Appendix H
Environmental Overview

Prohibition Creek Access Road Construction Project

Environmental Overview

Government of the Northwest Territories – Department of Infrastructure

September 2020

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Abbreviations

AIA	Archaeological Impact Assessment
AOA	Archaeological Overview Assessment
CCASAR	Canyon Creek All Season Access Road
CCME	Canadian Council of the Ministers of the Environment
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CRs	Conformity Requirements
dB	decibel
ECG	Ecosystem Classification Group
ENR	Environment and Natural Resources, Government of the Northwest Territories
GNWT	Government of the Northwest Territories
GVM	G.V.M Geological Consultants Ltd.
ha	hectare
INF	Department of Infrastructure, Government of the Northwest Territories
IORVL	Imperial Oil Resources Ventures Limited Partnership
km	kilometre
Lands	GNWT Department of Lands
m	metre
m^3/s	cubic metres per second
mg/L	milligrams per litre
MVWR	Mackenzie Valley Winter Road
NT	Northwest Territories
NWRRC	Norman Wells Renewable Resources Council
PCAR	Prohibition Creek Access Road
PDR	Project Description Report
Project	Prohibition Creek Access Road Construction Project
RCP	Representative Concentration Pathway
ROW	Right-of-way

SARA	*Species at Risk Act* (Federal)
SARA (NWT)	*Species at Risk Act* (Territorial)
SLUP	Sahtu Land Use Plan
SLUPB	Sahtu Land Use Planning Board
SMZ	Special Management Zone
SNAP	Scenarios Network for Alaska and Arctic Planning
SSA	Sahtu Settlement Area
Stantec	Stantec Consulting Ltd.
TK Study	Traditional Knowledge Study
TRRC	Tulita Renewable Resources Council

1 Introduction

This Environmental Overview has been developed by the Government of the Northwest Territories (GNWT) Department of Infrastructure (INF) for the construction of the Prohibition Creek Access Road (PCAR) project (the Project). The document provides an overview of the environmental characteristics of the Project footprint [including the 60 metre (m) right-of-way (ROW) between Canyon Creek and Prohibition Creek, and the Edie Lake Quarry and quarry haul road] and general Project area[1] to inform readers of baseline conditions for valued environmental components (VEC) during the review of the Project Description Report.

2 Environmental Overview

The proposed Project is located within the Taiga Level I Ecoregion, which is further subdivided into the Taiga Plains (Level II), Taiga Plains Low Subarctic (Level III) and the North Mackenzie Plain Subarctic (Level IV) ecoregions [Ecosystem Classification Group (ECG) 2007].

The Taiga Plains Low Subarctic Ecoregion (Level III) is dominated by closed to open canopied white (*Picea glauca*) and black (*Picea mariana)* spruce forests with lichen and low shrub understories, and black spruce dominated wetlands (ECG 2007). The North Mackenzie Plain Subarctic ecoregion is characterized as a level to gently undulating area with extensive imperfectly- to poorly-drained areas that have developed into wetlands. Its distinguishing features include glacial till deposits (lacustrine deposits from Glacial Lake McConnell, and fluvial and glaciofluvial deposits along the Mackenzie River and its major tributaries) dominating across a level to gently undulating plain, covered by low-canopy mixed coniferous forests with an understory of shrubs, lichen and moss in the uplands and peat plateaus throughout the lowlands.

Major watercourses in the ecoregion include the Mackenzie, Great Bear, Carcajou, Mountain and Hare Indian Rivers (ECG 2007). Three main landform types exist in this ecoregion. Fluvial or glaciofluvial terraces parallel the Mackenzie River and its tributaries, medium to course textured lacustrine plains occupy narrow discontinuous bands along the river and undulating to hummocky till veneers lie in higher terrain. Bedrock is also exposed in some areas.

2.1 Climate

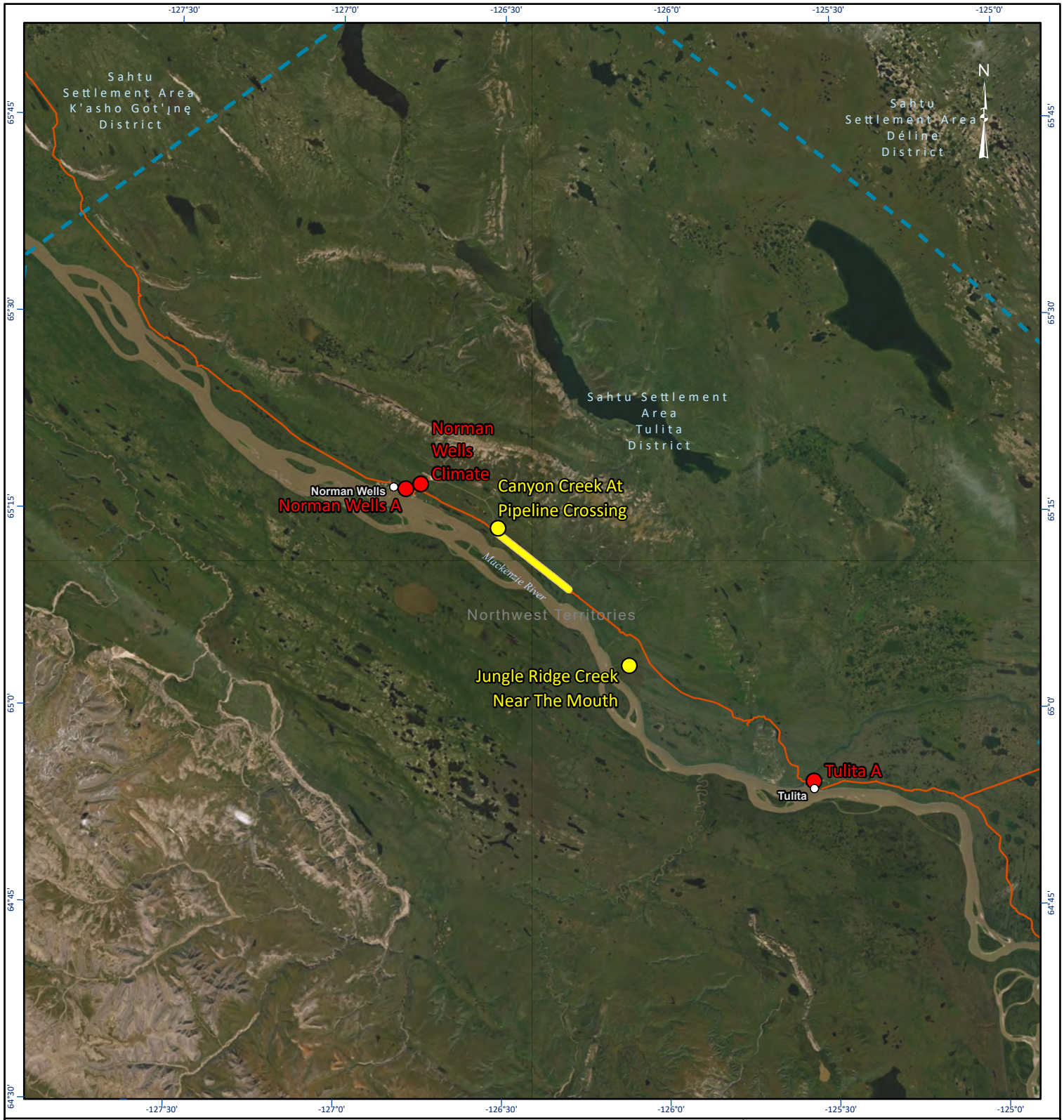
The general climate of the Central Mackenzie Valley is subarctic, characterized by long, cold winters, and short, mild summers with extreme seasonal temperature variations. The Mackenzie Valley overall has a somewhat milder climate than adjacent areas to the east and west, while cooler temperatures remain longer over the more mountainous areas (Kokelj 2001). The average annual temperature is below zero with a very short frost-free season and insufficient summer warmth to thaw prevalent permafrost areas. Snow and ice cover typically persist between October and May.

[1] Project area is defined loosely as the general area surrounding the Project footprint, and is not a measured spatial extent that is VEC-specific.

Annual precipitation is typically low, but sufficient for tree growth, and occurs more frequently in the warmer summer months than during the winter. A large portion of the annual precipitation is stored for several months in the form of snow and therefore snowmelt runoff in the spring is a dominant feature of regional stream hydrographs.

Daily air temperature, precipitation, wind speed and wind direction data were collected from the Norman Wells A meteorological station operated by Environment and Climate Change Canada (ECCC) between 1981 and 2010 (ECCC 2020) . Table 2-1 presents the data recorded at the station located at 65°16'57.00" N, 126°48’01.00” W; elevation: 72.5 m; Station ID: 2202800.

Climate Normal data from Station 2202800 was not available between 2010 and 2020; in the absence of data, INF has presented basic climatic data from another station located in Norman Wells (Station ID 2202810) in Table 2-2 below. Station 2202810 is located at 65°17’15.09" N, 126°45’12.08” W; elevation: 93.60 m. The basic climatic data available was not consistent with the extent of information presented in the Climate Normals; as such, the list of parameters for the 2011 to 2020 timeframe is less than those presented in Table 2-1.



LEGEND

- Community
- Hydrometric Station (Operated by Water Survey of Canada)
- Meteorological Station (Operated by Environment Canada)
- Prohibition Creek Access Road (Proposed)
- Winter Road
- District Boundary

20 10 0 20
1:750,000 Kilometres

NOTES

Sources: Project Data: Government of Northwest Territories. Base Data: CanVec, Government of Canada; Government of Northwest Territories; NWT Centre of Geomatics
Image Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Spatial Reference: NAD 1983 Northwest Territories Lambert

Figure 2-1- Meteorological and Water Survey Canada Stations Near Project

GIS	DR	2020-06-03	Doc ID: 144902910-2010 REVC
QA/QC	PC	2020-06-03	Government of the Northwest Territories

GOVERNMENT OF NORTHWEST TERRITORIES • GOUVERNEMENT DES TERRITOIRES DU NORD-OUEST

Table 2-1 1981 to 2010 Canadian Climate Normals Station Data for Norman Wells (Station ID 2202800)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature													
Daily Average [degrees celcius (°C)]	-26.1	-24	-18.4	-5.1	6.4	15	17.1	13.8	6.6	-4.7	-18.7	-23.4	-5.1
Standard Deviation	4.5	3.9	3.5	3.1	2.3	1	1.5	1.6	1.9	2.4	4	3.6	1.1
Daily Maximum (°C)	-22.2	-19.5	-12.5	1	12.1	20.7	22.5	19	11	-1.6	-15.2	-19.6	-0.4
Daily Minimum (°C)	-29.9	-28.4	-24.2	-11.1	0.6	9.3	11.5	8.4	2	-7.7	-22.2	-27.1	-9.9
Extreme Maximum (°C)	12.4	7.9	11.1	20	31.3	33.5	35	32.4	27.1	21	13.3	5.7	NR
Extreme Minimum (°C)	-52.2	-54.4	-46.1	-37.2	-17.8	-2.8	-1.1	-6.1	-15.7	-31.7	-42.8	-47.8	NR
Precipitation													
Rainfall [millimetres (mm)]	0.2	0	0.1	1.2	13.3	42.4	41.8	41.1	26.7	4.6	0	0.2	171.7
Snowfall [centimetres (cm)]	21.1	19.9	14.4	12.8	6.4	0.4	0	0.7	6.9	27.3	26	25.9	161.5
Precipitation (mm)	15.6	14.9	10.7	11.1	19	42.7	41.8	41.8	33.1	26.7	18.7	18.2	294.4
Average Snow Depth (cm)	27	30	30	18	1	0	0	0	0	5	14	22	12
Snow Depth at Month End (cm)	28	30	27	5	0	0	0	0	1	10	18	25	12
Extreme Daily Rainfall (mm)	3	0.9	5.6	12.4	19.6	45.1	49.3	48.5	42.8	21.4	5.8	2	NR
Extreme Daily Snowfall (cm)	23.1	27	13	28.4	20.6	15	2	7.6	16.8	18.8	16.8	17	NR
Extreme Daily Precipitation (mm)	24.6	20.6	9.6	26.7	20.6	45.1	49.3	48.5	50.8	21.8	16.5	17	NR
Wind													
Average Hourly Wind Speed (km/hr)	8.3	8.9	10.3	11	11.9	11.7	11	10.5	10.7	10.4	8.4	8.3	10.1
Predominant Wind Direction	SE	SE	W	SE	SE	SE	SE	SE	SE	NW	NW	SE	SE

Notes: NR – Not recorded

Table 2-2 2011 to 2020 Historical Weather Station Data for Norman Wells (Station ID 2202810)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Temperature													
Daily Average (°C)	-23.9	-21.5	-17.2	-6.5	7.3	14.3	16.3	13.1	6.1	-2.3	-18.1	-14.3	-3.9
Daily Maximum (°C)	-19.6	-16.1	-10.0	0.1	14.4	21.5	23.1	19.3	12.3	1.6	-13.7	-19.1	1.1
Daily Minimum (°C)	-28.2	-27.0	-24.3	-13.1	0.2	7.0	9.4	6.8	-0.1	-6.1	-22.5	-18.5	-9.7
Precipitation													
Precipitation (mm)	1.5	1.3	1.2	0.7	0.8	1.2	2.2	2.4	1.4	1.2	1.4	1.3	1.4
Snow on Ground (cm)	31.1	35.0	37.6	30.8	8.5	0.0	0.0	0.0	1.0	5.5	14.8	16.6	15.1
Wind													
Speed of Maximum Gust (km/hr)	40.9	42.6	38.8	39.8	39.4	38.1	37.1	38.9	38.0	39.5	40.3	40.0	39.5

2.2 Air Quality

Project specific air quality data has not been collected within the Project footprint. Air quality in the Project area is anticipated to be similar to Norman Wells located approximately 15 km northwest of the Project footprint. No comments or concerns regarding air quality were identified during the Traditional Knowledge (TK) Studies completed by the Norman Wells Renewable Resources Council (NWRRC) or the Tulita Renewable Resources Council (TRRC) (Appendix A) (NWRRC 2020 and TRRC 2020).

The 2016 Air Quality Report attributed elevated concentrations of fine and coarse particulates to forest fire activity and road dust within the community (ENR 2016). Concentrations of sulphur dioxide, nitrogen dioxide, carbon monoxide, and ground level ozone were below the Northwest Territories (NT) Ambient Air Quality Standards (Table 2-2).

Table 2-3 2016 Norman Wells Baseline Air Quality Report

Parameter	NT Ambient Air Quality Standards (ENR 2014)			Maximum Level Recorded in 2016	Number of Exceedances
	Maximum Concentration		Averaging Period		
	µg/m³	ppb_v			
Sulphur Dioxide	450	172	1 hour	0.9	0
	150	57	24-hour	0.8	0
Nitrogen Dioxide	400	213	1-hour	39.3	0
	200	106	24-hour	15.6	0
Carbon Monoxide	15,000	13,000	1-hour	Not recorded	Not applicable
	6,000	5,000	8-hour	Not recorded	Not applicable
Particulate Matter (2.5 µm)	28	No guideline	24-hour	58.9	2
Particulate Matter (10 µm)	50[1]	No guideline	24-hour	129.0	25
Ground level ozone	126	63	8-hour	44.3	0

Notes: µg/m³ – micrograms per cubic metre; ppb_v – parts per billion by volume

1 – The national Canadian Ambient Quality Standards have not set a limit of PM_{10}. Several provinces have adopted the 50 µg/m³ (24 hour average) as an acceptable limit for this parameter.

2.3 Noise

Little information is available on the existing noise conditions of the Project area. The proposed Project is located approximately 15 km southeast of Norman Wells and, aside from increased traffic noises associated with construction and operation of the Mackenzie Valley Winter Road (MVWR) between December and

March, the existing ambient noise levels are anticipated to be low. No comments or concerns regarding noise were identified during the TK Studies completed by the NWRRC and TRRC (NWRRC 2020 and TRRC).

2.4 Climate Change

Climate change refers to a change over time in regional or global climate patterns, and is usually associated with a change in the level of greenhouse gases (particularly carbon dioxide) leading to greater or reduced amounts of solar radiating being retained within the earth's atmosphere over time. The current trend of a warming global climate has been identified as the result of rising levels of greenhouse gases associated with human activities such as manufacturing, energy production, agriculture, and transportation. The effects of climate change are particularly apparent in the Northwest Territories, where the rate of warming is approximately three times the global average, and average temperatures are estimated to have increased 2.3°C between 1948 and 2016 (Bush and Flato 2018). Rapid warming within the NT has led to significant changes in ambient air temperatures, patterns of permafrost thickness and distribution and precipitation patterns.

No comments or concerns regarding climate change were identified during the TK Studies completed by the NWRRC and TRRC (NWRRC 2020 and TRRC). However, it should be noted that specific questions focused on climate change were not posed. It could be inferred that climate change is a concern given that the entire area was identified to be of importance to participants in the TK Study.

The following section summarizes the impacts of climate change in the region, as reflected by projections of future air temperatures, precipitation levels, and permafrost thickness over time.

2.4.1 Temperature and Precipitation

The GNWT, in partnership with the Scenarios Network for Alaska and Arctic Planning (SNAP), has developed a tool for projecting future temperature and precipitation trends for communities in Alaska and Canada's northern territories.

Temperature

Table 2-3 shows the mean temperature projections for the community of Norman Wells between 2020 and 2050 (SNAP 2020). The climate scenarios developed by SNAP represent differences in the amount of solar radiation absorbed by the earth relative to the amount reflected. The representative concentration pathways (RCPs) of 4.5, 6.0, and 8.5 were used to represent low, medium, and high scenarios.

Table 2-4 Norman Wells Mean Temperature Projections (2020 – 2050) (in °C)

Climate Scenario	2020-2029	2030-2039	2040-2049	2050-2059
Low (RCP 4.5)	-23.1	-22.3	-22.4	-21
Medium (RCP 6.0)	-22.4	-23	-22.1	-21.6
High (RCP 8.5)	-22.8	-20.9	-22	-19.6

Precipitation

Table 2-4 shows the annual precipitation projections for the community of Norman Wells between 2020 and 2050 (SNAP 2020).

Table 2-5 Norman Wells Mean Annual Precipitation Projections (2020 – 2050) (in mm)

Climate Scenario	2020-2029	2030-2039	2040-2049	2050-2059
Low (RCP 4.5)	20	22	22	25
Medium (RCP 6.0)	22	22	20	23
High (RCP 8.5)	22	22	22	24

2.4.2 Permafrost

The Project area is located within the discontinuous permafrost zone, with 50 to 90 % of the ground being underlain by permafrost (Heginbottom 1992). The temperature of permafrost within the Mackenzie Valley has increased since the 1980's at a rate of approximately 0.1˚C per decade (Derksen et al. 2018). Within the Mackenzie Valley, the active layer thickness has increased approximately 10 % since 2000. The average end-of-season thaw depth in Norman Wells was recorded by the Circumpolar Active Layer Monitoring Network (CALM) between 1992 and 2005 (CALM 2020). The average thaw depth ranged from 59 cm to 66 cm; however, there was no clear trend established as depths varied each year. Since 2005, data has not been collected at the Norman Wells location.

The extent of localized permafrost change within the Project area is difficult to predict as it is dependent on multiple variables including surface temperature, soil properties, and the initial permafrost temperature conditions. To monitor ground temperature regime during the Project, INF will install thermistors in the summer of 2020.

3 Terrain, Permafrost, and Geohazards

3.1 Terrain

The proposed Project is located within the Mackenzie Plain Physiographic Division of the Mackenzie Mountains Physiographic Region (Natural Resources Canada 2020). The proposed alignment is located on a gently sloping plain above the Mackenzie River, underlain by generally flat Devonian shale and minor limestone of the Horn River Group [G.V.M. Geological Consultants Ltd. (GVM) 2016]. The Edie Lake Quarry is located within the Hume Formation, which forms the slope of the Norman Range and is primarily limestone from the Devonian age (Fallas and McNaughton 2013).

Terrain types along the proposed alignment are primarily moraine deposits and lesser amounts of glaciofluvial and glaciolacustrine deposits (EBA 2011, GVM 2016). The moraine deposits consist of till material that vary from fine to coarse grained materials (30 % fines, 30 % sand, and 30 % gravels) that are well compacted (GVM 2016). The material is generally moderately to well drained. In wet areas, ice-rich

permafrost conditions are present; however, the ice contents will typically decrease with depth. In some areas, frozen peat veneers [less than 1 metre (m) thick] are located on poorly drained moraine, glaciolaustrine, and at times on glaciofluvial deposits.

Glaciofluvial deposits along the proposed alignment are limited to the areas north of Christina Creek and Prohibition Creek (GVM 2016). These deposits are mostly comprised of sand and gravel and they can have low to medium ground ice content and are moderately to well drained. In some cases, they may be unfrozen. The area north of Christina Creek features thinner glaciofluvial deposits between 1 to 3 m thick that overlies till, bedrock, and glaciolacustrine deposits. The area north of Prohibition Creek is a thicker glaciofluvial terrace material greater than 3 m thick.

Glaciolacustrine deposits consisting of mostly silt, fine sand, and clay material overlying till and bedrock material are located within the proposed alignment (GVM 2016). The thickness of the deposits are typically less than 3 m. Found in low-lying, wet lowland terrain and old lakebed locations, glaciolacustrine deposits are commonly overlain by moderate to thick organic over (GVM 2016 and Tetra Tech EBA 2015). As these deposits are typically fine grained and are located in areas with poor drainage, these are ice-rich and highly susceptible to compaction and rutting (Tetra Tech EBA 2015). Glaciolacustrine sediments present limitations for road construction and maintenance due to their fine-grained nature, wetness, high ground ice content, high settlement potential, and erodibility. Glaciolacustrine deposits are highly susceptible to gullying even on gentle slopes, following removal of vegetation. Retrogressive thaw flow slides, active layer detachment and rotational failures can develop following disturbance of vegetation and thermal disturbance.

