TŁĮCHǪ ALL-SEASON ROAD

Draft Wildlife Management and Monitoring Plan

September 2017

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REVISION HISTORY

Version	Date	Notes/Revisions
1	March 2016	Original version (in draft) to accompany permit application to Board for preliminary screening.
2	September 2017	Incorporate conceptual Wildlife Effects Monitoring Program. Updated Version 1 to reflect the content of the Adequacy Statement Response and the responses to information requests and to include commitments from the technical sessions.

DEFINITIONS AND ACRONYMS

ASR	Adequacy Statement Response
Adaptive management	Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. The term is commonly thought of as "learning by doing". Active adaptive management typically involves active experimentation to simultaneously test a range of alternative management actions, whereas passive adaptive management may involve selecting only the "best" management option and evaluating the results to see if further adjustments are needed.
Construction Areas	Areas where there is active construction at that time.
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Danger Zone	Areas determined by blast supervisor.
DoT	Department of Transportation, GNWT (now the Department of Infrastructure)
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
Environmental Monitor	Individuals who observe Project activities in relation to permit conditions, and report observations to the Project Supervisor so that mitigation actions can be taken if necessary.
GNWT	Government of the Northwest Territories

GNWT-ENR or ENR	Environment and Natural Resources, GNWT
GNWT-INF or INF	Department of Infrastructure, GNWT (formerly the Department of Transportation and Public Works and Services)
Habitat	The area or type of site where a species or an individual of a species of wildlife naturally occurs or on which it depends, directly or indirectly, to carry out its life processes (NWT *Wildlife Act*).
MBCA	*Migratory Birds Convention Act*
Mitigation	Measures taken to eliminate or reduce a potential Project effect.
Monitoring	The process of observing and documenting Project activities. This document distinguishes between "mitigation monitoring" which is undertaken to identify the need to apply or modify mitigations for the protection of wildlife and wildlife habitat at the project site, and "effects monitoring" which consists of the design and implementation of monitoring studies for quantifying project-related effects both within the project footprint and region.
MVEIRB	Mackenzie Valley Environmental Impact Review Board
NT1	The Northwest Territories Range for boreal caribou, used for critical habitat identification in the Recovery Strategy for the Woodland Caribou, Boreal population in Canada.
NWT	Northwest Territories
Project	The Tłı̨cho All-Season Road
Project Co.	The company that will be engaged to construct and operate TASR.
Project site	The area encompassed by the TASR right of way, borrow pits, borrow pit access roads, and all equipment and infrastructure within this area.
SARA	*Species at Risk Act*
SARC	Species at Risk Committee
TASR	Tłı̨chǫ All-season Road
TG	Tłı̨chǫ Government
WEMP	Wildlife Effects Monitoring Plan
Wildlife	"wildlife" means

	(a) all species of vertebrates and invertebrates found wild in nature in the Northwest Territories, and individuals of those species, except (i) fish as defined in section 2 of the *Fisheries Act* (Canada), and (ii) other prescribed species and subspecies, (b) species of wildlife referred to in paragraph (a) that are domesticated or held in captivity, and individuals of those species, and (c) prescribed species or subspecies of vertebrates and invertebrates, and individuals of those species or subspecies. (NWT *Wildlife Act*).
WLWB	Wek'èezhìı Land and Water Board
Worker	A person employed by the Developer or the Contractor to work on the Project.
WRRB	Wek'èezhìı Renewable Resources Board
WMMP	Wildlife Management and Monitoring Plan

1.0 INTRODUCTION

The Government of the Northwest Territories (GNWT) is proposing to construct an all-season road from Highway 3 to the community of Whatì, called the Tłı̨chǫ All-Season Road (TASR). Within the GNWT, this Project is led by the Department of Infrastructure (INF) (formerly Department of Transportation (DoT) and Public Works and Services (PWS)). The Department of Environment and Natural Resources (ENR) provided technical expertise on how potential highway impacts on wildlife and wildlife habitat could be mitigated and monitored.

The construction and operation of the TASR can impact wildlife and wildlife habitat in a number of ways, including direct habitat loss, habitat degradation, and functional habitat loss due to noise or other sensory disturbances, dust, accidental spills of toxic or hazardous substances, injury or mortality due to vehicle collisions, increased mortality associated with improved access for harvesters or wildlife-human interactions, increased mortality from facilitated predator movements, and wildlife attraction to construction camps. Particular concern over impacts to caribou from increased harvesting pressure, increased predation resulting from new access, increased road-induced mortality, and barrier effects to caribou as well as uncertainty regarding the effectiveness of mitigation measures were cited by the Mackenzie Valley Environmental Impact Review Board (MVEIRB) as reasons for referring the Project to environmental assessment (EA) (MVEIRB 2016). Frequently-raised concerns by other parties over the course of the EA have also related some of the above mentioned concerns specifically to moose and bison.

This draft Wildlife Management and Monitoring Plan (WMMP) outlines mitigation measures that will be implemented to reduce Project impacts on wildlife and wildlife habitat, and the monitoring actions proposed to understand the impacts of the TASR on wildlife, test the predictions made during the EA, and inform adaptive management. This document is intended to meet the requirements of s.95(2) of the *Wildlife Act* and other relevant legislation (see Appendix A).

The GNWT previously submitted a draft WMMP (Version 1) with the Project Description to the Wek'èezhìı Land and Water Board (WLWB) in March 2016. The initial draft dealt primarily with mitigation associated with direct effects to wildlife resulting from construction. In August 2017, the GNWT also submitted a conceptual Wildlife Effects Monitoring Plan (WEMP) to MVEIRB, which focuses on effects to wildlife extending beyond the Project footprint. This version of the WMMP consolidates the WMMP (version 1) and the WEMP, as well as incorporating updates to mitigation that were identified in the TASR Adequacy Statement Response (ASR) to EA1617-01.

The GNWT expects that this plan may be modified subject to internal GNWT discussion and the outcomes of the EA and regulatory processes. Whereas some elements of this WMMP fit into existing ENR programs and operations, several elements are new, specific to mitigating potential adverse effects of the TASR, and will require additional resources. Moreover, ongoing monitoring defined in this plan may need to be modified to meet sample size requirements or updated study designs to adequately answer the questions underlying the monitoring work.

This WMMP describes mitigation and monitoring that applies to both road construction and operation phases of the Project. In some cases mitigation is phase-specific, whereas other mitigation applies to both phases, as indicated.

2.0 BACKGROUND

2.1 Project Description

The proposed TASR is an all-season two-lane gravel road (Appendix B). The Project footprint is comprised of the preferred route and is approximately 94 kilometres (km) in length with a 60 metre (m) right of way. A further 3 km of upgrades are required within Community Government of Whatì lands, bringing the total Project footprint to 97 km. The footprint also includes laydown areas, construction camps, and borrow sites with associated access roads with a 30 m right of way. The total predicted area of the Project footprint is approximately 2,200 hectares. Up to 13 borrow sites/quarries may be developed with access roads. Construction camps and laydown areas will be located in either borrow sites or within the 60 m right of way, so are not expected to require additional land clearing. Almost all access roads are planned to overlap the preferred route right of way and borrow sites, and one borrow site may be accessed from the existing community access road from Whatì. Thus, access roads to borrow sites should not create additional direct physical disturbance to the landscape. The cleared driving surface of the preferred route is anticipated to be approximately 8.5 m wide. The Project predominately follows a pre-existing overland winter road route to minimize new disturbance to the landscape. The Project will also include 15 water crossings; 4 of these require bridge structures, 3 require structural culverts and 8 will have banks with drainage culverts. Some blasting is anticipated, the majority of which will be confined to the quarries. The road will have a posted speed limit of 70 kilometres per hour (km/h) during operations, and will allow for year-round use by commercial and private vehicles. Traffic levels are estimated at 20 to 40 vehicles per day, including potential traffic from a proposed mine northeast of Whatì. Construction of the TASR is expected to begin in Winter 2019 and the road is scheduled to open by late 2022. Further Project description details are provided in the Project Description Report (GNWT 2016).

2.2 Objectives

The objectives of this WMMP include the following:

- Document and mitigate effects to wildlife from TASR construction and operation.
- Describe how adaptive management will be applied to wildlife mitigation and monitoring.
- Constitute part of the engagement with communities, regulatory agencies, and interested parties in wildlife effects mitigation and monitoring.
- Describe how the GNWT will meet relevant guidelines and regulatory requirements.

2.3 Statutory Requirements and Guidelines

Several federal and territorial acts and regulations apply to wildlife and wildlife habitat in relation to the Project, summarized in (Table 1). Specific sections of the relevant acts are provided in Appendix A. The contents of this WMMP follow the requirements of Section 95(2) of the *Wildlife Act*.

Table 1: Regulatory Requirements for Wildlife and Wildlife Habitat Protection

Regulator	Regulatory Guidelines	Applicability to Wildlife Management and Monitoring Plan
Environment and Climate Change Canada (ECCC)	*Species at Risk Act* (SARA)	Under SARA, it is forbidden to kill, injure, harass, destroy the residence of, critical habitat of, capture or take an individual designated as extirpated, endangered, or threatened on federally-regulated lands (Sections 32 and 33), or territorial lands (Section 34 [1]). An order by the Governor in Council may, based on the recommendation of the Minister of Environment, apply Sections 32 and/or 33 on territorial lands if the territorial laws do not effectively protect the species or its residences in question (Section 34 [2] and [3]).
ECCC	*Migratory Birds Convention Act* (MBCA) and *Migratory Birds Regulations*	The MBCA protects migratory birds and their nests throughout Canada. Migratory birds covered under the act include: waterfowl, cranes, shorebirds, and songbirds. The MBCA is the enabling statute for the *Migratory Birds Regulations*, 1994. These regulations state that without authorization of a permit, the disturbance or destruction of a nest or eggs of a migratory bird is prohibited. See Appendix A for relevant excerpts of the MBCA.

Table 1: Regulatory Requirements for Wildlife and Wildlife Habitat Protection

Regulator	Regulatory Guidelines	Applicability to Wildlife Management and Monitoring Plan
GNWT-ENR	*Wildlife Act*	The NWT *Wildlife Act* pertains to all wildlife harvesting and management within the NWT. The Act states that a Wildlife Management and Monitoring Plan is required for projects that may cause significant disturbance to big game, substantially alter, damage or destroy habitat, pose a threat of serious harm or contribute to cumulative effects. The Act also states that no person shall, without a permit, chase, disturb, or harass wildlife. It prohibits the destruction, disturbance, or taking of the eggs or nests of birds identified in the list of prescribed wildlife, and the damage or destruction of a den, beaver dam or lodge, muskrat push-up or hibernaculum. Permits to haze wildlife or engage in an activity that may result in disturbance to an animal or destroy/damage a den, dam, or lodge, or eggs or nests of birds not listed under the MBCA may be issued by ENR under the Act. The Act also states that a person is permitted to kill wildlife in defense of human life or property. See Appendix A for relevant excerpts of the NWT *Wildlife Act.*
GNWT-ENR	*Species at Risk (NWT) Act*	The *Species at Risk (NWT) Act* applies to both public and private lands throughout the NWT and includes private lands owned under land claims agreements. The Act applies to any wild animal, plant, or other species managed by the Government of Northwest Territories (GNWT). The Act is intended to be complementary to the federal *Species at Risk Act* and addresses concerns at the territorial level.
Wek'èezhìı Land and Water Board	*Mackenzie Valley Land Use Regulations*	Land use permits may include provisions for the protection of wildlife habitat. GNWT – Lands has compliance and enforcement responsibilities related to land use permits.

Other guidelines that were considered in the preparation of this document include the following:

- Draft Wildlife and Wildlife Habitat Protection Plan and Wildlife Effects Monitoring Program Guidelines (November 2014)
- Draft Wildlife Management and Monitoring Plan Content Guidelines (unpublished draft)
- Guidelines for Dust Suppression

- Northern Land Use Guidelines: Camp and Support Facilities
- Northern Land Use Guidelines: Pits and Quarries
- Northern Land Use Guidelines: Access: Roads and Trails
- Forest Fire Prevention and Suppression Guidelines for Industrial Activities

2.4 Relevant Environmental Management Plans and Operating Procedures

Other environmental management plans or operating procedures that have some relevance to wildlife or wildlife habitat include the following.

- DoT Erosion and Sediment Control Manual
- TASR Erosion and Sediment Control Plan (to be developed)
- TASR In-Field Water Analysis Plan (draft)
- TASR Waste Management Plan (draft)
- TASR Spill Contingency Plan (draft)
- TASR Fish and Fish Habitat Protection Plan (draft)
- TASR Quarry Operations Plan (draft)
- Highway Operations Manual – Beaver Dam Removal

2.5 Learnings from other NWT Highways

The GNWT has mitigation and monitoring in place to reduce the impacts of existing NWT highways on wildlife during construction, maintenance, and operations. This section summarizes some of the relevant practices and experiences.

2.5.1 Migratory Bird Nesting

The GNWT has recent experience with managing birds nesting on infrastructure. For example, swallows routinely nest on the sides and underside of bridges, particularly when there is a platform (such as at the bridge drains). While this does not present a concern during normal use and inspections, there may be a hazard to the nests when conducting maintenance. To prevent swallow nesting on the underside of the Buffalo River Bridge prior to major rehabilitation in 2016 and 2017, the underside of the bridge was enclosed by netting in the spring prior to the work to prevent bird access. As a result, swallows were not observed in the area and no nesting occurred on the bridge.

Conversely, spikes were tried with less success. To deter ravens from nesting in the overhead steel trusses of the Buffalo River Bridge, bird spikes were installed prior to nesting season. The ravens successfully built their nest regardless of the spikes, as the spikes appeared to provide a better foothold for their nest. Work on the bridge had to be delayed until the chicks were fledged.

Typically, no effort is made to stop birds from nesting on operational structures such as bridges when there is no immediate hazard to the nest. However, unoccupied nest material may be removed during bridge cleaning operations.

With regards to the potential for bank and barn swallows nesting in highway aggregate stockpiles, the ECCC brochure on Bank Swallow in Sandpits and Quarries (Appendix F) is currently used as guidance to manage stockpile slopes. Additionally, vegetation clearing is conducted as part of highway maintenance along right of ways, outside of the migratory bird nesting season.

2.5.2 Bison Collisions

Based on experience on other NWT highways, the majority of bison-vehicle collisions occur in the months of August-November, with a peak in October. This may be due to shorter daylight hours meaning that more vehicle traffic occurs in low light conditions, and lack of snow on the ground makes it very difficult to see bison on the road (snow provides contrast). As driving conditions are generally still good at this time of year (no ice or snow), drivers may be driving faster than during the winter season. Bison tend to graze along the cleared right of way adjacent to roads and may do so more at this time of year than in mid-winter. Most collisions occur on straight and level sections of the road. Bison will travel on roads in winter, especially in years of deep snow.

In some winters, bison appear reluctant to leave the road, perhaps to avoid walking through deep snow. Plowing travel lanes for bison parallel to the road has been successful in reducing the number of animals on roads. In most cases, however, analyses of data available to the GNWT have not provided a clear explanation for why bison use roads or enter communities, how much time bison spend in places that result in conflicts, or how to prevent those incursions (Mackenzie Bison Working Group 2016).

Interactions with bison and highway operations occur during both construction and operation. During the four years of construction at the Deh Cho Bridge, bison were regularly present at open areas on the north approach. It was suspected that they selected these areas for the wind and associated shelter from insects. The bison did not seem to be disturbed by the construction activity, and often bedded within construction laydown areas. On rare occasions, bison got between an operator and the vehicle. In these instances, the operator would typically wait until the bison

moved. During an anthrax outbreak, a bison monitor was hired to deter bison from the work area due to the human safety concerns. Significant efforts were also made to prevent bison from gaining access to the bridge during construction, and Texas Gates were added to the bridge to prevent access during operations.

With respect to highway operations, collisions with bison continue to be a significant concern. Bison collisions and mortalities were documented by the Mackenzie Bison Working Group (2016), reporting 270 bison-vehicle collisions on Highway 3 between 1989 and 2015. Although a full analysis of the available data has not been completed, the number of collisions varies year-to-year for unknown reasons and there appears to have been a general increase over time (Mackenzie Bison Working Group 2016).

