



ENBRIDGE PIPELINES (NW) INC.

Closure and Reclamation Plan

Line 21 Planned Maintenance at KP 158 near Little Smith Creek

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1.0

Plain Language Summary

Enbridge Pipelines (NW) Inc. (Enbridge) is proposing to replace a segment of the Line 21 pipeline southeast of kilometre post (KP) 158 near Little Smith Creek in the Northwest Territories (NWT) (the Project).

This Closure and Reclamation Plan (the Plan) forms part of an application package prepared to satisfy the requirements of the Sahtú Land and Water Board (SLWB) for a Type A Land Use Permit (LUP) and Type B Water License. In conjunction with this Plan, Enbridge has prepared a Spill Contingency Plan, Waste Management Plan, and Environmental and Socio-Economic Assessment for the Project. A Project-specific Environmental Protection Plan (EPP) will be prepared prior to construction.

This Plan applies to the scope of activities considered in Enbridge's LUP and Water License applications (as described in **Section 3.4.5.1**) and has been prepared in accordance with the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (Mackenzie Valley Land and Water Board [MVLWB] and Aboriginal Affairs and Northern Development Canada [AANDC] 2013). It describes the planned closure and reclamation of the Project including reclamation measures to be implemented following construction; closure objectives and criteria; and ongoing post-construction monitoring to ensure the successful reclamation of the Project footprint to meet the Plan goal.

This Plan is preliminary and will be updated, as required, to reflect changes in construction planning, Project execution, and site-specific conditions.

2.0 Introduction and Background

Enbridge retained Dillon Consulting Limited to prepare this Plan in support of applications for a Type A LUP and Type B Water License to the SLWB.

Constructed in 1982, Line 21 (the Norman Wells Pipeline) carries crude oil from Norman Wells, NWT to Zama, Alberta over a distance of approximately 870 kilometres (km). At KP 158, the pipeline parallels a meander bend of Little Smith Creek, a tributary of the Mackenzie River. Enbridge has been actively monitoring slope instability in the area of the meander bend, which, over the years, has been encroaching onto the pipeline right-of-way (ROW). To protect the pipeline from the potential impacts of further slope movement and to support continued safe operation of the pipeline, Enbridge is proposing to replace a segment of the existing nominal pipe size (NPS) 12 pipeline at this location.

The Project involves the removal of an approximately 510-metre (m) segment of the existing NPS 12 pipeline and replacing it with a new, approximately 520-m NPS 12 pipeline segment at a greater depth of cover below the landslide impact zone. Enbridge is planning to install the new pipeline segment via horizontal directional drill (HDD) within the existing Enbridge ROW, and no new land rights are required for operation; however, some temporary workspace, located on privately-held Sahtú lands administered by the Tulita District Land Corporation, will be required to accommodate construction activities.

The Project will require upgrades to existing access roads, as well as the following temporary infrastructure.

- Construction camp and laydown yard (fuel and equipment storage)
- Potential barge landing (upgrades to an existing site on the Mackenzie River)
- Temporary workspace:
 - HDD work sites (entry and exit points, and false ROW for trenchless pipe drag section)
 - Pipeline stopple/tie-in locations

The Project is located in the Sahtú Region of the NWT (**NTS Map Sheet No. 096C**), approximately 80 km southeast of the hamlet of Tulita and approximately 140 km southeast of the Town of Norman Wells. The Project components are described in further detail in **Section 4.0** and **Section 5.2**.

The following sub-sections outline the purpose, scope and goal of this Plan and provide details on the closure and reclamation planning team, a summary of engagement efforts, and a summary of regulatory instruments (permits, authorizations, and agreements).

2.1 Purpose and Scope of the Plan

The purpose of this Plan is to:

- Meet the intent of the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013);
- Provide a description of the current baseline conditions of areas that will be disturbed as part of the Project and require a LUP and Water License;
- Establish closure objectives and criteria in alignment with the four core closure principles of (1) physical stability, (2) chemical stability, (3) no long-term active care requirements, and (4) future use; and,
- Provide a schedule of reclamation activities and post-construction monitoring activities.

This Plan applies to the Project activities/components subject to SLWB permitting, as described in **Section 4.0**. This version of the Plan is preliminary and will be updated, as required, to reflect changes in construction planning, Project execution, and site-specific conditions.

2.2 Goal of the Plan

In accordance with the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013), the goal of the Plan is to describe how the areas disturbed by the Project will be returned to a natural and self-sustaining ecosystem that is compatible with a healthy environment and human activities.

2.3 Closure and Reclamation Planning Team

The organization of the Closure and Reclamation Planning (CRP) Team is presented in **Figure 1**. The CRP Team is led by the Enbridge Project Manager, who has the ultimate responsibility for the Project and the reclamation of the Project areas, manages the Project budget, and approves remedial action plans, as required.

The Construction Manager reports directly to the Project Manager and oversees the Construction Contractor when construction activities are occurring on site. The Construction Manager is responsible for managing the execution of remedial action plans, as required.

The Environmental Inspector works directly with the Construction Manager and reports to the Enbridge Senior Environmental Advisor on the status of the Project. The Environmental Inspector works with the Construction Manager to ensure all Project personnel are aware of all environmental conditions, commitments and guidelines for the Project and that the Project is executed in compliance with the EPP and all applicable regulatory permits and approvals.

The Enbridge Senior Environmental Advisor is responsible for overseeing the Post-Construction Environmental Monitoring (PCEM) Program, which includes the implementation of this Plan and the

development of remedial action plans to address any outstanding environmental issues. The Enbridge Senior Environmental Advisor is responsible for overseeing the Environmental Consultant, who is contracted to complete the PCEM Program.

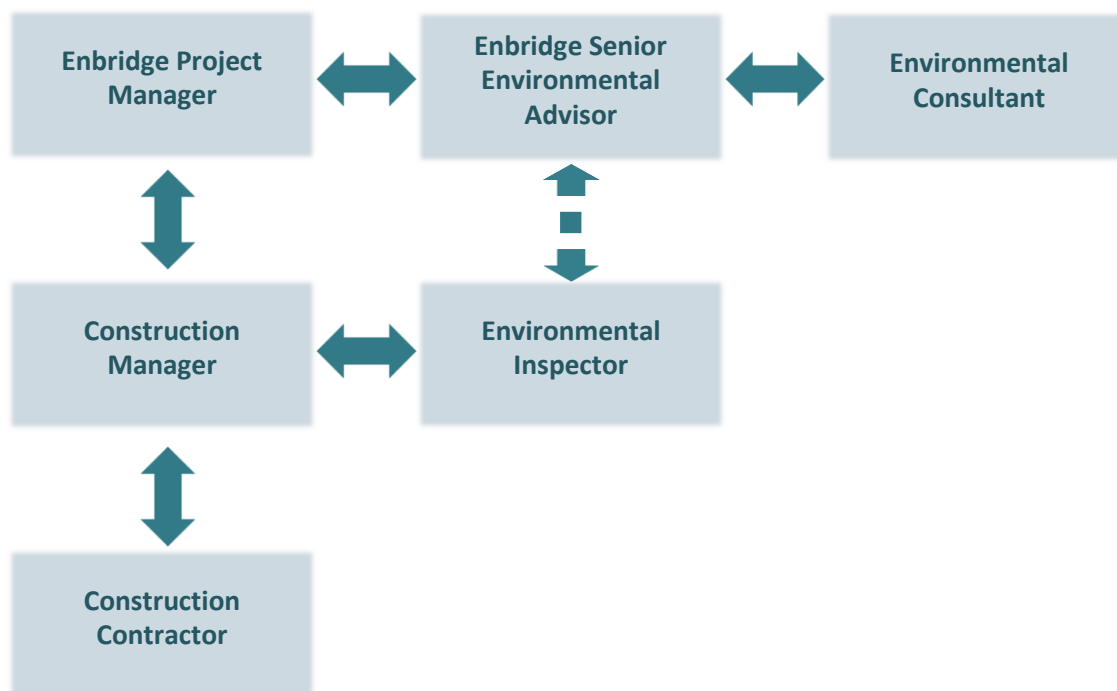


Figure 1: CRP Team Organization

2.4 Engagement

Enbridge continues to adhere to regulatory, corporate, and stakeholder engagement and consultation guidelines; and continues to assess best practices related to engagement and consultation. Enbridge is familiar with the engagement and consultation requirements outlined by both the MVLWB and the Canada Energy Regulator, as a result of recent segment replacement work in the Deh Cho Region of the NWT.

