie River or Little Smith Creek. .	<ul style="list-style-type: none">• Bull Trout injury or mortality.	<ul style="list-style-type: none">• Fish and Fish Habitat LSA	<ul style="list-style-type: none">• Conduct in-stream works in accordance with applicable existing territorial and federal guidelines, as well as mitigation measures and conditions stipulated by regulatory approvals.• Implement the mitigation measures listed for potential effects on the Fish and Fish Habitat element.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects are predicted for potential Bull Trout injury or mortality.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Species at Risk or Species of Special Status and Related Habitat (cont'd)	<ul style="list-style-type: none">• There is high potential for wildlife species at risk to occur in the Project footprint and Wildlife LSA, although no species at risk, or signs thereof, were observed during the field assessments conducted for the Project.• The Project is located within an IBA and some clearing and construction activities will occur within the migratory bird nesting period.• The Project is in Boreal Woodland Caribou Critical Habitat and the Wildlife LSA supports Woodland Caribou habitat. The use of mainly existing disturbances greatly reduces the Project's interaction with habitat potentially used by Woodland Caribou.	<ul style="list-style-type: none">• Alteration of habitat and movement patterns of bird species at risk, and increased risk of injury or mortality.	<ul style="list-style-type: none">• Wildlife LSA	<ul style="list-style-type: none">• If previously unidentified listed or sensitive wildlife species or their site-specific habitat (e.g., dens, nests) are identified during Project construction, report to the Environmental Inspector or Enbridge designate and implement contingency measures in the Project-specific EPP.• In the event that clearing or construction activities occur within the migratory bird nesting period (May 4 to August 22), Wildlife Resource Specialists will use non-intrusive methods to conduct an area search for evidence of nesting (e.g., presence of territorial males, alarm calls, distraction displays, adults carrying nesting material/food) a maximum of 7 days prior to construction activity to identify active nests. In the event that an active nest is found, it will be subject to site-specific mitigation measures (e.g., clearly marked species-specific buffer around the nest or non-intrusive monitoring).• Suspend the work activity in the event that an area to be cleared is found to contain an active bird nest, burrow or den. Report sightings of wildlife species of concern to the Environmental Inspector or Enbridge designate. Implement applicable contingency measures associated with the discovery of species of concern during construction (e.g., seasonal timing constraints within the recommended set back distances).• Implement the mitigation measures listed for potential effects on the Wildlife and Wildlife Habitat element.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects are predicted for potential alteration of habitat and movement patterns for bird species at risk and increased risk of injury or mortality.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Species at Risk or Species of Special Status and Related Habitat (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• Alteration of habitat and movement patterns of Woodland Caribou, and increased risk of injury or mortality.	<ul style="list-style-type: none">• Wildlife LSA	<ul style="list-style-type: none">• If caribou are identified during Project construction, report to the Environmental Inspector or Enbridge designate and implement contingency measures in the Project-specific EPP.• Avoid and/or minimize alteration of the biophysical habitat attributes (e.g., lowland black spruce-lichen forests and open coniferous forests) listed in the Recovery Strategy for the Boreal Caribou in the NWT (Conference of Management Authorities 2017), where feasible.• Reduce or avoid works during the calving period (mid-May to mid-June) in potential calving habitat (e.g., forested areas).• Maintain noise-abatement equipment (i.e., mufflers) on machinery and vehicles in good working order to limit noise emissions and air pollution.• Where practical, turn off equipment when not in use. Enclose noisy equipment, as needed, to limit the transmission of noise beyond the construction-site. Replace or repair equipment parts generating excessive noise, if practical.• Lighting will be restricted to the minimum required to complete the works safely.• Lighting will be directed to the work area to reduce light pollution during dark hours to the extent feasible.• Implement the mitigation measures listed for potential effects on the Wildlife and Wildlife Habitat element.	<ul style="list-style-type: none">• With the implementation of mitigation measures, no residual effects are predicted for potential alteration of habitat and movement patterns for Woodland Caribou and increased risk of injury or mortality.	