The watercrossings located along the alignment are located on alluvial plan deposits [G.V.M Geological Consultants Limited (GVM) 2016]. The alluvial deposits are thick (greater than 3 m in some areas) of fine (silt and sand) to coarse grained (gravel, cobbles, and boulders). Moderate ice content is located within the fine grained alluvial terrace and fan deposits.

The proposed Project is located within the extensive discontinuous and intermediate discontinuous permafrost [Imperial Oil Resources Ventures Limited (IORVL) 2004]. Although the proposed alignment is located in an area featuring mainly moraine deposits, the presence of glaciofluvial and glaciolacustrine deposits is of concern due to the varying ice content (GVM 2016). To characterize and confirm the extent of ice, a geotechnical assessment was completed along the proposed alignment in March 2020. The findings of the geotechnical assessment will be integrated into the final design of the Project. Where required, alignment amendments may be necessary to avoid thaw sensitive terrain and thermokarst features (if identified).

Table 3-1 summarizes the terrain types along the proposed alignment based on terrain mapping completed by GVM and EBA (GVM 2016, EBA 2011)

Table 3-1 Terrain Descriptions along the PCAR

Location	Terrain Description
Canyon Creek to Francis Creek	Canyon Creek Bridge located on alluvial plain. Mostly fine grained lacustrine blanket over till. Drainage is good and is perpendicular to the highway; except for near Francis Creek where drainage is parallel to the highway (EBA 2011).

Location	Terrain Description
Francis Creek to Helava Creek	Fine-grained or sandy soils of lacustrine or glacial origin (GVM 2016). Drainage is good and is perpendicular to the highway; except for near Francis Creek where drainage is parallel to the highway (EBA 2011).
Helava Creek to Christina Creek	Fine grained lacustrine veneer over till northwest approach slope to Christina Creek in gravel over till (GVM 2016).
Christina Creek to Prohibition Creek	East of Christina Creek – peat veneer and thicker lacustrine deposits underlain by till (GVM 2016). Closer to Prohibition Creek, the route is located in a thin layer of finer grained lacustrine over till. West of Prohibition Creek, the upper terrace is comprised of glaciofluvial materials (sands and gravels).
Prohibition Creek	Upper terrace is glaciofluvial and lower terrace is alluvial in origin (GVM 2016). Near surface soils are sand and gravel. At the crossing, transition to alluvial plain terrace deposits comprising of coarse grained materials.

3.2 Permafrost

The Project footprint is located within a discontinuous permafrost zone, with permafrost occurring at variable depths and thicknesses (Tetra Tech EBA 2015). In the early 2000's, the average thickness of the active layer in the Norman Wells area ranged from <1.0 m to <1.5 m for undisturbed forested soil; >1.5 m for sites disturbed through clearing; and, >3 m for cleared and in-filled sites (Robinson et. al 2001).

The NWRRC TK Study identified that the Project ROW contained a low amount of thawing permafrost (NWRRC 2020). The TRRC TK Study indicated that there was little information on the extent of permafrost remaining in the area (TRRC 2020). Areas containing muskeg were identified to be located in areas of permafrost. No other comments or concerns regarding permafrost were identified.

A geotechnical assessment was completed along the proposed alignment in March 2020. Once installed, thermistor data recovered will be used, in concert with geophysical data, to complete a thermal analysis prior to the completion of the final design. The findings of the thermal analysis, geotechnical assessments, and terrain analysis will be utilized to evaluate the presence of thaw sensitive terrain. Where thaw sensitive terrain is identified, mitigative measures will be incorporated into the final design (as needed) to prevent impacts to permafrost.

3.3 Soils

Soils within the ecoregion predominately consist of turbic crysols, however brunisolic and luvisolic soils can be found on glaciofluvial, coarse textured lacustrine and alluvial soils (ECG 2007). Field studies completed as part of the Mackenzie Gas Project (MGP) Environmental Impact Statement (EIS) identified gleysolic turbic cryosols within the Project area (IORVL 2004).

Turbic cryosols are formed in either mineral or organic materials that have permafrost either within 1 m of the surface or 2 m of the surface (if the active layer has been strongly cryoturbated) (IORVL 2004). These soils have a mean annual temperature of less than 0°C.

3.4 Geohazards

Geohazards are natural, existing or potential, geomorphic and geologic processes and formations which can cause damage to engineering structures. Several potential geohazards have been identified within the Project area including the presence of karst, massive ground ice and thermokarst processes (development of retrogressive thaw slumps, or landslides). The NWRRC TK Study confirmed that there were no hazards or other sensitive terrain areas located within the Project area (NWRRC 2020).

3.4.1 Karst

Karst development (e.g. sink holes) is documented in the area near Norman Wells; however, they are typically associated with the carbonate and/or sulphate rich outcrops located along the Norman Range of the Franklin Mountains (IORVL 2004). Karst formations were identified near Prohibition Creek during the den and nest survey completed by ENR in 2019 (ENR 2020).

3.4.2 Massive Ground Ice

Massive ground ice conditions are more common in elevated, undulating terrain, but relic ice lenses can also exist around low-lying depressions. Previous geotechnical assessments and/or construction projects were reviewed to confirm the presence of massive ground ice within the Project area. Massive ground ice was not observed during the geotechnical assessment program completed along the Canyon Creek All Season Access Road (CCASAR) project in 2015; however, it was observed during the construction of the CCASAR (Tetra Tech EBA 2016). Ice wedges and polygonal patterned ground were also not observed on aerial photographs of the Project area.

3.4.3 Thermokarst

Thermokarst terrain is the land surface that forms as ground subsides due to the thawing of ice rich permafrost. The presence of thermokarst terrain was not identified within the proposed Project area; however, thermokarst features were identified along the CCASAR (TetraTech EBA 2016).

Retrogressive thaw flows are slope failures that result from thawing ground ice and are a dynamic form of thermokarst (Kokelj et al 2017). A study reviewing the presence of slump affected terrain within the NT was completed in 2017. Retrogressive thaw slumps were not identified within the Project area.

Evidence of landslides are present along the stream bedding and banks of streams within the Project area (IORVL 2004).

4 Hydrology

The Project area is located within the Lower Mackenzie Sub-basin of the Mackenzie Drainage Basin (IORVL 2004). Three creeks are located within the Project footprint including Francis Creek, Helava Creek, and Christina Creek. In addition, one unnamed pond and several ephemeral drainage channels are also located along the alignment.

Canyon Creek and Prohibition Creek are not located within the Project footprint, but are located within the Project area. Each of the creeks have existing bridge structures that will not be rehabilitated and/or replaced during the Project. Appropriately sized culverts will be installed, where needed, to maintain the hydrological regime.

Project specific hydrological assessments of watercourses within the ROW were not completed during the preparation of this PDR. The description of hydrology is based on work completed as part of the MGP EIS (IORVL 2004) and work completed by GeoNorth and Golder Associates Ltd. (GeoNorth and Golder Associates Ltd. 2000), Stantec Consulting Ltd. (Stantec 2012), and EBA Consultants (EBA 2011).

The NWRRC and TRRC TK Studies confirmed that water in the Project area typically begins to freeze in October/November, with spring occurring typically in April/May (NWRRC 2020 and TRRC 2020). The TRRC TK Study indicated that there were no springs located in the area. No other comments or concerns regarding hydrology were identified.

Table 4-2 below summarizes the available baseline information on hydrology on watercourses within the Project area. The unnamed pond and ephemeral drainage channels will be assessed prior to completion of the final design.

Table 4-1 Hydrology of Watercourses Located within Project Area

Crossing[1]	Crossing Description	Channel Type	Drainage Area (km^2)	Width	Depth	Avg. Flow Rate	Channel Slope (m/m)	Winter Conditions
Canyon Creek (Approximately 1.4 km upstream of MVWR)	Meandering stream originating in the Franklin Mountains and contains inputs from Brandy Lake (EBA 2011). Upstream portion is wider deeply incised and runs straighter due to the gradient. Confluence with a tributary up-gradient of the crossing. Anticipated that freshet flows are significant and longer in duration due to snowmelt in the higher elevations to the east.	Active I	70	2 to 21 m (wetted channel) 6.7 m average	0.3 m	0.3 m/s (mean) 0.47 m/s (maximum)	0.014	Ice cover >1.6 m. Presence of ice cover attributed to potential groundwater seeps.
Francis Creek (Approximately 2 km upstream of MVWR)	Francis Creek, Helava Creek, and Christina Creek all originate in southwest slopes of the Discovery Ridge in the Norman Range and flow into the Mackenzie River (IORVL 2004). None of the creeks flow into lakes. Each creek would have similar morphology and flow regimes to Canyon Creek (EBA 2011).	Active II	28	1.5 to 2.3 m (wetted channel) 2 m average	0.32 m	0.1 m/s (mean) 0.1 m/s (maximum)	0.016	Ice cover of 0.08 m No measureable flow during winter Groundwater influx
Helava Creek (Approximately 2.7 km upstream of MVWR)		Active I	23	0.5 to 4.5 m (wetted channel); 2.2 m (mean)	0.9 m	0.04 m/s (mean) 0.13 m/s (maximum)	0.012	Ice cover > 1.5 m. Hydrologic analysis indicates Helava Creek freezes to the stream bed. Creek likely not suitable for overwinter use.
Christina Creek (Approximately 2.6 km upstream of MVWR)		Active I	25	1 to 3.5 m (wetted channel); 2.2 m (mean)	0.6 m	0.03 m/s (mean) 0.08 m/s (maximum)	0.015	Frozen to stream bed.
Unnamed ephemeral drainage channel located between Christina Creek and	Originates in three small lakes located at the base of the Franklin Mountains (IORVL 2004). Flows into an unnamed lake before entering the Mackenzie River.	Active II	9	1.4 to 5.2 m (wetted channel); 2.7 m (mean)	0.10 m	0.03 m/s (mean) 0.08 m/s (maximum)	0.014	Winter flow anticipated to be low or zero. Groundwater influx intermittent.

Crossing[1]	Crossing Description	Channel Type	Drainage Area (km^2)	Width	Depth	Avg. Flow Rate	Channel Slope (m/m)	Winter Conditions
Prohibition Creek (Approximately 2.0 km upstream of MVWR)								
Prohibition Creek (Approximately 3.8 km upstream of MVWR)	Located 2.1 km northeast of the Mackenzie River (Stantec 2012). Meandering braided creek carrying runoff from the Franklin Mountains (EBA 2011). Similar flow regime as Canyon Creek Bank erosion potential deemed to be low at the MVWR crossing; however, it is moderate up and downstream of the crossing. Left and right banks show evidence of slumping and the right downstream bank shows evidence of groundwater seepage (GeoNorth and Golder Associates Ltd. 2000). Concentrations of dissolved calcium and total dissolved solids detected in surface water samples exceeded applicable guidelines (GeoNorth and Golder Associates Ltd. 2000).	Active I	138	3.5 to 13 m (wetted channel); 7.1 m (mean)	0.35 m to 1.7 m (Stantec 2012)	0.46 m/s (mean) 0.77 m/s (maximum)	0.014	1.3 m of ice cover. Groundwater influx into the creek.

Notes:

1. In each of the assessments completed, the survey locations were located up-gradient of the Project ROW.

4.1 Water Quality

Project specific water quality assessments of watercourses within the ROW were not required as there will be no disposal of waste into water. Water quality information is, therefore, limited to Prohibition Creek (IORVL 2004). A summary of the information available is provided below.

Water temperatures ranged from 0 to 18.5 °C during the field programs (IORVL 2004). With the exception of one outlier value (2.4), pH values were within drinking water quality guidelines (6.5 to 8.5). Dissolved oxygen indicated in each of the samples collected exceeded the Canadian Council of Ministers of the Environment (CCME) guideline [6.5 milligrams per litre (mg/L)]. Concentrations of total suspended solids identified during the summer sampling events were low (<10 mg/L), with one sample collected in the fall were moderate (<25 mg/L). Total dissolved solids exceeded the CCME guideline in two of the three samples collected. Colour in one sample was above the aesthetic drinking water quality guideline. Concentrations of sulphate detected in some of the samples also exceeded the CCME guideline. With the exception of total aluminum and total copper indicated in one sample collected in 2002, concentrations of total metals, dissolved metals, and phenol were below the CCME guidelines.

Neither the NWRRC nor the TRRC identified concerns relating to water quality (NWRRC 2020 and TRRC 2020).

4.2 Water Quantity

4.2.1 Waterbodies within Project Area

Watercourses located within the ROW are not gauged [Water Survey Canada (WSC) 2020]. In the absence of Project-specific data, flow and level data were obtained from nearby Canyon Creek (10KA009) and Jungle Ridge Creek (10KA006) WSC stations to characterize conditions within the Project area. Canyon Creek is located approximately 450 m west of the western extent of the Project footprint; Jungle Ridge Creek is located approximately 13.9 km southeast of the eastern extent of the Project footprint.

At both Canyon Creek and Jungle Creek, the average monthly discharge is greatest in May (WSC 2020). At Canyon Creek the average low is 1.7 cubic metres per second (m^3/s); at Jungle Ridge Creek the average flow is 2.6 m^3/s. Average flow in the late fall is reduced to 0.42 m^3/s at Canyon Creek and 0.43 m^3/s at Jungle Ridge Creek. Water Levels at both stations are higher during the winter months which are likely the result of ice presence. In May, the average water levels at both Canyon Creek and Jungle Ridge Creek were 0.2 m higher than the average water levels, measuring 6.8 m and 8.4 m, respectively.

Neither the NWRRC nor the TRRC identified concerns relating to water quantity (NWRRC 2020 and TRRC 2020).

4.2.2 Water Withdrawal Location

The Project will include withdrawing water from the Mackenzie River. Water level and flow data for the Mackenzie River at Norman Wells (Station ID 10KA001; 65°16'19"N, 126°51'00"W) covers the period from 1943 to 2017 (WSC 2020). Monthly water level and flow data for the Mackenzie River are shown in Table 4-3.

Peak flows typically occur during June in Norman Wells although flow in these areas can peak in July during some years. Variations in the flow of the Mackenzie River between years are lowest during the cold winter months, and are highest during the spring melt period. Flow volumes and variation in flow between years are also high during the summer months due to more frequent and annually variable precipitation events including rainstorms and associated flooding (Yang et. al. 2015).

Table 4-2 Mackenzie River Average Water Level and Elevation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Water Level (m)												
Max Water Level	5.974	5.691	5.535	5.276	8.080	7.005	6.466	5.601	5.097	4.727	5.568	5.714
Mean Water Level	5.311	5.056	4.802	4.834	6.902	6.156	5.629	4.969	4.685	4.343	4.919	5.348
Min Water Level	4.840	4.523	4.353	4.476	6.091	5.244	4.893	4.359	4.080	4.008	4.244	4.994
Flow Rate (m^3/s)												
Max Discharge	6,680	4,960	4,670	4,920	18,700	24,400	24,700	18,100	13,700	13,400	10,000	18,100
Min Discharge	2,260	2,130	2,190	2,430	6,680	10,000	8,540	6,920	6,590	6,270	2,340	2,250
Mean Discharge	3,800	3,440	3,260	3,570	13,500	17,300	15,500	12,400	10,500	8,820	5,070	4,200

5 Fish and Fish Habitat

The description of fish and fish habitat along the Project ROW is based on work completed as part of the MGP EIS (IORVL 2004) and work completed by GeoNorth and Golder Associates Ltd. (GeoNorth and Golder Associates Ltd. 2000), Stantec Consulting Ltd. (Stantec 2012), and EBA Consultants (EBA 2011).

The NWRRC TK Study confirmed that there were no fish lakes in the Project area (NWRRC 2020). Respondents indicated that Prohibition Creek and Canyon Creek had suitable habitat for whitefish and grayling, and that the Mackenzie River, located approximately 1.2 km southwest of the Project footprint, is an important fishing location the area. The TRRC TK Study confirmed that fishing occurs along the Mackenzie River southwest of the Project area; some fish spawning grounds are located at the mouth of some of the creeks located along the PCAR alignment (TRRC 2020).

5.1 Waterbodies within Project Area

As previously discussed in Section 4, several watercourses are located within the Project ROW. In addition, the Project has the potential of impacting Canyon Creek, Prohibition Creek, and the Mackenzie River as a result of nearby Project activities and/or water withdrawal (Mackenzie River only).

Table 5-1 summarizes the available baseline information collected from waterbodies located within the Project area.

Table 5-1 Fish Habitat Characteristics of Water Crossings Located Within ROW

Crossing[1]	Habitat Type	Substrate	Winter Conditions	Potential Fish Species	Habitat Use
Canyon Creek (Approximately 1.4 km upstream of MVWR)	Stream habitat primarily riffles with shallow run habitat. Banks mostly stable. In stream cover limited to predominately overhanging vegetation. Riparian vegetation was shrubs, grasses, forbes near the channel.	Cobble and gravel with small amounts of sand and bolders.	Ice cover >1.6 m. Presence of ice cover attributed to potential groundwater seeps. High dissolved oxygen (DO) content and open water conditions identified 1.3 km upstream of pipeline crossing. Creek could be used for overwintering by most species.	Arctic grayling, Arctic lamprey, burbot, emerald shiner, flathead chub, lake chub, least cisco, longnose sucker, mountain whitefish, ninespine stickleback, northern pike, round whitefish, sculpin spp., and trout perch.	Overwintering – Arctic grayling, northern pike, sucker spp., whitefish spp., burbot Spawning and Incubating / Rearing - Arctic grayling, sucker spp., whitefish spp., burbot Adult Feeding and Holding - Arctic grayling, northern pike, sucker spp., whitefish spp., burbot
Francis Creek (Approximately 2 km upstream of MVWR)	Most of stream was shallow run habitat with riffles. In stream cover limited to less than 4 % of surveyed area. Primarily overhanging vegetation with wooden debris. Riparian vegetation predominately shrubs with mixed forest away from banks.	Cobble and gravel	Ice cover of 0.08 m No measureable flow during winter DO concentrations at 14.2 mg/L. High DO and groundwater influx suggests that Francis Creek can be used overwinter	Arctic grayling, emerald shiner, lake chub, spoonhead sculpin, and slimy sculpin.	Overwintering – Arctic grayling, northern pike, sucker species, whitefish species, burbot Spawning and Incubating / Rearing - Arctic grayling, sucker species, whitefish species, burbot Adult Feeding and Holding - None
Helava Creek (Approximately 2.7 km upstream of MVWR)	Mostly shallow runs with riffles, shallow pool and moderate depth pool habitat. Slumping banks common. Prone to erosion at high flow. Instream cover diverse primarily by undercut banks, overhanging vegetation, and	Gravel and cobble with silt in some locations	Ice cover > 1.5 m. Hydrologic analysis indicates Helava Creek freezes to the stream bed. Creek likely not suitable for overwinter use.	Arctic grayling, Arctic lamprey, emerald shiner, lake chub, northern pike, round whitefish, spoonhead sculpin, slimy sculpin, and longnose sucker.	Overwintering – None Spawning and Incubating – Arctic grayling and sucker species. Rearing – Arctic grayling, northern pike, sucker species, whitefish species, and burbot

Crossing[1]	Habitat Type	Substrate	Winter Conditions	Potential Fish Species	Habitat Use
	woody debris. Riparian vegetation was predominantly grasses, forbs and coniferous forest.				Adult feeding and holding – None
Christina Creek (Approximately 2.6 km upstream of MVWR)	Primarily riffles, with shallow run and shallow pool habitat also present.	Gravel and cobble with some sand.	Frozen to stream bed.	Slimy sculpin	Overwintering / Adult Feeding and holding – None Spawning and Incubating – Arctic grayling and sucker species.
Unnamed ephemeral drainage channel located between Christina Creek and Prohibition Creek (Approximately 2.0 km upstream of MVWR)	Shallow run and riffle habitat, with some moderate depth pool and shallow pool habitat. In-stream cover abundant woody debris, overhanging vegetation, undercut banks, and boulders. Riparian vegetation grasses, forbs, and shrubs. Deciduous forest farther back from stream.	Gravel, cobble, boulder, and sand	Winter flow anticipated to be low or zero. Groundwater influx intermittent.	None	Overwintering / Adult feeing and Holding– None Spawning and Incubating – Arctic grayling and sucker species Rearing – Arctic grayling, sucker species, whitefish species, and burbot
Prohibition Creek (Approximately 3.8 km upstream of MVWR)	70 % of section surveyed was riffle with shallow run. Remainder was moderate depth run and moderate depth pool. In-stream cover limited with boulders and overhanging vegetation. Riparian vegetation was grasses and forbs. Deciduous forest farther back from stream.	Predominantly gravels (60 %) with fines and gravels (Stantec 2012)	1.3 m of ice cover. DO concentration 13.7 mg/L. Groundwater flow to the stream. Creek likely not overwintering habitat by all major fish species. Some overwintering of Arctic grayling fry may	Arctic grayling, broad whitefish, mountain whitefish, round whitefish, cisco, northern pike, longnose sucker, trout-perch, lake chub, emerald shiner, spottail shiner, spoonhead sculpin, and slimy sculpin.	Overwintering – Arctic grayling, northern pike, sucker species, bull trout, whitefish species, and burbot Spawning and incubating - Arctic grayling and sucker species. Rearing - Arctic grayling, sucker species, bull trout, whitefish species, and burbot.