2.5 Regulatory Instruments for Closure and Reclamation

A summary of permits, authorizations, and agreements required for closure and reclamation of the Project is provided in **Table 1**.

Table 1: Permits, Authorizations, and Agreements for Project Closure and Reclamation

Permit, Authorization, or Agreement	Date of Expiry	Contact Information	Requirement(s)	Section(s) of Plan
Type A Land Use Permit (Permit # TBD) from SLWB	TBD	TBD	Financial Security	10.0
			Restoration of Disturbed Lands	5.0
Type B Water License (Permit # TBD) from SLWB	TBD	TBD	Project Description	4.0
			Closure Goals, Objectives and Criteria	5.0
			Community Engagement	2.4
			Sites Affected by Spills/Discharges	N/A
			Sites Affected by Permafrost Degradation	3.2
			Requirements for Closure and Reclamation	5.0
			Implementation Schedule	8.0
			Project Maps	Figure 2

3.0 Project Environment

The Project environment is described in terms of Atmospheric Environment, Physical (Terrestrial) Environment, Chemical Environment, and Biological Environment in accordance with the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013).

Further detail on the environmental setting of the Project can be found in the Environmental and Socio-Economic Assessment submitted to the SLWB as part of the LUP and Water License applications for the Project.

3.1 Atmospheric Environment

The Project is located in the Taiga Cordillera Low Subarctic Ecoregion where the climate is characterized by short, cool summers (June-August) and long, very cold winters (Ecosystem Classification Group 2010).

Table 2 provides data from the nearest meteorological station to the Project area, the Environment and Climate Change Canada (ECCC) Norman Wells station, located approximately 135 km northwest of the Project footprint. The values in **Table 2** represent averages of data collected over a 30-year period from 1981 to 2010.

Table 2: Summary of Meteorological Data for Project Area

Meteorological Parameter	Value (Annual Average)
Daily Average Temperature (°C)	-5.1
Daily Maximum Temperature (°C)	-0.4
Daily Minimum Temperature (°C)	-9.9
Rainfall (mm)	171.7
Snowfall (cm)	161.5
Average Snow Depth (cm)	12
Wind Speed (km/h) and Most Frequent Direction	10.1, SE
Average Date of Last Spring Frost	May 23
Average Date of First Fall Frost	September 7

Source: ECCC 2019a

The GNWT operates four ambient air quality monitoring stations located in Fort Smith, Inuvik, Norman Wells, and Yellowknife (GNWT 2019a). The Norman Wells station is the closest to the Project footprint.

Table 3 provides a summary of NWT Air Quality Standards and typical readings.

Table 3: NWT Air Quality Standards and Typical Readings

Pollutant	Typical NWT Reading	Air Quality Standard		
		1-Hour	8-Hour	24-Hour
Sulphur dioxide (SO ₂)	0-5 ppb	172 ppb	--	57 ppb
Hydrogen sulphide (H ₂ S)	0-2 ppb	10 ppb	--	3 ppb
Ozone (O ₃)	10-40 ppb	--	63 ppb	--
Nitrogen dioxide (NO ₂)	0-10 ppb	213 ppb	--	106 ppb
Carbon monoxide (CO)	0-0.2 ppm	13 ppm	5 ppm	--
Fine particulate matter (PM _{2.5})	0-10 µg/m ³	--	--	28 µg/m ³
Particulate matter (PM ₁₀)	0-15 µg/m ³	--	--	50 µg/m ³

Source: GNWT 2019a

Notes: ppb = parts per billion; ppm = parts per million; µg/m³ = micrograms per cubic metre

Table 4 provides the average 24-hour air quality readings from the Norman Wells station measured over a recent 1-year period (December 2018 to December 2019).

Table 4: Average 24-Hour Air Quality Readings from the NWT Norman Wells Air Quality Monitoring Station (December 2018-December 2019)

Pollutant	Average 24-Hour Reading	24-Hour Air Quality Standard
Sulphur dioxide (SO ₂)	2.2 ppb	57 ppb
Hydrogen sulphide (H ₂ S) ¹	--	3 ppb
Ozone (O ₃)	26.3 ppb	--
Nitrogen dioxide (NO ₂)	1.5 ppb	106 ppb
Carbon monoxide (CO) ¹	--	--
Fine particulate matter (PM _{2.5})	5.1 µg/m ³	28 µg/m ³
Particulate matter (PM ₁₀)	16.8 µg/m ³	50 µg/m ³

Source: GNWT 2019a

Note: 1 H₂S and CO are not monitored at the Norman Wells station.

The annual average 24-hour readings from the Norman Wells station are generally within the typical readings for the NWT and well within the 24-hour air quality standards. The Project will have a negligible contribution to air pollutants and is not anticipated to result in a noticeable reduction in local air quality (refer to the Project Environmental and Socio-Economic assessment).

3.2 Physical (Terrestrial) Environment

The Project is located in the Taiga Cordillera Low Subarctic Ecoregion of the NWT and, specifically, within the Central Mackenzie Plain Low Subarctic Boreal Ecoregion, which occurs between the Mackenzie Foothills and the Franklin Mountains (Ecosystem Classification Group 2010).

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The Project footprint is underlain by Cretaceous-aged shales and sandstones. Fine-textured lacustrine and till deposits occur along the Mackenzie River, with Continental till deposits common on higher terrain (Ecological Classification Group 2010). The terrain in the Central Mackenzie Plain Low Subarctic Boreal Ecoregion is mainly level to gently sloping and slopes are marked by regularly spaced erosion gullies (Ecosystem Classification Group 2010).

The Project footprint encounters Brunisolic soils associated with glaciofluvial and older alluvial and till deposits and Regosols associated with newly deposited alluvium (Ecosystem Classification Group 2010).

The Line 21 pipeline ROW at the Project site (near KP 158) is on a terrace above ox-bows formed by a meandering of Little Smith Creek (Wood Environment and Infrastructure Solutions [Wood] 2018). The existing pipe segment that will be removed via open cut trenching is situated approximately 12 m from the edge of the slope failure at the meander bend of Little Smith Creek. The elevation along the proposed HDD alignment ranges from approximately 85 m above sea level (asl) to 100 m asl. The topography along the existing ROW and at the temporary infrastructure sites is generally level.

The Project is an area generally characterized as having extensive and discontinuous permafrost with low to moderate ice content and sparse ice wedges (Natural Resources Canada 1995, 2009). There is permafrost present within the existing Line 21 pipeline ROW around KP 158, which will be encountered by the HDD during pipeline construction (Wood 2018). There is evidence that the permafrost in the ROW around KP 158 is thawing; the permafrost thaw depth has increased by 2 m over the past 8 years (Wood 2018).

The Project is in an area classified as having a moderate to high seismic hazard (Natural Resources Canada 2015). The nearest earthquake to occur over the last year occurred approximately 80 km southwest of the Project footprint on October 12, 2019 and was magnitude 3.9 (Natural Resources Canada 2019).

3.3 Chemical Environment

Chemical environment information is not provided here, as the requirements in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013) are specific to mining sites.

3.4 Biological Environment

The following subsections provide an overview of the biological environment in the Project area including vegetation, wetlands, fish and fish habitat, wildlife and wildlife habitat, and species at risk or species of special status. The information is based on desktop reviews and field investigations conducted for the Project.

More information on the biological environment, including detailed results of field investigations, is provided in the Environmental and Socio-Economic Assessment and associated appendices.

3.4.1 Vegetation

Large wildfires have burned over most of the Central Mackenzie Plain Low Subarctic Boreal Ecoregion over the last two decades and large tracts of forest are regenerating to shrubby and deciduous communities (Ecosystem Classification Group 2010).