<ul style="list-style-type: none">• No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Air Emissions	<ul style="list-style-type: none">Construction activities will involve the operation of vehicles and equipment that will emit criteria air contaminants (CACs). CACs associated with construction activities and the use of gasoline and diesel-powered vehicles and equipment include nitrogen dioxide, carbon monoxide, particulate matter, and sulfur dioxide. As part of vegetation clearing, particulate matter, dust, and smoke emissions are expected from burning slash.	<ul style="list-style-type: none">Increase in air emissions (CACs) during construction.	<ul style="list-style-type: none">Air Emissions LSA	<ul style="list-style-type: none">Use well-maintained equipment to reduce air pollution.Transport workers to and from the work site by multi-passenger vehicles to the extent practical to reduce emissions.Maintain noise-abatement equipment (i.e., mufflers) on machinery and vehicles in good working order to limit noise emissions and air pollution.Reduce idling of equipment, where possible.Clear vegetation only where required within the marked construction footprint boundaries.Obtain applicable permits prior to burning. Follow guidance in the applicable legislation.Implement techniques to limit smoke production from burning of slash including limiting pile size, minimizing moisture content and maintaining loose burning piles with minimal soil.Follow industry-accepted best management practices for the reduction of air emissions.	<ul style="list-style-type: none">With the implementation of mitigation measures, no residual effects on air quality are predicted.	<ul style="list-style-type: none">No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.
GHG Emissions	<ul style="list-style-type: none">Vehicles and equipment used during construction operate via internal combustion engines, which emit carbon dioxide, and to a lesser extent nitrous oxide, as part of the combustion process. In addition, vegetation clearing reduces carbon storage potential and burning results in the release of GHGs to the atmosphere.	<ul style="list-style-type: none">Increase in GHG emissions during construction.	<ul style="list-style-type: none">Beyond RSA	<ul style="list-style-type: none">Use well-maintained equipment to reduce air pollution.Transport workers to and from the work site by multi-passenger vehicles to the extent practical to reduce emissions.Reduce idling of equipment, where possible.Clear vegetation only where required within the marked construction footprint boundaries.Obtain applicable permits prior to burning. Follow guidance in the applicable legislation.	<ul style="list-style-type: none">Due to the long-lived nature of GHGs in the atmosphere and the time lag associated with climate change outcomes, the Project contribution to GHG emissions is permanent (i.e., irreversible). Since GHGs contribute to climate change, which is a global issue, the spatial boundary of the residual effect is Beyond the RSA. Despite the high likelihood and permanent nature of these emissions, their magnitude will be low in comparison with existing sources of GHGs in the region and local, territorial, or federal GHG inventories.The residual effect is not likely to be significant.	<ul style="list-style-type: none">Cumulative effects associated with the release of GHGs are a global phenomenon. Given the relatively small scope of Project activities and the low magnitude of the Project contribution to GHG emissions, an assessment of the cumulative effects of GHG emissions is considered beyond the scope of this ESA.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Acoustic Environment	<ul style="list-style-type: none">• The primary sources of noise from the Project will occur from vehicles and equipment used during construction. HDD activities will involve the use of a drilling rig, which will operate 24/7 until the drilling is complete.• The nearest potential receptors to the Project are the cabins located approximately 400 m south of the potential barge landing site. The frequency of use of the cabins is not known, however, it is assumed they may be in use during Project construction.	<ul style="list-style-type: none">• Increase in noise during construction.	<ul style="list-style-type: none">• Acoustic Environment LSA	<ul style="list-style-type: none">• Use well-maintained equipment to reduce air pollution.• Maintain noise-abatement equipment (i.e., mufflers) on machinery and vehicles in good working order to limit noise emissions and air pollution.• Reduce idling of equipment, where possible.• Follow industry-accepted best management practices for noise control.• Provide the construction schedule to potentially-affected Indigenous communities.	<ul style="list-style-type: none">• An increase in noise from Project vehicles, equipment and construction activities is short-term in duration, isolated in frequency, reversible, and of low magnitude.• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• The Project will act cumulatively with existing disturbances in the RSA to increase noise. Project construction may act cumulatively with other existing developments (e.g., winter road use); however, no interaction with and reasonably foreseeable developments is anticipated, given the remote setting and the nearest foreseeable development being located approximately 20 km away. The Project contribution to a cumulative increase in noise is short-term in duration reversible, and low in magnitude. The cumulative effect is not likely to be significant.