Crossing[1]	Habitat Type	Substrate	Winter Conditions	Potential Fish Species	Habitat Use
			occur.		Adult feeding and holding - None

Notes:
1. In each of the assessments completed, the survey locations were located up-gradient of the Project ROW.

Species listed under federal and territorial legislation occurring in the Project area are listed in Table 5-2. The table indicates the status of each species under the territorial *Species at Risk (NWT) Act* [*SARA (NWT)*], Schedule 1 of the federal *Species at Risk Act* (*SARA*), and the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Table 5-2 Fish Species of Management Concern

Common Name	Scientific Name	Conservation Status		
		***SARA (NWT)*[1]**	***SARA* (Schedule 1)[2]**	**COSEWIC[2]**
Bull Trout	*Salvelinus confluentus*	Not Applicable	Special Concern	Special Concern
Shortjaw Cisco	*Coregonus zenithicus*	Not Applicable	No Status	Threatened

Sources: [1] – GNWT 2020c; [2] – Government of Canada 2020a

Fish species listed under federal or territorial legislation were not identified within the Project area during previous assessments [including the Traditional Knowledge (TK) Study completed by the Norman Wells Renewable Resources Council (NWRRC)] (NWRRC 2020).

5.2 Water Withdrawal Location

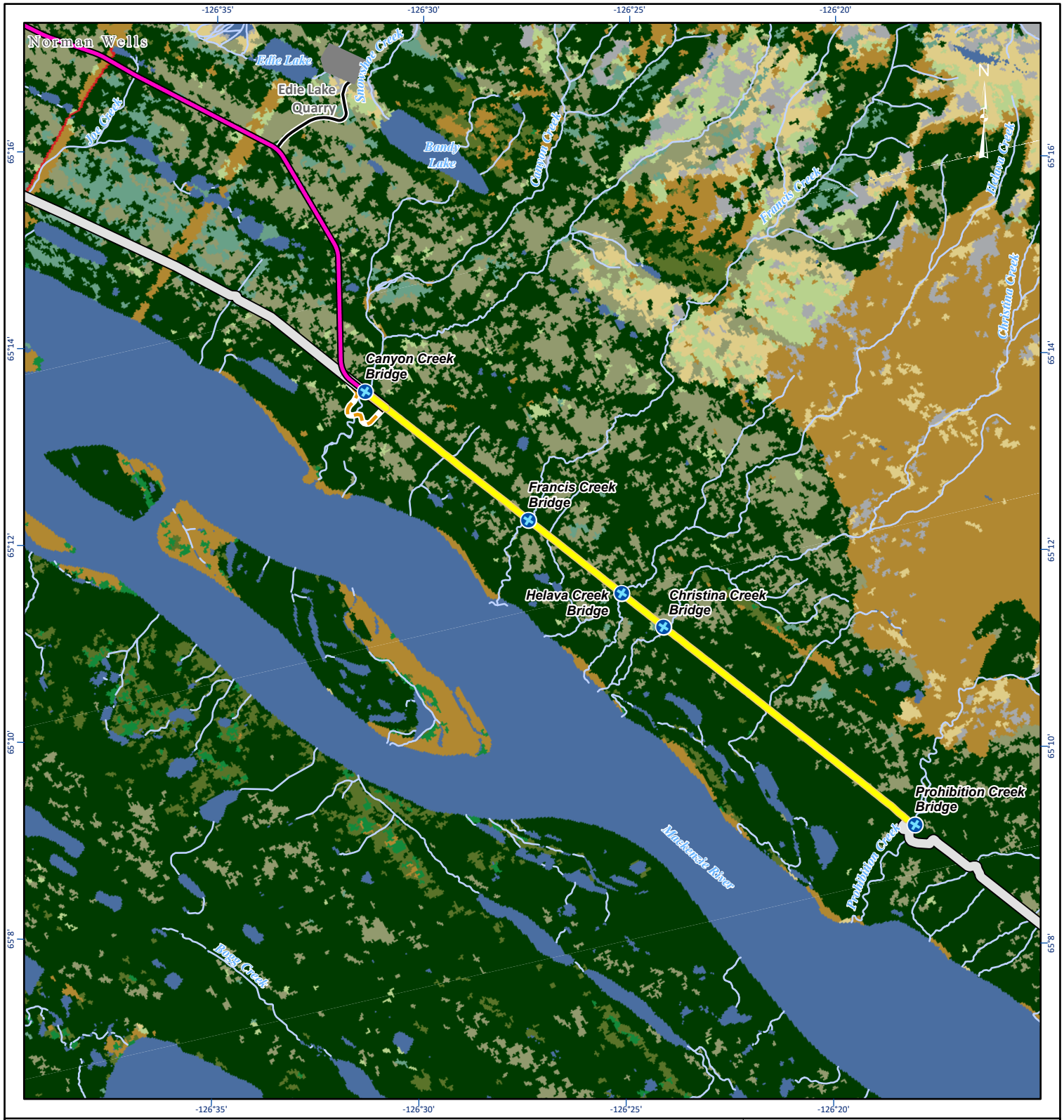
The Mackenzie River is reported to contain 53 native fish species (Bodaly et al., 1989), including Arctic grayling, lake trout (*Salvelinus namaycush*), northern pike, lake whitefish (*Coregonus clupeaformis*), and a number of minnow species. The Project is not expected to have significant impacts on fish populations and habitat in the Mackenzie River.

6 Vegetation

The North Mackenzie Plain Subarctic Ecoregion is characterized by low canopied coniferous stands and recently burned shrublands (ECG 2007) (Figure 6-1 below). Extensive forest fires have occurred in the area; however, forest fire activity has not been recorded in the Project area since prior to 1965 (GNWT 2020).

The NWRRC TK Study indicated that vegetation in the area is dominated by white spruce with some birch (NWRRC 2020). Blueberries and cranberries were identified within the Project area. No culturally important plants were identified. The TRRC TK Study identified that several species of trees, willows, berries, and flowers are used as medicinal plants in the area (TRRC 2020).

In the absence of Project specific vegetation assessments, previous assessments have been used to characterize the vegetation communities present within the Project area. Table 6-1 describes vegetation observed during field work completed by Tetra Tech EBA near the Project area during the CCASAR project (Tetra Tech EBA 2015).



LEGEND

- Existing Bridge
- Kilometer Marker (Proposed)
- Canyon Creek All Season Access Road
- Access to Camping / Recreational Area
- Mackenzie Valley Winter Road
- Haul Road
- Prohibition Creek Access Road (Proposed)
- Quarry
- Watercourse

2015 Land Cover of Canada

- Temperate or sub-polar needleleaf forest
- Sub-polar taiga needleleaf forest
- Temperate or sub-polar broadleaf deciduous forest
- Mixed forest
- Temperate or sub-polar shrubland
- Temperate or sub-polar grassland
- Sub-polar or polar shrubland-lichen-moss
- Sub-polar or polar grassland-lichen-moss
- Sub-polar or polar barren-lichen-moss
- Wetland
- Cropland
- Barren land
- Urban and built-up
- Water
- Snow and ice

2 1 0 2
1:100,000 Kilometres

NOTES

Sources: Project Data: Government of Northwest Territories. Base Data: CanVec, Government of Canada; Government of Northwest Territories; NWT Centre of Geomatics
Land Cover Source: Government of Canada; Natural Resources Canada; Canada Centre for Remote Sensing
Spatial Reference: NAD 1983 Northwest Territories Lambert

Figure 6-1 - Vegetation Communities in Project Area

GIS	DR	2020-06-04	Doc ID: 144902910-2007 REVB
QA/QC	PC	2020-06-04	Government of the Northwest Territories

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Table 6-1 Vegetation Communities Near Project Area

Vegetation Community	Comments
Open Black Spruce	Canopy cover is dominated by black spruce and some tamarack, ranges from approximately 5 % to 20 % (Tetra Tech EBA 2015). Understory vegetation includes black spruce (*Picea mariana*), labrador tea (*Ledum groenlandicum*), willow (*Salix spp*.), dwarf birch (*Betula nana*), bog bilberry (*Vaccinium uliginosum*), and variable cover of mosses and lichens.
Riparian Shrub	Most of the small drainage channels throughout the length of the ROW include a riparian shrub community along the water's edge. These small drainage channels commonly have low to negligible valleys, but include a shrub dominated community of varying widths. These riparian shrub communities are dominated by willow, scrub birch (Betula glandulosa), alder (*Alnus spp.),* and sedges (*Carex spp.*).
Upland Mixed Forest	Forest mixed with white and black spruce and Alaska birch/trembling aspen occur on middle slopes to crest positions, including at the Edie Lake Quarry. The understory is dominated by Alaska birch (*Betula neoalaskana)*, willow, alder, and labrador tea, mosses, and lichens.
Upland Tall Spruce	Tall stands of white and black spruce communities occur on upper slopes and crests of isolated moraine deposits (EBA 2011). Some Alaska birch occurs in this community. Willow, alder, shrubby cinquefoil (*Dasiphora fruticosa*) are present in the understory, as well as a minor component of lichen, mosses, and grass.
Wetland Shrub	Found within depressions or on level topography and is dominated by shrubs including dwarf birch, willow, and sweet gale (*Myrica gale*). In the local study area, shrub wetlands primarily occur near the Edie Lake Quarry.
Low Shrub	Low shrub communities exist within areas of disturbance (including the existing winter road and fire breaks). This community is dominated by shrubs on average 2 m (or less) in height and regenerating deciduous and coniferous trees on upland or level topography.
Exposed Land	Within the local study area, exposed land exists near the Edie Lake Quarry and in the vicinity of watercrossings.

6.1 Rare and Threatened Plants within Project Area

No plants within the Project area are listed under the territorial or federal SARA's or as rare plants (GNWT 2020a).

7 Wildlife

The distribution and abundance of wildlife species in the vicinity of the proposed Project will vary with season, life history stage, habitat availability, and hunting and trapping pressures. This section summarizes known and expected wildlife use in the vicinity of the proposed Project. This information is based on a variety of sources including the Project Description Report for the

Mackenzie Valley Highway (Tulita District) (EBA 2011), den and nest surveys completed in the Project area (ENR 2015 and ENR 2020), the NWRRC TK Study (NWRRC 2020), and the MGP EIS (IORVL 2004).

The Project will be approximately 13 km long and up to 60 m wide, traversing approximately 39 ha of previously disturbed habitat (i.e. winter road). The quarry covers an area of approximately 36 ha, 29 ha of which remains undisturbed. In total, the Project is proposed to directly affect up to 68 ha of previously undisturbed habitat.

The NWRRC TK Study indicated that boreal caribou and moose are common within the Project area, with muskox identified within the region recently (NWRRC 2020). The Enbridge pipeline corridor, along the creeks, and the MVWR were identified as important natural corridors within the Project area. The TRRC TK Study identified moose, boreal caribou, wolf, muskox, martin, beaver, bear, lynx, muskrat, small game, waterfowl and upland birds are harvested in the Project area (TRRC 2020).

A total of 31 species of mammals, 121 species of birds and two species of amphibian occur, or have the potential to occur in the Project area. A full list of species occurring in the Project area is provided in Appendix B.

7.1 Species of Special Management Concern

Species with federal or territorial conservation status in the Project area include three species of mammals, ten species of birds, and four species of insects.

Species listed under federal and territorial legislation occurring in the Project area are listed in Table 7-1. The table indicates the status of each species *SARA (NWT),* Schedule 1 of *SARA*, and COSEWIC.

Table 7-1 Wildlife Species of Management Concern

Common Name	Scientific Name	Conservation Status		
		SARA (NWT)[1]	SARA (Schedule 1)[2]	COSEWIC[2]
Mammals				
Boreal Caribou	*Rangifer tarandus caribou*	Threatened	Threatened	Threatened
Grizzly Bear	*Ursus arctos*	No Status	Special Concern	Special Concern
Wolverine	*Gulo gulo*	No Status	Special Concern	Special Concern
Birds				
Bank Swallow	*Riparia riparia*	Not Applicable	Threatened	Threatened
Barn Swallow	*Hirundo rustica*	Not Applicable	Threatened	Threatened
Common Nighthawk	*Chordeiles minor*	Not Applicable	Threatened	Special Concern

Table 7-1 Wildlife Species of Management Concern

Common Name	Scientific Name	Conservation Status		
		SARA (NWT)[1]	SARA (Schedule 1)[2]	COSEWIC[2]
Harris's Sparrow	*Zonotichia queula*	Not Applicable	Under Consideration	Special Concern
Horned Grebe	*Podiceps auritus*	Not Applicable	Special Concern	Special Concern
Olive-sided Flycatcher	*Contopus cooperi*	Not Applicable	Threatened	Special Concern
Peregrine Falcon	*Falco peregrinus anatum/tundrius*	No Status	Special Concern	Not at Risk
Red-necked Phalarope	*Phalaropus lobatus*	Not Applicable	Special Concern	Special Concern
Rusty Blackbird	*Euphagus carolinus*	No Status	Special Concern	Special Concern
Short-eared Owl	*Asio flammeus*	No Status	Special Concern	Special Concern
Insects				
Gypsy Cuckoo Bumble Bee	*Bombus bohemicus*	No Status	Endangered	Endangered
Suckley's Cuckoo Bumble Bee	*Bombus suckleyi*	No Status	Under consideration	Threatened
Traverse Lady Beetle	*Coccinella tranversoguttata*	No Status	Under consideration	Special Concern
Yellow-banded Bumble Bee	*Bombus terricola*	No Status	Special Concern	Special Concern

Sources: [1] – GNWT 2020c; [2] – Government of Canada 2020a

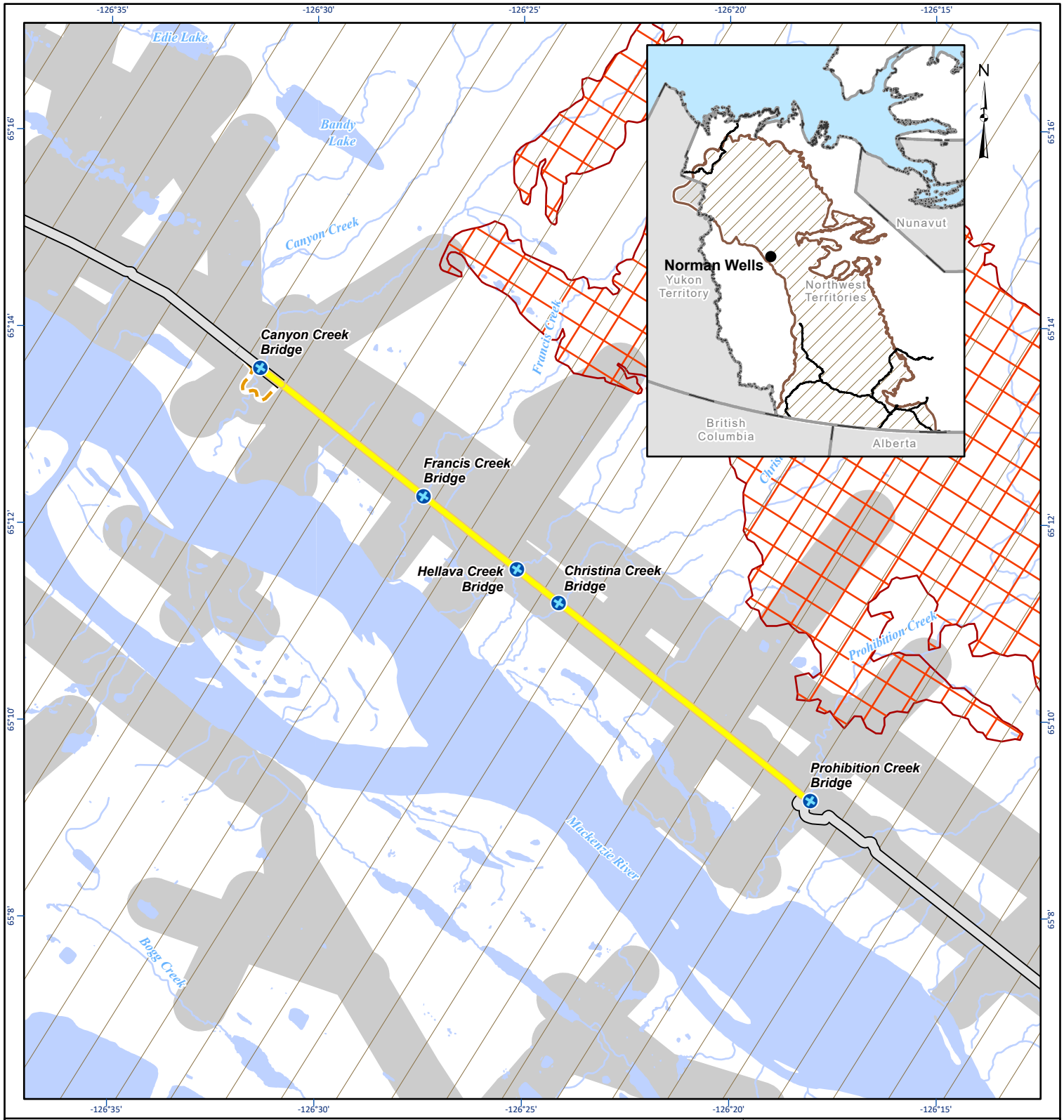
Listed species are discussed further in the section below. The following wildlife section has been divided into mammals, birds, and insect species.

7.2 Mammals

7.2.1 Boreal Caribou

The boreal population of woodland caribou (herein referred to as boreal caribou) are listed as a threatened species by SARA, COSEWIC and territorial legislation. As outlined on Figure 7-1 below, the Project area is located within the range of boreal caribou.

The Project would take place within the general range for boreal caribou, as delineated in the Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada (Environment Canada 2012).



LEGEND

- Existing Bridge
- Proposed Bridge
- Access to Camping / Recreational Area
- Mackenzie Valley Winter Road
- Prohibition Creek Access Road(Proposed)
- Caribou Range
- Existing Anthropogenic Disturbance
- Historical Fire Area
- Watercourse
- Waterbody

2 1 0 2
1:100,000 Kilometres

NOTES

Sources: Project Data: Government of Northwest Territories. Base Data: CanVec, Government of Canada; Government of Northwest Territories; NWT Centre of Geomatics
Spatial Reference: NAD 1983 Northwest Territories Lambert

Figure 7-1 - Overview of Caribou Range in Project Area

GIS	DR	2020-06-04	Doc ID: 144902910-2013 REVA
QA/QC	PC	2020-06-04	Government of the Northwest Territories

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Habitat loss, degradation, and fragmentation of large, continuous areas of mature forest are driving factors leading to a declining population. Boreal caribou prefer mature or old growth coniferous forests associated with bogs, lakes and rivers. Old coniferous forests greater than 100 years old are particularly favoured, as these habitats offer high concentrations of ground (caribou moss) and tree lichens (arboreal lichens). In winter, caribou tend to prefer uplands, bogs and south facing slopes where snow is not too deep. Caribou winter diet consists of up to 80 per cent ground and tree lichens. Preferred summer habitat includes forest edges, marshes and meadows that provide the fresh green growth of flowering plants and grasses.

In the NT, the boreal caribou population is estimated to be between 6,000 to 7,000 animals, with densities in the western Sahtu estimated at 1.5 caribou per 100 km^2 for a total of approximately 674 caribou (ENR 2012). Traditional and community knowledge within the Sahtu Settlement Area suggests that the populations within the region are stable or increasing (ENR 2020).

During the Traditional Knowledge (TK) Study, boreal caribou were identified as being within the Project area (NWRRC 2020).

7.2.2 Grizzly Bears

Grizzly bears (*Ursus arctos*) are listed as a species of special concern by SARA (NWT), SARA and COSEWIC, however, they do not have conservation status under territorial legislation. There are approximately 4,000 to 5,000 grizzly bears in the NT, with the highest concentration found in the Mackenzie mountains (GNWT 2020c). Within the NT, grizzly bears are classified as a big game species and a furbearer and impacts on them are regulated under territorial *Wildlife Act*. The proposed Project is located within the habitat range described by the territorial Species at Risk Committee (Species at Risk Committee 2017).

The Project area is located within known range for grizzly bears; however, presence in the boreal forest is less common than in other habitat types (GNWT 2020c). Grizzly bears have large home ranges, with maximum ranges of 6,700 km^2 for males and 2,100 km^2 for females. Habitat requirements for grizzly bears include adequate food supply, proper denning sites and protection from human disturbances. Grizzlies prefer open or semi-forested areas on all parts of their range and are most common in alpine and subalpine terrain or on the tundra, although sightings in the boreal forest are not uncommon. Bears eat a variety of different foods, with plants (horsetails, berries, legume roots and grasses) making up about 90 % of the diet of grizzly bears in the Mackenzie Mountains. Caribou are another important part of grizzly bear diet, and they may also eat lemmings and ground squirrels. Grizzlies are opportunistic predators and will kill moose, muskoxen and sheep if the occasion arises. Grizzlies are also carrion eaters and the carcasses of winter-killed animals can provide a source of food in spring before vegetation is available.

Human activity can present significant issues for grizzly bears, as bears will frequently consume and be attracted by human-generated garbage. Where grizzlies appear near human infrastructure, they are sometimes shot in defense of life or property. Human activities can also affect grizzly bear populations through harvesting, habitat degradation or both. Bears tend to avoid humans when possible, and this avoidance can lead to bears abandoning large sections of their home range.

Grizzly bears typically begin denning in September to early October with the first frosts and emerge from their dens beginning in April (Miller et al. 1982). Bears typically dig dens in till material available on mountain slopes, eskers, drumlins, stream banks, or in natural cavities.