Vegetation field surveys were conducted along the Project footprint in October 2018 and July 2019. A total of 163 vascular plant species and 21 nonvascular plant species (i.e., mosses and lichens) were identified within 30 m of the Project footprint. Several alien species and three invasive species (i.e., Smooth Brome, White Sweet-clover, and Yellow Sweet-clover) were observed, primarily along the existing ROW, the winter road, and in the clearing around the Enbridge operations base.

Several vegetation community types were observed and classified during the October 2018 site visit: treed fen, riparian, floodplain, upland coniferous forest, and young mixed-wood forest. A summary of ecological communities and dominant vegetation observed during the October 2018 and July 2019 field surveys is provided in Appendix B (Supplemental Environmental Studies Report) of the Environmental and Socio-Economic Assessment.

3.4.2 Wetlands

There are no naturally-occurring wetlands located within 30 m of the Project footprint, therefore, baseline information on wetlands is not warranted.

3.4.3 Fish and Fish Habitat

The HDD alignment for the new pipeline is located adjacent to Little Smith Creek (approx. 75 m set-back) and the potential barge landing site that may be constructed is approximately 250 m upstream of the mouth of Little Smith Creek, on the east bank of the Mackenzie River.

Little Smith Creek or the Mackenzie River may be utilized for water withdrawal for hydrovac and HDD activities, which would occur in the winter within the restricted activity timing window (August 15 to July 15) for the protection of fish and fish habitat (DFO 2013).

No historical records for fish species presence within Little Smith Creek were found during the desktop assessment; however, fish communities within the Mackenzie River are well-documented. The desktop review and site assessments conducted in 2018 and 2019 did not identify barriers to fish passage between the Mackenzie River and the area of slope instability along Little Smith Creek.

Fish species with recorded occurrences in the Mackenzie River include the following (Sahtú Renewable Resources Board 2019, COSEWIC 2012):

- Bull Trout (*Salvelinus confluentus*)
- Northern Pike (*Esox lucius*);
- Arctic Grayling (*Thymallus arcticus*);
- Burbot (*Lota lota*);
- Whitefish species (*Coregonus* sp.);
- Longnose Sucker (*Catostomus catostomus*);
- Lake Chub (*Couesius plumbeus*);
- Sucker species (*Catostomus* sp.);
- Walleye (*Sander vitreus*);
- Inconnu (*Stenodus nelma*);
- Cisco species (*Coregonus* sp.);
- Goldeye (*Hiodon alosoides*); and,
- Whitefish species (*Prosopium* sp.).

A preliminary fish habitat assessment was conducted October 15-18, 2018 and a supplemental assessment was conducted September 5-6, 2019. The assessments were conducted within a 900 m reach of Little Smith Creek near the area of slope instability and the supplemental assessment included the mouth of Little Smith Creek at the Mackenzie River.

A total of seven fish species were captured in Little Smith Creek (including the mouth of Little Smith Creek at the Mackenzie River) during the field investigations conducted for the Project, including Bull Trout, Slimy Sculpin (*Cottus cognatus*), Longnose Sucker, Arctic Grayling, Burbot, Spoonhead Sculpin (*Cottus ricei*), and Northern Pike.

The areas assessed during the site visits (i.e., 900 m reach of Little Smith Creek and the mouth of Little Smith Creek) provide moderate spawning and rearing potential, as well as overwintering habitat for a number of fish species.

3.4.4 Wildlife and Wildlife Habitat

The Project is in the Central Mackenzie Plain Low Subarctic Boreal Ecoregion, which provides favourable habitat for a large number of wildlife species, particularly along the flood-enriched shorelines of the Mackenzie River (Ecosystem Classification Group 2010). Mammals characteristic of the Ecoregion include the Woodland Caribou (*Rangifer tarandus caribou*), Muskoxen (*Ovibos moschatus*), Moose (*Alces alces*), Grizzly Bear (*Ursus arctos horribilis*), Black Bear (*Ursus americanus*), Canadian Lynx (*Lynx canadensis*), and Red Fox (*Vulpes vulpes*). Characteristic birds of the Ecoregion include, but are not limited to, the Gyrfalcon (*Falco rusticolus*), Willow Ptarmigan (*Lagopus lagopus*), Common Raven (*Corvus corax*), and many species of waterfowl (Kershwa 2005).

The Project is located within the boundaries of the Middle Mackenzie River Islands Important Bird Area (IBA). The IBA is considered Globally Significant for Congregatory Species and Waterfowl Concentrations. It serves as a stopover for a wide variety of waterfowl during spring migration including, but not limited to, Snow Goose, Greater White-fronted Goose, Canada Goose, and Tundra Swans, as well as many duck species (Bird Studies Canada 2019).

The Project is not located within any Territorial conservation areas or established/candidate protected areas (GNWT 2019b), National Wildlife Areas (Government of Canada 2019a), Migratory Bird Sanctuaries (Government of Canada 2017), Western Hemisphere Shorebird Reserves (Western Hemisphere Shorebird Reserve Network 2019), or Ramsar wetlands (The Ramsar Convention Secretariat 2014).

Wildlife and wildlife habitat field assessments were conducted October 14-17, 2018 and July 23-24, 2019 along the Project footprint. The field assessments included: bird surveys (auditory and visual); incidental wildlife observations, including animal occurrences (bird, mammal, amphibian, insects, etc.), tracks, scat, wildlife use, dens, and bird nesting structures; and, identification of sensitive species and habitat (i.e., listed under federal or territorial legislation as endangered, threatened, or of special concern), including snag and cavity tree habitat, landforms, forest structure, and diversity of habitat.

Based on observations made during the field assessments, the habitat within and around the Project footprint is typical of the boreal forest, providing moderately dense stands of small black spruce with abundant understory. There are many small wetlands (more than 100 m from the Project footprint) that provide adequate breeding grounds for insects and wetland birds, and the riparian zone around Little Smith Creek provides larger trees, which may house raptor nests and a different vegetation community from the surrounding spruce forests. A few wildlife trees with woodpecker sign were observed in the study area, including some cavities created by nesting woodpeckers. The access road from the potential barge landing site and the pipeline ROW provide distinct edge habitat. The area around the proposed camp site/laydown area is disturbed and generally degraded with few trees and limited ground cover.

A total of 9 mammal species and/or signs thereof were observed during the field assessments: Black Bear, Moose, Beaver (*Castor canadensis*), Red Squirrel (*Tamiasciurus hudsonicus*), Snowshoe Hare (*Lepus americanus*), Gray Wolf (*Canis lupus*), Red Fox, North American Porcupine (*Erethizon dorsatum*), and Weasel species (*Mustela* sp.). Wood Frog (*Lithobates sylvaticus*) was the only amphibian species observed. Signs of Ptarmigan species (*Lagopus* sp.) and Pileated Woodpecker (*Dryocopus pileatus*) were also observed. The species observed are considered common within boreal forests and disturbed habitats in the Ecoregion. Most of the wildlife sign was observed along the ROW, access roads, and Little Smith Creek stream bed, which are likely important movement corridors for mammals.

There were 23 species of birds observed during the bird surveys and incidentally during the field assessments. In addition, the tracks of 3 bird species (Spotted Sandpiper [*Actitis macularius*], an unidentified Gull, and one unidentified bird species) were observed within gravel bars in Little Smith Creek. The majority of the incidental bird observations occurred along Little Smith Creek. There were 4 raptor pellets found on and near the winter road bridge over Little Smith Creek, indicating that this is a common perch and may be a popular hunting location for birds of prey.

The Project is located in migratory bird nesting zone B8, where nesting has the potential to occur from May 4 to August 22, with the highest percentage (61%-100%) of species to be actively nesting between May 29 and July 26 (ECCC 2018).

3.4.5 Species at Risk or Species of Special Status

Table 5 provides the results of a desktop screening to identify species at risk or species of special status with the potential to occur within the Project area on a seasonal or year-round basis.