Human Occupancy and Resource Use	<ul style="list-style-type: none">• Given the remote setting of the Project and access constraints, there is limited potential for construction activities to interact with human occupancy and resource use (the nearest community is Tulita, located approximately 80 km from the Project footprint). Potential impacts on Indigenous land and resource use activities are considered under the Traditional Land and Resource Use element.	<ul style="list-style-type: none">• No effects to Human Occupancy and Resource Use are expected to occur as a result of Project activities.	<ul style="list-style-type: none">• N/A	<ul style="list-style-type: none">• N/A	<ul style="list-style-type: none">• N/A	<ul style="list-style-type: none">• N/A

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Heritage Resources	<ul style="list-style-type: none"> The AIA conducted for the Project (Appendix D) concluded that the Project will not impact any significant heritage resource sites. Project activities will largely occur within previously disturbed areas. The potential for unidentified heritage resources to occur within the Project footprint is very low. 	<ul style="list-style-type: none"> Disturbance of previously unidentified, surface, and buried heritage resources during construction. 	<ul style="list-style-type: none"> Footprint 	<ul style="list-style-type: none"> Suspend work in proximity (i.e., within 30 m or any distance specified by the appropriate regulatory agency) to archaeological, palaeontological or historical sites (e.g., arrow heads, modified bone, pottery fragments, fossils) discovered during construction. No work at that particular location shall continue until permission is granted by the appropriate regulatory agency. Prohibit the collection of any historical, archaeological or palaeontological resources by Project personnel. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects on heritage resources are predicted. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.
Traditional Land and Resource Use	<ul style="list-style-type: none"> Project construction may disturb traditional land use in the vicinity of the Project footprint. There is a cabin complex owned by two local Indigenous families located approximately 400 m south of the potential barge landing site. Enbridge is continuing to engage with the owners to mitigate impacts to their use of the area. For the purposes of this assessment, it is assumed that the cabins may be in use during Project construction. The Traditional Knowledge Study for the Project indicated that Indigenous communities use the area for various traditional activities, however, community members stated that they have no concerns with the Project (see Appendix E). 	<ul style="list-style-type: none"> Disturbance to traditional land and resource use activities (e.g., hunting, trapping, fishing, harvesting) during Project construction. 	<ul style="list-style-type: none"> Wildlife LSA 	<ul style="list-style-type: none"> Provide the construction schedule and mapping to potentially-affected Indigenous communities. Restrict construction activities to the approved Project footprint. Clear vegetation only where required within the marked construction footprint boundaries. Prohibit Project personnel from hunting on the Project footprint, and from harassing, feeding, collecting, or possessing wildlife species. Accommodate access through Project work areas and access routes for traditional land users and commercial trappers, wherever possible. This may include leaving/plowing gaps in snow windrows at obvious trails used by traditional land users or commercial trappers. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects on traditional land and resource use are predicted. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Social and Cultural Well-Being	<ul style="list-style-type: none"> An 80-person camp will be used to accommodate workers for the duration of the peak Project construction period (winter 2021). A small number of workers may require accommodation in Tulita for the winter 2022 construction season, however, the workforce will be small (≤ 12 workers) and duration of construction will be short (8 weeks or less). 	<ul style="list-style-type: none"> An influx of temporary workers may affect the social and cultural well-being of local communities. 	<ul style="list-style-type: none"> RSA 	<ul style="list-style-type: none"> Prohibit the use of alcohol and drugs amongst Project personnel at the construction camp. Workers will not be allowed to travel to nearby communities on their time off, except where required for access to health or social services. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects on social and cultural well-being are predicted. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.