During the Den and Nest Survey (Appendix C) completed in 2019, no evidence of bears (e.g. tracks or confirmed bear dens) were observed within 1.5 km of the ROW (ENR 2020). However, one lone grizzly bear track was observed on the MVWR at Canyon Creek prior to the survey.

7.2.3 Wolverines

Wolverines (*Gulo gulo*) are listed as a species of special concern by SARA and COSEWIC, but have no conservation status under territorial legislation. Increasing frequency and magnitude of threats, as well cumulative effects, could cause wolverines to be listed as a species of special concern in the NT (Species at Risk Committee 2014).

Wolverines live at low densities in home ranges that are generally large and can cover several hundred square kilometers (Banci 1994). An adult male typically uses an area several times larger than an adult female, and dispersing yearlings can typically cover over 1,000 km^2. Wolverines use different parts of their home range at different times of the year. They are well-adapted to deep snow packs, and appear to require large sparsely inhabited wilderness areas to meet their life requisites. They are scavenging predators with foraging habits that vary between seasons. During winter, they are primarily scavengers relying on carrion (Petersen 1997); and during the growing season they prey on small mammals including snowshoe hare, grouse, ptarmigan, ground squirrels, tree squirrels, mice and voles. Wolverines may also opportunistically take down moose and caribou calves.

The population of mature individuals across the Northwest Territories are estimated between 3,000 to 6,000, and the population is considered to be stable (ENR 2012; Species at Risk Committee 2014). Factors that may limit wolverine populations include harvest, disturbance of denning areas, threats to habitats, and fluctuations in wolves, bears, caribou and moose, as well as prey species. Transportation corridors are known to contribute to permanent, temporary or functional habitat losses (sensitivity to disturbance), which can destabilize populations. As wolverines have low reproduction rates, population recovery and habitat repopulation occurs slowly (Species at Risk Committee, 2014). Wolverines generally avoid areas of human activity, and disturbances near denning sites have adverse effects on wolverine reproduction in the long-term.

As wolverines occur throughout the NT, there is potential for the species to occur in the Project area. During the den and nest survey completed in 2019 (Appendix C), evidence of wolverines within the Project area was limited to tracks observed on the MVWR after completion of the survey (ENR 2020).

7.2.4 Moose

While moose (*Alces alces*) has not been given conservation status under *SARA, SARA (NWT)*, or by COSEWIC, the species is considered to be “big game” for the purposes of the territorial *Wildlife Act*.

Moose also have considerable cultural and spiritual importance for first nations groups throughout the NT, including in the Sahtu region.

Moose primarily obtain their food through browsing, and require abundant food located near secure cover. High quality moose habitat includes semi-open, sub-climax forests dominated by deciduous trees and shrubs. Heavily used areas include river floodplains, riparian areas along creeks, wetlands, and regenerating burns (Maier et al. 2005). In winter, forage is a critical life requisite for moose. Willow species are preferred winter forage species, while conifer stands play a role in providing snow interception and thermal cover during winter. Critical sources of secure cover in early spring calving season include dense tall shrub stands, shorelines and islands. Mineral licks are also a requirement for moose.

In the Sahtu Land Use Plan (SLUP), the Deh cho Special Management Zone (SMZ) contains riparian areas with high moose density during the winter (SLUPB 2013). The presence of moose within the Project area was identified by GeoNorth and Golder and Associates Ltd. in 2000; and subsequent wildlife tracking surveys completed in 2015 and 2019 also identified moose within the Project area (GeoNorth and Golder and Associates 2000, ENR 2015, ENR 2020). The Traditional Knowledge study completed by the NWRRC confirmed that moose are harvested in the Project area (NWRRC 2019).

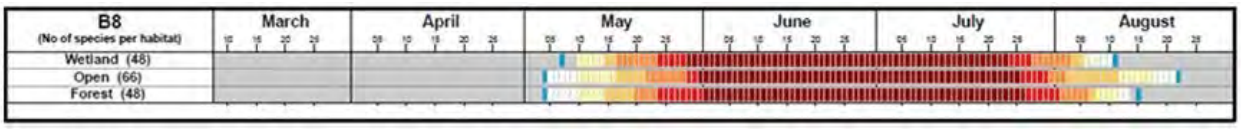
7.3 Birds

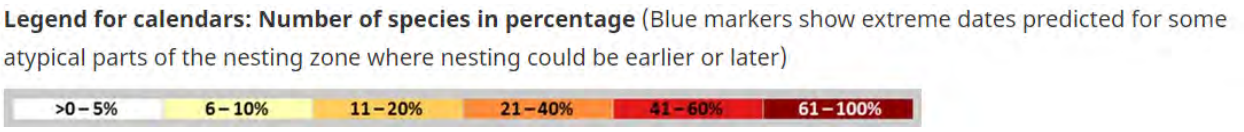
Several bird species with federal conservation status (SARA and COSEWIC) have ranges which overlap with the Project area, though none of these species are listed under territorial legislation. The listed species include two species of raptors (peregrine falcon and short-eared owl), bank swallow, barn swallow, Harris's sparrow, horned grebe, rusty blackbird, red-necked phalarope, and olive-sided flycatcher.

While some of these species have the potential to nest in the Project area, no raptor species nests were observed within 1.5 km of the ROW during the den and nest survey completed in 2019 (Appendix C) (ENR 2020). During the 2015 den and nest survey, one raptor nest was observed 600 m north of the CCASAR (ENR 2015).

The Project occurs within nesting zone B8 for nesting birds (Government of Canada 2020b). Within the zone, 48 species are known to nest in forest habitats, 66 in open, and 48 in wetland habitats. The nesting period for birds in this nesting zone lasts from early May to late August, with the highest percentages (between 61 to 100 %) of species actively nesting between late May to mid to late July as illustrated in Figure 7-2.

Figure 7-2 Nesting Period for Birds in Project Area





Source: (Government of Canada 2020b)

7.4 Insects

Four insect species with federal conservation status may occur within the Project area. These are the gypsy cuckoo bumble bee, the Suckley's cuckoo bumble bee, the yellow-banded bumble bee, and the transverse lady beetle. The status of these species at a territorial level has not been determined.

Project activities are not expected to produce negative impacts that would be specific to insects.

8 Socio-Economic Environment

Most of the socio-economic impacts of the Project will be experienced by the Town of Norman Wells. Some socio-economic impacts may also be experienced by nearby communities in the Sahtu, such as Tulita.

8.1 Overview - Norman Wells

The Town of Norman Wells is located on the north bank of the Mackenzie River, approximately 684 km northwest of Yellowknife and 80 km northwest of Tulita. It is accessible by air from Inuvik and Yellowknife year round. A winter road links the community with Tulita and Wrigley. Bulk supplies and food are barged to the community during the summer months.

8.1.1 Population

The current population of Norman Wells is 768 (NWT Bureau of Statistics 2020). Over time, the population has fluctuated, from a minimum of 744 in 2002 to a maximum of 837 in 2004. Births per year ranged from six to 18 between 1995 and 2018, with an average of 12 births per year. Based on the 2018 population estimates, the population projection for Norman Wells is to increase to 844 by 2035. There were an average of three deaths per year between 1995 and 2018.

Table 8-1 below summarizes the population, gender, age, and education of Norman Wells residents. The population is relatively young, with approximately 67 % of the population aged 44 or younger. There are more males (51 %) than females (49 %) in the community, and approximately 39 % of the population is indigenous.

Table 8-1 Norman Wells Gender and Ethnicity Demographics

Total Population (2019)	768
Number of Males	390
Number of Females	378
Age (2019)	
% 0 – 14 years	5.3
% 15 – 24 years	5.7
% 25 – 44 years	7.8
% 45 – 59 years	16.0
% 60 years and older	31.6
Education	
% High school diploma or more (2016)	82.2

Source: (NWT Bureau of Statistics 2020)

8.1.2 Education

The percentage of Norman Wells residents with a high school diploma or more is 82.2 % (NWT Bureau of Statistics 2020). Of those residents who obtained a high school diploma or more in 2014, 87.9 % were employed. By comparison, 36.3 % of residents without a high school diploma were reported as being employed in 2014.

8.1.3 Labour and Income

As of 2016, 82.2 % of the community population was considered part of the labor force, with an employment rate of 78.0 % and an unemployment rate of 5.2% (NWT Bureau of Statistics 2020). The unemployment rate in Norman Wells has decreased in recent years from 7.5 % in 2011 to 5.2 % in 2016. This is likely to be partially due to the community's small population size.

Of those who were employed in Norman Wells in 2016, 41.3 % worked for industries other than government, health, social services, and education, or goods producing which represented 31.5 % and 27.2 % of employment, respectively (NWT Bureau of Statistics 2020). The average employment income for Norman Wells residents was $ 84,500 in 2017, and the average family income in 2017 was $ 171,889 (NWT Bureau of Statistics 2020).

8.1.4 Traditional Economy

Traditional activities refer to the set practices which define the historical way of living for an Indigenous group of people. Traditional practices include land and resource uses, spiritual practices, and relationships to the land which have been passed down through many generations

from a group's distant ancestors. Components of traditional lifestyle for Norman Wells residents include hunting, fishing, trapping, arts and crafts, and the consumption of country foods.

Table 8-2 shows the percentage of the overall population of Norman Wells which engaged in various traditional activities in 2014.

Table 8-2 Norman Wells Traditional Activities Profile (2014)

Activity	Percent of Population
Hunting and Fishing	39.4 %
Trapping	2.8 %
Producing arts and crafts	27.3 %
Households consuming country foods for half their diet or more	26.7 %

Source: (NWT Bureau of Statistics 2020)

8.1.5 Business Services

The community of Norman Wells is the commercial and service hub of the Sahtu. The economy in Norman Wells is based primarily on oil and gas drilling and exploration. The service industry is well-developed and provides supplies for both residents and visitors to the community and employment to the local and regional population.

Norman Wells is connected to the south via the Mackenzie Valley Winter Road for two to three months of the year (December to March). Access to the community is provided year round through the community airport, which has scheduled air service daily to other Sahtu communities, Inuvik, and Yellowknife. Equipment and supplies are also transported to the community via barges operated on the Mackenzie River.

A list of businesses in Norman Wells is presented in Table 8-3.

Table 8-3 Businesses in Norman Wells

- 2B Taxi
- 506698 NWT Ltd. (Janitorial Services)
- 506974 NWT Ltd. (Wolverine Technical Solutions)
- Advance North
- Arctic Energy Alliance
- Aurora College, Norman Wells Learning Centre
- Blue Hills Ltd.
- Boiler Controls & Installations
- Neyo Drilling & Blasting
- Norman Wells Claimant Corporation Ltd.
- Norman Wells Historical Society (1977)
- Norman Wells Land Corporation
- Norman Wells Transportation Ltd.
- Norman Wells Children's Playgroup Association
- North-Wright Airways Ltd.
- Northern

- Borealis Communications Inc.
- Canadian Helicopters Ltd.
- Canadian North
- Canoe North Adventures Ltd.
- Canol Cleaning Services
- Canol Oilfield Services Inc.
- Cathy's Kitchen
- Central Mechanical Systems Ltd.
- CIBC (Canadian Imperial Bank of Commerce)
- ConocoPhillips Canada
- DJ Enterprises
- Enbridge Pipelines (NW) Inc.
- Frontier Medex Sahtu Limited
- Global Technical Systems Ltd.
- Green Energy NWT Inc.
- Green Enterprises Northwest Territories
- Harold's Construction
- Hay River Liquor Retailers (1992) Ltd. operating as Norman Wells Liquor Store
- HCI Leasing Inc.
- Heritage Hotel
- HRN Contracting Ltd.
- HRN Labour Services Ltd.
- Imperial Oil Resources (NWT) Ltd.
- J&D Ditchers
- JFSL Field Services Ltd.
- K.B. Bookkeeping and Consulting
- Kestrel Environmental Services
- Little Ducklings Day Home
- Lolita's Massage & Wellness
- Lone Loon Fine Woodworking
- Lorraine Tremblay CGA and Associates
- MacKay Expediting & Logistics (MXL)
- McCoy Enterprises Ltd.
- Mid-Arctic Transportation Co. Ltd. (MATCO)
- Mountain Dene Tulu Services
- Mountain River Outdoor Adventures Inc.
- Mountain View Sales & Services
- Mr. Joe's
- Northern Cartrols Ltd.
- Northern Transportation Company Ltd.
- Northridge Contracting Ltd.
- Northwest Transport Ltd.
- Northwest Territories Housing Corporation
- Northwest Territories Power Corporation
- Pete Rose's Welding
- Petra's Cleaning Services
- Precision Well Servicing
- Pyramid Corporation
- Ptarmigan Ridge Golf Club
- Rampart Rentals
- Royal Canadian Legion
- Royal Mackenzie Catering Ltd.
- S.R.P. North Ventures Ltd.
- S.R.P. Petroleum (A division of S.R.P. North Ventures Ltd.)
- Sahtu Adventures Inc.
- Sahtu Building Supplies
- Sahtu Computer Services
- Sahtu Dene Inn Inc.
- Sahtu Gardens
- Sahtu Helicopters (3542564 Canada Inc.)
- Sahtu Paddleboards
- Schlumberger of Canada Ltd.
- Sweet Treats
- Taiga Services
- Treeline
- Trumpeter Camp Company Partnership
- Tulita District Investment Corporation
- Whiponic Northern Cartrols Inc (Heritage Hotel)
- Willow Crescent Quilting
- Yamouri Inn Ltd.

Source: (Town of Norman Wells Business Directory 2020).

8.2 Overview - Tulita

The Hamlet of Tulita is located on the northern bank of the Mackenzie River, at its junction with the east bank of the Great Bear River. Tulita is accessible year round by air from Norman Wells and bulk supplies and food are barged to the community during the summer months. The winter road connects Tulita with Norman Wells and Wrigley during the winter months.

8.2.1 Population

Based on the 2018 census, the population of Tulita is 531 (NWT Bureau of Statistics 2020). Overtime, the population has remained generally consistent, fluctuating between 495 and 526 between 2001 and 2009. The community has an average birth rate of eight births per year, and an average death rate of two deaths per year. Based on the 2018 population estimates, the population projection for Tulita is to decrease to 457 by 2035.

Table 8-4 below summarizes the population, gender, age, and education of Tulita residents. The population is relatively young, with approximately 63 % of the population aged 44 or younger. There are more males (56 %) than females (44 %) in the community, and approximately 83 % of the population is indigenous.

Table 8-4 Tulita Gender and Ethnicity Demographics

Total Population (2019)	531
Number of Males	299
Number of Females	232
Age (2019)	
% 0 – 14 years	23
% 15 – 24 years	15
% 25 – 44 years	24
% 45 – 59 years	21
% 60 years and older	16
Education	
% High school diploma or more (2016)	50

Source: (NWT Bureau of Statistics 2020).

8.2.2 Education

The percentage of Tulita residents with a high school diploma or more is 50 % (NWT Bureau of Statistics 2020). Of those residents who obtained a high school diploma or more in 2014, 69.2 % were employed. By comparison, 29.8 % of residents without a high school diploma were reported as being employed in 2014.

8.2.3 Labour and Income

As of 2016, 64.5 % of the community population was considered part of the labor force, with an employment rate of 53.9 % and an unemployment rate of 14.3 % (NWT Bureau of Statistics 2020). The unemployment rate in Tulita has decreased in recent years from 23.3 % in 2011 to 14.3 % in 2016. This is likely to be partially due to the community's small population size.

Of those who were employed in Tulita in 2016, 39.0 % worked for industries other than government, health, social services, and education (which represented 46.3 % of employment); or goods producing (which 14.6 % of employment) (NWT Bureau of Statistics 2020). The average employment income for Tulita residents was $ 36,141 in 2017, and the average family income in 2017 was $ 91,000 (NWT Bureau of Statistics 2020).

8.2.4 Traditional Economy

Components of traditional lifestyle for Tulita residents include hunting, fishing, trapping, arts and crafts, and the consumption of country foods. Table 8-5 shows the percentage of the overall population of Tulita which engaged in various traditional activities in 2014.

Table 8-5 Tulita Traditional Activities Profile

Activity	Percent of Population
Hunting and Fishing	57 %
Trapping	8.7 %
Producing arts and crafts	23.3 %
Households consuming country foods half of their diet or more	59.8 %

Source: (NWT Bureau of Statistics 2020).

8.2.5 Business Services

The local economy in Tulita is primarily based on hunting, fishing, and trapping. Oil exploration, tourism, arts and crafts are also features of the economy. A list of businesses in Tulita is presented in Table 8-6.

Table 8-6 Businesses in Tulita

• Tulita Summit Air Services Limited Partnership	• HRN Contracting Ltd.
• Sahtu Geomatics Ltd.	• Blueridge Enterprise
• MacKay Range Development	• Kalo Stantec Limited
• Tulita Gravel & Concrete Ltd.	• Willow Lake Environmental Ltd.
• Tulita Forest Products Ltd.	• Stewart Heating & Repair Inc.
• M.Y.B Construction Ltd.	• Cornerstone Oilfield Services Inc.
• Northern Envirosearch (Tulita) Ltd.	• BJ Services Limited
• Tulita Water Services Ltd.	• Northern Store

Source: (GNWT Department of Industry, Tourism, and Investment 2020).

8.3 Cultural and Historical Resources

8.3.1 Traditional Land Use

The NWRRC TK Study identified that the Project area is used for traditional (hunting and trapping) as well as recreational land uses (NWRRC 2020). Used for traditional purposes by residents from Norman Wells and Tulita, the Project area is located within a traditional boundary between Tulita and Norman Wells trappers. Harvested species include moose, caribou, and muskox, rabbits, spruce hens, grouse). Trappers use the area intermittently looking for mink, martin, beaver, lynx, wolverine, fox, and wolves.

Three cabins were identified near the Project area, each located on the Mackenzie River and accessed during the summer by boat and ATVs; during the fall and winter, the ROW is used to access the cabins (NWRRC 2020). The TRRC TK Study also confirmed a cabin at Canyon Creek which remains in use (TRRC 2020).

The TRRC TK Study identified that although there are no known spiritual or ceremonial sites within the Project area, there may be unmarked burial sites as people used to live in the Project area (TRRC 2020). Historically, the Project area was used as a traditional trail with camps located along it. Only some of the trails are known. The Project area has been an important harvesting area for people within the community of Tulita.

8.3.2 Archeological Assessments

8.3.2.1 Edie Lake Quarry

Archeological assessments were completed at the Edie Lake Quarry by Points West Heritage Consulting Ltd. in 2010 and 2015 (Points West Heritage Consulting Ltd. 2016). The 2015 assessment was limited to the northeast portion of the quarry. The 2015 assessment and did not identify any archaeological remains; however, it identified areas of good archaeological potential in the surrounding areas. The assessment recommended the completion of an archaeological impact assessment (AIA) prior to development.

In 2017, Stantec completed an AIA on the remainder of the quarry site (Stantec Consulting Ltd. 2018). A total of 17 potential zones were identified and assessed during the assessment. The assessment did not identify archaeological resources within the boundaries of the proposed quarry; as a result, no further studies were recommended for the quarry area.

8.3.2.2 Project ROW

An archaeological overview assessment (AOA) was completed on the Project ROW in 2019 to assess the potential heritage resources along the Project ROW (Stantec 2019). The following key findings were outlined in the AOA report:

- The proposed road alignment is located within the Zone 63 Deh Cho (Mackenzie River) which is a SMZ within the SLUP (Sahtu Land Use Planning Board 2013). This SMZ was developed to protect cultural/heritage areas, as well as water quality, riparian habitat, and wildlife. As a result, this SMZ has been identified to have the potential to have traditional land use sites.
- The majority of the proposed alignment was concluded to be of low archaeological potential due to the flat and featureless landscape within heavily treed terrain.
- Five watercourse crossings were identified as having high archaeological potential, including Canyon Creek, Francis Creek, Helava Creek, Christina Creek, and Prohibition Creek.
- Based on the findings of the assessment, Stantec recommended AIAs be completed in the areas of highest potential prior to any land-altering Project activities. Stantec recommended that work can proceed in previously disturbed lands (e.g. along the existing alignment).

Prior to the start of construction, an AIA will be completed within undisturbed areas identified as having high archaeological potential along the Project ROW. The findings of this assessment will be integrated into the Project design.

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Appendix A

Traditional Knowledge Studies

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Phone: (867) 587-2455 Fax: (867) 587-2545

January 9 2020

Joe Acorn
Manager, Mackenzie Valley Highway
Environmental Affairs
Department Of Infrastructure
Government of the Northwest Territories
PO Box 1320
Yellowknife NT X1A 2L9

Dear Joe:

Traditional Knowledge Study
Canyon Creek to Prohibition Creek Access Road

Attached you will find a TK Study for Canyon Creek to Prohibition Creek Access Road completed by Norman Wells Renewable Resources Council consultant Roger Odgaard.

We interviewed 5 Elders – John McDonald, Margaret McDonald, Norman McDonald, Harold McDonald and Edward Oudzie.

We look forward to participating in the activities during this project bt providing monitors.

Sincerely,

Ruby L. McDonald
Office Manager

Enclosures (1)

P.O. Box 520, Norman Wells, NT X0E 0V0
Phone: (867) 587-2455 Fax: (867) 587-2545

Canyon Creek to Prohibition Creek

Access Road TK Study

Jan 2020

Introduction

The Government of the Northwest Territories (GNWT) is planning to construct a 13 km all season access road from Canyon Creek to Prohibition Creek. The GNWT is calling this proposed road the Prohibition Creek Access Road, or PCAR.