Table 5: Species at Risk or Species of Special Status with Potential to Occur in Project Area

Common Name	Scientific Name	NWT Status ^{1,2}	SARA Status ^{1,3}	Potential to Occur	Rationale ⁴
Mammals					
Woodland Caribou	<i>Rangifer tarandus</i>	THR	THR	High	The species' habitat is present throughout the Project study area, as indicated by the presence of terrestrial and arboreal lichens, and old-growth forest habitat in proximity to rivers and creeks. Woodland Caribou are reported to likely overwinter throughout the Sahtú Region.
Grizzly Bear	<i>Ursus arctos</i>	UC	UC	Medium	Likely seasonal use in low densities; no denning habitat observed.
Wolverine	<i>Gulo gulo</i>	N/A	UC	High	The species' range and habitat requirements are found throughout the Project study area, as indicated by forest habitat, and adequate year-round food supply. No denning sites observed.
Birds					
Bank Swallow	<i>Riparia riparia</i>	N/A	THR	Low	The Project study area is within the species' range and potential nesting habitat can be found along the Little Smith Creek riparian corridor where there are steeper, exposed banks. No old nesting sites observed.
Barn Swallow	<i>Hirundo rustica</i>	N/A	THR	Low	The Project study area is within the species' range and potential nesting habitat can be found at the Enbridge operations facility near KP 160, as barn swallows are known to nest in man-made features such as buildings. Potential nesting habitat is also present along the Little Smith Creek riparian corridor in vegetation and natural features.
Common Nighthawk	<i>Chordeiles minor</i>	N/A	THR	High	The species' range and nesting habitat requirements are found throughout the Project study area, including forest clearings, sandy areas, and creek banks.
Harris' Sparrow	<i>Zonotrichia querula</i>	N/A	UC	Low	The species' range overlaps with the Project study area; however, use is likely seasonal as nesting typically occurs in tundra habitat.

Common Name	Scientific Name	NWT Status ^{1,2}	SARA Status ^{1,3}	Potential to Occur	Rationale ⁴
Horned Grebe	<i>Podiceps auritus</i>	N/A	SPC	Low	The species' range and nesting habitat requirements are typical throughout the Taiga Cordillera Ecoregion (i.e., shallow freshwater ponds and marshes); however, specific microsite requirements (i.e., emergent vegetation and wetland areas critical for cover during nesting) is lacking in the Project study area.
Olive-Sided Flycatcher	<i>Contopus cooperi</i>	N/A	THR	High	Likely seasonal use during the breeding season only; nesting habitat found in trees/snags along the ROW and open areas.
Rusty Blackbird	<i>Euphagus carolinus</i>	N/A	SPC	Low	Likely seasonal use during the breeding season only; nesting habitat in wetlands, typically.
Short-Eared Owl	<i>Asio flammeus</i>	N/A	SPC	Low	The species is typically found in open grasslands, prairies, and tundra, and may opportunistically use or occupy the Project study area for hunting or summer roost; however, the likelihood of breeding in the Project study area is low.
Fish					
Bull Trout	<i>Salvelinus confluentus</i>	N/A	SPC	Medium	Found throughout the Sahtú Region, typically in tributaries west of the Mackenzie River; however, suitable habitat for resident populations, and fluvial habitat (overwintering, rearing, and spawning) is present within the Project study area.

Notes:

- 1 THR = Threatened; SPC = Special Concern; UC = Under Consideration; N/A = Not Applicable
- 2 Refers to legal status under the Species at Risk (NWT) Act (SNWT 2009, c. 16).
- 3 Refers to legal status under Schedule 1 of SARA (SC 2002, c. 29).
- 4 Rationale is based on the GNWT Guide to Species at Risk in the NWT (2018).

3.4.5.1

Vegetation Species

No rare plants or plant species listed on Schedule 1 of the *Species at Risk Act (SARA)* (SC 2002, c. 29) or the *Species at Risk (NWT) Act* (SNWT 2009, c. 16) were observed during the vegetation field surveys conducted for the Project.

There is a moderate potential for rare plant habitat to exist in the riparian areas of Little Smith Creek, and among groundwater and meltwater seepages on the Little Smith Creek valley slope. These areas are outside the Project footprint and no Project interaction is anticipated.

3.4.5.2

Fish Species

The Project is not located within critical habitat for aquatic species at risk (DFO 2019).

Bull Trout, listed as Special Concern on Schedule 1 of *SARA* (SC 2002, c. 29), were captured at the mouth of Little Smith Creek during the supplemental field assessment. No spawning Bull Trout or Bull Trout spawning redds were observed; however, suitable spawning and rearing habitat was observed in the lower reaches of Little Smith Creek (approximately 100 m upstream of the mouth of Little Smith Creek).

No other aquatic species at risk or species of special status are known to occur in Little Smith Creek or the Mackenzie River in the Project area.

3.4.5.3

Wildlife Species

No wildlife species listed on Schedule 1 of *SARA* (SC 2002, c. 29) or the *Species at Risk (NWT) Act* (SNWT 2009, c. 16) were observed during the wildlife field assessments conducted for the Project. However, many birds observed within the Project area are protected under the *Migratory Birds Convention Act, 1994* (SC 1994, c. 22) such as the Alder Flycatcher (*Empidonax alnorum*), Hermit Thrush (*Catharus guttatus*), Pine Siskin (*Spinus pinus*), and Spotted Sandpiper.

The Project is located within Boreal Woodland Caribou Range (NWT Range, NT1; ECCC 2019b). The Boreal population of Woodland Caribou is listed as Threatened on Schedule 1 of *SARA* (SC 2002, c. 29) and on the NWT List of Species at Risk (Government of Canada 2019b, GNWT 2019c). Boreal Woodland Caribou habitat is present throughout the Project area, as indicated by the presence of terrestrial and arboreal lichens, and old-growth forest habitat in proximity to rivers and creeks. Woodland Caribou are reported to likely overwinter throughout the Sahtú Region. The integrated risk assessment for the Boreal population of Woodland Caribou in NWT (NT1) determined that local populations of Woodland Caribou are likely self-sustaining (ECCC 2019b).

4.0 Project Description

4.1 Location and Access

The Project is located in the Sahtú Region of the NWT, approximately 80 km southeast of the hamlet of Tulita and approximately 140 km southeast of the Town of Norman Wells (see **Figure 2**).

The Project is located in a remote area that is currently only accessible over land by a winter road that is typically in service from December to early April. The Project area can be accessed in the summer months by barging on the Mackenzie River.

4.2 Site History

Construction of the Line 21 pipeline occurred from 1982 to 1985. The Project uses Enbridge's existing permanent easement and previous workspace to the extent possible. In particular, the camp and laydown yard are situated in a disturbed area that was previously used as a construction camp and is adjacent to existing disturbances including the winter road, an inactive airstrip, gravel pit, and Enbridge operations facility. Minimal new clearing is required for Project activities.

4.3 Site Geology

Site geology information is not provided here, as the requirements in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013) are specific to mining sites.

Wood (2018) prepared a report on hydrotechnical and geotechnical conditions and potential remedial options for the Line 21 pipeline at the slope failure location along the meander bend of Little Smith Creek near KP 158. Geotechnical investigations were completed for detailed engineering to determine the feasibility and optimal design of the HDD installation.

4.4 Project Summary

The Project will require upgrades to existing access roads, as well as the following temporary infrastructure:

- Construction camp and laydown yard (fuel and equipment storage);
- Potential barge landing (upgrades to an existing site on the Mackenzie River); and
- Temporary workspace:
 - HDD work sites (entry and exit points, and false ROW for trenchless pipe drag section); and
 - Pipeline stopple/tie-in locations.