To manage this risk, the GNWT includes wildlife-vehicle collisions in the Drive Alive! Program, with a focus on bison. This program includes public messaging and campaigns to reduce the number of bison collisions. The following advice is provided through the program to educate drivers:

- Check road bulletins before departing
- Drive at speeds appropriate for the conditions, particularly at dusk and dawn, and don't overdrive headlights
- Avoid distractions
- If you see wildlife, flash your hazard lights to warn drivers behind you
- Do not swerve suddenly, rather stop and wait for bison to leave the road
- Remember that most bison travel in herds
- Use your high beams whenever possible
- Wear your seatbelt
- Do not approach an injured animal

Also included in the Program is signage reminding drivers of the presence of bison and current updates.

2.6 Roles and Responsibilities

The implementation of the wildlife effects monitoring programs will be led by GNWT-ENR, GNWT-INF, or Project Co., the company that will be engaged to construct and operate the TASR. Mitigation monitoring activities will be conducted as required to fulfill the terms and conditions set out in regulatory approvals, licences and permits, to meet commitments, and to check the effectiveness of

mitigation measures in avoiding or minimizing potential effects. Ultimately, the Project Supervisor will be responsible for ensuring that commitments in the WMMP are met and for monitoring the implementation of wildlife and wildlife habitat mitigation measures. Environmental Monitors will conduct monitoring of construction activities as they relate to wildlife and wildlife habitat protection and the mitigation measures outlined in the WMMP. Environmental Monitors will also be responsible for conducting and recording observations of wildlife throughout construction activities and participating in wildlife surveys.

2.7 Spatial and Temporal Scales

2.7.1 Spatial Boundaries

The WMMP uses different spatial boundaries, depending on the objective and the species. The spatial boundaries include:

- The Project footprint (i.e., the road, right of way, and quarries) was used for questions related to direct effects (such as habitat loss, vehicle collisions, disturbance to nests, traffic levels).
- Study areas extending beyond the Project footprint were used for questions related to indirect effects, and is defined for each monitoring program described.

2.7.2 Temporal Boundaries

The Project is planned to occur during two phases:

- Construction phase: the period from the start of construction to the start of operation (estimated at two to four years).
- Operation phase: encompasses operation and maintenance activities throughout the life of the Project, which is anticipated to be indefinite.
- For the purposes of the WMMP, wildlife effects monitoring is proposed to continue for up to five years following construction.

2.8 Focal wildlife species

The WMMP focuses on mitigating and monitoring the impacts to caribou, species at risk, as well as big games species and prescribed species identified in the Wildlife Act General Regulations for which impacts were identified in the Adequacy Statement Response (i.e., moose, bison), for which human safety concerns tend to arise (i.e., black bear). The WMMP also address a broader range of species for which general prohibitions under the *Wildlife Act*, *Species at Risk Act,* and *Migratory Birds*

Convention Act and associated regulations apply. Mitigation and monitoring measures are meant to address impacts to individuals of these species and their habitat. Species descriptions can generally be found in the Adequacy Statement Response, but relevant additional clarifications are included below.

2.8.1 Caribou

The Project may interact with both boreal and barren-ground caribou. As these two ecotypes of caribou may be difficult to distinguish, the mitigation and monitoring described in this document applies equally to both, unless otherwise stated. A brief description of the boreal and barren-ground caribou is provided. Further details on caribou habitat availability, habitat distribution, survival, and reproduction are provided in the Adequacy Statement Response (Golder 2017).

Boreal caribou are distributed across the forested regions of Canada, reaching the northern limit of their range in the NWT. Both traditional knowledge and science based studies of boreal caribou in Wek'èezhìı suggest that boreal caribou have used areas along the proposed Project corridor, including some areas identified as traditional harvest sites and important habitat for boreal caribou. The TASR alignment is completely within the NT1 boreal caribou range as delineated in the national recovery strategy (EC 2012). Traditional knowledge indicates that the boreal caribou range includes parts of the proposed TASR route; however, the Elders indicated that the main habitat is to the west of the proposed corridor (Tłı̨chǫ Government 2016). The current population trend in the North Slave Region and Wek'èezhìı region are unknown but areas except in southern NWT are believed to be stable or increasing (SARC 2012). Boreal caribou prefer mature to old conifer forests since these habitats contain lichen, which is the caribou's primary winter food source, and are present throughout the year.

Barren-ground caribou migrate from boreal habitats in winter, to calving grounds north of the treeline in summer. While the Project is nearest to the Bathurst and Bluenose East herd ranges, the Project likely occurs outside of the core seasonal range boundaries described by barren-ground collared caribou cows and regular interaction with the Project is not expected. However, traditional knowledge indicates that barren-ground caribou have in the past been present in areas near the north end of the Project during winter (Tłı̨chǫ Government 2016), likely during periods of high abundance. Due to the current low population of the Bathurst herd, harvest controls have been in place since 2010, currently limiting harvest of Bathurst caribou to zero.

2.8.2 Species at Risk

The intent of the *Species at Risk Act*, and the *Species at Risk (NWT) Act* is to protect species at risk from becoming extirpated or extinct as a result of human activity. While the former was enacted by the Government of Canada, the latter was enacted by the GNWT and applies only to wild animals and plants managed by the GNWT. For example, species managed by the *Migratory Bird Convention Act* and Regulations are not covered by the *Species at Risk (NWT) Act*. For the purposes of this WMMP (and as recommended by ECCC 2017), species may be considered to be of concern as a result of either their national, territorial or Committee on the Status of Endangered Wildlife in Canada (COSEWIC) status (notwithstanding that COSEWIC does not provide legal protection). The list of species of concern that may be affected by the TASR Project is provided in Table 2. This table may be updated in the future to reflect the latest species assessments by the NWT Species at Risk Committee (NWT SARC) and COSEWIC.

Table 2: Species of Concern Expected at the Project

Species	SARC Listing[a]	COSEWIC Listing[b]	SARA Listing[c]
Boreal caribou	Threatened	Threatened	Threatened
Barren-ground caribou	Under assessment	Threatened	Under consideration
Wood bison	Threatened	Special Concern	Threatened
Wolverine	Not At Risk	Special Concern	No status
Little brown myotis	Not assessed	Endangered	Endangered
Peregrine falcon	Not assessed	Special Concern	Special Concern
Short-eared owl	Not assessed	Special Concern	Special Concern
Bank swallow	Not applicable	Threatened	No status
Barn swallow	Not applicable	Threatened	No status
Common nighthawk	Not applicable	Threatened	Threatened
Olive-sided flycatcher	Not applicable	Threatened	Threatened
Horned grebe (western population)	Not applicable	Special Concern	No status
Red-necked phalarope	Not applicable	Special Concern	No status
Rusty blackbird	Not assessed	Special Concern	Special Concern
Yellow rail	Not applicable	Special Concern	Special Concern
Gypsy cuckoo bumble bee	Not assessed	Endangered	No status

Species	SARC Listing[a]	COSEWIC Listing[b]	SARA Listing[c]
Yellow-banded bumble bee	Not assessed	Special Concern	No status

All listings sourced from the *Species at Risk Act* Public Registry (2017)

a) Northwest Territories Species at Risk Committee. Note that species included in the *Migratory Bird Convention Act* are not covered by the *Species at Risk (NWT) Act*, and are labelled 'Not applicable'.

b) Committee on the Status of Endangered Wildlife in Canada

c) *Species at Risk Act*.

The WMMP is intended to be consistent with the proposed Recovery Strategy for the Wood Bison in Canada (ECCC 2016) by including mitigation to reduce vehicle collisions, and including a mechanism for documenting and reporting bison observations along the TASR.

2.9 Sensitive Periods for Wildlife:

Known sensitive periods for wildlife are listed in Table 3. Sensitive periods are not meant to imply that all construction activities will need to be suspended at these times; however, different types of pre-construction surveys and additional mitigation measures will be required during these times to minimize sensory disturbance and/or risk of wildlife injury or mortality.

Table 3: Sensitive Periods for Wildlife and Rationale

Wildlife	Period	Rationale
Boreal Caribou Moose Bison	Calving: 05 April to 06 June 15 May to 15 July 15 April to 15 July	Timing window captures parturition (birth) and the first month of life for offspring. Female ungulates entering the parturition period are usually in poorer physical condition from the harsher climatic conditions and limited food availability throughout the winter period. After parturition, females are subject to additional energy demands from lactation , and generally attain their lowest body condition post-calving. Disturbance during the calving/fawning period can induce fleeing, increased movement of young and increased nutritional demands, and higher susceptibility to predation.
Boreal Caribou	Late-winter: 16 March to 04 April	Boreal caribou are exhibiting their shortest daily movements at this time of year, likely reflecting the increased energetic costs of travelling through deep snow at this time of year, or limited areas that provide easier access for foraging on round. As boreal caribou are depleting their stores of fat throughout the winter, and movement through deep snow or displacement from good foraging habitat could have high energetic costs, disturbance events at this time of year could

Table 3: Sensitive Periods for Wildlife and Rationale

Wildlife	Period	Rationale
		have negative impacts on female body condition and subsequently have negative impacts on calving and calf survival.
Birds	Nesting season: 01 May to August 15	Prohibition against damage or destruction of nests or eggs of migratory birds under Migratory Birds Regulations and the *Wildlife Act*. This sensitive period should cover the majority of species, but it should be noted that some raptor species may initiate nests as early as late March, and may remain at the nest until mid-September.
Black Bear	Denning season: September 30 to March 30	Prohibition under the *Wildlife Act* against damage or destruction of a den. Disturbance of denning bears could jeopardize survival of both adults and young born in the den.

Appendix E provides further details on how construction activities may be modified based on sensitive periods and boreal caribou collar data.

3.0 POTENTIAL IMPACTS

The construction and operation of the TASR can impact wildlife and wildlife habitat in a number of ways, including direct habitat loss, habitat degradation and functional habitat loss due to noise, dust, spills of toxic or hazardous substances or other sensory disturbances, injury or mortality due to vehicle collisions, increased mortality associated with improved access for harvesters or wildlife-human interactions, increased mortality from facilitated predator movements, and wildlife attraction.

Follow-up monitoring under the *Mackenzie Valley Resource Management Act* is intended to evaluate the soundness of the EA. To indicate the linkages between the EA and the proposed monitoring, Table 4 contains the Effects Pathways identified for wildlife in the Adequacy Statement Response (Golder 2017), and the associated monitoring that will address each identified pathway. Further, Table 5 indicates the monitoring proposed for each species of concern. Potential impacts from the Project on wildlife are described in detail the Project Description Report (GNWT 2016) and the Adequacy Statement Response (Golder 2017). Details of the proposed monitoring is provided in Section 5.0.

Table 4: Project Effects Pathways to Wildlife and Associated Monitoring

ASR Effects Pathway	Pathway Category	Phase (Construction or Operation)	Pathway Assessment	Applicable Monitoring
Site preparation, construction and operation activities can result in the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution	Direct habitat loss	Construction Operation	Primary	• Spatial data for the footprint of the Project will be collected and reported when construction is complete to provide a precise record of direct habitat loss. • Boreal Caribou Collaring • Barren-ground Caribou Collaring • Moose and Bison Population Monitoring
Site preparation and construction may result in the destruction of roosting or hibernating bats (incidental take)	Direct habitat loss	Construction	Primary	• Pre-clearing Bird Nest surveys (applies to roosting bats) • Camp Surveillance
Site preparation and construction may result in the destruction or disturbance of bear dens	Direct habitat loss and Sensory Disturbance	Construction	Primary	• Pre-clearing den surveys • Wildlife surveillance monitoring at active construction areas
Site preparation and construction may result in the destruction of nests, eggs, and individuals of migratory birds (incidental take)	Direct habitat loss	Construction	Primary	• Pre-clearing Bird Nest surveys • Camp Surveillance
Dust and air emissions, and subsequent deposition can change soil quality and vegetation, which can affect wildlife habitat availability and distribution	Indirect habitat loss or alteration	Construction Operation	Secondary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring
Surface water runoff from the Project area can alter surface water, soil, vegetation, which can change the availability and distribution of wildlife habitat	Indirect habitat loss or alteration	Construction	Secondary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring • In-Field Water Analysis Plan • Erosion and Sediment Control Plan

Table 4: Project Effects Pathways to Wildlife and Associated Monitoring

ASR Effects Pathway	Pathway Category	Phase (Construction or Operation)	Pathway Assessment	Applicable Monitoring
Changes to hydrology may alter drainage patterns and increase/decrease drainage flows and surface water levels that can cause changes to soils and vegetation, which can affect wildlife habitat availability and distribution	Indirect habitat loss or alteration	Construction Operation	Secondary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring • In-Field Water Analysis Plan • Erosion and Sediment Control Plan
Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution	Sensory disturbance	Construction Operation	Primary	• Road Surveys • Pre-blast Surveys • Traffic Monitoring • Boreal Caribou Collaring • Barren-ground Caribou Collaring • Moose and Bison Population Monitoring
Physical hazards on the Project site, and collisions with construction vehicles can cause injury or mortality to individual wildlife, leading to decreases in survival and reproduction	Direct mortality	Construction Operation	Secondary	• Wildlife Sightings Log • Pre-blast Surveys • Road Surveys • Camp Surveillance • Traffic Monitoring • Wildlife Sightings and Collisions
Spills on the Project site can alter surface water quality, soils, vegetation, which can change the availability and distribution of wildlife habitat	Indirect habitat loss or alteration	Construction Operation	No Linkage	• In-Field Water Analysis Plan
Increase in public access could affect wildlife survival and reproduction through vehicle strikes, and/or legal and illegal hunting	Access and harvesting	Operation	Primary	• Traffic Monitoring • Access and Harvest Monitoring

Table 4: Project Effects Pathways to Wildlife and Associated Monitoring

ASR Effects Pathway	Pathway Category	Phase (Construction or Operation)	Pathway Assessment	Applicable Monitoring
Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey	Indirect habitat loss or alteration	Operation	Secondary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring • Moose and Bison Population Monitoring
Use of linear corridors by bison may lead to range expansion and affect moose and caribou habitat	Indirect habitat loss or alteration	Operation	Primary	• Moose and Bison Population Monitoring • Wildlife Sightings and Collisions
Loss of functional habitat due to competition with other wildlife species (in particular bison)	Indirect habitat loss or alteration	Operation	Primary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring • Moose and Bison Population Monitoring
Altered movement patterns, including any changes to interactions with other caribou herds	Indirect habitat loss or alteration	Operation	Primary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring • Moose and Bison Population Monitoring
Reduced habitat availability and distribution due to any increases in fires resulting from use of the road.	Access and harvesting	Operation	Secondary	• Boreal Caribou Collaring • Barren-ground Caribou Collaring • Moose and Bison Population Monitoring • Access and Harvest Monitoring
Attraction of wildlife to the Project (e.g., food waste, petroleum based products, salt) during construction may increase human wildlife interactions and change predator-prey relationships, which can affect wildlife survival and reproduction	Direct mortality	Construction Operation	Secondary	• Wildlife Sightings Log • Road Surveys • Pre-blast Surveys • Camp Surveillance

Table 4: Project Effects Pathways to Wildlife and Associated Monitoring

ASR Effects Pathway	Pathway Category	Phase (Construction or Operation)	Pathway Assessment	Applicable Monitoring
Introduction and spread of noxious and invasive plant species can affect plant community composition, which can affect wildlife habitat availability and distribution	Indirect habitat loss or alteration	Operation	Secondary	• Herbaceous plant surveys

Table 5: Applicability of Monitoring to Species of Concern

Species	Proposed Monitoring
Boreal caribou	• Boreal Caribou Collaring • Road Surveys • Pre-blast Surveys • Wildlife Sightings and Collisions • Access and Harvest Monitoring • Wildlife Sightings Log
Barren-ground caribou	• Barren-ground Caribou Collaring • Road Surveys • Pre-blast Surveys • Wildlife Sightings and Collisions • Access and Harvest Monitoring • Wildlife Sightings Log
Wood bison	• Moose and Bison Population Monitoring • Road Surveys • Pre-blast Surveys • Wildlife Sightings and Collisions • Access and Harvest Monitoring • Wildlife Sightings Log
Wolverine	• Wildlife Sightings Log • Camp Surveillance • Wildlife Incidents • Wildlife Sightings and Collisions • Access and Harvest Monitoring • Wildlife Sightings Log
Little brown myotis	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Peregrine falcon	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Short-eared owl	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Bank swallow	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Barn swallow	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Common nighthawk	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log

Table 5: Applicability of Monitoring to Species of Concern

Species	Proposed Monitoring
Olive-sided flycatcher	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Horned grebe (western population)	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Red-necked phalarope	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Rusty blackbird	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log
Yellow rail	• Bird Nesting • Camp Surveillance • Wildlife Sightings Log

4.0 MITIGATION

Mitigation for each of the General Pathways (Table 4) is described in the section below.