In order to understand the cultural resources that are present near the project area, and to plan the project in a way that prevents negative impacts on these resources, the GNWT has put together this questionnaire to gain insight into local and regional traditional knowledge about this area.

Methodology

The proposed Canyon Creek to Prohibition Creek Access Road TK study was done conducting one on one interviews with the local land users who are also lifetime users of the area.

Five local life, long community members were interviewed regarding the Canyon Creek to Prohibition Creek Access Road, they are:

Johnny McDonald

Margaret McDonald

Norman McDonald

Harold McDonald

Edward Oudzie

The Proposed access work area

The Prohibition Creek Access Road will run straight from Canyon Creek to Prohibition Creek, with no corners or turns in the complete 13km section. It will follow the existing winter road and be widened to 30 meters from Canyon to Prohibition Creeks. It will not cross or disturb any major water ways. There are no cabins or dwellings on the access road.

Cabins

There are three cabins close to the work area. These three cabins are all on the banks of the Mackenzie River, about one to two miles from the access road.

Bobby Lennie has built a small cabin on the west side of Prohibition Creek. This cabin has only been there for a couple years. Bobby is a beneficiary from Tulita, who moved to Norman Wells with his family, around ten years ago.

Jarred Kumar has built a cabin on the east side of Prohibition Creek, and he built his cabin about six years ago. Kumar is a non aboriginal person who moved to Norman Wells around 15 years ago, he also has an aboriginal spouse and family.

Roger Odgaard has a cabin at the mouth of Canyon Creek on the Mackenzie River. This cabin and area have been in the family for over 75 years. This is the traditional area for the Hodgson/Tourangeau family.

Access to all three cabins is by boat in the summer, as well as quads in the summer along the shore. In the fall and winter seasons, the winter road right away is used by quads for access to these cabins. There is to much muskeg on the right of way for access in the summer.

Traditional Land Use

This area between Canyon Creek and Prohibition Creek, has been traditionally used by both Tulita and Norman Wells indigenous residents. Most members of the NWLC are descendants and relations to the people of Tulita. In the past, (not so much anymore), this area was harvested and trapped by both Tulita and Norman Wells people. The Tulita people would station across on the Bear River on the west side, and trap between Norman Wells and Tulita before Christmas. They would trap beaver and all fur bearers that would bring a good price. Often they would come and visit my mother and I at Canyon Creek before freeze up.

VegetationThis area is common with the boreal forest that takes up most of the valley. Mostly white spruce with some birch trees in the area.

There are some blueberries and cranberries sporadic in the area. The winter road right away is comprised mostly of muskeg from Canyon to Prohibition, making it difficult to drive quads on in the summer.

Wildlife

This area is common for moose and some caribou. Muskox show up in the area, more so lately. These are the large game harvested in the area.

Trappers that utilize the area periodically, set traps for martin, mink, beaver, lynx, wolverines, fox and wolves.

There is the usual small game that can be harvested in the area, such as rabbits, spruce hens, and grouse.

There are no fish lakes in this area.

Closing comments

All and all, this extension of the road from Canyon Creek to Prohibition Creek, is welcomed by all. I did not receive any negative comments, and all seem to look forward to the work and they also look forward to a road all the way south one day. There does not appear to be any hazards or sensitive areas to be concerned about.

_____ Roger Odgaard (Interviewer)

JOHN McDONALD R.O.

Traditional Knowledge Questionnaire: Prohibition Creek Access Road

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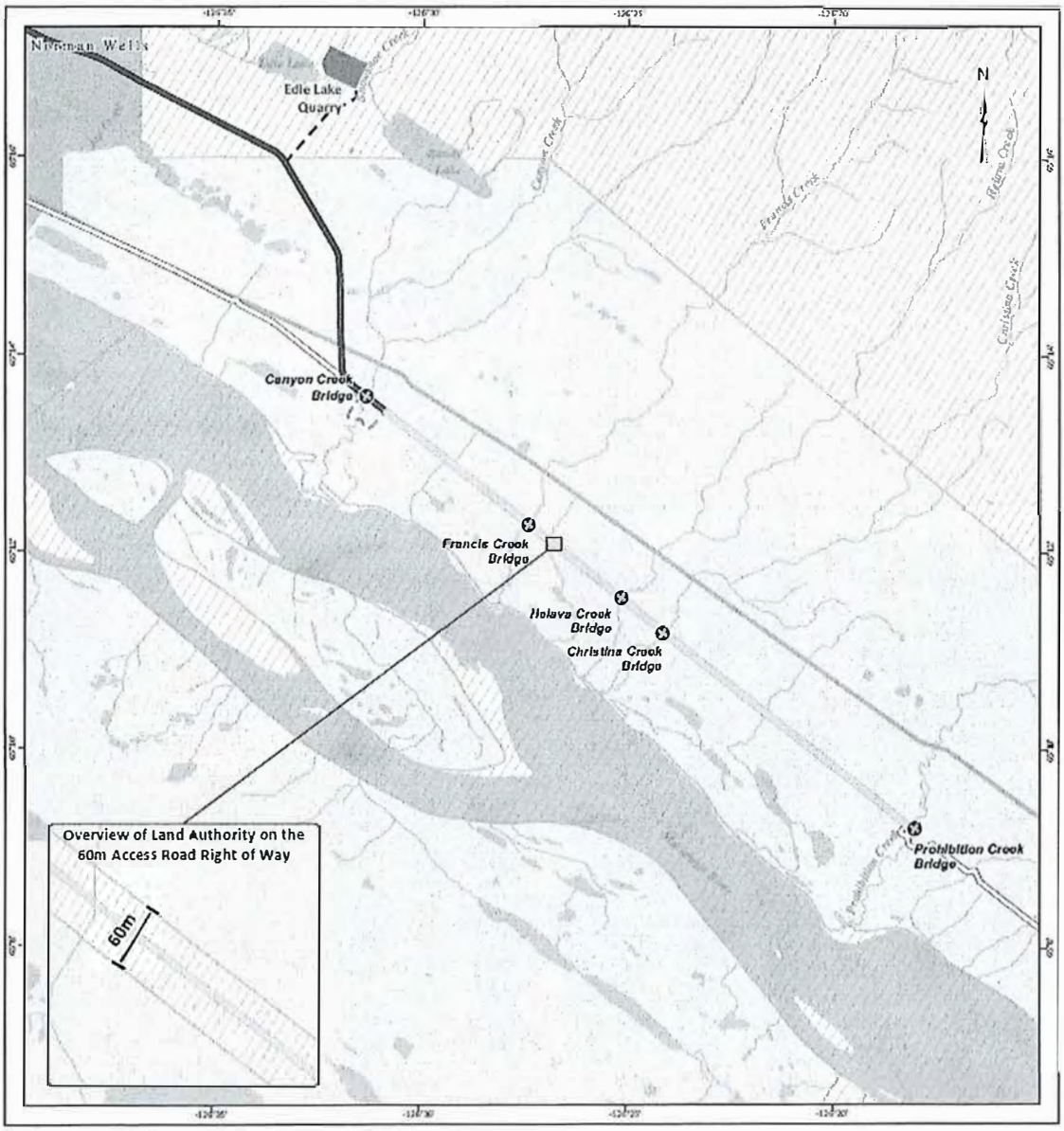

In order understand the cultural resources that are present near the project area, and to plan the project in a way that prevents negative impacts on these resources, the GNWT has put together the following questionnaire to gain insight into local and regional traditional knowledge (TK) about the area.

Q1 Who uses the area around the proposed project?

ABORIGINAL & NON ABORIGINAL HARVESTERS & RECREATIONAL USERS

Q2 How long has this area been used by you, your family, and your community?

1940's

Q3 Do you have, or do you know someone who has, a cabin in the area? Where is this cabin located?

BOBBY LONNIE - PROHIBITION EAST

KUMAR - PROHIBITION - WEST

ROGER OGARD - CANYON CREEK

Q4 Are there any traditional boundaries within this area? Where are these boundaries?

TRADITIONAL FORT NORMAN AND NORMAN WELLS TRAPPERS.

Q5 Are there any specific types of land in this area (ex. stream shorelines, lowlands, hills/mountains) that are considered important for traditional land use?

ALL OF IT

Q6 What is the permafrost like in the area? Where are the areas of high and low permafrost occurrence?

NORMAL

Q7 What kind of wildlife is harvested in this area? Where are the most important areas for hunting and harvesting? Is there any wildlife occurring in the area that is considered important outside of harvesting purposes?

Moose, Caribou, Muskox
— Martin, Fox, Lynz,
Wolverine, Wolves

Q8 Are there any locations that are important for hunting and trapping?

All of it

Q9 Are there any culturally important plants within the surrounding area? If so, are there specific locations that are considered important for vegetation harvesting?

No

Q10 Are there any places near the proposed project that are considered important for fishing? If so, what kinds of fish are caught in these areas?

MACKENZIE RIVER

Q11 Do you know if there are any fish spawning habitats near the proposed project?

NO

Q12 Are there important natural corridors or trails that are used for travelling or hunting? If so, where are these located?

RIGHT OF WAY - PIPELINE

WINTER ROAD

Q13 When does the water typically begin to freeze in this area? When does the ice begin to thaw?

FREEZE OCT / NOV

THAW - APRIL / MAY

Q14 Are there any springs located near the proposed project?

NO

Q15 Are there any burial grounds, spiritual sites, or ceremonial sites in this area?

NO

Q16 Can you provide any information about the stories behind the traditional names of places and features in the area?

No

Q17 Are there any other traditional activities or important sites that occur in the area, aside from those which were previously mentioned?

No

MARGRET McDONALD R.O.

Traditional Knowledge Questionnaire: Prohibition Creek Access Road

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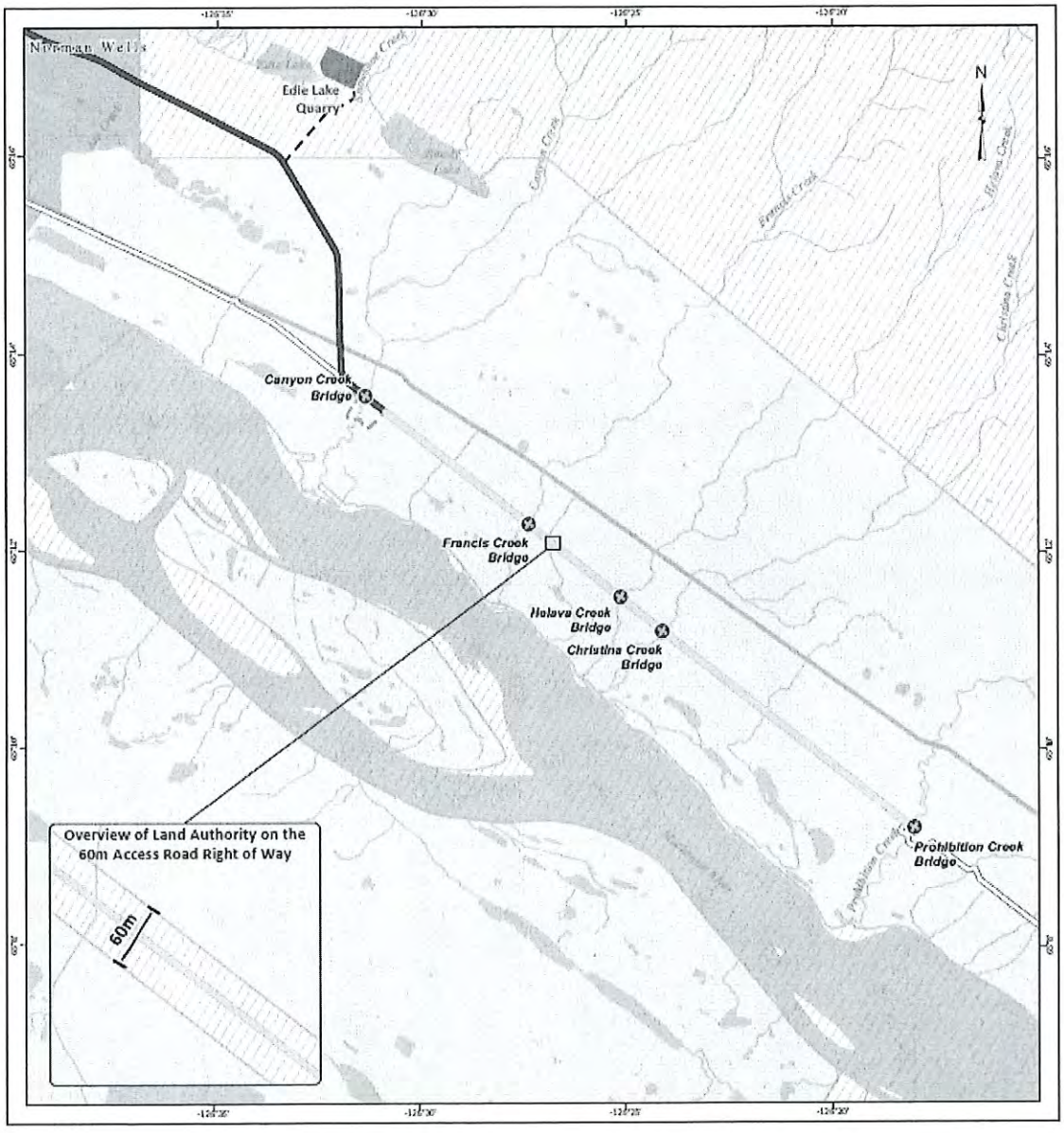

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Q1 Who uses the area around the proposed project?

PEOPLE FROM NORMAN WELLS

Q2 How long has this area been used by you, your family, and your community?

1940's → PRESENT

Q3 Do you have, or do you know someone who has, a cabin in the area? Where is this cabin located?

KUMAR – EAST OF PROHIBITION

BOBBY/LENNIE – WEST OF PROHIBITION

ROGER ODJARD – CANYON CREEK

Q4 Are there any traditional boundaries within this area? Where are these boundaries?

No

Q5 Are there any specific types of land in this area (ex. stream shorelines, lowlands, hills/mountains) that are considered important for traditional land use?

SHORE OF MACKENZIE RIVER

Q6 What is the permafrost like in the area? Where are the areas of high and low permafrost occurrence?

LOW ON THE RIGHT OF WAY

Q7 What kind of wildlife is harvested in this area? Where are the most important areas for hunting and harvesting? Is there any wildlife occurring in the area that is considered important outside of harvesting purposes?

SMALL GAME – SPRUCE HENS
– RABBITS
MOOSE/CARIBOU

Q8 Are there any locations that are important for hunting and trapping?

THE WHOLE AREA

Q9 Are there any culturally important plants within the surrounding area? If so, are there specific locations that are considered important for vegetation harvesting?

BLUE BERRIES/CRAN BERRIES

Q10 Are there any places near the proposed project that are considered important for fishing? If so, what kinds of fish are caught in these areas?

Not Really

Q11 Do you know if there are any fish spawning habitats near the proposed project?

No

Q12 Are there important natural corridors or trails that are used for travelling or hunting? If so, where are these located?

Winter Road

Q13 When does the water typically begin to freeze in this area? When does the ice begin to thaw?

LATE OCTOBER - FREEZE

LATE APRIL - THAW

Q14 Are there any springs located near the proposed project?

NO

Q15 Are there any burial grounds, spiritual sites, or ceremonial sites in this area?

NO

Q16 Can you provide any information about the stories behind the traditional names of places and features in the area?

No

Q17 Are there any other traditional activities or important sites that occur in the area, aside from those which were previously mentioned?

No

Norman McDonald R.O.

Traditional Knowledge Questionnaire: Prohibition Creek Access Road

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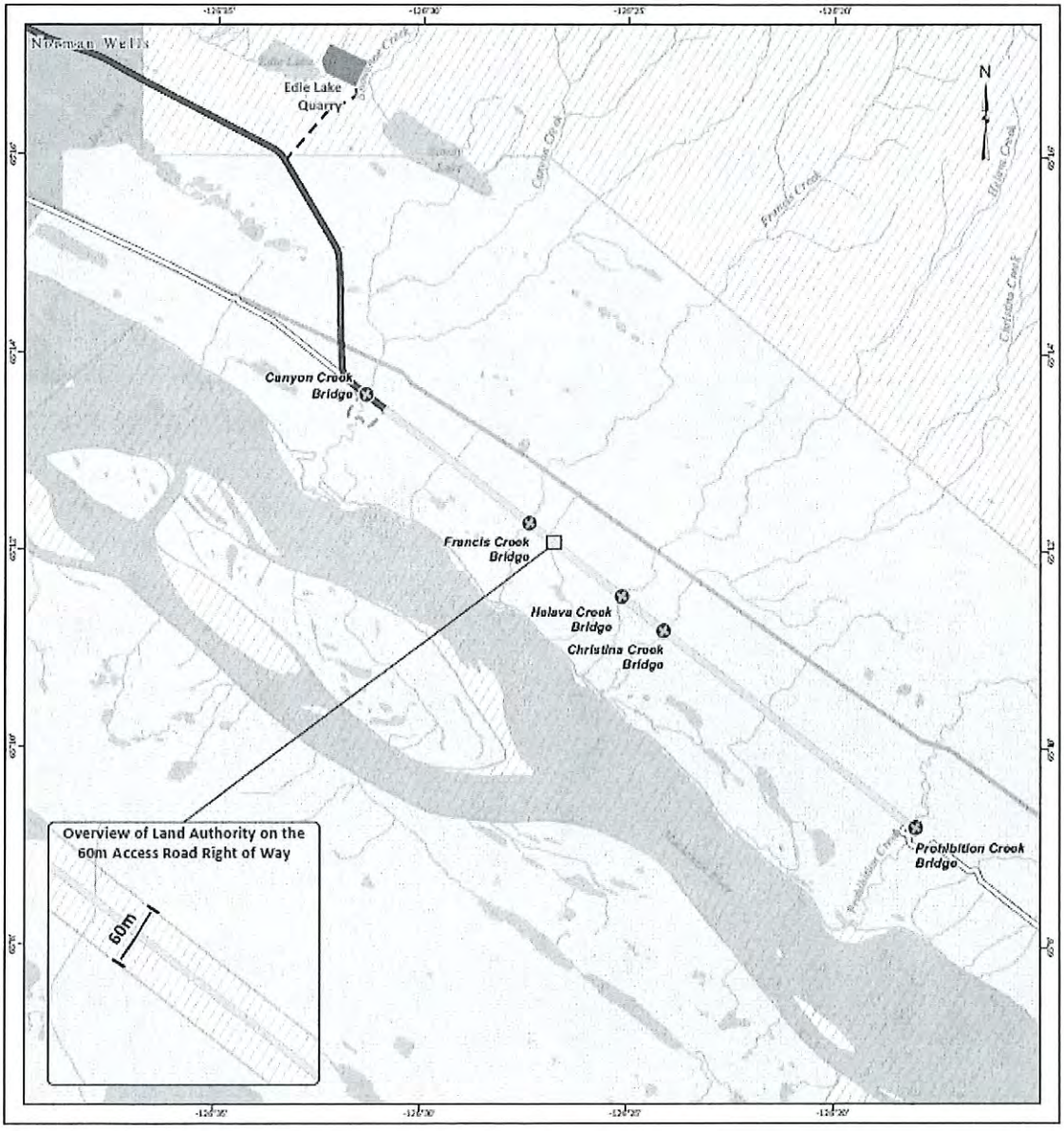

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Q1 Who uses the area around the proposed project?

RECREATIONAL USERS & HUNTERS FROM NORMAN WELLS

Q2 How long has this area been used by you, your family, and your community?

1940's

Q3 Do you have, or do you know someone who has, a cabin in the area? Where is this cabin located?

R.O. - CANYON CREEK

BOBBY LENNIE - PROHIBITION WEST

KUMAR - PROHIBITION EAST

Q4 Are there any traditional boundaries within this area? Where are these boundaries?

No

Q5 Are there any specific types of land in this area (ex. stream shorelines, lowlands, hills/mountains) that are considered important for traditional land use?

ALL OF IT.

Q6 What is the permafrost like in the area? Where are the areas of high and low permafrost occurrence?

NOT SURE.

Q7 What kind of wildlife is harvested in this area? Where are the most important areas for hunting and harvesting? Is there any wildlife occurring in the area that is considered important outside of harvesting purposes?

MOOSE, CARIBOU, MUSKOX, SMALL GAME

TRAP → MARTN, LYNZ, FOX, WOLVES, WOLVERINES

Q8 Are there any locations that are important for hunting and trapping?

ALL

Q9 Are there any culturally important plants within the surrounding area? If so, are there specific locations that are considered important for vegetation harvesting?

NO

Q10 Are there any places near the proposed project that are considered important for fishing? If so, what kinds of fish are caught in these areas?

No, just the river.

Q11 Do you know if there are any fish spawning habitats near the proposed project?

CANYON & PROHIBITION
GET THE ODD WHITEFISH
& OR GRAYLING

Q12 Are there important natural corridors or trails that are used for travelling or hunting? If so, where are these located?

WINTER ROAD RIGHT OF WAY,
SHORE OF THE RIVER

Q13 When does the water typically begin to freeze in this area? When does the ice begin to thaw?

FREEZE LATE OCTOBER, THAWS IN APRIL

Q14 Are there any springs located near the proposed project?

NO

Q15 Are there any burial grounds, spiritual sites, or ceremonial sites in this area?

NO

Q16 Can you provide any information about the stories behind the traditional names of places and features in the area?

PROHIBITION CREEK, OLD BOUDRY FOR PROHIBITION OF BOOZE FOR TULITA.