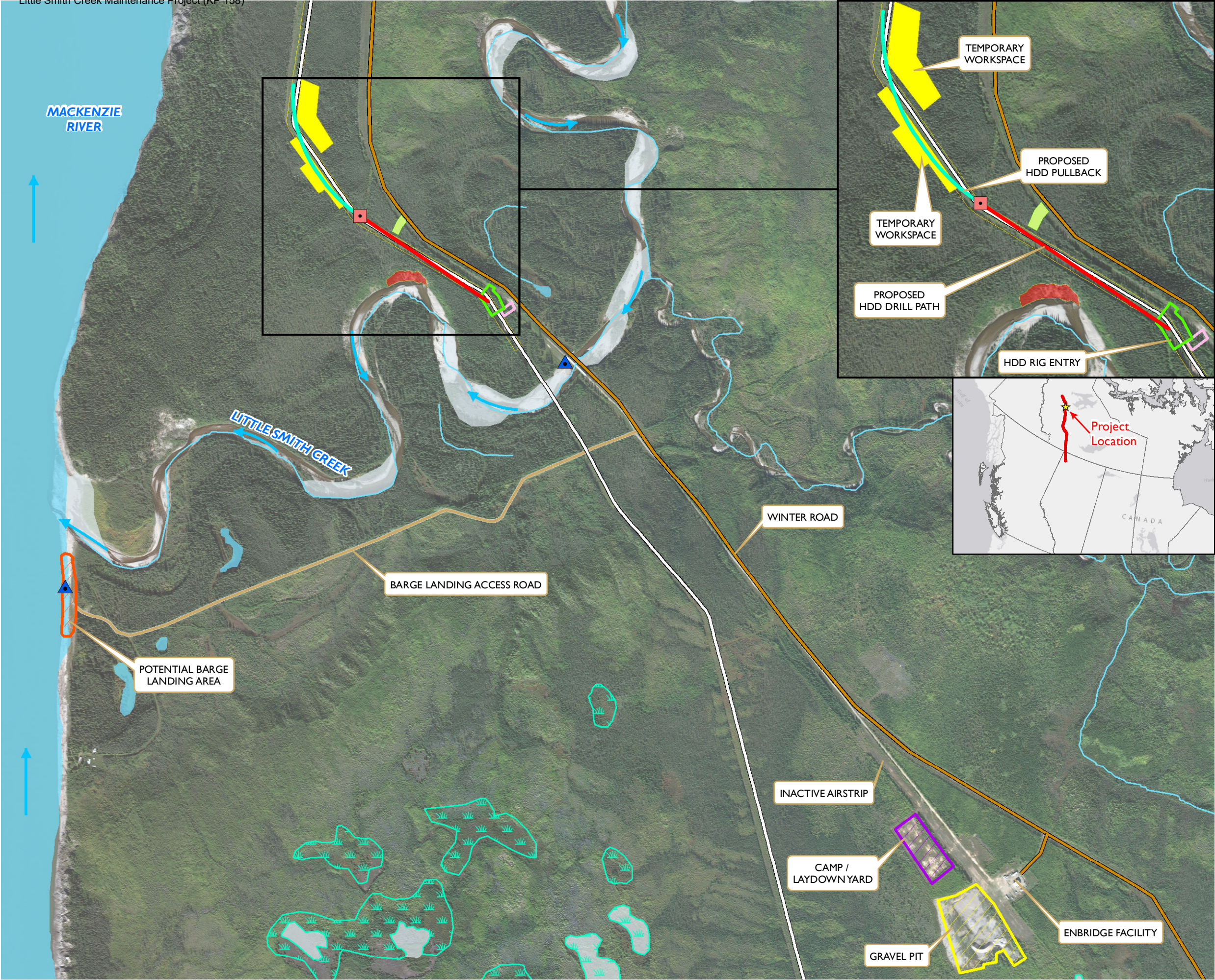
Further details on the Project components are provided in **Section 5.2**.

The general activities associated with construction of the Project are described in **Table 6**.

Table 6: Project Construction Activities

Construction Stage	Associated Activities
Engineering	The new pipeline segment will be designed and constructed in accordance with all applicable industry standards (e.g., Canadian Standards Association [CSA] Z662) and the <i>NEB Onshore Pipeline Regulations</i> (SOR/99-294), as well as federal, territorial, and regional requirements, and conditions of permits or authorizations.
Surveying	The boundaries of the proposed construction workspaces (e.g., temporary workspace, bell holes, etc.) will be flagged and staked, as required. Areas to be avoided will also be flagged.
Clearing and vegetation removal	Vegetation (i.e., trees, stumps, brush, and other vegetation) and/or snow will be cleared from the temporary workspaces, camp site, laydown area, and access roads, as needed, to facilitate construction activities. Any salvaged trees will be stockpiled and given to the local community. Non-salvageable vegetative material will be disposed of through burning, to be conducted at the existing gravel pit adjacent to the camp site location. A burn permit will be acquired from the Sahtú Regional Office of the Department of Environment and Natural Resources if burning is conducted during the closed season (May 1 to September 30).
Strippings salvage	The surface organics layer of the soil (strippings) will be salvaged where excavation is required (e.g., HDD drill entry and exit, stopple, and tie-in locations, trench for pipeline removal).
Grading/site preparation	Grading will be conducted on slopes and irregular ground surfaces and may be required for preparation of the potential barge landing site, temporary workspaces, and access roads in order to provide a safe work surface. The camp site and laydown area are already level and do not require grading.
Excavating	Bell holes will be excavated at the HDD drill entry and exit sites and stopple/pipeline tie-in locations to facilitate the construction of the new pipeline segment, as well as to plug the existing pipeline segment prior to removal and tie the new pipeline segment into the existing pipeline. The trench line will also be excavated over the existing pipe segment to facilitate pipe removal.
New pipeline installation and existing pipeline removal	The new pipeline segment will be transported by truck to the HDD entry site and will be lined up, welded, joint-coated, and inspected prior to being installed. The existing pipe segment will be drained to onsite tankage prior to installation of the new pipe segment. Once the new pipe is installed and commissioned, oil will be reinjected into the new pipe. The existing pipe will be removed via open cut trenching. The trench may be backfilled with HDD/hydrovac slurry and additional HDD/hydrovac slurry material will be mixed and buried in a previously disturbed area like the gravel pit area, if both options are permitted. The removed pipe segment will be disposed of at an approved facility in Alberta.
Backfilling	Excavations/bell holes will be backfilled using native spoil material.

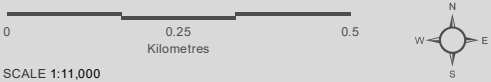
Construction Stage	Associated Activities
Testing	The new pipeline segment will be hydrostatically pressure-tested using a rental fluid comprised of a 50/50 mix of water and glycol. Testing will adhere to relevant territorial and federal regulations. The test fluid will be trucked in and out of the construction site and will not be discharged to the environment.
Waste disposal	Waste disposal will occur throughout construction as part of general maintenance activities. Construction wastes typically include scrap materials, welding rods, used lubricants, and domestic garbage. The Contractor will dispose of all waste materials in accordance with the Project's Waste Management Plan.
Clean-up and reclamation	During clean-up, preconstruction contours will be re-established and salvaged strippings will be replaced. Matting will be removed from access roads and temporary workspaces and these areas will be de-compacted, where necessary. Disturbed areas will be left to naturally revegetate.



ENBRIDGE PIPELINES (NW) INC.
LINE 21 PLANNED MAINTENANCE AT KP 158 NEAR LITTLE SMITH CREEK

PROJECT OVERVIEW
FIGURE 2

- Potential Water Withdrawal Location
- HDD Exit
- Existing Line 21 Pipeline
- Winter Road
- Barge Landing Access Road
- Watercourse
- Flow Direction
- Wetland
- Permanent Waterbody
- Intermittent Waterbody
- Slope Failure
- Proposed HDD Drill Path
- Proposed HDD Pullback
- Potential Barge Landing Area
- Camp / Laydown Yard
- HDD Rig Entry
- Temporary North Access
- Gravel Pit
- Temporary South Access
- Temporary Workspace
- Existing Line 21 ROW



MAP DRAWING INFORMATION:
DATA PROVIDED BY ESRI, ENBRIDGE, CANVEC

MAP CREATED BY: LK
MAP CHECKED BY: AL
MAP PROJECTION: NAD 1983 UTM Zone 10N



PROJECT: 18-8582
STATUS: FINAL
DATE: 2020-02-27

5.0 Permanent Closure and Reclamation

This section details Enbridge's plans for the permanent closure and reclamation of the Project.