4.1 Mitigation for Direct Habitat Loss

4.1.1 Construction

- The current layout of the Project footprint will minimize the amount of new disturbance by primarily following the existing Old Airport Road route to Whatì and intersecting areas previously burned.
- Limit the cleared TASR corridor to 60 m wide (not including the borrow sites and access corridors).
- Borrow source areas will be minimized and will be located close to the TASR right of way so that access roads are short. Most of the borrow sources also overlap the TASR alignment so additional disturbance to access these areas will be limited.
- If borrow pits and quarries are no longer required during the operations phase, reclamation will be conducted in consideration of the Northern Land Use Guidelines for Pits and Quarries. Once reclamation activities are complete, access will be blocked to quarries and borrow sources that are no longer required.
- Avoid disturbance or destruction of bird nests and eggs by clearing land outside of the bird nesting and fledging season (May to mid-August); however, if vegetation clearing is required within this time, pre-clearing nest surveys will be completed and

no-work zones will be observed for identified active nests. Through consultation with ENR and ECCC, bird nests will be protected by a buffer that protects the nest while allowing construction to continue, and will be monitored weekly. Details of nests identified and the mitigation will be included in the weekly wildlife monitoring reports.

- Birds will be deterred from nesting on infrastructure by placing covers/screens on vents, holes, and crevices where birds could potentially nest, and if necessary through active (but non-lethal) disturbance of birds to discourage them from establishing a nest on a construction site. If bird nesting occurs, the nest will not be disturbed until after the birds have left the area, with clearance to be discussed in consultation with GNWT-ENR and ECCC.
- Destruction of bat roosts will be avoided by managing, to the extent possible, the incremental removal of vegetation so that it occurs outside of spring through fall. If vegetation clearing is required within this time, pre-clearing surveys and 'no work zones' for identified active maternity roost sites will be implemented to avoid disturbance.
- Avoid disturbance of hibernating bats by surveying for sites of hibernacula potential (i.e., abandoned buildings and mines and caves) within 200 m of the right of way for bat use prior to construction.
- If any reclamation activities are planned for the terrestrial portions of the existing Tłı̨chǫ winter road, it will be managed and addressed jointly by the Tłı̨chǫ Government (TG) and the GNWT by way of a bilateral agreement.
- Operating machinery on highly saturated soil (primarily during freshet) outside of the highway alignment, borrow sources and borrow source access roads will be avoided where practical. Where it is unavoidable, suitable ground equipment will be used to prevent unnecessary soil damage through rutting, etc.
- Herbaceous plant surveys of the Project footprint will be completed during the growing season by a qualified botanist in advance of construction, one year following construction and again after five years of operations. If rare plants and/or invasive species are found, ENR will be consulted to determine next steps.
- Any required reseeding will be done so with an approved native, non-invasive, seed to avoid the introduction of noxious and invasive plants.

4.1.2 Operations

- Signs indicating the daily wildfire risk will be posted at the TASR junctions at Highway 3 and the existing Whatì community access road by the GNWT to minimize the risk of accidental fires.

- As the operational phase will require gravel, borrow pits will remain only accessible to Project Co. staff and blocked to unauthorized personnel. Protocols to follow the Quarry Operations Plan.

4.2 Mitigation for Indirect Habitat Loss or Alteration

4.2.1 Construction

- Dust suppression techniques (as per the GNWT Guideline for Dust Suppression and the GNWT-INF Erosion and Sediment Control Manual) will be utilized as required and feasible to reduce dust emissions onto vegetation outside of the right of way.
- Layout and location of quarries will consider the Northern Land Use Guidelines for Pits and Quarries.
- Reduced speed limits (50 km/h) during construction will reduce dust production.
- Clean and inspect Project vehicles and equipment prior to entering the NWT to avoid introducing noxious and invasive plants.
- Re-cleaning Project vehicles and equipment if an area of weed infestation is encountered, prior to advancing to a weed-free area to minimize the spread of noxious and invasive plants.
- Locating and managing cleaning locations on the Project site to avoid the spread of noxious and invasive plants
- Domestic and recyclable waste and dangerous goods will be stored on site in appropriate containers, as per the Waste Management Plan, to avoid exposure until they are shipped off site to an approved facility, and to prevent spills or leakage into the surrounding environment that would cause habitat degradation.
- Hazardous materials and fuel will be stored according to regulatory requirements to avoid contamination to the environment and workers
- Individuals working on-site and handling hazardous materials will be trained in the Workplace Hazardous Materials Information System and the Transportation of Dangerous Goods to avoid accidental spills.
- An approved Spill Contingency Plan will be followed by Project staff to prevent spills and if spills occur as a result of an accident, that they will be controlled to minimize the area impacted.
- Emergency spill kits will be available wherever toxic materials or fuel are stored and transferred during construction to minimize effects to vegetation and wildlife habitat.

- Spill response and containment will be completed expeditiously in accordance with the approved site specific Spill Contingency Plan to reduce the area impacted. Spills will be reported in a timely manner.
- Construction equipment, machinery, and vehicles will be regularly maintained to avoid accidental spills.
- Fuel storage areas will be equipped with spill kits, will be located at least 100 m away from water bodies. Large fuel storage tanks (2,000 to less than 80,000 litres) will be double walled as per the regulations
- Construction and maintenance vehicles will be equipped with spill kits and fuelled at least 30 m away from water bodies.
- The GNWT-INF Erosion and Sediment Control Manual, in conjunction with a suitable road design, will be utilized for erosion and sediment control and slope stabilization, which should minimize damage to riparian, stream, wetland, and lake habitat from altered hydrology.
- Workers will not travel off the Project site unless there is a specific requirement.
- Riparian areas will be maintained whenever possible to minimize erosion, with vegetation removal limited to the width of the right of way. At watercourse crossings, a riparian buffer will be maintained along the width of the right of way except at the actual crossing location.
- Removed vegetation/debris will be removed from site to prevent them entering the watercourse.
- Impacts to riparian vegetation at temporary crossings will be minimized by using structures such as snow fills and single-span bridges instead of fording, especially where banks are susceptible to erosion.
- Disturbed areas along the streambanks will be stabilized upon completion of work to minimize erosion.
- Culverts will be embedded as appropriate to maintain species and habitat present, and will be installed parallel to the existing channel to minimize changes to channel morphology.

4.2.2 Operation

- Dust suppression techniques (as per the GNWT Guideline for Dust Suppression and the GNWT-INF Erosion and Sediment Control Manual) will be utilized as required to reduce dust emissions onto vegetation outside of the right of way.

- Signs indicating the daily wildfire risk will be posted by GNWT at the TASR junctions at Highway 3 and the existing Whatì community access road to minimize the risk of accidental fires.
- Use of culverts and other design features will minimize changes to local flows and drainage patterns and drainage areas. Regular maintenance will occur along the TASR to ensure culverts are clear of debris (including ice during spring thaw).
- Culverts will be embedded as appropriate to maintain species and habitat present, and will be installed parallel to the existing channel to minimize changes to channel morphology.
- Disturbed areas along the streambanks will be stabilized upon completion of work to minimize erosion.

4.3 Mitigation for Sensory Disturbance

4.3.1 Construction

- Harassment, feeding or approaching wildlife by Project staff will be prohibited.
- Project staff will communicate relevant observations of wildlife to other drivers via radio.
- Blasting may only proceed if no large mammals (e.g.) caribou, moose, bison are detected in the blast radius identified by Blast Supervisor. The Blast Supervisor or Environmental Monitor will conduct a visual scan of the blast radius prior to blasting to ensure no large mammals are present. All blasting will be preceded by air horn signals, which should deter wildlife from the area. Specific mitigation measures that apply to blasting during the late-winter and calving season for collared boreal caribou are included in Appendix E.
- Construction activities will consider sensitive periods. For example, vegetation clearing is planned to occur outside of the nesting season for migratory birds.
- Boreal caribou collar locations will be used to notify construction crews of their proximity to active construction areas during the late-winter and calving season, and increased mitigation measures will be triggered as described in Appendix E.
- Construction will be temporarily suspended by the Project Supervisor, or speed limits on the road temporarily reduced, when moose, caribou, bison, or any other wildlife valued component that may be at imminent risk of injury or mortality, are known to be near the active construction site.
- If any big game species are observed within the cleared right of way adjacent to active construction areas, speed limits will be reduced to 30 km/h within 1 km on either side of the sighting. If bison on are present on roads, Environmental Monitories will

be contacted. Environmental Monitors should be aware that groups of bison with more than 5 individuals are likely to be nursery groups containing calves and juveniles.

- In the event that an active mammal den or bird nest is identified during construction, GNWT-ENR will be consulted to determine an appropriate strategy to avoid or minimize disturbance. A protocol for pre-clearing den surveys will be developed once the final TASR alignment and borrow source locations are determined.
- Observations of caribou, moose, bison, and other big game and species at risk will be reported to Environmental Monitors. Observations of species at risk will be reported to GNWT-ENR through weekly reports.
- Fixed-wing and helicopter flights associated with highway construction will consider the minimum altitude guidelines outlined in the brochure "Flying Low? Think Again…" (Appendix F) where safety permits. Flight paths will follow the cleared highway right of way to the extent feasible.
- If available, generalized calving locations of collared boreal caribou will be provided to pilots indicating areas to avoid during the calving season. Pilots will be expected to complete a visual scan for large mammals prior to landing.
- If caribou, bison, or moose are observed during helicopter flights, they will not be approached, followed, hovered above, or circled around.
- Pilots will increase altitude and follow flight paths that veer away from caribou, bison, and moose if the animals are observed running, panicking, or exhibiting other startled response.

4.4 Mitigation for Direct Wildlife Mortality

4.4.1 Construction

- Quarries will be operated in accordance with the ECCC brochure Bank Swallows in Sandpits and Quarries (Appendix F).
- Wildlife will have the right of way on all roads during construction.
- Speed limits for construction vehicles will be limited to 50 km/h.
- Speed limits may be lowered to 30 km/h for construction vehicles within 1 km of wildlife sighted on or adjacent to the road.
- The presence of large mammals (caribou, moose, and bison) and other wildlife will be communicated to construction workers, which will minimize risks of physical hazards through site-wide awareness. Project staff will communicate relevant observations of wildlife to other drivers via radio. If bison, caribou or moose are observed within construction areas, and their safety, or the safety of workers or equipment, are at

imminent risk, operations at that particular work site will be temporarily suspended by the Project Supervisor to allow wildlife to move away from the area of their own accord. If they do not leave the area within 15 minutes, they will be gently encouraged to move away from construction activities, and an incident report will be completed. This will involve the slow approach of Environmental Monitors towards the caribou/moose/bison to encourage them to move. It is possible that females may be unwilling to leave the area if they have a calf hiding nearby. In these cases, operations in the area may be suspended by the Project Supervisor.

- Blasting may only proceed if no large mammals (e.g. caribou, moose, bison) are detected in the blast radius identified by Blast Supervisor. The Blast Supervisor or Environmental Monitor will conduct a visual scan of the blast radius prior to blasting to ensure no large mammals are present. All blasting will preceded by air horn blasts, which will deter wildlife from the area. Specific mitigation measures that apply to blasting during the late-winter and calving season for collared boreal caribou are included in Appendix E.
- Construction activities will consider sensitive periods. For example, vegetation clearing is planned to occur outside of the nesting season for migratory birds.
- Pre-clearing den surveys will be completed. In the event that an active mammal den is identified during pre-clearing surveys, or during construction activities, ENR will be consulted to determine next steps. Operations near the den will be temporarily suspended by the Project Supervisor, and ENR will be consulted.
- Project staff will be provided with environmental awareness training.
- An appropriately designated supervisor will provide field workers with Bear Aware training (see Appendix D) and general wildlife awareness.
- Environmental Monitors will be on site to document wildlife and manage and minimize risks to wildlife and workers.
- Harassment, feeding or approaching wildlife by Project staff will be prohibited.
- No hunting or fishing by Project staff will be permitted.
- To avoid wildlife harvest, firearms will not be allowed on-site during construction except for firearms in the possession and control of authorized Environmental Monitors or law enforcement officers.
- Camps and buildings will be designed to prevent wildlife interactions, including appropriate storage of non-waste wildlife attractants (e.g. food and petroleum products) and use of adequate lighting will be installed in areas where it is essential to detect bears that may be in the vicinity.
- Development and implementation of a Waste Management Plan to avoid access to food waste by wildlife. This will include:

  - Waste products will be stored in secured containers and transported to approved facilities to avoid access by wildlife.
  - Food waste will be collected in bear proof containers that minimize attraction or impact to wildlife.
  - Littering and feeding of wildlife will be prohibited to avoid wildlife attraction to the site.
  - All workers and visitors will be educated on waste management practices for the Project site to avoid wildlife attraction.
- Exposure of wildlife to contaminants will be avoided by use of appropriate deterrents (e.g., temporary fencing, noise makers) to discourage wildlife from entering an affected area.
- In case of wildlife exposure to contaminants, territorial (GNWT-ENR) or federal (ECCC) authorities will be contacted immediately to determine appropriate course of action, which may including capturing, relocating or treating contaminated wildlife.

4.4.2 Operation

- Speed limits will be established, posted, and enforced to reduce the risk of vehicle-wildlife collisions.
- GNWT has the ability to install temporary portable signage and temporarily lower speed limits on parts of the TASR if a localized wildlife collision hazard is present. This mitigation will be applicable to areas where groups of bison, caribou, or moose are seen or reported along the right of way, in areas where wildlife-vehicle collisions repeatedly occur, or where caribou are known to be nearby based on collar data.
- GNWT's Drive Alive! Program includes information on avoiding wildlife collisions (see Section 2.5.2). Information on this program will be disseminated at appropriate locations in the communities of Whatì and Behchokǫ̀.
- Quarries will be operated in accordance with the ECCC brochure Bank Swallows in Sandpits and Quarries (Appendix F).

4.5 Mitigation for Access and Harvesting

4.5.1 Construction

- Firearms will not be allowed on-site except for firearms in the possession and control of authorized Environmental Monitors or law enforcement officers.
- No hunting or fishing by Project staff will be permitted.

4.5.2 Operation

- GNWT-ENR will enforce the NWT's hunting regulations which are in place to ensure that wildlife is conserved for future generations and that hunting is done safely.
- The TG will investigate the need for regulations and policies to manage the construction of cabins and design of hunting, trapping, and fishing in the area, in order to minimize impacts on local animal populations. TG will work to provide clear guidance on this topic. (Mitigation 10 of PR#96, Appendix D Motion 2015 018).
- Further mitigation and monitoring measures to address Access and Monitoring are described in Wildlife Effects Monitoring (Section 5.2 of this document)

4.6 Caribou Mitigation

In addition to the mitigation described in Sections 4.1 to 4.5, specific mitigation is required for boreal and barren-ground caribou during the Construction phase.

Barren-ground caribou show a distinct seasonal migration and tend to travel in groups. While the TASR is beyond the recent range of barren-ground caribou, traditional knowledge indicates that they are occasionally present in the area during winter. While boreal caribou do not undertake long-range seasonal migration, they are considered a species at risk and require particular attention. As it can be difficult for inexperienced observers to distinguish barren-ground and boreal caribou, the same mitigation is applied to both if they are known to be in the TASR area, as described in Table 6. Protocols for the use of collared caribou locations to mitigate impacts from construction are provided in Appendix E.