Q17 Are there any other traditional activities or important sites that occur in the area, aside from those which were previously mentioned?

No

HAROLD McDONALD
R.O.

Traditional Knowledge Questionnaire: Prohibition Creek Access Road

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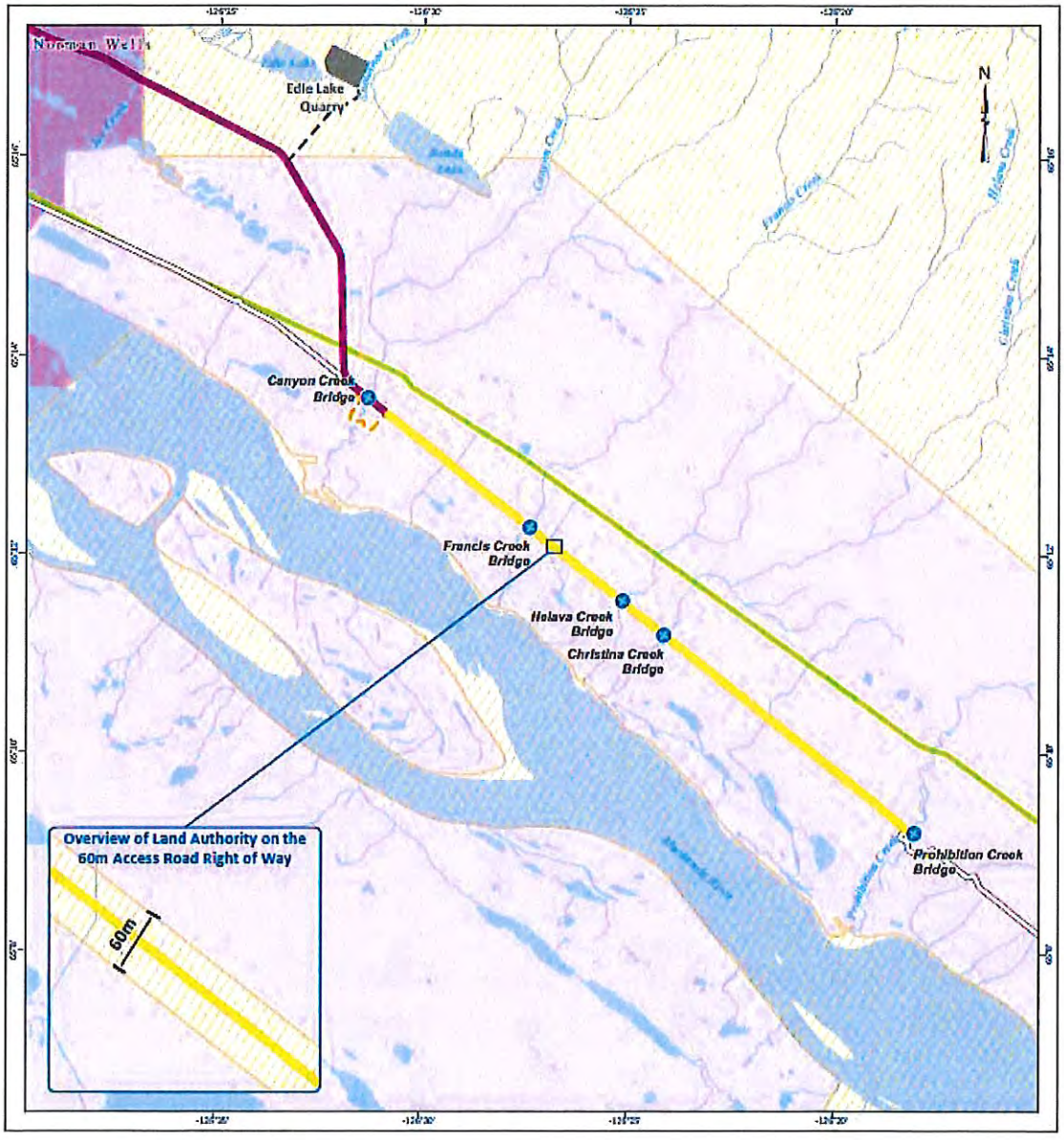

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Q1 Who uses the area around the proposed project?

HUNTERS FROM NORMAN WELLS & TULITA

Q2 How long has this area been used by you, your family, and your community?

1940's

Q3 Do you have, or do you know someone who has, a cabin in the area? Where is this cabin located?

BOBBY LENNIE - PROHIBITION

KUMAR - PROHIBITION

ROGER ODGAARD - CANYON CREEK

Q4 Are there any traditional boundaries within this area? Where are these boundaries?

No

Q5 Are there any specific types of land in this area (ex. stream shorelines, lowlands, hills/mountains) that are considered important for traditional land use?

ALL

Q6 What is the permafrost like in the area? Where are the areas of high and low permafrost occurrence?

MELTING ON WINTER ROAD

Q7 What kind of wildlife is harvested in this area? Where are the most important areas for hunting and harvesting? Is there any wildlife occurring in the area that is considered important outside of harvesting purposes?

Moose, Caribou, Muskox.

- Martin, Lynz, Wolverine, Fox, Wolves, Mink

Q8 Are there any locations that are important for hunting and trapping?

All of it

Q9 Are there any culturally important plants within the surrounding area? If so, are there specific locations that are considered important for vegetation harvesting?

Berries, Blue & Cran

Q10 Are there any places near the proposed project that are considered important for fishing? If so, what kinds of fish are caught in these areas?

RIVER

Q11 Do you know if there are any fish spawning habitats near the proposed project?

SPARADIC GRAYLING

Q12 Are there important natural corridors or trails that are used for travelling or hunting? If so, where are these located?

WINTER ROAD & CREEKS

Q13 When does the water typically begin to freeze in this area? When does the ice begin to thaw?

FREEZE – NOV.
THAW – MAY

Q14 Are there any springs located near the proposed project?

NO

Q15 Are there any burial grounds, spiritual sites, or ceremonial sites in this area?

NO

Q16 Can you provide any information about the stories behind the traditional names of places and features in the area?

No

Q17 Are there any other traditional activities or important sites that occur in the area, aside from those which were previously mentioned?

No

EDWARD OUDZIE R.O.

Traditional Knowledge Questionnaire: Prohibition Creek Access Road

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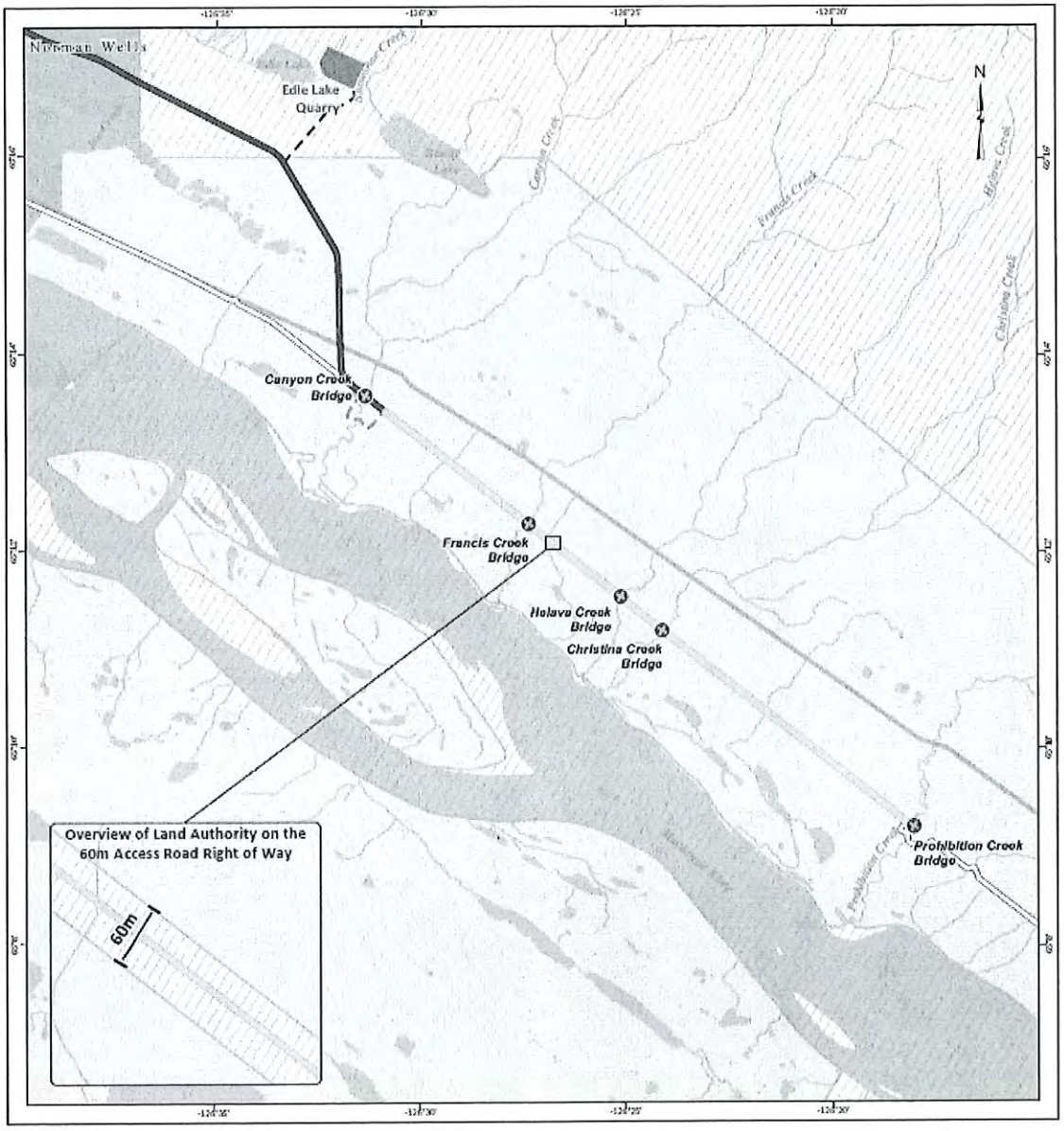

In order understand the cultural resources that are present near the project area, and to plan the project in a way that prevents negative impacts on these resources, the GNWT has put together the following questionnaire to gain insight into local and regional traditional knowledge (TK) about the area.

Q1 Who uses the area around the proposed project?

ABORIGINAL & NON ABORIGINAL HUNTERS, TRAPPERS

Q2 How long has this area been used by you, your family, and your community?

20 years

Q3 Do you have, or do you know someone who has, a cabin in the area? Where is this cabin located?

BOBBY LENNIE - PROHIBITION

KUMAR — PROHIBITION

ROGER ODOARD - CANYON CREEK

Q4 Are there any traditional boundaries within this area? Where are these boundaries?

No

Q5 Are there any specific types of land in this area (ex. stream shorelines, lowlands, hills/mountains) that are considered important for traditional land use?

No

Q6 What is the permafrost like in the area? Where are the areas of high and low permafrost occurrence?

Normal

Q7 What kind of wildlife is harvested in this area? Where are the most important areas for hunting and harvesting? Is there any wildlife occurring in the area that is considered important outside of harvesting purposes?

Small Game
Moose

Q8 Are there any locations that are important for hunting and trapping?

The Whole Area

Q9 Are there any culturally important plants within the surrounding area? If so, are there specific locations that are considered important for vegetation harvesting?

Not Really

Q10 Are there any places near the proposed project that are considered important for fishing? If so, what kinds of fish are caught in these areas?

MACKENZIE RIVER

Q11 Do you know if there are any fish spawning habitats near the proposed project?

CANYON & PROHIBITION
HAVE WHITEFISH & GRAYLING

Q12 Are there important natural corridors or trails that are used for travelling or hunting? If so, where are these located?

WINTER ROAD CUTLINE

Q13 When does the water typically begin to freeze in this area? When does the ice begin to thaw?

FREEZE IN NOV.

THAW IN MAY

Q14 Are there any springs located near the proposed project?

NO

Q15 Are there any burial grounds, spiritual sites, or ceremonial sites in this area?

NO

Q16 Can you provide any information about the stories behind the traditional names of places and features in the area?

PROHIBITION CREEK - FROM PROHIBITION DAYS

Q17 Are there any other traditional activities or important sites that occur in the area, aside from those which were previously mentioned?

NO

Interview List Probition Access

Andrew, Frank
Andrew, Frederick Jr.
Andrew, Norman
Bernarde, Joseph
Clement, Frederick Sr.
Clement, Mary Ann
Clement, Therese
Etchinelle, David
Horassi, Joseph
Horassi, Peter
Horassi, Robert
Lennie, Angus
Lennie, Wilfred
MacCauley, Edward
MacCauley, Jonas
Menacho, Charlotte
Pellissey, Vivian
Squirrel, Helen
Wrigley, Violet
Yakeleya, Gordon

Q1 Who uses the area around the proposed project?

#1 Pat Tourangeau's family, Edward Oudzi used the area
#2 The people that used the area are long gone (passed away)
#3 My parents used the area, Blondin family, Hodgson family, McDonald family
#4 Edith Hodgson cabin, now Roger Odgard at Canyon Creek
#5 Use to be a dog team trail and became the telegraph poles route for communication. After that it became the route for winter road.
People used lakes to hunt caribou and moose. Use to be camps along the road.
#6 Canyon Creek cabin belongs to Roger Odgard;. Ron Doctor has a tent somewhere along the river where he is building a cabin. Bruce McPherson has a cabin around Probition Creek.
#7 Eddie Hodgson has a cabin at Canyon Creek now owned by Rodger Odgard. Tourangeau's originally used this area. David Hodgson has a cabin on the Island across Canyon Creek and others too. People use winter road all the time back and forth.
#8 Both Norman Wells and Tulita people use the area
#9 The Tourangeau family used the area Blondins in the old days too. People use to trap around the area to Probition Creek.
#10 No one that I know of people use to but no more except Canyon Creek (Rodger Odgard)
#11 People go Spring hunt in the area before Canyon Creek close to Prohibition Creek
#12 Spring hunt around Probition Creek
#13 Not many people use the area except for Canyon Creek
#14 Roger Odgard lives at Canyon Creek. Pat Tourangeau trapped in the area and hunt moose
#15 I don't know who use this area but in the past our people being nomadic have stayed with families for

seasons, One family who was mentioned by elders were the Blondins, Lennies, Hodgsons, Tourangeaus. Another family move there in the fifties; The McDonald's who were the last group to move in the area. Other relatives stayed with relatives on and off throughout the last few years.

#16 Canyon Creek by Rodger Odgard
#17 Canyon Creek was the Tourangeau and Hodgson family
#18 Rodger Odgard and family. Traditionally Tourangeau/Hodgson family live at Canyon Creek
#19 We use to use the area for trapping but not anymore. Pat Tourangeau use to trap around there too.
#20 People use to use the area but no one uses the area today.

Q2 How long has this area been used by you, your family, and your community?

#1 People never used the area that I know of
#2 Used as winter road, quads in the summer months and river for transportation. Used area for hunting ground.
#3 They used it before early 1900's; before they found oil in Norman Wells area.
#4 I was really young and we went to Norman Wells when Esso first started and we stopped at Canyon Creek and there were families living there.
#5 All the time, its beside the river. Used for camping, fishing, muskrats and beaver on lakes for trapping.
#6 My family used this area since 35 years but my parents and other families used it all their lives
#7 All the time, since time immomorail for our people.
#8 All their life they have used this area for hunting, fishing and visiting
#9 As long as I can remember who knows how long
#10 A lot of people
#11 Since the 60's that I know of people hunt and trap in the area
#12 Parents hunt and trap in the area
#13 People trap around the area from Canyon Creek for hunting, trapping and fishing. People trap and get lots of fur
#14 People never used the area for hunting and trapping after Pat Tourangeau passed. They used to set nets on Mackenzie River.
#15 My family have used only by hunting and trapping in the area living with relatives before moving onto other areas.
#16 Canyon Creek- Tourangeau and Hodgson family live there all their lives. Now Rodger Odgard lives there.
#17 All their life the Tourangeau and Hodgson family
#18 All their life they raised their children there at Canyon Creek
#19 Before they use to use it all the time. No border.
#20 For awhile not to sure how long

Q3 Do you have, or do you know someone who has, a cabin in the area? Where is this cabin located?

#1 Bruce McPherson has a cabin along side of the river but don't know the exact location.
#2 Canyon Creek that use to be the Tourangeau family. There are tents at Prohibiton Creekk, Lisa Duncan and Bobby Lennie.
#3 Cabin at Canyon Creek belongs to Cecile and Hib Hodgson and then to Edith Hodgson and now Roger Odgard. There is cabins at 10 mile Island area.
#4 Edith Hodgson at Canyon Creek, Bruce McPherson, not sure where his cabin is located, Ron Doctor, not sure where his tent is located
#5 Cabin at Canyon Creek belongs to Roger Odgard. A non-aboriginal has a cabin along the way but it is

leased from GNWT. Bruce McPherson has a cabin in the area too.

#6 same as #1

#7 Same as #1, Rodger Odgard and David Hodgson on Island. Some one has a cabin on Point of Probition Creek and Dave Wilderspin has tentframe at lake before Probition Creek.

#8 Edith Hodgson used the area for hunting and fishing

#9 Lisa Duncan at Probition Creek, Bobby Lennie and just below on Probition Creek near the lake. Rodger Odgard at Canyon Creek.

#10 Canyon Creek, and MacCauleys on the Island

#11 There use to be a cabin somewhere in the hills in the back but not sure where it is exactly

#12 I remember a cabin in the hills somewhere but don't remember location

#13 Canyon Creek where Edith Hodgson has a cabin that use to belong to her family

#14 Canyon Creek - Rodger Odgard

#15 There is a cabin b uilt in 40's or 50's by Tourangeau's.

#16 Same as #1 - Canyon Creek Rodger Odgard

#17 Canyon Creek - Rodger Odgard and McMillian Creek Bruce McPherson

#18 Canyon Creek - Rodger Odgard

#19 Pat Tourangeau at Canyon Creek.

#20 Just Canyon Creek where there is a cabin

Q4 Are there any traditional boundaries within the area? Where are these boundaries?

#1 No boundaries that I am aware of
I don't know any boundaries

#3 No known boundaryt at this time

#4 Probition Creek? Not sure what it is for if there is a history

#5 No known boundaries but just one known as Tulita District area through SDMLCA

#6 I don't know of any boundaries

#7 No traditional boundaries, everything is open to people

#8 No known boundaries in the area

#9 Don't know any traditional boundaries

#10 No boundaries

#11 No boundary

#12 No boundary

#13 No known boundary

#14 No boundary known

#15 There were no boundaries during my time

#16 No boundary known between here and Norman Wells

#17 No boundaries

#18 No boundary

#19 No boundaries

#20 No known boundary

Q5 Are there any specific types of land in this area (ex streamsk, shorelines, lowlands, hills, mountains) that are considered important for traditional land use?

#1 Just timber is very important especially around Vermillion Creek

#2 Bear Rock is our important Land Mark

#3 There mayb e some burial sites in the area around Canyon Creek as people use to live in the area. Also 10 mile Island and the other side of Mackenzie river around 10 mile Island.

#4 Lots of people go hunting around the area
#5 Fish lakes and hunting closer to the river are important. Not so much the other side but towards Kelly Lake side. River is used for transportation and used for travel
#6 None that I know of in this area
#7 All land is important for landuse not just one area
#8 All the creeks are very important for moose, caribou, rabbits, lynx for all animal habitat
#9 Not that I know of
#10 None Known
#11 Yes, people use to hunt and trap in the area long ago
#12 Yes, people use to hunt and trap in the area long ago
#13 No known area but trapping in the area is good in the whole area
#14 Areas with traditional medicine
#15 There are streams at Canyon and Probition Creeks which the people use for drinking water. There are lowlands and mountains throughout this areause for fishing, hunting and trapping.
#16 The creeks are important, cant tear up the creeks. Need to be careful for sensitive areas such as creeks for small fish.
#17 None known
#18 Garden at Canyon Creek
#19 Creek for fishing, caribou around the area
#20 Fishing at Canyon Creek and Probition Creek

Q6 What is the permafrost like in the area? Where are the areas of high and low permafrost occurrence?

#1 Don't know
#2 I don't know where there is perma frost
#3 Permafrost in the whole area but more in muskeg area on right of way and less permafrost on high ridges.
#4 There is permafrost around all over but not sure how deep. Everything under muskeg is permafrost.
#5 The perma frost along side the river is starting to fall into the river. In the future there might be more thawing of permafrost. More studies need to be done in the future.
#6 Not sure of perma frost
#7 Don't know the perma frost condition
#8 There is permafrost all over. Very good high ground between the creeks.
#9 High perma frost around the lakes near swamp country
#10 None Known
#11 Permafrost on the muskeg areas
#12 Permafrost on muskeg areas
#13 The ground is still frozen deep down but is is slowly thawing out. Need to be careful for erosion.
#14 Permafrost is slowly melting that's why there is a lot of erosion along the river banks.
#15 I don't know this area as I do not use the area for traditional use
#16 Its all over the place permafrost
#17 Have permafrost around all the creeks in the area
#18 Not sure
#19 Permafrost in the low land areas
#20 Permafrost is melting because of climate change so there is not to permafrost because of climate change

Q7 What kind of wildlife is harvested in this area? Where are the most important areas for hunting and harvesting? Is there any wildlife occuring in the area that is considered important outside of harvesting purposes?