Human Health or Aesthetics	<ul style="list-style-type: none"> Given the limited scope of the Project and the short duration of construction activities (approx. 8 consecutive weeks in any one season), only nuisance-related health effects such as vehicle exhaust and noise have the potential to be created by the Project. The Project is located in a remote, forested setting and will not have any noticeable effects on existing aesthetics. The Project does not require any new, permanent above-ground infrastructure. 	<ul style="list-style-type: none"> No effects to Human Health or Aesthetics are expected to occur as a result of Project activities. See the Air Emissions, GHG Emissions, and Acoustic Environment elements of this table. 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A
Infrastructure and Services	<ul style="list-style-type: none"> The Project is going to result in increased traffic on the winter road within the Project footprint. Increased traffic between the Project footprint and Tulita will be limited by the use of the construction camps. Daily commuting to Tulita will only be required during the winter 2022 construction season for a small number of workers over a short duration. 	<ul style="list-style-type: none"> Temporary increase in traffic on the winter road during construction. 	<ul style="list-style-type: none"> RSA 	<ul style="list-style-type: none"> Inform all responsible federal and territorial resource agencies and interested Indigenous communities of the Project developments, as warranted. Restrict construction activities to the approved Project footprint. All construction traffic will adhere to safety and road closure regulations. Where practical and applicable, use multi-passenger vehicles for the transport of crews to and from work sites. Post signage to discourage unauthorized public access onto the construction footprint during construction. Clearly delineate areas that have access restrictions. Restrict access to construction personnel only. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects are predicted for the potential temporary increase in traffic during construction. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Infrastructure and Services (cont'd)	<ul style="list-style-type: none"> The construction camps will have all necessary amenities for construction personnel and there will be limited potential for the Project to interact with local accommodations or services (e.g., emergency, protective, healthcare, social, recreation) in the region (i.e., Tulita or Norman Wells). The Project will result in an increase in non-hazardous waste, which will be disposed of at local disposal facilities. Hazardous wastes will be hauled off-site, likely to a facility in Alberta, and will not impact local waste services. 	<ul style="list-style-type: none"> Increased demand on local waste disposal facilities for the disposal of non-hazardous Project wastes during construction. 	<ul style="list-style-type: none"> RSA 	<ul style="list-style-type: none"> The Contractor will collect all construction debris and other waste materials and dispose at an approved facility and in accordance with the Project-specific Waste Management Plan. Official agreement(s) will be put in place with the accepting waste facilities prior to Project construction. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects are predicted for the potential increased demand on local waste disposal facilities during construction. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.
Navigation and Navigation Safety	<ul style="list-style-type: none"> The installation of the potential barge landing site on the Mackenzie River would occur within a small window of time and no in-stream works are currently planned. The Project will not obstruct navigation, and the river will remain navigable by watercraft throughout construction. 	<ul style="list-style-type: none"> Disruption of watercourse users during construction of the potential barge landing site on the Mackenzie River. 	<ul style="list-style-type: none"> RSA 	<ul style="list-style-type: none"> Enbridge will obtain and follow all applicable federal and territorial approvals prior to the commencement of construction and in-stream activities. Inform all responsible federal and territorial resource agencies and interested Indigenous communities of the Project developments, as warranted. Install warning signs along the banks both upstream and downstream of the in-stream works to caution users of a navigational hazard, where appropriate. Maintain downstream flow at all times when constructing the potential barge landing. Return the banks of the river to as close to the original preconstruction contours as feasible. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects on navigation and navigation safety are predicted. 	<ul style="list-style-type: none"> No residual effects have been identified, therefore, a cumulative effects assessment is not warranted.