Table 6: Construction Phase Mitigation and Monitoring for Boreal and Barren-ground Caribou

Threshold	Caribou-specific Mitigation	Caribou-specific Monitoring
Barren-Ground collared caribou within 10 km of the TASR	• Notify GNWT-INF, Tłı̨chǫ Government, Wek'èezhìı Renewable Resource Board (WRRB) and Project Co. Construction Manager • Notify all Project staff working in the area	• ENR will advise the Project Supervisor if a collared caribou is within 10 km of the Project, and provide updates based on collar data as required. • Wildlife Road Surveys along the TASR by Environmental Monitors or patrols by ENR wildlife officers to document caribou presence near the road and group size
Caribou (barren-	• Caribou have the right of way on	• Environmental Monitors

Table 6: Construction Phase Mitigation and Monitoring for Boreal and Barren-ground Caribou

Threshold	Caribou-specific Mitigation	Caribou-specific Monitoring
ground or boreal) observed on or adjacent to the TASR right of way	the road • Communicate location of caribou sightings to other Project staff working in the area via radio • Decrease speed limits within 1 km on either side of the area to 30 km/h • Project Supervisor may temporarily suspend construction traffic and other activities if caribou are on the road or within an active construction area (e.g. borrow source)	will be informed of general location and time of caribou sighting and will initiate active monitoring of the area. • Continue monitoring the road within 1 km on either side of where caribou were sighted for 30 minutes after they leave the right of way, before increasing speed limits to 50 km/h again.
Collared boreal caribou within 0.5-3 km of the TASR right of way, borrow sources or borrow source access roads	• See Appendix E for detailed mitigation measures	• Boreal caribou collar-based monitoring ; maps of collar locations will be provided on a more frequent basis if caribou occur within cautionary zones during late-winter and calving periods; see Appendix E for further details.

4.7 Education and Training

4.7.1 Education and Training for Project Workers

Contractor(s) hired for road construction, and maintenance activities during the operational phase of the road, will be responsible for educating and training Project staff on applicable practices contained within the WMMP. All training will be documented and recorded in the WMMP Annual Report. Information provided to contract employees during training will include the following:

- Review of the WMMP.
- An understanding of wildlife response protocols including reporting requirements and procedures related to wildlife observations, wildlife incidents, and wildlife-

related accidents. Posters on display in camps illustrating species that require real-time reporting will reinforce the training information.

- Project staff must report wildlife observations using the Wildlife Sightings Log, and to report any incidents or concerns immediately to the Environmental Monitors.
- Understanding of confidentiality of observations made during work.
- Instructions not to disturb any birds or nests of observed birds.
- Reporting procedures for all wildlife observations.
- Instructions regarding Project mitigation and operating protocols (e.g. wildlife right of way and speed limits).
- An understanding of Species at Risk, including identification (posters in camps) and reporting procedures.
- Wildlife legal requirements and policies (i.e., no feeding, no harassment, no hunting, and no trapping).
- Instructions on waste and wildlife attractant management including the implications of wildlife human-habituation, food conditioning, and unsecured wildlife attractants.
- An understanding of working safely in wildlife areas and avoiding wildlife encounters through familiarization with the ecology of potentially dangerous predators, including bears, wolves and wolverines. This will include education on the identification, behaviour, seasonal movements, and habitat preferences of these species, as well as specific bear awareness and safety training, referencing regulations, permit conditions, industry standards, and Project commitments/policies, and information on managing non-natural attractants. Appropriate videos/DVD's such as "Staying Safe in Bear Country" and "Working in Bear Country", as well as the GNWT Bear Safety Brochure (see Appendix D) will be provided as part of the bear awareness and safety training. Workers will be educated on proper procedures for exiting vehicles or buildings in bear areas, where high risk bear-human interaction areas are likely to occur (i.e., areas where vegetation or terrain limit visibility and might hide a bear, and locations where sounds may mask the sound of an approaching bear), and to watch for bear signs and avoid potential denning and feeding areas if possible.
- Instructions regarding worker safety precaution protocols for working in remote areas. These include, working in pairs or larger groups, packing out waste for proper disposal, having adequate communication with supervisors and Environmental Monitors (radios, cell phones, and satellite phones), and regular check-in times.
- Instructions for the Environmental Monitors and other designated/trained staff on how to use non-lethal deterrent materials (e.g. bear spray and bear bangers). These

individuals will be given access to non-lethal deterrent materials while working and living on construction sites.

4.7.2 Public Awareness

Public awareness will also reduce environmental impacts of the TASR. The GNWT conducts continual public education and information campaigns, including the Drive Alive! Program (Section 2.5.2), and information on preventing and reducing the risk of forest fires through the FireSmart Program. These campaigns will continue to be communicated through the GNWT website, social media, radio, newspapers, road checkpoints, and roadside signs. The public will be restricted from accessing the active construction areas, unless authorized and accompanied by Project Co. representatives.

5.0 MONITORING

5.1 Mitigation Monitoring

This section describes the monitoring that will take place to ensure that the wildlife and wildlife habitat protection measures identified for the TASR are being implemented and functioning as intended, provide advance warning of wildlife issues that may require mitigation and identify opportunities to improve mitigation through adaptive management.

5.1.1 Wildlife Sightings Log

Rationale

Wildlife sighting logs provide a simple means for all Project staff to contribute to tracking wildlife activity at the Project. The value of the data is limited as it is not systematically collected and contains repeated observations, but it can provide an indication of the potential for wildlife incidents or problem wildlife and areas of concern at the Project.

Methods

Wildlife sighting logs will be posted at the Project accommodations for Project staff to record observations of wildlife. Project staff will be made aware of which species are a priority to report. All Project staff will be encouraged to add observations to the log, including the species, number, location and date of the observation. Environmental Monitors will check the logs weekly for evidence of problem wildlife or problem areas that may pose a risk to wildlife. Observations of wildlife called in by radio should entered into the Wildlife Sightings Log.

Supporting Documentation

Wildlife Sighting Log (Appendix C).

5.1.2 Road Surveys

Rationale

Environmental Monitors will be driving Project site regularly. Documenting wildlife observations along the road may help to identify wildlife risks that should be communicated to Project staff in the area, or to identify areas with higher presence of wildlife.

Methods

Observations of wildlife on the roads, within the cleared right of way adjacent to the road, or within borrow pits will be documented by Environmental Monitors. Unlike the Wildlife Sightings Monitoring, this task will be only completed by the Environmental Monitors. All observations of big game species on or visible from the road will be documented, communicated to relevant Project staff, and the mitigation measures outlined in Section 4.0 will be implemented. Observations of any birds nesting or mammals denning adjacent to the cleared right of way, access roads or borrow sources will also be recorded. Environmental Monitors will aim to cover the entire drivable length of road at least twice per week.

Supporting Documentation

Road Wildlife Observations (Appendix C).

5.1.3 Camp Surveillance

Camp surveillance monitoring is intended to provide systematic and current information of wildlife activity at the Project construction camps, and will provide direct feedback regarding the effectiveness of wildlife mitigation. Examples of wildlife activities that will be documented through the Camp Surveillance monitoring include presence of wildlife within camp areas, any instances where food or wastes may be improperly stored, and use of buildings by wildlife for shelter or nesting. Through systematically and actively searching for and documenting the presence of all wildlife within and around the Project footprint, Environmental Monitors will remain appraised of current and emerging issues, and will be able to manage issues as they arise.

Methods

Environment Monitors will undertake systematic tours of the Project construction camps to record all wildlife observations or recent wildlife sign (e.g., tracks, scat). Environmental Monitors will record the area surveyed, and the nature and location of all observations. The surveillance monitoring survey will include areas of the Project where there is risk of wildlife attractants (such as waste management areas) and risk of wildlife finding shelter, denning or availability of food. Surveillance monitoring will occur systematically at least

once per week throughout the year, and more frequently if necessary when camps are in operation. Monitoring of camps could be suspended if camps are unoccupied.

Supporting Documentation

Wildlife Surveillance Monitoring Procedures (Appendix C).

5.1.4 Bird Nesting

In addition to the Camp Surveillance monitoring described above, specific monitoring is proposed for bird nests, with particular emphasis on birds protected by the *Migratory Bird Convention Act* and the *Species at Risk Act* (Table 2). Early identification of birds showing nesting activity can help to avoid conflict, and nests that are found on Project infrastructure or in hazardous areas should be identified and monitored.

This protocol does not include any pre-clearing nest surveys if vegetation must be removed during the migratory bird nesting season. If pre-clearing surveys are required, they will be carried out by qualified biologists.

Methods

Environment Monitors will undertake systematic tours of the Project site to detect bird nesting activity on Project infrastructure. Environment Monitors will document the areas surveyed, and the nature and location of all observations. The surveillance monitoring survey will include areas of the Project where there is risk of birds nesting or finding shelter.

Bird nest monitoring will occur at least once per week prior to and during the migratory bird nesting season and more frequently if necessary. Monitoring will initiate in April and continue at least until mid-July (or until all identified nests are inactive). Monitoring should include Project infrastructure (buildings), equipment (particularly tall, stationary equipment such as inactive drills), quarries where scheduled construction activities are expected during the migratory bird nesting season.

Supporting Documentation

Bird Nest Monitoring Procedures (Appendix C).

5.1.5 Pre-blast Surveys

Blasting may be required on both the TASR route and in borrow pits. Blasting will be preceded by a scan for large mammals to reduce the risk of injury and the impacts of sensory disturbance. The blast surveys are intended to apply the same standards to large mammals as are used for humans with regards to proximity to the blast radius. Note that it may not be possible to detect all large mammals within the blast radius if there is dense forest, but this will be partly mitigated by the drilling and horn signals the precede the blast, which will likely deter wildlife from the area.

Scans for large mammals within the blast radius will be completed prior to all blasts, regardless of blast size; although it is currently undecided if blasting will be required, and the magnitude of the blasts may be small as the Project is within a sedimentary rock region.

Methods

Environment Monitors or the Blast Supervisor will complete a scan for large mammals (caribou, moose, bison, and bears) within the blast radius prior to each blast. Any wildlife observed will be deterred from the blast radius prior to the blast. All wildlife observations and deterrent methods will be documented.

Supporting Documentation

Pre-blast Surveys (Appendix C).

5.1.6 Wildlife Incidents

Wildlife incidents refer to a range of possible occurrences at the Project, some of which are reportable under the *Wildlife Act* (see Appendix A). Examples of wildlife incidents include:

- human-wildlife interactions that present a risk to either people or animals
- wildlife-caused damage to property or delay in operations
- wildlife deterrent actions
- wildlife injury or mortality (including vehicle collisions), or situations likely to cause injury or mortality
- wildlife in hazardous areas or hazardous situations

The Project will document all such incidents to prevent future incidents or escalation of problems, and report to ENR.

Wildlife incidents during the operational phase of the road are addressed in the Wildlife Effects Monitoring section (Section 5.2).

Methods

Documentation of wildlife incidents should include photographs, names of people involved, the nature of the incident, and supporting information such as the time, date, location, and follow-up actions that occurred.

Encounters with bears (grizzly bears and black bears) will follow the guidance provided in the ENR Bear Encounter Response Guidelines and Bear Complaint Checklist, the Safety in Grizzly Bear and Black Bear Country brochure (Appendix D). All incidents will require

follow-up to determine what can be done to prevent a similar incident from occurring in the future.

Supporting Documentation

Wildlife Incident Procedures and Form (Appendix C).

Bear Encounter Response Guidelines (Appendix D).

5.2 Wildlife Effects Monitoring

The proposed monitoring of effects of the TASR on wildlife and wildlife habitat focus on boreal caribou, barren-ground caribou, moose, and bison. Specifically, effects monitoring will address concerns raised during the environmental assessment that the TASR will lead to direct and indirect loss of wildlife habitat, potential range expansion of bison, and increased wildlife mortality due to increased harvest pressure and traffic-related mortality along the highway.

The primary objectives of monitoring activities will be to:

a) Determine if improved year-round access created by the highway results in a level of harvest mortality or harvest patterns of any wildlife that would suggest a conservation concern.

b) Determine the distribution, habitat use, and movements of boreal woodland caribou in the TASR study area and adjacent areas before road construction.

c) Measure direct habitat loss at completion.

d) Monitor and measure changes in distribution and abundance of moose, bison, and caribou as borrow site activities and TASR right of way construction progresses.

e) Monitor and measure changes in distribution and abundance of moose, bison, and caribou for up to five years after construction of the highway is completed, and possibly longer if traffic levels increase substantially.

f) Determine the amount and seasonality of wildlife injuries and mortality from vehicle collisions.

g) Determine spatial and temporal distribution of wildlife movements, sightings, and collisions along the road to inform targeted mitigation actions.

h) Use the information from monitoring to mitigate and manage highway impacts where possible

i) Use information from monitoring to inform best practices associated with future highway development and wildlife management in the NWT.

5.2.1 Traffic Monitoring

Rationale

Many of the predictions in the EA are contingent on the TASR having relatively low traffic volumes. Traffic levels for the proposed TASR have been estimated at 20 to 40 vehicles per day. This number was extrapolated both qualitatively and quantitatively by relying on the Tłı̨chǫ Winter Road Project Officer's numerous years of experience, Tłı̨chǫ winter road traffic counters, Tłı̨chǫ winter road community resupply details, and the estimated traffic volumes of a metals mine north of Whatì. Monitoring traffic levels is important for operational considerations related to road maintenance as well as for gauging the effects of the road. As roads tend to open up other areas for new development, the potential exists for traffic levels to increase in future, along with associated risks to people and wildlife.

Monitoring Question

- Are daily traffic levels averaged over a three-year period staying within 50% of the levels maximum annual average daily traffic levels predicted for the TASR?
- What are average and maximum daily traffic levels during sensitive seasonal periods for boreal caribou, moose and bison, or during periods of higher known collision risk?

Proposed Approach

The NWT highway network consists of 2,200 km of all-weather roads and 1,620 km of winter roads. To monitor traffic using the highway system, the Department of Infrastructure operates a series of permanent and seasonal mechanical traffic counters, and conducts periodic visual counts and surveys. Where counters are located, the stations provide hourly information on traffic for the full year, or selected portions of the year for counters located on winter roads or other seasonal access roads. These stations are positioned to capture the general flow of traffic on the highway network. INF will install a permanent traffic counting station along the TASR, develop a regular schedule of visual counts and surveys to verify the accuracy of the unit, and provide monthly average daily traffic level summary reports to ENR every year. ENR can use this information as a covariate in analyses for other programs under this WMMP.

Temporal scope

Traffic monitoring will occur indefinitely through the operations phase, and INF will report to ENR annually.

Thresholds

Part of adaptive management is identifying the need for increased monitoring or mitigation when conditions change, therefore, when traffic levels averaged over a three-

year period indicate a 50% increase in traffic levels above the predicted annual average daily traffic levels or maximum daily traffic levels during sensitive periods exceed 200 vehicles/day, the need for extending or reinstating programs in this WMMP beyond the initial operations timelines will be considered. Although the literature review of effects of different traffic levels in appendix G suggests thresholds of 300 to 500 vehicles/day as levels associated with adverse impacts to carnivores and ungulates, respectively, a trigger of 200 vehicles/day is chosen both to be precautionary and to reflect the design criteria for the road.

5.2.2 Access and Harvest Monitoring

Rationale

One of the key concerns associated with the TASR is increased wildlife mortality associated with a) hunting along the road; b) greater hunter access from the road into previously difficult-to-access harvesting areas and c) extended seasonal access into winter harvesting areas for barren-ground caribou beyond the TASR study area. There is concern that this increased access will change patterns of legal harvest in the region and increase illegal harvest such that harvested wildlife populations will experience higher total mortality. GNWT is limited in the actions it can take to restrict harvest along a public road unless it can identify a public safety or conservation concern; and to identify the latter, enhanced monitoring is required to determine whether harvest is increasing and to what extent. While the range of options for monitoring and managing access and harvest is project-specific, other major developments that involve the construction and operation of either a seasonal or all-season road in caribou range in the North typically include actions to assist in the monitoring and management of harvest associated with road access. A comprehensive approach employing both greater collaboration between GNWT and the TG at the community level to support community based programs, as well as enhanced compliance monitoring by the ENR will be required.