#1 Moose, Woodland Caribou, rabbit, chickens, woves, marten, bears, beaver, muskrat,
#2 People trap for martens, fox, lynx, and hunt moose, caribou and now see more muskox in the area
#3 Harvest caribou, moose, chicken, rabbit. All the creeks are very important for moose habitat. Trapping outside area for marten.
#4 Lots black bears, moose, lots of muskox, rabbits, wolves, now Gizzley Bears. Lots of Connie, blue fish and Berries.
#5 Moose, Woodland Caribou, fish lakes, beaver, muskrats, gees and other migratory birds, bears, lynx, Harvesting around lakes is important. Starting to see more muskox in the area northwest of highway.
#6 Moose, woodland caribou, marten, lynx, wolves, rabbit, now muskox in the area
#7 Lots of animals all over in the area such as moose, caribou, and some fish on Mackenzie River. See muskox in the area.
#8 Good habitat for moose around the creeks. Very good moose in this area, rabbits and lynx.
#9 Moose, caribou and now Muskox. Lots of marten, beaver, lynx and losts of muskrat in the area
#10 Moose, caribou, Muskox now in the area
#11 Moose, caribou, wolves, fox, bear, beaver, marten, woverine and muskrats
#12 Lots of animals in the area, moose, caribou, wolves, fox, bear, beaver, marten, muskrat, now muskox
#13 Moose, woodland caribou, fox, rabbit, lynx, marten, wolves, chicken
#14 Moose, Woodland Caribou, rabbit, chickens, wolves, marten, bears, beaver, muskrat, weasels. Squirrels
#15 Moose, caribou, rabbits. There are trees use for buildings
#16 Vermillion Creek people always shoot moose and Woodland Caribou there. Bruce McPherson has a cabin there.
#17 Marten, lynx, moose, woodland caribou, wolverine,
#18 Rabbits, marten, fox, lynx, chicken, moose, caribou
#19 Lots of moose, caribou, chicken, ptarmigan, fish, lots of everything
#20 Moose on the islands on the Mackenzie which is very important. Set a net on the Mackenzie for fish. Rabbits on the islands.

Q8 Are there any locations that are important for hunting and trapping?

#1 Along the roadside, people hunt and trap along the road
#2 Hunting in the area for moose, caribou
#3 The whole area is important for hunting and trapping.
#4 Everywhere, the lands provide to people from the area that travewl through area for hunting
#5 All areas are important for hunting and trapping and fishing
#6 The whole area for hunting and trapping
#7 Lots of moose or 10 mile Island and moose all over the area on both sides of the river.
#8 The whole area is good for hunting and trapping. Good for marten trapping.
#9 All the little lakes and high up in the hills for trapping
#10 The whole area is important for hunding and trapping
#11 The whole area is goo for hunting and fishing
#12 The whole area is good for hunting, trapping and fishing
#13 Good for hunting all over in the area and for trapping but not to many hunt and trap in the area
#14 Not sure
#15 Hunting and trapping are done throughout the area
#16 Blue fish creek is important; very good hunting area. Lots of beaver in the area.
#17 Sometimes people hunt and trap along the road
#18 The whole area is important for hunting and trapping.
#19 Hunt mainly around the shoreline

#20 The whole area is very good for trapping

Q9 Are there any culturally important plants within the surrounding area? If so, are there specific locations that are considered important for vegetation harvesting?

#1 No known areas
#2 Tourangeau use to have a garden at Canyon Creek growing lots of different vegetables
#3 Lots of blueberries, cranberries, knuckle berries around Canyon Creek area
#4 Lots of cranberries, blueberries, knuckleberries, they had a large garden at Canyon Creek years ago and lots of plants for traditional medicine.
#5 There are in depth documentation by elders on medicine and labrador tea, spruce gum. People use to tap trees. People did not leave a footprint because they moved around and not leave imprint. People collected rat root from lakes and other medicines. They used mud and clay for healing purposes.
#6 There should be traditional plants as they are moving around people would pick only what they need
#7 Spruce gum is very important, Labrador tea in area. Trees are important for branches, Birch trees, Popular trees, Willows and Lily pads
#8 Raven berries
#9 No I don't think so have not heard of anyone mentioning that
#10 Berries, Spruce trees, Willows, Flowers used for medicine
#11 Lots of medicine plants and cranberries, blueberries, and knuckle berries
#12 Lots of medicine plants and berries, cranberries, blueberries and knuckle berries
#13 Lots of medicinal plants all over but not to many people know about it
#14 All over the area is traditional plants for medicinal plants use not just one area
#15 Not known
#16 Good hunting along the Mackenzie River but very good hunting at 20 mile Island, Vemillion Creek and Canyon Creek areas.
#17 Sometimes there are berries around the hills such as cranberries, blue berries, knuckle berries, Birch trees, Spruce trees, Willows used for medicine.
#18 Lots of medicinal plants and lots of berries in the area along the road.
#19 No
#20 Canyon Creek and Prohibition Creek is good areas for animals. Animals go to the Island during winter season what kinds of fish are caught in these areas?

Q10 Are there any places near the proposed project that are considered important for fishing? If so, what kinds of fish are caught in these areas?

#1 No fish in those creeks that I know of
#2 I don't know of any fishing
#3 None known for fish in the creeks identified. Fish on the other side of Mackenzie River.
#4 Connie, losh, Blue fish along the Mackenziue River by setting net
#5 All the creeks are important because it is run off. Animals use the creeks to replenish themselves. not sure if fish in the tributaries. Need to find out more information.
#6 Would fish for Connie, jack fish, losh and suckers. Would go fishing at Sucker Creek for fish run
#7 Fish will be in the creeks and it will be grayling, jack fish
#8 Probition Creek has grayling
#9 No fish lakes around there
#10 Bluefish (grayling)
#11 Bluefis, white fish in the creeks in the area
#12 Bluefish (grayling), whitefish in the creeks in the area
#13 Not sure but there should be fish some where because where do the fish come from so there has to be fish

in the area. If people set a net they always catch fish.

#14 Canyon Creek - catch all kinds of fish connie, jack fish, herring, grayling, whitefish
#15 Fishing was done along Mackenzie River all types of fish are caught
#16 Mackenzie River catch Connie, Sucker, Grayling, Jack fish. Probition Creek is good place for fish net.
#17 Grayling and Connie on Mackenzie River and sometimes people have caught Salmon
#18 Grayling, jack fish, Connie, sucker and sometimes white fish
#19 Grayling, white fish, losh along the creeks.
#20 In the creeks, mainly jack fish and grayling. In the Mackenzie River all kinds of fish like Connie, Sucker, Herring, Losh, Pickeral and Jack Fish

Q11 Do you know if there are any fish spawning habitats near the proposed project?

#1 No
#2 No
#3 No, none known
#4 No. none known in this area
#5 Possibility at Probition Creek but not sure. Its important that we get that information.
#6 None that aware of
#7 Mackenzie River
#8 Don't know
#9 No don't think so not heard of any grayling in the creeks
#10 None known
#11 Yes, the fish spawn in eddies around the creeks
#12 Yes, the fish spawn in eddies around the creeks
#13 Maybe shomewhere but not sure where
#14 Don't think so, creeks are to small for fish spawning
#15 Not known
#16 All the creeks have areas where fish spawn. Probition Creek, fish spawn there.
#17 No
#18 Never heard of any spawning areas
#19 Gotta be spawning around the creeks.
#20 Where ever there is fish on the Mackenzie River there is always fish spawning. Canyon Creek and Probition Creek fish go up the creek to spawn.

Q12 Are there important natural corridors or trails that are used for travelling or hunting? If so, where are these located?

#1 None Known
#2 All over the place whereever they hunt there is trails
#3 Only around Canyon Creek
#4 Traditional trails along the Mackenzie Rivewr to peoples cabins and hunting and trapping trails
#5 This was an original dog team trail which evolved to a corridor for transportation. Closer to left hand side vs right hand side for use by people for hunting, fishing etc..,
#6 The travel was a traditional dog team trail and evolved to winter road
#7 used to be dog team trail that later used for winter road
#8 No known trails
#9 No don't know of any but there probably is that people don't use anymore. See trails when flying over the area
#10 Use to be traditional dog team trail and evolve to winter road

#11 Yes there are traditional trails around the area where people use to hunt and trap in the area
#12 Yes, lots of traditional trails around the area used for hunting and trapping
#13 Yes, people use to hunt and trap all over on the land. People walked all over to hunt and trap so there shoul be trails all over.
#14 Don't know, around Canyon Creek where Tourangeau family lived there and hunt and fish
#15 There are a lot of traditional trails used by our people throughout the areas. People would go to Kelly Lake for traditional purposes.
#16 None known
#17 No, None known
#18 Canyon Creek where people lived there is traditional trails for hunting and harvesting.
#19 Maybe around Canyon Creek.
#20 No known trails

Q13 When does the water typically begin to freeze in this area? When does the ice begin to thaw?

#1 Starts to freeze in October and thaw in May ususally
#2 Freeze usually 1st week of November and thaw April usually
#3 Freeze in November and thaw April or May
#4 Freeze in November and thaw May, different every year because of climate change
#5 Freeze up starts usually September but changing because of climate change to October or November.
The thaw season is usually one month ahead or behind.
It got warmer sooner this year than last year so we are one month ahead because of climate change.
Things are not the same anymore.
#6 Freeze usually October or November and thaw in April and more in May
#7 Freeze in October and thaw around April or May it will begin to thaw out.
#8 Freeze around October and thaw around May
#9 Freeze usually late October and thaw in April
#10 Freeze in November and thaw in April or May
#11 Freeze in October and thaw in April
#12 Freeze in October and thaw in April / May
#13 Freeze in October / November climate change so now takes longer to freeze and thaw in May climate chang so ice is much thinner than it use to be
#14 Freeze in October and thaw in April
#15 Water would freeze as soon as it turns cold. Mackenzie River usually freeze around November every year.
#16 Freeze in October and thaw in April
#17 Freeze in October/November and thaw in April / May
#18 Freeze in October and thaw in April /May
#19 Freeze in November and thaw in May
#20 Freeze in September and thaw in May

Q14 Are there any springs located near the proposed project

#1 No
#2 No known springs
#3 No
#4 None known
#5 None that I know of but does not mean there is not any under water streams that are fresh water.
#6 None that I know of in this area
#7 Not sure never heard of any springs

#8 No known sites
#9 Not that I know of
#10 None known
#11 Yes around the creeks
#12 Yes around the creeks
#13 Not sure but there should be under groun d spring in the area
#14 Water always flow in the creeks they do not totally freeze over
#15 There are lots of spring throughout the area
#16 Above Probition there is 2 sink holes on side of the mountain.
#17 Water went up in the spring, first time in a long time.
#18 None known
#19 No, none that I know of
#20 None known

Q15 Are there any burial grounds, spiritual sites, or ceremonial sites in this area?

#1 No
#2 I don't know
#3 Canyon Creek area, people use to live in the area in early 1900's
#4 Burial sites around Canyon Creek. People lived there and moved around so there could be burial sites that m not be marked.
#5 One of my elders told me there are people buried all along the river without markings to identify the area.
#6 People maybe buried around the area but not marked
#7 None known
#8 Not to sure, don't know
#9 Have not heard of any in this area but there probably is
#10 Maybe burial sites along the traditional trail that are unmarked
#11 None known
#12 None known but there probably is in the area
#13 Yes there should be because people traveled in the area along the traditional trail or where people lived
#14 No, none known
#15 Unknown. No one mentioned any sites.
#16 None known
#17 Never heard anything about these things
#18 Yes but not sure of the areas where people are buried and no markings
#19 No maybe Pat Tourageau place but never heard of any other areas.
#20 No none known

Q16 Can you provide any information about the stories behind the traditional names of the places and features in the area?

#1 No
#2 No, don't know why ncalled those names
#3 No known names
#4 Don't know because its all done in english not slavey. The well known place is Canyon Creek.
#5 A study of place names needs to be done. At one time the govt was suppose to do a project but it never happened. Need to give land marks proper slavey names.
#6 There are names for this area but now its all in english and different names. Need to get traditional name.
#7 "Pat Ahda" known as Canyon Creek. The names have changed to english so not sure of traditional names.

#8 Don't know the story behine the english names
#9 No don't know what the traditional names are or where the new names came from
#10 No traditional names known
#11 "Pat Ahda" known as Canyon Creek.
#12 "Pat Ahda" known as Canyon Creek
#13 "Pat Ahda" - Canyon Creek
#14 No
#15 Unknown
#16 "Pat Ahda" at Canyon Creek
#17 "Pat Ahda" at Canyon Creek and I don't know why they call it Probition Creek
#18 "Pat Ahda" at Canyon Creek
#19 "Pat Ahda" at Canyon Creek
#20 Prohibition Creek is "Pe lah ah ze adah" and "Pat Ahda" at Canyon Creek.

Q17 Are there any other traditional activities or important sites that occur in the area, aside from those which were previously mentioned?

#1 Timber for log cabins at Probition Creek, that is very important for people
#2 No
#3 Need to identify historical sites and identify burial sites for all projects
#4 People used snowshoes and dog team to travel in the area to hunt, trap and these days snowmobile. People travel by boat today to hunt and fish in the area
#5 Not sure, need to ask elders that may know that are 80 years an older.
#6 The whole area is important to the Dene people. Important for berries around in this area such as blueberrie cranberries, and knuckle berries
#7 Everything is important so its Important to keep all the land good. All creeks are important too because cannot afford for them to get blocked while building the road.
#8 No Known
#9 No
#10 No
#11 No
#12 No
#13 No
#14 No
#15 Unknown
#16 No
#17 No
#18 Canyon Creek, Need to protect the land and the animals. Need to worry about our young people and make sure we keep them safe when Highway is built.
#19 No, none known
#20 No

Appendix B

Wildlife in Project Area

Table B-1 Wildlife Located within Project Area[2]

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Mammals					
American Black Bear	*Ursus americanus*	Secure	Not Listed	Not Listed	Not at Risk
American Marten	*Martes americanus*	Secure	Not Listed	Not Listed	Not Listed
American Mink	*Neovison vison*	Secure	Not Listed	Not Listed	Not Listed
American Pygmy Shrew	*Sorex hoyi*	Secure	Not Listed	Not Listed	Not Listed
Arctic Fox	*Vulpes lagopus (Alopex lagopus)*	Secure	Not Listed	Not Listed	Not Listed
Arctic Ground Squirrel	*Urocitellus parryii (Spermophilus parryii)*	Secure	Not Listed	Not Listed	Not Listed
Arctic Hare	*Lepus arcticus*	Secure	Not Listed	Not Listed	Not Listed
Arctic Shrew	*Sorex arcticus*	Secure	Not Listed	Not Listed	Not Listed
Beaver	*Castor canadensis*	Secure	Not Listed	Not Listed	Not Listed
Boreal Caribou	*Rangifer tarandus caribou*	At Risk	Threatened	Threatened	Threatened
Canadian Lynx	*Lynx canadensis*	Secure	Not Listed	Not Listed	Not At Risk
Gray Wolf	*Canis lupus*	Secure	Not Listed	Not Listed	Not At Risk
Grizzly Bear (Western Population)	*Ursus arctos*	Sensitive	No Status	Special Concern	Special Concern
Least Weasel	*Mustela nivalis*	Secure	Not Listed	Not Listed	Not Listed
Masked Shrew	*Sorex cinereus*	Secure	Not Listed	Not Listed	Not Listed
Meadow Vole	*Microtus pennsylvanicus*	Secure	Not Listed	Not Listed	Not Listed
Moose	*Alces americanus*	Secure	Not Listed	Not Listed	Not Listed
Muskrat	*Ondatra zibethicus*	Secure	Not Listed	Not Listed	Not Listed
Nearctic Brown Lemming	*Lemmus trimucronatus (sibiricus)*	Secure	Not Listed	Not Listed	Not Listed
North American Porcupine	*Erethizon dorsatum*	Secure	Not Listed	Not Listed	Not Listed

[2] Species identified through the NWT Species 2016-2020 - General Status Ranks of Wild Species in the NWT (Working Group on the General Status of NWT Species 2016). Species ranges determined through International Union for Conservation of Natures (IUCN's) Red List of Threatened Species (IUCN 2020), IORVL 2004, and Cornell Lab or Ornithology 2020. Conservation status source: GNWT 2020c and Government of Canada 2020a.

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
North American River Otter	*Lontra canadensis*	Secure	Not Listed	Not Listed	Not Listed
Northern Bog Lemming	*Synaptomys borealis*	Secure	Not Listed	Not Listed	Not Listed
Northern Flying Squirrel	*Glaucomys sabrinus*	Secure	Not Listed	Not Listed	Not Listed
Northern Red-backed Vole	*Myodes rutilus*	Secure	Not Listed	Not Listed	Not Listed
Red Fox	*Vulpes vulpes*	Secure	Not Listed	Not Listed	Not Listed
Red Squirrel	*Tamiasciurus hudsonicus*	Secure	Not Listed	Not Listed	Not Listed
Root vole (Tundra Vole)	*Microtus xanthognathus*	Secure	Not Listed	Not Listed	Not Listed
Short Tailed Weasel (Ermine)	*Mustela erminea*	Secure	Not Listed	Not Listed	Not Listed
Snowshoe Hare	*Lepus americanus*	Secure	Not Listed	Not Listed	Not Listed
Taiga (Chestnut-cheeked) Vole	*Microtus xanthognathus*	Secure	Not Listed	Not Listed	Not Listed
Wolverine	*Gulo Gulo*	Sensitive	No Status	Special Concern	Special Concern
Birds					
Alder Flycatcher	*Empidonax alnorum*	Secure	Not Listed	Not Listed	Not Listed
American Golden Plover	*Pluvialis dominica*	Sensitive	Not Listed	Not Listed	Not Listed
American Kestrel	*Falco sparverius*	Secure	Not Listed	Not Listed	Not Listed
American Pipet	*Anthus rubescens*	Undetermined	Not Listed	Not Listed	Not Listed
American Robin	*Turdus migratorius*	Secure	Not Listed	Not Listed	Not Listed
American Three-toed Woodpecker	*Picoides dorsalis*	Secure	Not Listed	Not Listed	Not Listed
American Tree Sparrow	*Spizelloides arborea*	Secure	Not Listed	Not Listed	Not Listed
American Wigeon	*Mareca americana*	Secure	Not Listed	Not Listed	Not Listed
Arctic Tern	*Sterna paradisaea*	Secure	Not Listed	Not Listed	Not Listed
Baird's Sandpiper	*Calidris bairdii*	Secure	Not Listed	Not Listed	Not Listed
Bald Eagle	*Haliaeetus leucocephalus*	Secure	Not Listed	Not Listed	Not Listed
Bank Swallow	*Riparia riparia*	At Risk	Not Applicable	Threatened	Threatened
Barn Swallow	*Hirundo rustica*	At Risk	Not Applicable	Threatened	Threatened

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Belted Kingfisher	*Megaceryle alcyon*	Secure	Not Listed	Not Listed	Not Listed
Black-backed Woodpecker	*Picoides arcticus*	Secure	Not Listed	Not Listed	Not Listed
Black-bellied Plover	*Pluvialis squatarola*	Sensitive	Not Listed	Not Listed	Not Listed
Blackpoll Warbler	*Setophaga striata*	Secure	Not Listed	Not Listed	Not Listed
Bohemian Waxwing	*Bombycilla garrulus*	Secure	Not Listed	Not Listed	Not Listed
Bonaparte's Gull	*Chroicocephalus philadelphia*	Secure	Not Listed	Not Listed	Not Listed
Boreal Chickadee	*Poecile hudsonica*	Sensitive	Not Listed	Not Listed	Not Listed
Boreal Owl	*Aegolius funereus*	Secure	Not Listed	Not Listed	Not at Risk
Bufflehead	*Bucephala albeola*	Secure	Not Listed	Not Listed	Not Listed
Cackling Goose	*Branta hutchinsii*	Secure	Not Listed	Not Listed	Not Listed
Canada Goose	*Branta canadensis*	Secure	Not Listed	Not Listed	Not Listed
Canvasback	*Aythya valisineria*	Secure	Not Listed	Not Listed	Not Listed
Chipping Sparrow	*Spizella passerina*	Secure	Not Listed	Not Listed	Not Listed
Cliff Swallow	*Petrochelidon phyrrhonota*	Secure	Not Listed	Not Listed	Not Listed
Common Goldeneye	*Bucephala clangula*	Secure	Not Listed	Not Listed	Not Listed
Common Loon	*Gavia immer*	Secure	Not Listed	Not Listed	Not At Risk
Common Nighthawk	*Chordeiles minor*	At Risk	Not Applicable	Threatened	Special Concern
Common Raven	*Corvus corax*	Secure	Not Listed	Not Listed	Not At Risk
Common Redpoll	*Acanthis flammea*	Secure	Not Listed	Not Listed	Not Listed
Dark-eyed Junco	*Junco hyemalis*	Secure	Not Listed	Not Listed	Not Listed
Downy Woodpecker	*Picoides pubescens*	Secure	Not Listed	Not Listed	Not Listed
Eastern Phoebe	*Sayornis phoebe*	Secure	Not Listed	Not Listed	Not Listed
Fox Sparrow	*Passerella iliaca*	Secure	Not Listed	Not Listed	Not Listed
Golden Eagle	*Aquila chrysaetos*	Secure	Not Listed	Not Listed	Not At Risk
Gray Jay	*Perisoreus canadensis*	Secure	Not Listed	Not Listed	Not Listed
Gray-cheeked Thrush	*Catharus minimus*	Secure	Not Listed	Not Listed	Not Listed
Great Gray Owl	*Strix nebulosa*	Secure	Not Listed	Not Listed	Not At Risk
Great Horned Owl	*Bubo virginiansis*	Secure	Not Listed	Not Listed	Not Listed