Employment and Economy	<ul style="list-style-type: none"> Project activities will require a small workforce (approximately 80 workers) for a short duration (approximately 8 consecutive weeks in any one season) at the Project site. No permanent jobs will be created or lost as a result of the Project. 	<ul style="list-style-type: none"> No effects to Employment and Economy are expected to occur as a result of Project activities. 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> N/A

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Accidents and Malfunctions	<ul style="list-style-type: none">• Potential contaminants associated with the Project may include gasoline, diesel fuel, lubricants, and hydraulic fuels.• Hydrostatic test water will be trucked to and from the Project site and will not be released to the environment.• During construction, it is possible for spills of hazardous materials to occur. Spot spills are more likely than large spills; however, spills of any kind are unlikely with the implementation of preventative measures.	<ul style="list-style-type: none">• Contamination of soils, vegetation, wildlife habitat, surface water, or fish habitat may occur as a result of an accidental release of hazardous materials during construction.	<ul style="list-style-type: none">• Footprint	<ul style="list-style-type: none">• Maintain equipment and vehicles in good working condition and free of leaks.• Do not allow fuel, lubricating fluids, hydraulic fluids, methanol, antifreeze, herbicides, biocides or other chemicals to be dumped on the ground or into any watercourse. In the event of a spill, implement the Project-specific Spill Contingency Plan.• Cleaning, fuelling and servicing of equipment are to be conducted in an area, or in a manner, where spill or wash water will not contaminate surface water or groundwater resources. An appropriate emergency spill kit is to be available at all times.• Store all hazardous substances and fuels in containment systems appropriate for preventing release to the environment.• Transport, handle, use and dispose of hazardous materials in accordance with local laws, and territorial and federal regulatory requirements, and as identified in the Project-specific Waste Management Plan and Spill Contingency Plan.• Report spills immediately to the Environmental Inspector who will, if required, notify the appropriate government agencies in accordance with the Project-specific Spill Contingency Plan.• Place drop pans, an impervious tarp or other form of secondary containment underneath equipment/vehicles when servicing equipment/vehicles with the potential for accidental spills (e.g., oil changes, servicing of hydraulic systems).• All vehicles and equipment will carry a drip tray, and drip trays must be placed under all inactive vehicles/equipment to prevent leaks from contacting the ground surface.• Equip bulk fuel trucks, service vehicles and pick-up trucks with box-mounted fuel tanks; carry spill prevention, containment and clean-up materials, including a tarp, shovel and heavy plastic bags that are suitable for the volume of fuels or oils carried. Carry spill contingency material on bulk fuel and service vehicles that is suitable for use on land and water (i.e., sorbent pads, sorbent boom and rope).	<ul style="list-style-type: none">• A release of hazardous materials would be immediately contained and recovered. A release of this nature is expected to be avoided, or effectively mitigated, therefore, no residual effects are predicted.	<ul style="list-style-type: none">• None of the potential effects of accidents and malfunctions are likely to occur and, therefore, a cumulative effects assessment for accidents and malfunctions is not warranted. In the unlikely event of an accident or malfunction, the contingency and management plans prepared for the Project would be implemented to effectively contain, clean-up and document the incident.

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Accidents and Malfunctions (cont'd)	<ul style="list-style-type: none">HDD activities have the potential to result in an inadvertent return of drilling fluid to the surface. This is most likely to occur at the drill entry and exit locations and would only affect the terrestrial environment, as the HDD is set back > 75 m from the banks of Little Smith Creek and controls will be in place to contain a potential inadvertent return and prevent migration to the creek.Drilling mud is typically composed of bentonite clay which is inert and, as such, a release to land would be relatively benign. The activities involved in cleaning up an inadvertent return are more likely to cause an adverse effect on the environment, as clean-up may require removal of vegetation where it may not have previously been required for construction.	<ul style="list-style-type: none">An inadvertent return may occur during HDD activities, affecting surrounding soils, vegetation, and wildlife habitat.	