Monitoring Questions

- Determine if the highway is resulting in a pattern or level of harvest mortality for moose and caribou that would suggest a conservation concern or need for additional harvest management actions.
- Identify who is using the road to access harvest opportunities.
- Determine the sex and age structure of the harvested population of moose in the North Slave Region.
- Determine if and where moose are being harvested near the TASR.

Proposed Approach and Temporal Scope

i) Create a new ENR Renewable Resource Officer position in Whatì. Creating an ENR Officer position in the community of Whatì will help to conduct and/or facilitate several of the recommended actions in the WMMP and address concerns related to harvest and access associated with the Whatì Road. This position would also help to monitor for additional impacts to wildlife habitat associated with the road such as fire monitoring, spill response etc. (*Temporal scope*: This is proposed to be a permanent position.)

ii) Establish regular patrols along the TASR throughout the year, particularly during fall resident moose harvest seasons and winter caribou harvest seasons. Currently ENR regularly sends patrols out along the existing winter road for the duration of the winter road season; however, there will need to be patrols year-round with increased activity in peak harvesting seasons (i.e., fall moose hunt, winter barren-ground caribou hunt, etc.). ENR patrols contribute to harvest and access monitoring as well as enforcement of hunting regulations, and promoting the "Report a Poacher" toll-free line. (*Temporal scope*: indeterminate with the frequency of patrols to be determined and modified in response to results of monitoring or identified concerns).

iii) Increase the length of the winter monitoring season. GNWT will move the checkpoint station for barren-ground caribou winter harvest season to the TASR south of Whatì and extend the period the checkpoint is open by one month on either end of the current winter road season. (*Temporal scope:* Ongoing until harvest restrictions on barren-ground caribou are lifted, at minimum).

iv) Subject to discussion with TG, the potential for expanding community-based harvesting monitoring within the community of Whatì can be explored with ENR. This would involve having someone within the community to collect information about how many animals are harvested based on conversations with people in the community. Ideally, this would include harvest reporting for moose and boreal caribou (*Temporal scope*: to be determined).

v) Increased number of aerial surveys to monitor harvesting activities on either end of the winter barren-ground caribou harvest season. (*Temporal scope*: Ongoing until harvest restrictions on barren-ground caribou are lifted, at minimum).

vi) Continue ENR North Slave Region's moose jaw collection program. The ENR North Slave Region has been running a voluntary moose jaw collection program since 2013/2014 whereby moose hunters in the North Slave Region are provided an incentive of $50 plus a ball cap to supply ENR with the lower jaws of harvested moose and general location of harvest on a 10 km by 10 km grid. Hunter information, specific locations and personal details are kept confidential and results are saved to ENR's Wildlife Management Information System. The program is run year-long. The information is used to generate the sex and age structure of moose harvested in the

North Slave Region, identify areas of higher harvest pressure and generate an interest in moose management among the public. This program can provide general indicators on patterns of harvest in the North Slave Region. For instance, the age structure of the harvested moose population can provide one broad indicator of the overall sustainability of the harvest. If, over time, there is a change in the age structure of the population (such as a shift to a younger average age of harvested moose) to suggest the harvest is no longer sustainable, increased monitoring and harvest management actions can be considered in areas of concern within the North Slave Region. Locations of harvests can provide a sense of the extent to which additional harvest areas are being targeted near the road during construction and operation. (*Temporal scope*: Ongoing, subject to funding).

Thresholds

The proposed approach in conjunction with other programs for monitoring species population trend (boreal and barren-ground caribou) and/or distribution (moose, bison) is expected to provide several lines of evidence to inform GNWT and the TG if there would be a need to consider management actions. Given the paucity of baseline data and current absence of identified triggers defined by species–level management plans, setting quantitative thresholds is difficult and therefore the need to consider wildlife management actions can be raised by co-management partners as part of the review of monitoring results. Implementation of management actions within Wek'èezhìı would need to occur through formal co-management processes with the Wek'èezhìı Renewable Resources Board (WRRB).

5.2.3 Boreal Caribou

Rationale

Boreal caribou are a culturally and ecologically important species in the Northwest Territories (NWT). They are listed as "Threatened" under the federal *Species at Risk Act* and as "Threatened" under the *Species at Risk (NWT) Act*. While the population in the continuous range in the NWT (NT1) identified in the federal Boreal Caribou Recovery Strategy is considered to be to be "likely self-sustaining" based on habitat conditions, population trends likely vary among NWT regions. For example, there is evidence of population declines in the southern NWT, yet it is unclear to what extent this applies across the range. While ENR has conducted boreal caribou population monitoring in the South Slave, Deh Cho and Inuvik regions, boreal caribou were only once formally surveyed in the North Slave Region in 2005, and no long-term population monitoring has ever been conducted in this region. Part of the reason for this is that, until recently, the management priority for this relatively diverse region has been on barren-ground caribou, and human and financial resources have been allocated accordingly. Implementation of a boreal caribou collar monitoring program in the North Slave Region has become imperative with the TASR and with the "threatened" status of boreal caribou

in the NWT. In other jurisdictions, linear features including roads have been shown to contribute to the loss of functional habitat for boreal caribou and to population declines associated with increased predation by wolves that use those features. Although the TASR is not predicted to change the self-sustaining status of boreal caribou at the range-wide scale (NT1), the impact of the road on population trend of boreal caribou within the North Slave portion of the range is less certain given that there is currently less than 65% undisturbed habitat in the region. Initiating a collaring program prior to construction of the road will provide some baseline data on boreal caribou distribution, population trend, movements and body condition in the TASR Project area against which potential impacts can be monitored. Collars are also necessary to complement aerial surveys to provide sightability metrics necessary for calculation of abundance should population surveys be undertaken by the GNWT in future. Information on habitat associations obtained from collars can be used to target mitigations for preventing collisions.

To complement the collaring program, GNWT is committed to supporting, subject to availability of additional resources, the TG in the design and implementation of a program that uses Tłı̨chǫ harvesters' traditional knowledge and methods to monitor the health of boreal caribou (tǫdzı) and the state of their habitat, during and after the completion of the TASR project. Further details of the program, including monitoring questions and approach, will be determined following discussion with traditional harvesters and elders through engagement with TG, with a view it be included as a component of the WMMP to be finalized and approved during the regulatory phase for this project. The expertise and advice of the WRRB will also be sought in the design of the program.

Monitoring Questions

Information from a collaring program may help determine:

- Where collared boreal caribou are located in relation to construction activities
- If boreal caribou avoid the road during and after construction
- If and where boreal caribou cross the road
- If the rate of boreal caribou movements changes in proximity to the road
- If rates of caribou mortality are higher within the study area during and after highway construction
- The population trend of boreal caribou in the regional TASR study area

Proposed Approach

A total of 20 collars were deployed in the boreal caribou study area in March 2017 (see response to ECCC IR #7 (PR#128) for more details; see Figure 1 for the study area). Based on work elsewhere in the NWT, a minimum of 20 collars is recommended for reasonably precise estimates of adult female survival to support calculation of population trend in a

given area and maximize the information provided by collared animals. The 20 collars should allow ENR to obtain an estimate of female mortality and calf survival with which to generate an estimate of population trend in 2018. It is intended that sample size will be expanded and maintained at 30 collars annually for at least 5 years during the operational period of the road to measure population trend. To monitor population trend, spring recruitment surveys will be required annually to determine cow:calf ratios and sex ratios. When possible, collars will be retrieved from cows that have died to determine the cause of mortality.

The collars used in this study will be equipped with a "geofencing" function that allows increased frequency of locations to be collected within a previously defined area programmed into the collar. In this study, collars will be programmed to generate three locations per day, but this will increase to hourly locations within a buffer of 10 km from the proposed TASR. This will allow for a finer scale assessment of the behavioural response of boreal caribou to the construction and operation of the TASR, and to traffic along the existing highway.

During construction of the TASR, information on the location of collared boreal and barren-ground caribou will be provided to the Project Supervisor to alert of the potential need to apply mitigations, such as work scheduling to avoid disturbing known animals (see Appendix F).

Data collected during collar deployment will include pregnancy and body condition, diseases and parasites, and DNA.

Analytical methods that will be used to answer the above-mentioned monitoring questions will be finalized in later drafts of this document, however, resource selection functions can likely be developed for boreal caribou with covariates such as vegetation type, proximity of road, proximity of other linear features, traffic levels (if available), seasonality, proximity and/or relative abundance of other species (moose/bison). Furthermore, should funding become available in the future for repeated surveys, estimates of population abundance may be determined using a variety of techniques using marked individuals and modeling their detection probabilities. Depending on the data, other potential analyses include the use of multi-state models to test whether the construction of the highway influences the probability of caribou movement across the road and if proximity to the highway affects survival rates.

Annual reporting and summaries of results would be distributed to co-management partners such as TG and the WRRB through the research permitting process; whereas more formal comprehensive analysis and reporting will occur a) at the end of construction and b) after five years of operations.

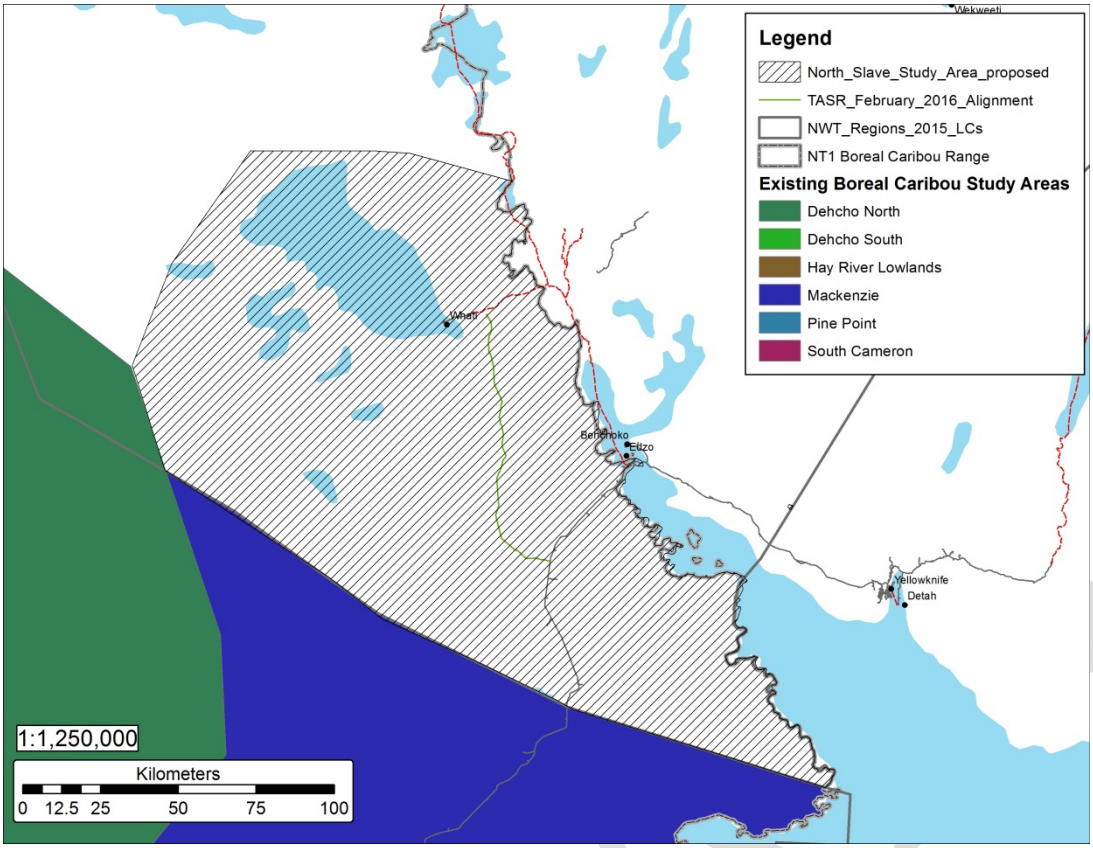

Figure 1: Boreal Caribou North Slave Study Area

Temporal Scope

This collaring program is proposed for the duration of constructions plus five years of operations. The need for continued monitoring will be re-evaluated at that time.

Thresholds

During construction, monitoring of collared animals will help to determine the proximity of some animals to the TASR for construction. In addition to visual on-the-ground monitoring conducted by Environmental Monitors to identify approaching wildlife, ENR will provide location maps of collared boreal caribou to construction crews to monitor the movements of collared caribou, and to trigger mitigation measures to reduce sensory disturbance and risk of caribou mortality or injury. These maps will be provided more frequently during the late-winter and calving seasons as per the standard operating procedure (Appendix E).

During operations, the results of this monitoring program will be used to identify where mitigation actions (such as reduced speed limits or signage at crossing locations or in sensitive seasons) should be applied. Formal analyses of resource selection and movement patterns related to the road can help to quantify the impact of the road and provide information for future resource planning in the NWT. Estimates of population

trend and related statistics will support regional scale efforts such as range planning and help to identify larger issues with productivity and survival that may lead to consideration of management interventions among co-management partners.

5.2.4 Barren-Ground Caribou Collaring

Rationale

Barren-ground caribou are a highly valued species in the NWT. Barren-ground caribou have been assessed as "threatened" by COSEWIC and by the NWT Species at Risk Committee. Several herds in the NWT have experienced substantial population declines. While barren-ground caribou have not been detected in the vicinity of the TASR in recent years of low population levels, the historical annual range of the Bathurst herd as determined by traditional knowledge and collaring data has overlapped the northern section of the TASR corridor. It is possible that barren-ground caribou may re-occupy the area of the TASR corridor in future, likely in winter. ENR's existing barren-ground caribou collaring program will help ENR to detect whether barren-ground caribou are approaching the TASR corridor. Given that the TASR will occur on the very edge of the range, the risk of the road acting as a substantial barrier to barren-ground caribou is low, however, collar data may be used over time to evaluate the impacts of the road on barren-ground caribou movements if they move into the area.

To complement the collaring program, GNWT is committed to supporting, subject to availability of additional resources, the TG in the design and implementation of a program that uses Tłı̨chǫ harvesters' traditional knowledge and methods to monitor the state of barren-ground caribou (ʔekwǫ̀) winter habitat, during and after the completion of the TASR project. Further details of the program, including monitoring questions and approach, will be determined following discussion with traditional harvesters and elders through engagement with TG, and WRRB engaged/consulted, with a view it be included as a component of the WMMP to be finalized and approved during the regulatory phase for this project. The expertise and advice of the WRRB will also be sought in the design of the program.

Monitoring Question

Data from the existing barren-ground caribou collaring program may be used to determine whether barren-ground caribou are approaching the area of the TASR corridor.

Approach

GNWT-ENR attempts to maintain 50 GPS collars annually on the Bathurst caribou herd, 30 on cows and 20 on bulls. Some of these collars could be equipped with a "geofencing" function that allows increased frequency of locations to be collected within a previously defined area programmed into the collar, and the goal is to have all collars equipped with

this capability over time with redeployments. Collars are generally programmed to generate three locations per day but newly deployed collars can be programmed to generate hourly locations within a buffer of 10 km from the proposed TASR if caribou begin to spend more time in the region of the road. This will allow for a finer scale assessment of the behavioural response of barren-ground caribou to the construction and operation of the TASR, and to traffic along the existing highway if caribou do re-enter the area. Data are typically downloaded every four days. Given the slower and more limited movements of barren-ground caribou in the winter, current programming of three times daily is sufficient to detect their approach into the area and to initiate patrols to look out for them and determine how many individuals may be in the area.

Temporal Scope

Indefinitely, as this is a well-established, on-going program.

Thresholds

If collar data indicate that barren-ground caribou are approaching within 10 km of the TASR road, ENR and INF staff traveling the road will be notified to monitor for groups of caribou. In the event that GNWT staff either see or receive reports of groups of caribou on or adjacent to the road, ENR will contact INF to discuss the need or potential for temporary signage, speed reductions or road closures.