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Greater Scaup	*Aythya marila*	Secure	Not Listed	Not Listed	Not Listed
Greater White-fronted Goose	*Answer albifrons*	Secure	Not Listed	Not Listed	Not Listed
Green-winged Teal	*Anas crecca*	Secure	Not Listed	Not Listed	Not Listed
Gyrfalcon	*Falco rusticolus*	Secure	Not Listed	Not Listed	Not At Risk
Hairy Woodpecker	*Picoides villosus*	Secure	Not Listed	Not Listed	Not Listed
Harris's Sparrow	*Zonotrichia querula*	Undetermined	Not Applicable	Under Consideration	Special Concern
Herring Gull	*Larus argentatus*	Secure	Not Listed	Not Listed	Not Listed
Hoary Redpoll	*Acanthis hornemanni*	Undetermined	Not Listed	Not Listed	Not Listed
Horned Grebe	*Podiceps auritus*	Sensitive	Not Applicable	Special Concern	Special Concern
Horned Lark	*Eremophila alpestris*	Secure	Not Listed	Not Listed	Not Listed
Killdeer	*Charadrius vociferus*	Secure	Not Listed	Not Listed	Not Listed
Lapland Longspur	*Calcarius lapponicus*	Secure	Not Listed	Not Listed	Not Listed
Least Sandpiper	*Calidris minutilla*	Secure	Not Listed	Not Listed	Not Listed
Lesser Scaup	*Aythya affinis*	Sensitive	Not Listed	Not Listed	Not Listed
Lesser Yellowlegs	*Tringa flavipes*	Sensitive	Not Listed	Not Listed	Not Listed
Lincoln's Sparrow	*Melospiza lincolnii*	Secure	Not Listed	Not Listed	Not Listed
Long-tailed Duck	*Clangula hyemalis*	Sensitive	Not Listed	Not Listed	Not Listed
Mallard	*Anas platyrhynchos*	Secure	Not Listed	Not Listed	Not Listed
Merlin	*Falco columbarius*	Secure	Not Listed	Not Listed	Not At Risk
Mew Gull	*Larus canus*	Secure	Not Listed	Not Listed	Not Listed
Northern Flicker	*Colaptes auratus*	Secure	Not Listed	Not Listed	Not Listed
Northern Goshawk	*Accipiter gentilis*	Secure	Not Listed	Not Listed	Not At Risk
Northern Harrier	*Circus cyaneus*	Secure	Not Listed	Not Listed	Not At Risk
Northern Hawk Owl	*Surnia ulula*	Secure	Not Listed	Not Listed	Not At Risk
Northern Pintail	*Anas acuta*	Sensitive	Not Listed	Not Listed	Not Listed
Northern Shrike	*Lanius excubitor*	Secure	Not Listed	Not Listed	Not Listed
Northern Waterthrush	*Parkesia noveboracensis*	Secure	Not Listed	Not Listed	Not Listed
Olive-sided Flycatcher	*Contopus cooperid*	At Risk	Not Applicable	Threatened	Special Concern

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Orange-crowned Warbler	*Oreothlypis celata*	Secure	Not Listed	Not Listed	Not Listed
Osprey	*Pandion haliaetus*	Secure	Not Listed	Not Listed	Not Listed
Pacific Loon	*Gavia pacifica*	Secure	Not Listed	Not Listed	Not Listed
Pectoral Sandpiper	*Calidris melanotos*	Secure	Not Listed	Not Listed	Not Listed
Peregrine Falcon	*Falco peregrinus*	Sensitive	No Status	Special Concern	Not at Risk
Pine Grosbeak	*Pinicola enucleator*	Secure	Not Listed	Not Listed	Not Listed
Pine Siskin	*Spinus pinus*	Secure	Not Listed	Not Listed	Not Listed
Red-breasted Merganser	*Mergus seraator*	Secure	Not Listed	Not Listed	Not Listed
Red-tailed Hawk	*Aquila chrysaetos*	Secure	Not Listed	Not Listed	Not At Risk
Red-throated Loon	*Gavia stellata*	Secure	Not Listed	Not Listed	Not Listed
Ring-necked Duck	*Aythya collaris*	Secure	Not Listed	Not Listed	Not Listed
Red-eyed Vireo	*Vireo olivaceous*	Secure	Not Listed	Not Listed	Not Listed
Red-necked Grebe	*Podiceps grisegena*	Secure	Not Listed	Special Concern	Special Concern
Red-necked Phalarope	*Phalaropus lobatus*	Sensitive	Not Applicable	Special Concern	Special Concern
Red-winged Blackbird	*Agelaius phoeniceus*	Secure	Not Listed	Not Listed	Not Listed
Rock Ptarmigan	*Lagopus muta*	Secure	Not Listed	Not Listed	Not Listed
Rough-legged Hawk	*Buteo lagopus*	Secure	Not Listed	Not Listed	Not At Risk
Ruby-crowned Kinglet	*Regulus calendula*	Secure	Not Listed	Not Listed	Not Listed
Rusty Blackbird	*Euphagus carolinus*	Sensitive	No Status	Special Concern	Special Concern
Savannah Sparrow	*Passerculus sandwichensis*	Secure	Not Listed	Not Listed	Not Listed
Say's Phoebe	*Sayornis saya*	Undetermined	Not Listed	Not Listed	Not Listed
Semipalmated Plover	*Charadrius semipalmatus*	Secure	Not Listed	Not Listed	Not Listed
Semipalmated Sandpiper	*Calidris pusilla*	Sensitive	Not Listed	Not Listed	Not Listed
Sandhill Crane	*Grus canadensis*	Secure	Not Listed	Not Listed	Not Listed
Sharp-shinned Hawk	*Accipiter striatus*	Secure	Not Listed	Not Listed	Not At Risk
Sharp-tailed Grouse	*Tympanuchus phasianellus*	Secure	Not Listed	Not Listed	Not Listed

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Short-eared Owl	*Asio flammeus*	Sensitive	No Status	Special Concern	Special Concern
Smith's Longspur	*Calcarius pictus*	Undetermined	Not Listed	Not Listed	Not Listed
Snow Bunting	*Plectrophenax nivalis*	Secure	Not Listed	Not Listed	Not Listed
Snowy Owl	*Bubo scandiacus*	Secure	Not Listed	Not Listed	Not At Risk
Sora	*Porzana Carolina*	Secure	Not Listed	Not Listed	Not Listed
Spotted Sandpiper	*Actitus macularius*	Secure	Not Listed	Not Listed	Not Listed
Spruce Grouse	*Falcipennis canadensis*	Secure	Not Listed	Not Listed	Not Listed
Surf Scoter	*Melanitta perspicillata*	Sensitive	Not Listed	Not Listed	Not Listed
Swamp Sparrow	*Melospiza georgiana*	Secure	Not Listed	Not Listed	Not Listed
Tennessee warbler	*Oreothlypsis peregrina*	Secure	Not Listed	Not Listed	Not Listed
Townsend's Solitaire	*Myadestes townsendi*	Secure	Not Listed	Not Listed	Not Listed
Tree Swallow	*Tachycineta bicolor*	Secure	Not Listed	Not Listed	Not Listed
Tundra Swan	*Cygnus columbianus*	Secure	Not Listed	Not Listed	Not Listed
Varied thrush	*Ixoreus naevius*	Undetermined	Not Listed	Not Listed	Not Listed
Warbling Vireo	*Vireo gilvus*	Secure	Not Listed	Not Listed	Not Listed
Western Tanager	*Piranga ludoviciana*	Secure	Not Listed	Not Listed	Not Listed
White-crowned Sparrow	*Zonotrichia leucophrys*	Secure	Not Listed	Not Listed	Not Listed
White-throated Sparrow	*Zonotrichia albicollis*	Secure	Not Listed	Not Listed	Not Listed
White-winged Crossbill	*Loxia leucoptera*	Secure	Not Listed	Not Listed	Not Listed
White-winged Scoter	*Melanitta fusca*	Sensitive	Not Listed	Not Listed	Not Listed
Willow Ptarmigan	*Lagopus lagopus*	Secure	Not Listed	Not Listed	Not Listed
Wilson's Snipe	*Gallinago delicata*	Secure	Not Listed	Not Listed	Not Listed
Wilson's Warbler	*Cardellina pusilla*	Secure	Not Listed	Not Listed	Not Listed
Yellow Warbler	*Setophaga petechia*	Secure	Not Listed	Not Listed	Not Listed
Yellow-bellied Sapsucker	*Sphyrapicus varius*	Secure	Not Listed	Not Listed	Not Listed
Yellow-rumped Warbler	*Setophaga coronata*	Secure	Not Listed	Not Listed	Not Listed

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Amphibians					
Boreal Chorus Frog	*Pseudacris maculata*	Secure	Not Listed	Not Listed	Not Listed
Wood Frog	*Lithobates sylvaticus*	Secure	Not Listed	Not Listed	Not Listed
Fish[3]					
Arctic Cisco	*Coregonus autumnalis*	Sensitive	Not Listed	Not Listed	Not Listed
Arctic Lamprey	*Lethenteron camtschaticum*	Undetermined	Not Listed	Not Listed	Not Listed
Bering Cisco	*Coregonus laurettoe*	Presence Expected	Not Listed	Not Listed	Not Listed
Arctic Grayling	*Thymallus arcticus*	Secure	Not Listed	Not Listed	Not Listed
Broad Whitefish	*Coregonus nasus*	Secure	Not Listed	Not Listed	Not Listed
Brook Stickleback	*Culaea inconstans*	Secure	Not Listed	Not Listed	Not Listed
Bull Trout	*Salvelinus confluentus*	Sensitive	Not Applicable	Special Concern	Special Concern
Burbot	*Lota lota*	Secure	Not Listed	Not Listed	Not Listed
Chum Salmon	*Oncorhynchus keta*	Undetermined	Not Listed	Not Listed	Not Listed
Cisco	*Coregonus arted*	Secure	Not Listed	Not Listed	Not Listed
Emerald Shiner	*Notropis atherinoides*	Secure	Not Listed	Not Listed	Not Listed
Finescale Dace	*Chrosomus neogaeus*	Secure	Not Listed	Not Listed	Not Listed
Flathead Chub	*Platygobio gracilis*	Secure	Not Listed	Not Listed	Not Listed
Goldeye	*Hiodon alosoides*	Secure	Not Listed	Not Listed	Not Listed
Inconnu	*Stenodus leucichthys*	Sensitive	Not Listed	Not Listed	Not Listed
Lake Chub[4]	*Couesius plumbeus*	Secure	Not Listed	Not Listed	Not Listed
Lake Trout	*Salvelinus namaycush*	Secure	Not Listed	Not Listed	Not Listed
Lake Whitefish	*Coregonus clupeaformis*	Secure	Not Listed	Not Listed	Not Listed
Largescale Sucker	*Catostomus macrocheilus*	Presence Expected	Not Listed	Not Listed	Not Listed
Least Cisco	*Coregonus sardinela*	Secure	Not Listed	Not Listed	Not Listed

[3] Chinook Salmon, Coho Salmon, Pink Salmon, and Sockeye Salmon have been identified as vagrant and/or undetermined rankings in the NT General Status Ranking Program. These species have been identified as threatened or endangered under SARA or COSEWIC; however, the populations at risk are located outside of the NT. As a result, the status for these populations has been identified as Not Listed.
[4] Lake Chub populations within the NT are not at risk.

Common Name	Scientific Name	NT General Status Ranks	Conservation Status		
			SARA (NWT)	SARA (Schedule 1)	COSEWIC
Longnose Dace	*Rhinichthys cataractae*	Secure	Not Listed	Not Listed	Not Listed
Longnose Sucker[5]	*Catostomus catostomus*	Secure	Not Listed	Not Listed	Not Listed
Mountain Whitefish	*Prosopium willimsoni*	Secure	Not Listed	Not Listed	Not Listed
Ninespine Stickleback	*Pungitius pungitius*	Secure	Not Listed	Not Listed	Not Listed
Northern Pike	*Esox lucius*	Secure	Not Listed	Not Listed	Not Listed
Pond Smelt	*Hypomesus olidus*	Secure	Not Listed	Not Listed	Not Listed
Round Whitefish	*Prosopium cylindraceum*	Secure	Not Listed	Not Listed	Not Listed
Shortjaw Cisco	*Coregonus zenithicus*	At Risk	Not Applicable	No Status	Threatened
Slimy Sculpin	*Cottus cognatus*	Secure	Not Listed	Not Listed	Not Listed
Spoonhead Sculpin	*Cottus ricel*	Secure	Not Listed	No Status	Not at Risk
Spottail Shiner	*Notropis hudsonius*	Secure	Not Listed	Not Listed	Not Listed
Trout-Perch	*Percopsis omiscomaycus*	Secure	Not Listed	Not Listed	Not Listed
Walleye	*Sander vitreus*	Secure	Not Listed	Not Listed	Not Listed
White Sucker	*Catostomus commersonii*	Secure	Not Listed	Not Listed	Not Listed

[5] Salish Sucker populations, which are a subspecies of the Longnose Sucker, are listed as Threatened under SARA and COSEWIC. These populations are confined to lower British Columbia and are not located within the Project area.

Appendix C

2019 Den and Nest Survey Report

Black Bear, Grizzly Bear, Wolverine and Wolf Den Survey and Raptor Nest Survey for the proposed Prohibition creek realignment

Field Report, January 2020

Prepared by: Kevin Chan, ENR, Sahtu Region

Introduction

The Government of the Northwest Territories (GNWT) Department of Infrastructure (DoI) will be planning a relocation of the Prohibition creek bridge. The Department of Environment and Natural Resources (ENR) was requested to conduct a den and nest survey of black bears, grizzly bears, wolverines, wolves and any raptor species prior to the work that will occur around the Prohibition creek site to mitigate and minimize the amount of disturbance to local wildlife.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has assessed the status of, and listed, the western population of wolverine and grizzly bear in Canada as *Special Concern*. Both wolverine and grizzly bear, with their low tolerance to human disturbance, could be affected by operations in the project area. Although wolves and black bears are less sensitive to disturbance, often being seen around populated areas including Tulita and the location of the proposed bridge, these factors may also have a negative impact wolves and black bears through increased noise pollution, vehicle collisions, and easier access for harvesters. Wolves and wolverines are not target species for local trappers but when caught, can be quite profitable for trappers. Traditional Knowledge (TK) study was done in 2003 during the consultation process for the Prohibition Creek's bridge location and the results indicated that these species utilize the Prohibition Creek area and that it was quite common to see bears walking on the road to use as a corridor.

In addition, many raptor species nest within the Northwest Territories such as (but not limited to) osprey, bald and golden eagle, boreal owl, great horned owl, snowy owl, rough-legged hawk, gyrfalcon. Of particular concern is the peregrine falcon (COSEWIC species of *Special Concern*); populations of which are currently recovering after a drastic decline in the 1960s and 1970s due to the exposure to organochlorine pesticides such as DDT. Of the three subspecies of peregrine falcons, the *anatum* subspecies is found south of the tree line, with a large population located along the Mackenzie River Valley.

The objective of the survey is to locate any dens (active or inactive) or signs of denning by bears, wolverines and wolves in the proposed work site, as well as, to locate any raptor nests in the proposed work site. This information will be used to minimize disturbance to denning bears, wolverines and wolves during the winter and raptor nests during the summer. A protective buffer zone of 800m will be recommended around any dens located if disturbance is suspected to the affect species of concern. Raptor nests will have a recommended protective buffer zone of 500 m from August 2 – February 28 and 1000 m from March 1 – August 1.

Methods

The survey area consists of a 1.5 km buffer added around the Prohibition creek bridge relocation site (Figure 1). Within these sites, karst formations were found during summer ground operations that could be possible bear dens. This flight uses the same area flown for the previous 2018 survey. The survey crew composed of one ENR biologist, one wildlife monitor recommended by the Norman Wells Renewable Resource Council (NWRRC), and the helicopter pilot. Flight lines were plotted prior to flights in ArcGIS along the longest axis of the buffered area and flown 200m apart. The survey was flown using a rotary wing aircraft at 100-200 feet at a speed of 40-60 km/hr when the weather was cooperative. Low and slow flying gave opportunity for observers to see clearly any wildlife sign and/or presence. If any wildlife sign was observed, the pilot was instructed to slow down and circle the area in order to obtain photos and GPS waypoints.

The timing of the survey was based on adequate weather conditions. To be effective, the survey needed to be conducted when bears were still active and building and/or searching for their dens but have enough snow cover identify tracks leading to the den/potential denning sites. Ideally the survey would be conducted within 1-3 days of fresh snowfall. Wolves and wolverines usually den in the spring and while an early winter den survey is not ideal, tracks and signs can be observed as well as locating dens used in prior years as both species have been known to reuse dens. Although raptor nests are quite visible in the winter, optimal timing for a nest survey is in the late spring to early summer in order to confidently determine the occupants of the nest.

Dens were considered active if observed with freshly mounded dirt and no vegetation growing or fresh tracks in the snow leading to the den. In addition, any dens observed from the air were investigated with an infrared camera (FLIR ThermaCAM P25) for heat signatures indicating a possible occupied den and if possible from the ground. Collapsed dens with no spoor or heat signature were considered to be inactive. Potential denning areas would include areas near water features, south facing slopes, large fallen trees, large boulders, and areas with soft soil. Potential raptor nest areas would include features such as: rock outcrops, cliffs, ridges, knolls, stream banks, coniferous and cottonwood forests. Waypoints and photos were taken of any dens or nests observed.

Tracks of all wildlife species were noted when observed but waypoints were not recorded due to the abundance of tracks found on the survey. Photos and waypoints of tracks and sign were taken if target species (e.g. wolverine) or unique behaviours were observed. Given the sensitivity of location data for dens and nests, the specific locations of these features have not been identified in this report; however, the coordinates have been provided to GNWT-DOT to assist with planning of mitigation measures.

Results

Observations for the Prohibition creek bridge site are summarized in Table 1. The flight was conducted on November 8th 2019. The flight lines were flown as planned. For seen animals, the survey noted 2

Moose (cow and calf), and a group of 8-10 muskox including 2 calves. Numerous moose, muskox, and wolf tracks were observed throughout the site but largely concentrated along the road to the pass. No sign of wolverine or raptor nests were observed.

Discussion

Our survey found no dens or raptor nests within the 1.5km buffer around the proposed winter road realignment. The only species seen during the survey were moose and muskox. Wolf tracks were recorded throughout the survey area, with the majority recorded along the winter road, the creek beds, and the low forested areas. Wolverine tracks were not observed.

No tracks of bears were seen in the field nor were any signs of dens, however, a lone grizzly bear track was found on the winter road at canyon creek just prior to the survey . Conditions during the survey were ideal for aerial tracking, however, the survey was conducted at least 2 weeks after the first snow fall. It is likely either that the fresh snow covered any tracks going to the den, or that bears were using the dens before the first snowfall. This year, bear tracks were not observed near the Norman Wells dump since the first snow fall. Ideally, bear dens would be found following tracks of bears continuing to foraging subsequent to the first snowfall. However, bear behaviour is exceptionally plastic and many factors ranging from weather, to availability of forage, to body condition can dictate the timing of bear denning behaviour (Manchi and Swenson 2005, Baldwin and Bender 2010). Thus relying on an overlap of active bears and adequate snow cover to find dens may not be the best approach(Manchi and Swenson 2005).

Wolf tracks were abundant throughout the survey area and especially along the winter road. Linear features such as cut lines and roads generally promote the movement of predators such as wolves. Wolves den during the spring-summer months, thus timing was not optimal for determining if any of the potential dens have been used by wolves.

No wolverine sign was observed during this survey though there is suitable year-round habitat for wolverine in the project area. Wolverine tracks were noted on the road subsequent to the survey and the species is highly gregarious and occupies habitats at low density (Efford and Boulanger 2018). Wolverines are known to have the low tolerance toward human activity (Scrafford et al. 2018) but some forms of resource development such as the development of cut lines for access to sites may attract wolverines by providing increased forage opportunities (Scrafford et al. 2017). Development of these sites is likely to have a low immediate impact but longer term may result in increased mortality of wolverines due to increased road activity and access (Scrafford et al. 2017, 2018). Wolverines are currently listed as Special Concern with COSEWIC and previous work in the NWT has indicated that certain populations may be declining (Efford and Boulanger 2018). Current trends in the Sahtu wolverine population are unknown.

Acknowledgments

A very big thank you goes out to the Norman Wells Renewable Resource Council for helping in hiring the wildlife monitors, John McDonald who assisted as a wildlife monitor, and to the pilot, Scott Douglas, with Sahtu Helicopters.

Figures and Tables

Figure 1. Prohibition creek survey area indicating the road network (white) surrounding Prohibition creek and corresponding 1.5 km buffer (yellow). Flight lines were mapped prior to flights (red) and flown with deviations (light blue) due to terrain.

Table 1. Summary of observations from den and nest survey flown for DHU and Prospect B sites on November 7th, 2019.

Project Area	Date	Observation	Species	Comments
Prohibition Creek	5-Nov-19	Seen animal	Moose	Cow and calf
Prohibition Creek	5-Nov-19	Tracks	Wolf	Many wolf tracks along winter road and Prohibition creek pass road
Prohibition Creek	5-Nov-19	Seen animal	Muskox	Bull
Prohibition Creek	5-Nov-19	Seen animal	Moose	Cow
Prohibition Creek	5-Nov-19	Seen animal	Moose	Bull
Prohibition Creek	5-Nov-19	Seen animal	Moose	Cow
Prohibition Creek	5-Nov-19	Den (ID: 128)	Unknown	Potential den found with heat signature but unable to investigate on ground. Excavated den.

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