5.1 Definition of Permanent Closure and Reclamation

In the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013), permanent closure and reclamation is defined as follows:

Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining.

In the context of the Project, it can be interpreted that permanent closure of the Project means that Enbridge has no intentions of conducting further activities at the site, aside from routine operations and maintenance monitoring and potential remedial actions (when and where required).

5.2 Permanent Closure and Reclamation Requirements

Permanent closure and reclamation requirements are described in the following subsections for the Project components listed in **Section 4.4**, including:

- Construction camp and laydown yard;
- Potential barge landing;
- Existing access roads; and,
- Temporary workspace.

5.2.1 Project Component Descriptions

5.2.1.1 Camp and Laydown Yard

The proposed camp site and laydown yard are located on a previously cleared area that has been used in the past for similar purposes. Together, the camp (1.50 ha) and laydown area (3.82 ha) measures approximately 5.32 ha. Site preparation will include minor grubbing and clearing and will be conducted in the summer, following the construction of the potential barge landing. The camp and laydown area are adjacent to an inactive airstrip, as well as an existing Enbridge operations facility and gravel pit (see **Figure 2**). A portion of the airstrip will be used for access from the winter road to the camp/laydown area. The gravel pit may be used for mix-bury-cover sumps for hydrovac slurry and HDD drilling waste. The plan, pending approval, is to use the hydrovac slurry and HDD drilling waste as backfill for the existing pipeline trench after removal of the existing pipeline segment. Any remaining slurry may be disposed via mix-bury-cover at the gravel pit, if permitted by the SLWB, and pending the results of

substrate testing, which will occur during camp set-up. The gravel pit may also be used as a location for burning of non-salvageable vegetative material from clearing.

5.2.1.2 Potential Barge Landing

An existing barge landing site on the Mackenzie River, located approximately 250 m upstream of the mouth of Little Smith Creek (see **Figure 2**), may be upgraded/repared so that it can be used to mobilize equipment to the work sites in the summer, prior to the winter construction season. In order to utilize the barge landing site, some slope modifications will be required on the bank of the Mackenzie River. It is possible that the barge landing site may require instream works, including installation of a dead man and placement of fill; however, Enbridge is planning to avoid work below the high-water mark. All slope modifications will be temporary and the bank of the river will be returned to its pre-construction condition when construction and final clean-up are complete. Should in-stream work be required at the potential barge landing, Enbridge will attempt to conduct the work outside of the restricted activity timing window (August 15 to July 15) for the protection of fish and fish habitat (DFO 2013). If required, Enbridge will obtain all necessary permits/authorizations from DFO and Transport Canada prior to conducting work at the potential barge landing site.

5.2.1.3 Existing Access Roads

An existing access road, approximately 3.5 km in length, will be used to transport equipment/materials from the potential barge landing site to the proposed camp site and laydown area. The margins of the road will require minor clearing/brushing (approximately 2 m on each side).

An existing winter road will be used to access the ROW from the camp site/laydown area and is in good condition from the camp area up to the existing bridge over Little Smith Creek. The bridge is in good condition and requires no improvements. The winter road to the ROW, after the bridge crossing, is in poor condition and should only be used in the winter due to springs and soft ground conditions.

All access routes for the Project will be frozen-in except for a few low-lying areas where matting may be used.

5.2.1.4 Temporary Workspace

Some temporary workspace, outside of the existing Enbridge ROW, will be required at the HDD work sites (drill entry and exit, and pull-back area for pipeline drag section) and the stopple/tie-in locations (see **Figure 2**). Workspace off the ROW will require clearing/grubbing, however, no merchantable timber is expected to be salvaged. The HDD entry site will require approximately 0.34 ha of land, of which, 0.16 ha is outside of the existing ROW. The pipe pull-back area will require an area of approximately 0.5 ha, with 0.05 ha required for corner pull-back. Two temporary access trails will also be cleared from the winter road to the HDD work sites and stopple/tie-in locations (north and south) on the ROW. Access to the north stopple/tie-in location will require approximately 0.12 ha of land and access to the south stopple/tie-in location will require approximately 0.09 ha.

5.2.2 Pre-Disturbance, Existing, and Final Site Conditions

A description of the pre-disturbance, existing, and final site conditions for the Project components described in **Section 5.2.1** is provided in **Table 7**, below. Representative photo plates are provided following the table.

5.0 Permanent Closure and Reclamation 23

Table 7: Description of Pre-Disturbance, Existing, and Final Site Conditions

Project Component	Site Condition		
	Pre-Disturbance	Existing	Final
Camp and Laydown Yard	It is assumed that the pre-disturbance condition of the camp site and laydown yard would have been similar to the current setting of the surrounding area. The vegetation surrounding the camp site and laydown yard is comprised of young mixedwood forest dominated by Balsam Poplar, Jack Pine, White Birch, White Spruce, Buffalo Berry, Green Alder, Prickly Rose, Common Bearberry, and Twinflower (see Photo 1).	The existing condition of the camp site and laydown yard is disturbed poorly vegetated land surrounded by young mixedwood forest (see Photo 2). There is bare land with some small regenerating trees and shrubs on the site and several alien species and three invasive species (i.e., Smooth Brome, White Sweet-clover, and Yellow Sweet-clover) are present around the site.	Final site condition (i.e., after post-construction reclamation and the completion of the PCEM Program) is planned to be the equivalent of the existing site condition, with woody vegetation being allowed to fully develop.
Potential Barge Landing	It is assumed that the pre-disturbance condition of the potential barge landing site would have been similar to the surrounding undisturbed portions of the east bank of the Mackenzie River near the Project location.	The existing condition of the potential barge landing site is a consolidated sediment riverbank with some sparse vegetation and driftwood present. Further up the bank, the vegetative ground cover becomes denser approaching the forest and existing access road (see Photo 3 and Photo 4).	Final site condition (i.e., after post-construction reclamation and the completion of the PCEM Program) is planned to be the equivalent of the existing site condition.

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Project Component	Site Condition		
	Pre-Disturbance	Existing	Final
Existing Access Roads	It is assumed that the pre-disturbance condition of the existing access roads would have been similar to the current setting of the surrounding area near Little Smith Creek. The vegetation surrounding Little Smith Creek is comprised of mature upland coniferous forest with some young deciduous undergrowth. Dominant species include Black Spruce, White Spruce, Green Alder, Buffalo Berry, and various forbs, and Feather Moss species.	The existing condition of the access to the potential barge landing is disturbed, with some overgrowth along the margins of the road. The winter road is disturbed and is maintained by the GNWT as a regional access road (see Photo 5). Several alien species and three invasive species (i.e., Smooth Brome, White Sweet-clover, and Yellow Sweet-clover) are present around the winter road and existing Line 21 ROW.	Final site condition (i.e., after post-construction reclamation and the completion of the PCEM Program) is planned to be the equivalent of the existing site condition.
Temporary Workspace	It is assumed that the pre-disturbance condition of the temporary workspace sites would have been similar to the current setting of the surrounding area near Little Smith Creek. The vegetation surrounding Little Smith Creek is comprised of mature upland coniferous forest with some young deciduous undergrowth. Dominant species include Black Spruce, White Spruce, Green Alder, Buffalo Berry, and various Forbs, and Feather Moss species.	The existing condition of the temporary workspace sites off the Line 21 ROW is historically disturbed with regenerating coniferous forest and deciduous undergrowth (see Photo 6). Many of the trees present in the off-ROW Project footprint are small diameter and non-salvageable.	Final site condition (i.e., after post-construction reclamation and the completion of the PCEM Program) is planned to be the equivalent of the existing site condition, with woody vegetation being allowed to fully develop.



Photo 1: Young mixedwood forest in area surrounding proposed camp site and laydown yard (October 2018).



Photo 2: Aerial view of proposed camp site and laydown yard (July 2019).



Photo 3: Bank of the Mackenzie River at the potential barge landing site, looking north towards Little Smith Creek (July 2019).



Photo 4: Bank of the Mackenzie River at the potential barge landing site, looking east towards the existing access road (September 2019).