5.2.5 Moose and Bison Population Monitoring

Rationale

Moose are an important big game species in the North Slave Region, comprising a substantial portion of the Tłı̨chǫ subsistence harvest and supporting a resident fall harvest. Moose occur in low densities throughout the NWT, and the most recent targeted population survey in the North Slave Region conducted in 2012 identified densities of roughly 2.9 moose/100 km^2 in the Taiga Plains. While ENR conducts moose population surveys approximately every five years throughout the North Slave Region, these studies have not historically provided good coverage of the TASR regional study area and are not designed to detect changes in a targeted area. There are several factors affecting moose in the TASR study region that, in addition to the road itself, warrant tracking moose populations. Given harvest restrictions on caribou, moose may be targeted more frequently by hunters, which will be further facilitated by the road. This could lead to the potential for localized over-hunting. In addition, community members have expressed concerns that the potential expansion of the Mackenzie bison northward towards Whatì will negatively impact moose and caribou in areas where they overlap. While the extensive recent burns in the vicinity of the TASR might be expected to increase moose habitat over time, the interaction of these factors introduces sufficient uncertainty to warrant more targeted regional monitoring. Having an understanding of how the population is changing in the regional study area is essential to placing the information

generated by harvest and collision monitoring into context for making decisions about the need for management actions.

Wood bison, assessed as Threatened by the NWT Species at Risk Committee and listed as Threatened under the federal *Species at Risk Act*, are a species of management concern in the NWT. With construction of the TASR, it is likely that the Mackenzie bison herd will use the road corridor to expand its range northward, possibly entering the community of Whatì. This has raised the concern among community members that bison may begin to exclude moose and caribou in the region. Hunting of the Mackenzie bison population is currently closed following an anthrax outbreak in 2012, but a new road will increase hunters' access into bison habitat and may increase hunting pressure when hunting is reinstated. Traffic on a new road will also increase the number of bison-vehicle collisions, which is already a substantial cause of mortality on Highway 3. Collisions are a risk to human safety and a cause of bison mortality. Aerial surveys designed to monitor moose relative abundance and trend in the TASR study region can also be used to monitor bison abundance in the area, track any northward expansion, and inform the need for more targeted mitigation to minimize bison-vehicle collisions.

Monitoring Questions

Data obtained from population monitoring conducted in the regional TASR study area will help to determine:

- If the relative abundance of moose in the TASR regional study area changes over time. This will help to identify potential conservation concerns related to the road and hunter access.
- Whether changes in the abundance of moose in the TASR regional study area are qualitatively similar to what is observed in North Slave Regional surveys.
- If and at what rate bison expand their range northward along the road corridor.
- If the relative abundance of bison in the TASR regional study area changes over time.

Proposed Approach

ENR proposes late winter aerial surveys every three years for moose and bison to generate density estimates in the TASR regional study area, and look for impacts of the road for at least two rounds of surveys after the operations period of the road begins. The first survey would occur in winter 2018 before road construction begins to get a baseline estimate, with the others being conducted in March. Therefore two surveys are proposed during construction and two surveys during operations. ENR is proposing to use a distance-based sampling method over a minimum study area of 25,000 km^2 using 3 km transect spacing. These surveys would also record boreal caribou sightings which although not sufficient to provide reliable caribou population estimates or trend information, could provide information on caribou occupancy throughout the study area.

For this program, a summary report would be provided to co-management partners every survey year (i.e., every three years), and at the end of the study. Analysis of the relative abundance of moose and bison in the TASR regional study area will be determined using appropriate statistical and analytical software.

This monitoring approach and initial study design is subject to change pending statistical power analyses. In the event that it is determined that aerial surveys would not provide the statistical power necessary to reliably detect changes in abundance and distribution of moose and bison in the TASR study area, other methods of population monitoring (e.g. based on collared individuals, or indices such as track counts, browse or pellet surveys) will be assessed and considered.

Temporal Scope

One baseline survey will be conducted in Winter 2018, two additional surveys within three years during the construction phase, and two additional surveys during operations. This schedule is subject to change based on statistical analysis.

Thresholds

Density estimates and distribution information within the TASR road study area of bison and moose can help to detect changes in the region over time that may identify harvesting or collision issues and inform the need for management decisions to be considered with co-management partners. For example, if harvest monitoring indicates notable increases in moose mortality in the regional study area, the need to consider conservation actions would be informed by whether population level monitoring shows decreasing, stable or increasing populations.

5.2.6 Wildlife Sighting and Collisions

Rationale

Increased risk of wildlife injury and mortality due to vehicle collisions is one of the main concerns with the TASR. One difficulty in predicting the extent and the seriousness of harm to wildlife from vehicle collisions associated with a new road is that currently GNWT does not have a single source of baseline data on wildlife mortalities. INF and ENR have different processes and keep separate records of animal–vehicle collisions which makes assessing the true costs to humans and wildlife difficult. This particular impact pathway potentially affects all wildlife but has been a particular source of uncertainty in the EA for Mackenzie bison which are more susceptible to collisions given their frequent use of roadways. There are currently harvest restrictions in place until the population reaches 1000 animals, and additional mortalities will slow recovery. Furthermore, there is no consistent, accurate, geo-referenced system in place for tracking wildlife-vehicle collisions or wildlife observations along the road to determine where potential hotspots may be that warrant dedicated mitigation efforts such as increased signage or heightened

speed limit enforcement. Having a consistent method for reporting wildlife-vehicle collisions and wildlife observations will also provide information on potential range expansion of Mackenzie bison along the TASR, which addresses one of the questions of the EA.

Monitoring Question

- How many wildlife-vehicle collisions are occurring along NWT highways, and how will the TASR contribute to that?
- Where are wildlife-vehicle collisions occurring most frequently along the TASR, if they occur, and other NWT highways?
- Where are wildlife being observed most frequently along the TASR?
- Are the Mackenzie bison expanding their range further north along the road?

Monitoring Approach

GNWT will establish an inter-departmental working group co-chaired by INF and ENR to investigate, design and launch a wildlife collision and sighting reporting system for GNWT employees based on the Alberta Wildlife Watch Program (Alberta 2016). Alberta has designed a smartphone app for use by employees and contractors who travel the roads frequently to easily and accurately record wildlife sightings, carcasses and collisions in order to better understand the costs associated with collisions, impacts to wildlife, where mitigation is required and the effectiveness of mitigation. Alberta is making the platform available to other jurisdictions to tailor to their needs. GNWT will work on designing and launching the program during the construction phase of the TASR, with the intention of having the program operational in time for operation of the TASR.

Temporal Scope

The timeline and appropriate review cycles necessary to generate the appropriate amount of data to support mitigation for the operations phase of the TASR would be determined by the working group based on periodic review of results. Wildlife-vehicle collision monitoring and wildlife sightings reporting along the TASR will be ongoing once the TASR is operational.

Thresholds

Depending on the rate of data acquisition, the program will identify regular intervals for analysis that will provide sufficient data to identify potential hot-spots along the road. When these are identified, INF can implement mitigations such as lowered speed limits or temporary and permanent signage.

5.3 Refinement of the Study Design

Statistical analysis will be conducted to verify whether modifications of the initial study designs for wildlife effects monitoring proposed herein are required to ensure that the proposed programs obtain the information required. Part of this will analysis may also consider the feasibility of using alternate methods to achieve similar objectives.

6.0 REPORTING AND ADAPTIVE MANAGEMENT

6.1 Reporting

Three levels of reporting will be completed; weekly, annual, and cyclical comprehensive reports. The monitoring described here is exclusive of any immediate reports that may be required in the event of a wildlife emergency or required to fulfill research permit requirements. Weekly and monthly meetings will also occur during the construction phase.

6.1.1 Weekly Reports

During the construction phase, weekly reports will be prepared. The weekly reports will be submitted to the GNWT, the Project Co. Project Supervisor, the Tłı̨chǫ Government, the Wek'èezhìı Land and Water Board, Environment and Climate Change Canada and other interested parties. The weekly reporting will include, but not be limited to the following content:

- Mitigation triggered or new mitigation implemented
- Wildlife incidents
- Wildlife collisions and mortalities
- Migratory bird nests observed (and any mitigations implemented)
- Observations of Species of Concern or Species at Risk (and any mitigations implemented)
- Waste management concerns
- Project staff behaviour concerns
- Any other issues that may be pertinent to the protection of wildlife or the relevant legislation and regulations protecting wildlife
- Any reviews of or changes to WMMP mitigation.

6.1.2 Annual Reports

The GNWT will report on the progress and implementation of the WMMP in an Annual Report, which will document the previous year's activities. The WMMP Annual Report should include, but not be limited to, the following information:

- Occurrences of human-wildlife interactions, and incidents, accidents, injuries, or mortalities involving wildlife
- Records of disturbances to wildlife habitat that were not predicted
- Observations of recreational, traditional, or non-traditional activities near the project
- A discussion of the effectiveness of the mitigation outlined in the WMMP (see section 6.2)
- Any reviews of or changes to WMMP mitigation

6.1.3 Comprehensive Reports

Two comprehensive reports that compile and synthesize information from all previous years and monitoring programs will be prepared, the first following the final year of construction, and the second five years after monitoring during operations start. The comprehensive report will consider analysis of the following, in addition to any other relevant issues:

- the efficacy of mitigation
- road-related mortalities
- available information on changes in wildlife distribution
- wildlife conservation concerns related to the TASR
- suggested mitigation for any unacceptable effects observed
- description total direct habitat loss

The second comprehensive report will include recommendations for the termination of the WMMP or continuation of aspects of the WMMP.

6.2 Adaptive Management

Adaptive management is a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs. The term is commonly thought of as "learning by doing". Active adaptive management typically involves active experimentation to simultaneously test a range of alternative management actions, whereas passive adaptive management may involve selecting only the "best" management option and evaluating the results to see if further adjustments are needed.

6.2.1 Construction Phase:

Adaptive management during the construction phase will occur primarily through the proposed weekly and annual reports. Through these reports, all incidents, relevant wildlife observations and concerns regarding the environmental management of the Project will be documented, and the WMMP mitigation triggered or any new mitigation implemented will be described. The weekly report will be circulated to interested parties.

In addition, the following thresholds will lead to an incident report, and will trigger an immediate review of the WMMP mitigation:

- One caribou, moose or bison killed or injured as a result of construction operations.
- Destruction or disturbance of one bird nest, one bat roost site or hibernaculum, or one mammal den.
- One bear or other carnivore killed in defense of life and property as a result of attraction to camp facilities or other work areas

6.2.2 Operations phase:

Adaptive management approaches proposed for the operations phase include the following:

- If monitoring indicates that there are recurring areas, times of year or times of day associated with wildlife-vehicle collisions, GNWT will evaluate the implementation of temporary/permanent signage, reduction of speed limits in high risk zones or at high risk times.
- If there is evidence of specific sections of the road that are repeatedly crossed by big game species, based on monitoring of collared boreal and barren-ground caribou or reporting of sightings of big game species, GNWT will install signage to warn of collision risk in these areas.
- If collared barren-ground caribou are within 10 km of the TASR, or there are reports of sightings of barren-ground caribou along the TASR, GNWT will initiate patrols along the road, to determine the number of individual caribou involved. ENR will contact INF to discuss any required mitigations.
- Higher than expected traffic levels on an average annual daily basis, or that surpasses a seasonal maximum threshold.
- Snow will be managed to maintain a slope on the side of the road (to maintain permafrost and reduce snowdrifts on the road). If there are reports of wildlife having difficulty crossing the TASR right of way or moving off the road due to the depth of cleared snow along the roadside, GNWT will consider instructing Project Co. to clear escape routes at regular intervals along problematic sections of the TASR.

- If there is evidence or concerns about unsustainable levels of wildlife harvest along the TASR corridor, GNWT will initiate discussions with TG, WRRB and other relevant Aboriginal government organizations to determine an appropriate response.

6.2.3 Mitigation Audit

During the construction phase, an internal audit will be undertaken annually, specific to the mitigation listed as part of the WMMP Annual Report, to evaluate:

- if all mitigation has been implemented
- which mitigation is perceived to be or shown to be successful
- if new mitigation has been implemented in response to new issues
- if some mitigation is redundant

The results of the adaptive management audit will be included in the Annual Report, and the WMMP will be revised if necessary to reflect lessons learned.

7.0 REFERENCES

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APPENDIX A

Statutory Requirements Relevant to Wildlife and Wildlife Habitat

NWT *Wildlife Act*		
Topic	**Section of NWT *Wildlife Act***	**Notes**
Birds and nests	**51.** (1) Subject to section 17, no person shall, unless authorized by a licence or permit to do so, destroy, disturb or take (a) an egg of a bird; (b) the nest of a bird when the nest is occupied by a bird or its egg; or (c) the nest of a prescribed bird.	Bullet (c) of the NWT *Wildlife Act* does not specify that the nest has to be active.
Wildlife abodes	**51.**(2) Subject to section 17, no person shall, unless authorized by a licence or permit to do so, break into, destroy or damage a den, beaver dam or lodge, muskrat push-up or hibernaculum.	
Disturbance and harassment	**52.** Subject to section 17, no person shall, unless authorized by a licence or permit to do so, (a) engage in an activity that is likely to result in a significant disturbance to big game or other prescribed wildlife; or (b) unnecessarily chase, fatigue, disturb, torment or otherwise harass game or other prescribed wildlife.	"big game" means species of wildlife prescribed as big game, or an individual of a species of big game, as set out in Schedule A of the Wildlife General Regulations; BIG GAME (1) *Bison* - including buffalo and bison (2) *Canis* - including coyote and wolf (3) *Puma* - including cougar (4) *Gulo* - including wolverine (5) *Oreamnos* - including mountain goat (6) *Ovis* - including Dall's sheep (7) *Ovibos* - including muskox (8) *Ursus* - including bear (9) *Alces* - including moose (10) *Rangifer* - including caribou (11) *Odocoileus* - including deer (12) *Cervus* - including elk Prescribed wildlife for the purpose of paragraph 52(a) and (b): BIRDS OF PREY (1) *Pandion* - including osprey (2) *Accipiter* and *Buteo* - including hawk (3) *Circus* - including harrier (4) *Aquilia* and *Haliaeetus* - including eagle (5) *Falco* - including falcon (6) *Aegolius, Asio, Bubo, Stix* and *Surnia* - including owl
Chasing Wildlife	55. Notwithstanding any other provision of this Act or the regulations, a person may chase wildlife away from a dwelling place, camp, work site,	"wildlife" means (a) all species of vertebrates and invertebrates found wild in nature in the Northwest Territories, and individuals of

	municipality or unincorporated community, or its immediate vicinity, if doing so is necessary to prevent injury or death to a person or damage to property.	those species, except (i) fish as defined in section 2 of the *Fisheries Act* (Canada), and (ii) other prescribed species and subspecies, (b) species of wildlife referred to in paragraph (a) that are domesticated or held in captivity, and individuals of those species, and (c) prescribed species or subspecies of vertebrates and invertebrates, and individuals of those species or subspecies.
Defence of life and property	**56.** (1) Notwithstanding any other provision of this Act or the regulations but subject to subsection (4), a person may harvest and consume wildlife or take and consume the eggs of birds if it is necessary to prevent starvation of a person. (2) Notwithstanding any other provision of this Act or the regulations but subject to subsection (4), a person may kill wildlife if it is necessary to prevent injury or death to a person. (3) Notwithstanding any other provision of this Act or the regulations but subject to subsection (4) and any regulations specified as applying in respect of this section, a person may kill wildlife if it is necessary to prevent damage to property. (4) Subsections (1), (2) and (3) do not provide a defence to a contravention of this Act or the regulations for a person who resorts to harvesting or killing wildlife as a result of his or her mismanagement.	
Reporting	**57.** Subject to the regulations, a person shall, as soon as is practicable, report the harvest or kill of big game or other prescribed wildlife to an officer, if (a) under section 56, the person	

	harvested big game or other prescribed wildlife to prevent starvation, or killed big game or other prescribed wildlife to prevent injury or death to a person or damage to property; and (b) the harvest or kill would, but for subsection 56(1), (2) or (3), be a contravention of this Act or the regulations.	
Accidental kill or wounding	**58.** A person who, with a motorized vehicle, accidentally kills or seriously wounds big game or other prescribed wildlife on a highway as defined in section 1 of the *Motor Vehicles Act*, shall report the event to an officer within the time fixed in the regulations.	Subject to the Wildlife General Regulations: **8.** (1) A report of an accidental kill or serious wounding of big game or wildlife under section 58 of the Act must be made within 24 hours after the incident. (2) A report of an accidental kill or serious wounding of big game or wildlife under section 58 of the Act must include (a) the name of the person who killed or seriously wounded the big game or wildlife; (b) an explanation of the incident; (c) the time, date and location of the incident; (d) the species and quantity involved; and (e) any other information requested by an officer.
Feeding wildlife	**65.** (1) Subject to subsection (2), no person shall intentionally feed big game, fur-bearers or other prescribed wildlife. (2) Subsection (1) does not apply in respect of a person feeding wildlife lawfully kept in captivity or in circumstances permitted by the regulations.	
Wildlife Attractants	**66.** (1) No person shall deposit, place or leave in, on or about land or premises food, food waste or another substance if there is a reasonable likelihood that it could attract big game or other prescribed wildlife to the land or premises and endanger a person, a domestic animal or wildlife.	