<ul style="list-style-type: none">Vegetation LSA	<ul style="list-style-type: none">Utilize an Enbridge-approved drilling mud. Limit drilling mud composition to bentonite, fresh water and, if warranted, other inert additives.Develop a clean-up plan prior to drilling. The plan will be prepared by the Drilling Contractor in consultation with Enbridge Environment and Construction.Excavate the entry and expected exit sites to provide for the containment of drilling mud and sediments during an HDD. Excavations must be large enough to contain the anticipated maximum volume of drilling mud.Monitor the drill path and surrounding area for signs of drilling fluid release. The size of the area to be monitored will be determined by evaluating geotechnical conditions (i.e., amount of fracturing, type and depth of substrate) and drilling conditions (i.e., depth of drill path, distance between the entry and exit points). Monitoring will be on a continuous basis during drilling operations and will continue for at least 12 hours after shut-down. Personnel equipped with appropriate communication devices shall be positioned at the most advantageous locations to observe any sign of a release of drilling mud to the surface.Suspend drilling operations immediately if an excessive loss of drilling fluid is noted and conduct a detailed examination of the drill path and surrounding area for evidence of a release to the surface.In the event of an inadvertent return, implement the drilling fluid release contingency measures in the Project-specific EPP.	<ul style="list-style-type: none">In the event of an inadvertent return, the released drilling fluid would be cleaned up immediately and contingency measures would be implemented. The residual effect is short to medium-term in duration. In the short-term, soil productivity could be restored, however, the effect could extend into the medium-term depending on the amount of clay released and the level of clean-up required, as any residual clay that remains following clean-up may impact soil productivity and vegetation re-growth for more than one growing season. With the implementation of mitigation measures, the residual effect is reversible and low magnitude.The residual effect is not likely to be significant.	<ul style="list-style-type: none">See above

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Accidents and Malfunctions (cont'd)	<ul style="list-style-type: none">• The Project will require the use of vehicles and equipment that will travel the winter road and Project access trails in order to transport workers and materials from the camp sites and laydown yard to the construction ROW. In winter 2022, crews will travel the winter road from the construction ROW to Tulita on a daily basis.• The remote nature of the Project setting and the abundance of wildlife habitat means there is a possibility for collisions with large mammals, resulting in an accident.	<ul style="list-style-type: none">• A transportation accident may occur during Project activities.	<ul style="list-style-type: none">• RSA	<ul style="list-style-type: none">• Require all Contractor personnel to participate in a safety and environmental training session that will include instruction on the expectation that all Project-related vehicles are required to follow applicable traffic, road-use and safety laws.• Implement measures in Enbridge's O&MM 'Book 2: Safety'. Transport workers to and from the work sites by multi-passenger vehicles, to the extent practical.	<ul style="list-style-type: none">• A transportation accident may cause injury to people or wildlife, or may result in fire or contamination of lands and water, depending upon the location and severity of the accident.• The duration of the residual effect would vary from immediate to extended-term depending on the severity of the accident. If a minor accident were to occur during Project activities and did not involve serious property damage, injury or loss of life, fire, or contamination, it could be resolved immediately. However, if a major accident were to occur resulting in permanent injury or death of a person or multiple people, then the residual effect would be irreversible. The magnitude of the residual effect is considered to be negligible to high. A minor traffic accident that amounts to a short-lived nuisance or inconvenience to those involved and has no noticeable environmental effects would be considered to have a negligible magnitude. A high magnitude scenario would be an accident that results in death to humans, irreparable damage to property, damage to important wildlife habitat, or severe contamination of lands or water.	<ul style="list-style-type: none">• See above

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Accidents and Malfunctions (cont'd)	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• See above	<ul style="list-style-type: none">• See above	<p>The probability of a transportation accident is considered low since Enbridge will be adhering to all applicable traffic and road regulations as well as measures for traffic control to be included in the Project-specific EPP.</p> <ul style="list-style-type: none">• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• See above
	<ul style="list-style-type: none">• The Project is in an area that has historically experienced large wildfires, although the fire hazard rating in the Project footprint is low.• The majority of Project activities will occur in the winter, outside of the closed season for burning (May 1 to September 30). However, some Project activities will occur in the summer, including vegetation clearing along the access to the potential barge landing, which will result in the creation of flammable materials. The Project footprint is surrounded by woody vegetation and, under the right conditions, a fire could be accidentally ignited during Project activities.	<ul style="list-style-type: none">• A fire may occur during Project activities.	<ul style="list-style-type: none">• RSA	<ul style="list-style-type: none">• Obtain a Burn Permit from the Sahtú Regional Office of the GNWT Department of Environment and Natural Resources if burning is required during the closed season (May 1 to September 30).• Conduct all burning in accordance with the Forest Protection Act (RSNWT 1988, c. F-10) and regulatory permits.