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Photo 5: ROW near winter road bridge (July 2019).



Photo 6: Aerial view of ROW at slope failure location (July 2019).

5.2.3 Closure Objectives and Criteria

The closure objectives for the Project have been guided by the four closure principles outlined in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013): (1) physical stability, (2) chemical stability, (3) no long-term active care, and (4) future use. Closure objectives and criteria are provided in **Table 8**.

In general, successful reclamation will be defined as achieving a final site condition that is similar to a representative area off the Project construction footprint (i.e., the existing re-vegetated ROW). Representative areas will be identified by Enbridge in consultation with an Environmental Consultant and GNWT Inspectors.

Table 8: Project Closure Objectives and Criteria

Closure Objective	Closure Criteria
Remove all garbage and construction material from the Project footprint	All materials brought to the Project footprint are removed following final site clean-up and reclamation (e.g., garbage, matting, fencing, gravel, etc.)
Return the landscape to pre-construction condition	Surface contours are comparable to the surrounding representative area
	Pre-construction surface drainage is restored
	Surface stoniness is consistent with the representative area
	No ponding, subsidence, or slumping is observed
	Erosion is not observed (beyond typical natural erosion in the Project area)
	Erosion controls are functional or removed if no longer required
Achieve soil stability	Slopes are stable and no soil movement is observed
	No severe compaction or soil mixing is observed (i.e., vegetation regrowth is not noticeably stunted)
Revegetate the Project footprint	No large bare areas are observed
	Species composition is consistent with the surrounding representative area, as defined above
	Average desirable vegetation density is comparable to the surrounding representative area
	Overall vegetation health is similar to the surrounding representative area
No increased presence of weeds and/or invasive vegetation	Weeds and/or invasive species represent the species composition observed in the surrounding representative area, as defined above
Sumps (if used)	Pre-construction surface drainage is restored
	No ponding, subsidence, or slumping is observed
	Erosion is not observed (beyond typical natural erosion in the Project area)
	Slopes are stable and no soil movement is observed
	No large bare areas are observed

Closure Objective	Closure Criteria
Sumps (if used) cont'd	Species composition is consistent with the surrounding representative area
	Average desirable vegetation density is comparable to the surrounding representative area
	Overall vegetation health is similar to the surrounding representative area
	Weeds and/or invasive species represent the species composition observed in the surrounding representative area, as defined above
	No severe compaction or soil mixing is observed (i.e., vegetation regrowth is not noticeably stunted)

5.2.4 Consideration of Closure Options and Selection of Closure Activities

Closure and reclamation of the Project area will be conducted using Enbridge's standard clean-up, reclamation, and monitoring procedures. These methods have been used to reclaim thousands of kilometres of pipeline in western Canada for both federal and provincial/territorial regulators. As such, multiple closure options are not being considered for the Project.

5.2.5 Engineering Work Associated with Selected Closure Activity

Engineering work associated with Project closure is completed as part of the Project design, and no additional work is required to complete the permanent closure and reclamation of the Project.

5.2.6 Predicted Residual Effects

The Environmental and Socio-Economic Assessment completed as part of the LUP and Water License applications to the SLWB indicated that no significant residual effects are anticipated following the implementation of mitigation measures.

Following the completion of site reclamation activities, Enbridge will implement a PCEM Program to determine if remedial measures are warranted to meet the goal of this Plan. It is anticipated that not all closure criteria outlined in **Section 5.2.3** will be met during the first full growing season following construction, and that some residual effects may be present in the short-term (e.g., revegetation).

5.2.7 Uncertainties

Given the scope and size of the Project, and the fact that standard, industry-accepted mitigation measures will be implemented, there are few uncertainties associated with the permanent closure and reclamation of the Project.

The primary uncertainty is the planned natural revegetation of the Project area. If natural revegetation is determined to not be successful during the PCEM Program (i.e., vegetation is not observed to be on a positive growth trajectory or to have met the revegetation criteria as outlined in **Section 5.2.3**),

additional measures may need to be implemented in consultation with Indigenous communities, stakeholders, and regulatory agencies.

5.2.8 Post-Closure Monitoring, Maintenance, and Reporting

Enbridge will implement a PCEM Program to determine if remedial measures are warranted. Monitoring will occur in spring following break-up and in the summer/fall during the growing season for the first two years. Following year two, monitoring will only be conducted in summer during the growing season. Following the completion of the PCEM Program in 2023, Enbridge will continue monitoring the site as part of ongoing operations and maintenance of the Line 21 pipeline.

A report will be completed each year of the PCEM Program to summarize the results of the PCEM fieldwork and will be submitted to the SLWB as part of the Annual Water License Report.

5.2.9 Contingencies

In the event that an unforeseen issue arises that is not resolved by standard mitigation measures, Enbridge will develop appropriate contingency measures in consultation with the Construction Manager and, when appropriate, Indigenous communities, stakeholders, and regulatory agencies.

6.0 Progressive Reclamation

The definition of progressive reclamation is provided in the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013) and is quoted in **Section 6.1**, below. It should be noted that progressive reclamation applies to longer-term projects (e.g., mines), where reclamation of some project components can occur prior to the closure stage. Given the relatively short timeline for the Project, which includes a construction period of no more than 8 consecutive weeks in any one season, progressive reclamation is not applicable.

Notwithstanding, Enbridge typically employs a phased approach to reclamation that is in line with the principles of progressive reclamation. This includes completing clean-up and restoration of Project sites immediately following the completion of construction, including restoring surface grades and drainages; backfilling excavations; rolling back brush and peat over disturbed areas; and installing erosion and sediment controls, where required. Following site restoration, ongoing monitoring of the site is completed every year by Enbridge's Environmental Consultant as part of the PCEM Program to determine if remedial measures are warranted to meet the goal of this Plan (**Section 2.2**).

6.1 Definition of Progressive Reclamation

In the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (MVLWB and AANDC 2013), progressive reclamation is defined as follows:

Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may provide valuable experience on the effectiveness of certain measures that might be implemented during permanent closure.

6.2 Opportunities for Progressive Reclamation

While progressive reclamation is not planned for the Project due to the short duration of construction activities, Enbridge will implement a PCEM Program to determine if remedial measures are warranted. See **Section 5.2.8**.

6.3 Completed Progressive Reclamation

No progressive reclamation has occurred, or will occur, for the Project, as discussed above.

7.0 Temporary Closure

Temporary closure of the Project work sites is possible in the event that full demobilization of equipment is not possible following construction due to early spring break-up or in the event that construction is not completed in the winter 2021 season (January 1 – March, 31 2021). If construction is completed in winter 2021, but equipment is trapped due to early spring break-up, Enbridge will stage equipment at the camp site/laydown yard until it can safely be removed via barge in summer 2021 or the following winter of 2022. If construction is not completed in winter 2021, equipment required to complete construction will be staged at the camp site/laydown yard until the following winter and final clean-up and demobilization will occur in winter 2022.

7.1 Temporary Closure Goal and Closure Objectives

The primary goal for temporary closure is to adequately secure and stabilize the Project work sites to minimize environmental impacts until final clean-up and reclamation can be completed.

7.2 Temporary Closure Activities

In the event of a temporary closure, measures will be implemented to secure and stabilize the Project work sites. Temporary closure activities may include:

- Securing and restricting access to the inactive work sites;
- Implementing erosion and sediment control measures in accordance with the Erosion and Sediment Control Plan (to be developed prior to construction); and,
- Inspecting the site regularly via aerial patrol and completing necessary remedial work, as needed (e.g., silt fence repair).

7.3 Temporary Closure, Monitoring, Maintenance, and Reporting

Aerial patrols of the existing Line 21 ROW are conducted on a routine basis and will include the Project area during temporary closure to monitor the inactive work sites and ensure the temporary closure goal and all applicable regulatory/permit conditions are being met. Reporting required as part of regulatory/permit conditions will be completed during the temporary closure; no additional reporting is anticipated to be required.