	(2) Subsection (1) does not apply in respect of (a) the drying or caching of meat, pelts or hides, except in a manner contrary to regulations respecting the treatment, caching and identification of wildlife and parts of wildlife left temporarily on the land; (b) a person lawfully harvesting fur-bearers with bait; or (c) other persons and circumstances exempted by the regulations.	
Damage to habitat	**93.** (1) No person shall substantially alter, damage or destroy habitat. (2) A person who establishes that he or she acted with legal justification in altering, damaging or destroying habitat shall not be convicted of an offence under subsection (1).	"habitat" means the area or type of site where a species or an individual of a species of wildlife naturally occurs or on which it depends, directly or indirectly, to carry out its life processes;
Requirement for Wildlife Management and Monitoring Plan	**95.** (1) A developer or other person or body may be required, in accordance with the regulations, to prepare a wildlife management and monitoring plan for approval by the Minister, and to adhere to the approved plan, if the Minister is satisfied that a development, proposed development, or other activity is likely to (a) result in a significant disturbance to big game or other prescribed wildlife; (b) substantially alter, damage or destroy habitat; (c) pose a threat of serious harm to wildlife or habitat; or (d) significantly contribute to cumulative impacts on a large number of big game or other prescribed wildlife, or on habitat	
Contents of the Wildlife Management and Monitoring Plan	**95**. (2) A wildlife management and monitoring plan must include (a) a description of potential disturbance to big game and other prescribed wildlife, potential harm to	

	wildlife and potential impacts on habitat; (b) a description of measures to be implemented for the mitigation of potential impacts; (c) the process for monitoring impacts and assessing whether mitigative measures are effective; and (d) other prescribed requirements.	
Species at Risk (NWT) Act		
Topic	**Section of the Act or Regulations**	**Notes**
Designated Habitat	**80.** No person shall destroy any part of designated habitat.	
Species conservation	**151.** (1) The Commissioner, on the recommendation of the Minister, may make regulations respecting the conservation of pre-listed species or listed species, including but not limited to (a) requiring the doing of things that may conserve the species; (b) prohibiting activities that may adversely affect the species; (d) imposing prohibitions against (i) killing, harming, harassing, capturing or taking an individual of a species,	For up-to-date information on Regulations and Permits issued under the Act go to http://nwtspeciesatrisk.ca/en/Regulations
Habitat conservation	**152.** The Commissioner, on the recommendation of the Minister, may make regulations respecting the conservation of habitat of pre-listed species or listed species or the area in which the habitat is located or the surrounding area, including but not limited to (a) requiring the doing of things that may conserve the habitat or area; (b) prohibiting activities that may adversely affect the habitat or area; (c) imposing prohibitions against damaging or destroying the habitat or area; (d) controlling, restricting or prohibiting any use of, access to, or activity in the habitat or area; and (e) controlling, restricting or	For up-to-date information on Regulations and Permits issued under the Act go to http://nwtspeciesatrisk.ca/en/Regulations

	prohibiting the release of any substances in or into the habitat or area.	
Designating habitat	**153.** (1) The Commissioner, on the recommendation of the Minister, may, by regulation, designate habitat, or a component or combination of components of habitat, of a pre-listed species or a listed species.	For up-to-date information on Regulations and Permits issued under the Act go to http://nwtspeciesatrisk.ca/en/Regulations
Designated habitat	**154.** The Commissioner, on the recommendation of the Minister, may make regulations respecting the conservation of designated habitat or the area in which designated habitat is located or the surrounding area, including but not limited to (a) requiring the doing of things that may conserve the designated habitat or area; (b) prohibiting activities that may adversely affect the designated habitat or area; (c) imposing prohibitions against damaging the designated habitat or area; (d) controlling, restricting or prohibiting any use of, access to, or activity in the designated habitat or area; and (e) controlling, restricting or prohibiting the release of any substances in or into the designated habitat or area.	For up-to-date information on Regulations and Permits issued under the Act go to http://nwtspeciesatrisk.ca/en/Regulations
Migratory Birds Convention Act		
Topic	**Section of the Act or Regulations**	**Notes**
Deposit of harmful substances	5.1 (1) No person or vessel shall deposit a substance that is harmful to migratory birds, or permit such a substance to be deposited, in waters or an area frequented by migratory birds or in a place from which the substance may enter such waters or such an area.	
Migratory Birds Regulations (federal) enabled under the *Migratory Birds Convention Act*		
Topic	**Section of the Act or Regulations**	**Notes**
Disturbance and/or	5(1) of the Migratory Bird Regulations states that no person shall hunt a	"Hunt" means to chase, pursue, worry, follow after or on the trail of, lie in wait for,

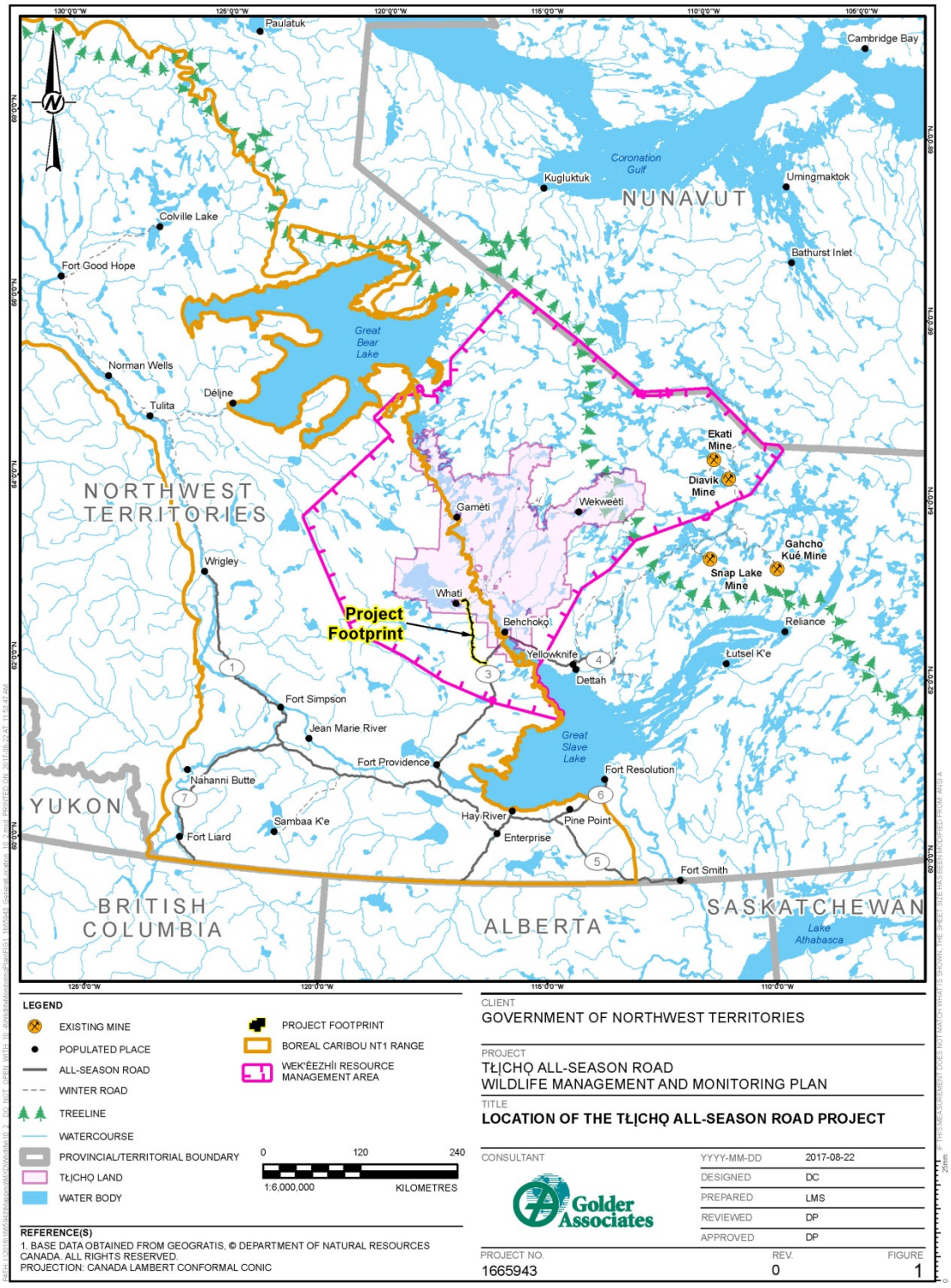
destruction of migratory birds, their nests and eggs	migratory bird except under authority of a permit. 6. Subject to subsection 5(9), no person shall (a) disturb, destroy or take a nest, egg, nest shelter, eider duck shelter or duck box of a migratory bird, or	or attempt in any manner to capture, kill, injure or harass a migratory bird, whether or not the migratory bird is captured, killed or injured. Currently, the regulations do not provide for authorizations or permits for the inadvertent harming or killing of migratory birds and the disturbance or destruction of their nests and eggs (a.k.a. "incidental take") in the course of industrial or other activities. For further advice on how to avoid incidental take or reduce risks to migratory birds and their nests and eggs, refer to the avoidance guidelines and frequently asked questions related to the protection of migratory bird nests and eggs as well as the fact sheet "Planning Ahead to Reduce Risks to Migratory Bird Nests" at: http://www.ec.gc.ca/paom-itmb/
Species at Risk Act (federal)		
Topic	**Section of the Act or Regulations**	**Notes**
Killing, harming, etc., listed wildlife species	**32.** (1) No person shall kill, harm, harass, capture or take an individual of a wildlife species that is listed as an extirpated species, an endangered species or a threatened species.	"individual" means an individual of a wildlife species, whether living or dead, at any developmental stage and includes larvae, embryos, eggs, sperm, seeds, pollen, spores and asexual propagules.
Damage or destruction of residence	**33.** No person shall damage or destroy the residence of one or more individuals of a wildlife species that is listed as an endangered species or a threatened species, or that is listed as an extirpated species if a recovery strategy has recommended the reintroduction of the species into the wild in Canada.	"residence" means a dwelling-place, such as a den, nest or other similar area or place, that is occupied or habitually occupied by one or more individuals during all or part of their life cycles, including breeding, rearing, staging, wintering, feeding or hibernating.
Destruction of critical habitat	**58.** (1) Subject to this section, no person shall destroy any part of the critical habitat of any listed endangered species or of any listed threatened species — or of any listed extirpated species if a recovery strategy has	"critical habitat" means the habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species' critical habitat in the recovery strategy or in an action plan for the species.

	recommended the reintroduction of the species into the wild in Canada — if (a) the critical habitat is on federal land, in the exclusive economic zone of Canada or on the continental shelf of Canada; (b) the listed species is an aquatic species; or (c) the listed species is a species of migratory birds protected by the Migratory Birds Convention Act, 1994.	
Destruction of critical habitat	**61.** (1) No person shall destroy any part of the critical habitat of a listed endangered species or a listed threatened species that is in a province or territory and that is not part of federal lands. (1.1) Subsection (1) does not apply in respect of (*a*) an aquatic species; or (*b*) the critical habitat of a species of bird that is a migratory bird protected by the *Migratory Birds Convention Act, 1994* that is habitat referred to in subsection 58(5.1). (2) Subsection (1) applies only to the portions of the critical habitat that the Governor in Council may, on the recommendation of the Minister, by order, specify.	
Agreements and Permits	**73.** (1) The competent minister may enter into an agreement with a person, or issue a permit to a person, authorizing the person to engage in an activity affecting a listed wildlife species, any part of its critical habitat or the residences of its individuals. 2) The agreement may be entered into, or the permit issued, only if the competent minister is of the opinion that (*a*) the activity is scientific research relating to the conservation of the species and conducted by qualified	

	persons; (*b*) the activity benefits the species or is required to enhance its chance of survival in the wild; or (*c*) affecting the species is incidental to the carrying out of the activity. (3) The agreement may be entered into, or the permit issued, only if the competent minister is of the opinion that (*a*) all reasonable alternatives to the activity that would reduce the impact on the species have been considered and the best solution has been adopted; (*b*) all feasible measures will be taken to minimize the impact of the activity on the species or its critical habitat or the residences of its individuals; and (*c*) the activity will not jeopardize the survival or recovery of the species.	

APPENDIX B

Draft TASR Project Maps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Fort Good Hope
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Norman Wells
Déline
Tulita
Ekati Mine
Diavik Mine
NORTHWEST TERRITORIES
Gamèti
Wekweèti
Gahcho Kué Mine
Snap Lake Mine
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Fort Simpson
Jean Marie River
Great Slave Lake
Fort Providence
Fort Resolution
Nahanni Butte
YUKON
Hay River
Pine Point
Sambaa K'e
Fort Liard
Enterprise
Fort Smith
BRITISH COLUMBIA
ALBERTA
SASKATCHEWAN
Lake Athabasca
LEGEND
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GOVERNMENT OF NORTHWEST TERRITORIES
PROJECT
TŁĮCHǪ ALL-SEASON ROAD
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CONSULTANT
Golder Associates
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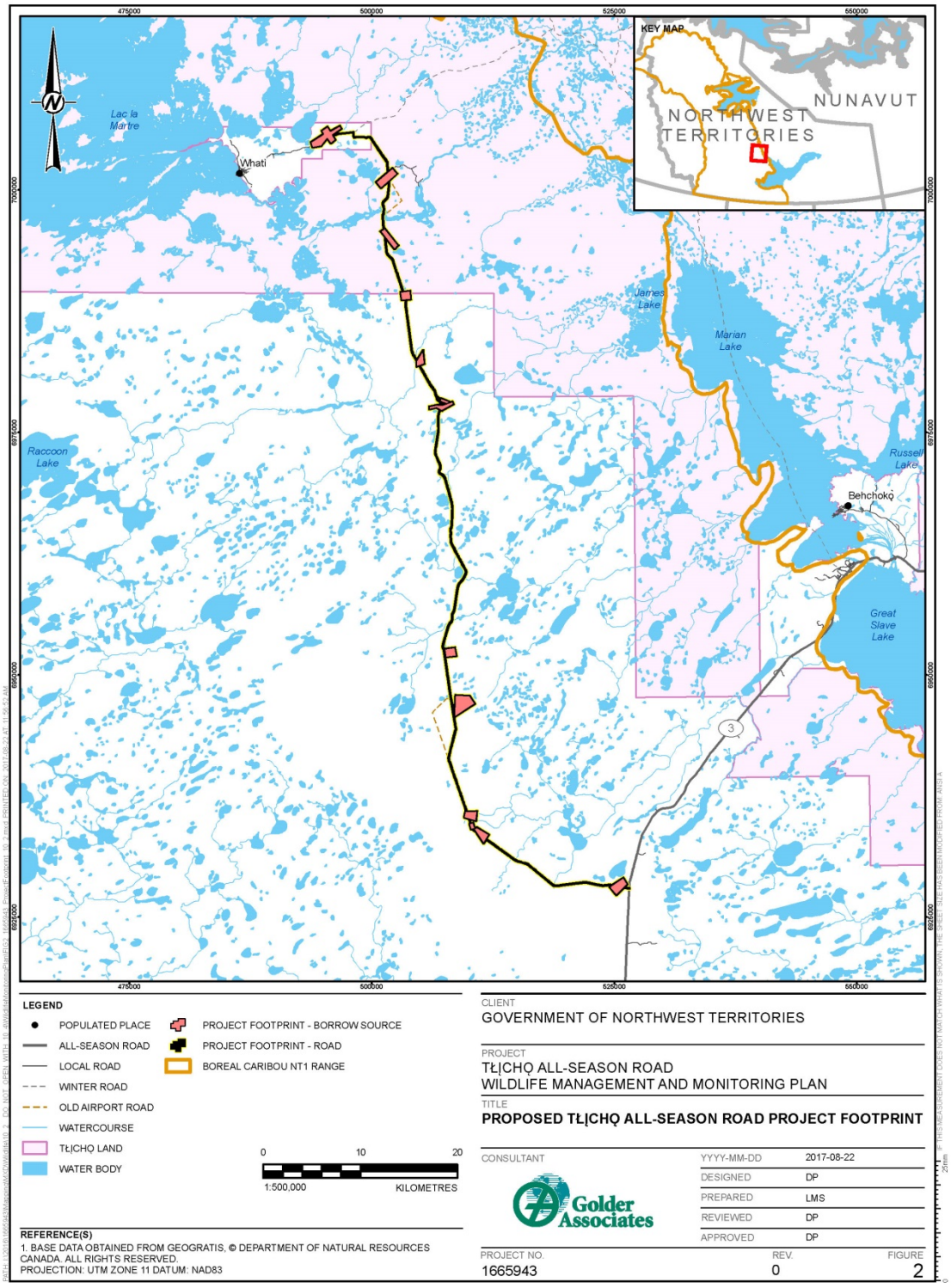
KEY MAP
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Golder Associates
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PREPARED LMS
REVIEWED DP
APPROVED DP
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FIGURE 2

APPENDIX C

Draft Monitoring Protocols and Data Sheets

1 WILDLIFE SIGHTINGS LOG

1.1 Purpose

The purpose of this procedure is to describe the management of the Wildlife Sightings Form. This procedure will be used during the construction phase only.