• All personnel shall be made aware of proper disposal methods for welding rods, cigarette butts and other hot or burning material.• Conduct burning as conditions permit and do not burn when the fire hazard is high.• Smoke only on Enbridge property or the construction ROW in outdoor areas that are posted and approved by Enbridge.• Follow the fire suppression measures in the Fire Contingency Plan (to be included in the Project-specific EPP).• Follow the measures identified within the Emergency Response Plan in the event of an accidental fire. A copy of the Emergency Response Plan will be available in the Enbridge and Contractor construction offices for reference during construction.	<ul style="list-style-type: none">• Despite vigilance, fires may adversely affect adjacent vegetation and wildlife habitat, and may affect human health and public safety, or increase the demand on local emergency services.• Depending upon the size and location of the fire, the duration of the residual effect would vary from short to long-term, and is reversible. The magnitude of the residual effect is considered to be low to high depending on the location, size, and what it consumes. Since small fires within the Project footprint could be extinguished quickly, they are not likely to cause an adverse effect of high magnitude. Large fires that spread off the Project footprint and result in loss of a large amount of vegetation and wildlife habitat would be considered an adverse effect of high magnitude.• The residual effect is not likely to be significant.	<ul style="list-style-type: none">• See above

Element	Description of Interaction (Context)	Description of Potential Effects	Spatial Boundary	Mitigation to Resolve Potential Adverse Effects	Description of Residual Effects After Mitigation	Description of Cumulative Effects
Accidents and Malfunctions (cont'd)	<ul style="list-style-type: none"> Project activities around the existing Line 21 pipeline will be conducted to avoid potential damage, however, there is a rare possibility for an accident to occur during construction, leading to a leak or failure. The possibility of a leak or pipeline failure during operations is extremely low, given the level of ongoing monitoring that the pipeline is subject to. The potential for a failure is further reduced by the Project, since the replacement pipeline segment will be buried at a greater depth of cover, making it unlikely to interact with potential sources of external interference. 	<ul style="list-style-type: none"> A leak/pipeline failure may occur as a result of damage to the Line 21 pipeline during construction or as a result of damage to the pipeline during operations (e.g., external interference – human or natural). 	<ul style="list-style-type: none"> RSA 	<ul style="list-style-type: none"> Conduct construction activities in the vicinity of adjacent pipelines in compliance with all requirements of CSA Z662 and CER regulations for work close to an operating pipeline. Conduct all ground disturbance activities in accordance with Enbridge's ground disturbance policies. Properly train construction personnel in ground disturbance techniques. Implement measures in Enbridge's O&MM Book 7 for Emergency Response in the event of a pipeline failure, including Chapter 2 (Emergency Response Actions), Chapter 3 (Hazard-Specific Emergencies) and Chapter 4 (Containment, Recovery and Cleanup). 	<ul style="list-style-type: none"> A pipeline failure could adversely affect soil and soil productivity, surface water quality, groundwater quality, air quality, fish and fish habitat, vegetation, wildlife and wildlife habitat, species at risk, traditional land and resource use, human health, and infrastructure and services. Depending on the size of the leak and the environmental and socio-economic components that are impacted, the duration of the residual effect may be immediate to long-term and the magnitude may be low to high. The potential residual effects of a leak are reversible with the implementation of remedial measures. The residual effect is not likely to be significant. 	<ul style="list-style-type: none"> See above
Effects of the Environment on the Project	<ul style="list-style-type: none"> Refer to Section 5.2. 	<ul style="list-style-type: none"> Severe weather events (i.e., heavy or persistent precipitation, extreme temperatures, high winds, storms [lightning, ice], or wildfires) or natural hazards (e.g., landslides, earthquakes, flooding, permafrost melting) may: <ul style="list-style-type: none"> Delay the Project schedule Damage construction equipment Increase safety concerns for workers during construction Damage the operating pipeline 	<ul style="list-style-type: none"> Footprint 	<ul style="list-style-type: none"> Notify the Environmental Inspector in the event mitigation measures identified in the Project-specific EPP are ineffective at avoiding or reducing environmental effects or if alternative measures to address environmental issues are warranted due to site or weather conditions. Postpone work during severe weather events that may pose a hazard to safety and/or result in damage to Project infrastructure and equipment. Design and construct the pipeline in accordance with all applicable industry standards (e.g., CSA Z662). Conduct regular monitoring during O&M in accordance with regulatory requirements. 	<ul style="list-style-type: none"> With the implementation of mitigation measures, no residual effects are predicted for potential effects of the environment on the Project. 	<ul style="list-style-type: none"> N/A