7.4 Temporary Closure Contingency Program

Enbridge's response to unforeseen events or conditions during the temporary closure will be consistent with routine operations and maintenance procedures for the Line 21 pipeline. If remedial actions are identified based on aerial patrols, Enbridge will respond in a timely manner in accordance to the severity of the condition and in consideration of seasonal feasibility for completing the work.

7.5 Temporary Closure Schedule

Temporary closure may occur between March 31, 2021 and June 30, 2021 if construction is completed in winter 2021, but equipment is trapped by early spring-break-up. In this case, final clean-up and demobilization of equipment would occur in summer 2021. If construction is not completed in winter 2021, temporary closure may occur between March 31, 2021 and January 1, 2022, when remaining construction would be completed and final clean-up and demobilization would occur by March 31, 2022.

8.0 Integrated Schedule of Activities

Pending regulatory approval, Project construction is planned to generally follow the schedule outlined in **Table 9**. Construction is not anticipated to last more than 8 consecutive weeks during any one season.

Table 9: Anticipated Project Schedule

Dates	Project Activities
Summer 2020	Construction of potential barge landing, clearing along access road, and installation of matting required for access to camp site. Construction/preparation of camp site.
January 1, 2021 – March 31, 2021	Clearing, HDD construction, tie-ins, removal of existing pipeline, demobilization of equipment, haul-off drilling waste (if mix-bury-cover is not permitted).
Summer 2021	Demobilization by barge of any equipment trapped by early spring break-up (back-up plan; only required if all equipment cannot be demobilized in winter).
January 1, 2022 – March 31, 2022	If pipe removal is not completed in winter 2021, pipe removal will occur in winter 2022, followed by final clean-up and demobilization of any remaining equipment left on site.
Spring 2022 or Spring 2023	On-the-ground monitoring following spring break-up.
Summer/Fall 2022 or Summer/Fall 2023	On-the-ground monitoring during the first growing season.
Spring 2023 or Spring 2024	On-the-ground monitoring following spring break-up.
Summer/Fall 2024 or Summer/Fall 2024	On-the-ground monitoring during the second growing season.

9.0 Post-Closure Site Assessment

As outlined in **Section 5.2.8**, Enbridge will implement a PCEM Program to determine if remedial measures are warranted following construction. Monitoring will occur in spring following break-up and in the summer/fall during the growing season for the first two years. Following year two, monitoring will only be conducted in summer during the growing season. Following the completion of the PCEM Program in 2023, Enbridge will continue monitoring the site as part of ongoing operations and maintenance of the Line 21 pipeline.

The PCEM report will address the Project closure objectives and criteria outlined in **Table 8** of **Section 5.2.3**. Typical PCEM reporting involves the use of an Environmental Issues List, which is a comprehensive listing of observed issues and recommendations for remediation noted during on-the-ground fieldwork. The list is carried forward to each subsequent year of PCEM and issues that have been successfully addressed are noted as resolved. When all the issues have been resolved, the goal of this Plan will be met and no residual effects will remain.

10.0 Financial Security

Enbridge will post financial security with the GNWT as required in accordance with the Project LUP and Water License (to be acquired).

11.0 References

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Appendix A

Glossary of Terms and Definitions

Glossary of Terms and Definitions

Closure Criteria	Standards that measure the success of selected closure activities in meeting closure objectives (MVLWB and AANDC 2013).
Closure Goal	The guiding statement that provides the vision and purpose of reclamation. Attainment of the closure goal happens when the proponent has satisfied all closure objectives. By its nature, the closure goal is a broad, high-level statement and not directly measurable (MVLWB and AANDC 2013).
Closure Objectives	Statements that describe what the selected closure activities are aiming to achieve; they are guided by the closure principles. Closure objectives are typically specific to project components, are measurable and achievable, and allow for the development of closure criteria (MVLWB and AANDC 2013).
Closure Principles	The four core closure principles are (1) physical stability, (2) chemical stability, (3) no long-term active care requirements, and (4) future use (including aesthetics and values). The principles guide the selection of closure objectives (MVLWB and AANDC 2013).
Land Use Permit	A land use permit required for an activity set out in sections 4 and 5 of the <i>Mackenzie Valley Land Use Regulations</i> (SOR/98-429), for an activity set out in the <i>NWT Land Use Regulations</i> (R-012-2014).
Permanent Closure	Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining (MVLWB and AANDC 2013). In the context of the Project, this definition does not directly apply. However, it can be interpreted that permanent closure of the Project means that Enbridge has no intentions of conducting further activities at the site, aside from routine operations and maintenance monitoring and potential remedial actions (when and where required).

Progressive Reclamation

Progressive reclamation takes place prior to permanent closure to reclaim components and/or decommission facilities that no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, minimize the duration of environmental exposure, and enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may provide valuable experience on the effectiveness of certain measures that might be implemented during permanent closure (MVLWB and AANDC 2013).

Reclamation

The process of returning a disturbed site to its natural state or which prepares it for other productive uses that prevents or minimizes any adverse effects on the environment or threats to human health and safety (MVLWB and AANDC 2013).

Remediation

The removal, reduction, or neutralization of substances, wastes, or hazardous material from a site in order to prevent or minimize any adverse effects on the environment and public safety now or in the future (MVLWB and AANDC 2013).

Type B Water License

A water license required as per Column III of Schedules IV to VIII of the NWT *Waters Regulations* (R-019-2014).

Appendix B

List of Acronyms, Abbreviations, Units, and Symbols

List of Acronyms, Abbreviations, Units and Symbols

°	<i>Degrees</i>
'	<i>Minutes</i>
"	<i>Seconds</i>
µg	<i>Microgram(s)</i>
AANDC	<i>Aboriginal Affairs and Northern Development Canada</i>
asl	<i>Above Sea Level</i>
CO	<i>Carbon Monoxide</i>
CRP	<i>Closure and Reclamation Planning</i>
CSA	<i>Canadian Standards Association</i>
DFO	<i>Fisheries and Oceans Canada</i>
ECCC	<i>Environment and Climate Change Canada</i>
Enbridge	<i>Enbridge Pipelines (NW) Inc.</i>
EPP	<i>Environmental Protection Plan</i>
GNWT	<i>Government of Northwest Territories</i>
H ₂ S	<i>Hydrogen Sulphide</i>
HDD	<i>Horizontal Directional Drill</i>
IBA	<i>Important Bird Area</i>
km	<i>Kilometre(s)</i>
KP	<i>Kilometre Post</i>
LUP	<i>Land Use Permit</i>
m	<i>Metre(s)</i>
m ³	<i>Cubic Metre(s)</i>
MVLWB	<i>Mackenzie Valley Land and Water Board</i>
N/A	<i>Not Applicable</i>
NO ₂	<i>Nitrogen Dioxide</i>
NPS	<i>Nominal Pipe Size</i>
NWT	<i>Northwest Territories</i>
O ₃	<i>Ozone</i>
PCEM	<i>Post-Construction Environmental Monitoring</i>
PM _{2.5}	<i>Fine Particulate Matter (≤ 2.5 micrometres in diameter)</i>
PM ₁₀	<i>Particulate Matter (≤ 10 micrometres in diameter)</i>

<i>ppb</i>	<i>Parts Per Billion</i>
<i>ppm</i>	<i>Parts Per Million</i>
<i>ROW</i>	<i>Right-of-Way</i>
<i>SARA</i>	<i>Species at Risk Act</i>
<i>SC</i>	<i>Statutes of Canada</i>
<i>SLWB</i>	<i>Sahtú Land and Water Board</i>
<i>SNWT</i>	<i>Statutes of the Northwest Territories</i>
<i>SO₂</i>	<i>Sulphur Dioxide</i>
<i>SOR</i>	<i>Statutory Orders and Regulations</i>
<i>SPC</i>	<i>Special Concern</i>
<i>the Project</i>	<i>Replacement of a segment of the Line 21 pipeline southeast of KP 158 near Little Smith Creek in the Northwest Territories</i>
<i>the Plan</i>	<i>Closure and Reclamation Plan</i>
<i>THR</i>	<i>Threatened</i>
<i>UC</i>	<i>Under Consideration</i>
<i>Wood</i>	<i>Wood Environment and Infrastructure Solutions</i>