1.2 Responsibility

All staff are responsible for reporting wildlife sightings. The Environmental Monitors are responsible for collecting the log sheets weekly, entering them into a database. Environmental Monitors are also responsible for entering wildlife observations reported by radio into the log sheets.

1.3 Procedure

The Wildlife Sightings Form is posted on various bulletin boards in camps and work areas. Environmental Monitors will also carry Wildlife Sightings forms in order to record observations reported by radio. Check the wildlife monitoring log weekly and note any observations that may require action, such as sightings of a wolverine or nesting bird to the Project Supervisor. Replace the sheet weekly. File the original hard copy in the Environmental Office and update the Wildlife Sightings Form database.

1.4 Equipment Requirements

None. Data sheets to be posted for all staff use.

1.5 Reporting

Observations relevant to human or wildlife safety, such as observations of bears, caribou, species at risk or nesting birds, will be included in the Weekly Report. All information will be summarized in the Annual Report.

TASR WILDLIFE SIGHTINGS LOG

Date	Time	Species	Number	Location (km marker, or coordinates)	Notes (any behavioural response or reactions?)	Name	Company

2 WILDLIFE ROAD SURVEY

2.1 Purpose

The purpose of this procedure is to describe the management of the Wildlife Road Survey. This procedure will be used during the construction phase only.

2.2 Responsibility

The Environmental Monitors are responsible for completing wildlife road surveys and entering them into a database.

2.3 Procedure

The Wildlife Road Survey is to be completed each time Environmental Monitors drive a section of road. This survey may be completed as a stand-alone survey, or while driving the road for other purposes. To provide sufficient survey effort, a minimum distance of 10 km is suggested, and the entire drivable length of road should be covered at least twice per week.

At the start of the survey, document the date, start time, start location and observers on the Wildlife Road Survey data sheet provided. All observations of wildlife or wildlife sign along the road should be documented, including the species, number of individuals, location (UTM or kilometre) and photo if relevant. Speed should be limited to 50 km/h, the maximum driving speed for Project vehicles. Any notes on mitigation actions taken or suggested follow up should also be reported. Observations of large mammals on the road should be reported to other drivers in the area, to reduce risk of collision.

At the completion of the survey, document the end time and the end location. File the original hard copy in the Environmental Office and update the Wildlife Sightings Form database.

2.4 Equipment Requirements

- Truck
- Binoculars
- Data Sheet
- Field guide to birds
- GPS
- Project map

- Digital camera

2.5 Reporting

Observations relevant to human or wildlife safety, such as observations of bears, caribou, species at risk or nesting birds, will be included in the Weekly Report. All information will be summarized in the Annual Report.

WILDLIFE ROAD SURVEY

Date: Start time: End time: Observer(s):

Survey start at (km marker or other landmark): Survey completed at (km or other landmark):

Time	Species	Number	Age/sex	Location (general feature describe)	Location UTM or Km Marker	Photo ID	Notes (any behavioural response or reactions?)

Additional notes (e.g. details on wildlife interactions, behavioural responses, or response to mitigation):

3 CAMP SURVEILLANCE

3.1 Objective

To prevent wildlife incidents through systematically documenting wildlife activity. This procedure will be used during the construction phase only.

3.2 Responsibility

The Environmental Monitors are responsible for completing surveys of all camps and Project infrastructure for evidence of wildlife presence and entering them into a database.

3.3 Procedures

Surveys of the Project infrastructure for wildlife and wildlife sign will be completed at least once per week. Observers will travel to defined Project location, and record the following at each:

- Time upon arrival at location / monitoring site
- Location or monitoring site
- Presence of wildlife or wildlife sign (Yes or No)
- Species or sign observed
- Number of individuals
- Activity
- Photo number (if photo taken)
- Any relevant comments about the observation, or relevant information from people working at the location.

Any reports of sign or observations of species from Project staff working in the area shall be recorded on the data sheets in the additional comments section on the reverse side of the data sheet. Photos of sign and wildlife should be taken where possible to help in identification of species after completion of the survey. Record the photo number on the data sheet and download and file the photos by date.

If no wildlife is observed, no sign seen and no reports of wildlife from staff, then an "N" should be recorded on the data sheet and in the database for that monitoring site or location.

3.4 Locations for Systematic Monitoring

The following areas / sites should be visited at least once a week:

- Accommodations camps (entire perimeter)
- Waste transfer areas (entire perimeter)
- Quarries

3.5 Equipment Requirements

- Truck
- Binoculars
- Data Sheet
- Field guide to birds
- GPS
- Project map
- Digital camera

3.6 Reporting

Any wildlife concerns that come to light during the survey should immediately be brought to the attention of the Project Supervisor so that appropriate action can be taken. Any wildlife incidents observed or reported during this survey should be reported in the Wildlife Incident Report Form (see separate form). Observations relevant to human or wildlife safety, such as observations of bears, caribou, species at risk or nesting birds, will be included in the Weekly Report. All information will be summarized in the Annual Report.

WILDLIFE CAMP SURVEILLANCE MONITORING FORM

Observers: Date: Page: of:

Wildlife Observed or Wildlife Sign

Time	Location	Wildlife Present? (Y/N)	Species Or Sign	Number	Activity	Photo #	Observations from people working at the location / other comments

Record any additional comments on reverse page

Additional comments or notes:

Reviewed by:

Date:

Follow up:

4 BIRD NEST MONITORING

4.1 Objective

To detect bird nesting activity and mitigate impacts to active nests. This procedure will be used during the construction phase only, except for quarries which will be monitored during operations as well.

If vegetation clearing is required during the migratory bird nesting season (May to mid-August), a separate pre-clearing survey will be required.

4.2 Responsibility

The Environmental Monitors are responsible for completing bird nest surveys and entering them into a database.

4.3 Procedures

Surveys of the Project for bird nesting activity and bird nests will be completed at least once per week. Observers will travel to defined Project location, and record the following at each:

- Time upon arrival at location / monitoring site
- Location or monitoring site
- Presence of bird nesting behaviour or active bird nests
- Number of individuals
- Photo number (if photo taken)
- Any relevant comments about the observation, or relevant information from people working at the location.

Any reports of sign or observations of species from Project staff working in the area shall be recorded on the data sheets in the additional comments section on the reverse side of the data sheet.

If no bird nests or nesting behaviour is observed, no sign seen and no reports of wildlife from staff, then an "N" should be recorded on the data sheet and in the database for that monitoring site / location.

Quarries in particular should be checked for signs of swallow and Common Nighthawk nesting. Quarry pile slopes should be less than 70 degrees (Refer to the ECCC pamphlet Bank Swallow in Sandpits and Quarries, Appendix F).

Monitoring will initiate in April and continue at least until mid-July (or until all identified nests are inactive), and focus on areas where scheduled construction activities are expected during the migratory bird nesting season.

Incidental observations of avian species at risk in particular should be documented. These include:

- Little brown myotis
- Peregrine falcon
- Short-eared owl
- Bank swallow
- Barn swallow
- Common nighthawk
- Olive-sided flycatcher
- Horned grebe
- Red-necked phalarope
- Rusty blackbird
- Yellow rail

4.4 Locations For Systematic Monitoring

The following areas / sites should be visited at least once a week:

- Accommodations camps (entire perimeter)
- Waste transfer areas (entire perimeter)
- Waterbodies within 100 m of camps
- Stream crossing locations
- Quarries
- Borrow sources

4.5 Equipment Requirements

- Truck
- Binoculars
- Data Sheet
- Field guide to birds
- GPS
- Project map
- Digital camera

4.6 Reporting

Any bird nesting observed during the survey should immediately be brought to the attention of the Project Supervisor. The Project Supervisor will contact ENR to determine an appropriate course of action. All observations of nesting activity or risk of nesting on Project infrastructure should be included in the Weekly Report. All information will be summarized in the Annual Report.

BIRD NESTING MONITORING FORM

Observer: Date: Page: of:

Location:

Wildlife Observed or Wildlife Sign

Time	Location	Species Observed	Photo #	Nesting behaviour observed	Nests observed (describe)

Record any additional comments on reverse page

Additional comments or notes:

Reviewed by:

Date:

Follow up:

5 PRE-BLAST SURVEYS

5.1 Objective

To document scans for large mammals (specifically caribou, moose, bison and bears) within the blast radius prior to blasts.

5.2 Responsibility

The Environmental Monitors or the Blast Supervisor are responsible for completing the survey. The Environmental Monitors are responsible for entering the results into the database.

5.3 Procedures

The Environmental Monitor or the Blast Supervisor will ensure that blasting does not conflict with the Operating Procedure for Use of Boreal Caribou Collar Data to Mitigate Impacts from Construction of the TASR (Appendix E).

The Environmental Monitors or the Blast Supervisor will check the blast area visually and by foot or truck, to the extent that it is safe to do so. All large mammals observed will be documented. If wildlife are observed within the blast radius, they should be deterred immediately.

Using the form provided, the Environmental Monitors or the Blast Supervisor will document efforts to detect wildlife, document any wildlife observed and document any deterrent actions taken. The following will be recorded for during each survey:

- Date, time and location of blast
- Magnitude of the blast
- Time spent on wildlife survey
- Area of blast radius that cannot be surveyed due to vegetation
- Photo number (if photo taken)
- Wildlife observed and efforts to deter the wildlife

5.4 Equipment Requirements

- Truck

- Binoculars
- Data Sheet
- GPS
- Digital camera

5.5 Reporting

All relevant observations for each blast will be documented in the Weekly Report. A summary of all surveys completed will be included in the Annual Report.

PRE-BLAST SURVEY FORM

Observer: Date: Page: of:

Location: Magnitude of blast:

Estimated area of blast radius: Start and end time of Survey:

Time of blast:

Wildlife Observed:

Deterrent Actions Required and Wildlife Response:

6 WILDLIFE INCIDENT REPORTING

6.1 Purpose

The following is intended as a guideline to identify wildlife that requires immediate reporting and sampling (if necessary).

1. ENR encourages all those conducting activities on the land or residents to record and report all instances of injury or possibility of disease in wildlife.
2. As per Section 57 of the *Wildlife Act,* any defense of life and property kills must be reported without delay to ENR. All reasonable efforts must be made to ensure the hide and other valuable parts do not spoil and that these are turned over to an ENR Officer to avoid any wastage.
3. As per Section 58 of the *Wildlife Act*, and sub-section 8(1) of the Wildlife General Regulations, any person who accidentally kills or seriously wounds big game or other prescribed wildlife with a motorized vehicle on a highway must report the event to an officer within 24 hours after the incident.

This procedure will be used during the construction phase only.

6.2 Notification Procedures

1. *When to Report Wildlife*

    - Anytime wildlife is determined to be injured.
    - Anytime wildlife is suspected of being diseased.
    - Anytime wildlife is found dead.
    - Anytime there is the potential for human/wildlife conflict such as an occupied bird nest or wolf or bear den.
    - Anytime wildlife was deterred from camp.
    - Anytime there is a defensive kill.
    - Anytime property is destroyed by wildlife.
    - Anytime wildlife is injured or killed due to collision with a vehicle.

2. *What information should be collected and reported upon initial observations:*

- Record the following information
    i. Fill out the **Wildlife Incident Record Form**
    ii. When known, include details on the incident such as:
        1. Behaviour and movements
        2. Loss of life or property
        3. Reason for attraction to area
        4. Estimation of how long the animal was dead
        5. Any other animals seen in the area
- Photographs (wildlife mortality)
    iii. Add photo name/label
    iv. General area
    v. Animal (one from each side, head, and tail)
    vi. Anything unusual
    vii. Any obvious injuries or marks

3. Who to Contact

North Slave Region

Wildlife	Emergency	(867) 873 - 7181 (24 Hours)
Yellowknife		(867) 873 - 7184
Fax:		(867) 873 - 6230

Occurrence Date/Time:
Date Reported:

Wildlife Incident Record

MAIN CONTACT INFORMATION	
NAME:	
ADDRESS:	
PHONE NUMBER:	
Location of Complaint: (coordinates, km marker, lake, camp)	
Details Taken by:	
Location of Incident (coordinates, km marker, lake, camp):	
Type of Incident:	☐ Encounter ☐ Nuisance ☐ Wildlife Mortality ☐ Wildlife Injured ☐ Defensive ☐ Other:

Species:	☐ Black Bear ☐ Bison ☐ Fox ☐ Wolverine ☐ Wolf ☐ Caribou ☐ Moose ☐ Bird ☐ Other:		
Sex:	☐ Male	**AGE CLASS:**	☐ Adult
	☐ Female		☐ Juvenile
	☐ Unknown		☐ Cub
			☐ Unknown

Details of Incident: (movement, behaviour, reason for attraction, property damage, vehicle collision, etc.)

Details of Action Taken: (reporting, deterrence type, disposal, removal of attractant, etc.)

DATE: mm/dd/yy	

Was the incident resolved?	☐ Yes	☐ No
Has Environment & Natural Resources been contacted? Contact Name: Date/Time Reported:	☐ Yes	☐ No

APPENDIX D

Bear Safety and Reporting

2014

Bear Occurrence Procedures Manual

Photo by Dean Cluff/ENR

Environment & Natural Resources

Northwest Territories Environment and Natural Resources

BEAR OCCURRENCE PROCEDURES MANUAL

Implementation of these procedures will allow ENR a greater ability to provide advice and assistance in preventing harm to humans, bear(s) or property. In addition, it will provide guidance on safely deterring bears that find themselves in areas of development, tourism camps or cabins with the aim of preventing habituation and unnecessary destruction.

Report any incidents such as sightings, encounters, injuries and/or mortalities to the ENR. The GNWT Phone Directory can be found at http://rdirectory.gov.nt.ca/rDirectory.aspx
Regional contacts are listed below:

North Slave Region

Wildlife Emergency	(867) 873 - 9238 (24 Hours)
Yellowknife	(867) 873 - 9238
Fax:	(867) 873 - 6230

South Slave Region

Wildlife Emergency	(867) 872 - 0400 (24 Hours)
Fort Smith	(867) 872 - 6400
Fax:	(867) 872 - 4250

Inuvik Region

Wildlife Emergency	(867) 678 - 0289 (24 Hours)
Inuvik	(867) 678 - 6650
Fax:	(867) 678 - 6659

Sahtu Region

Wildlife Emergency	(867) 587 - 2422 (24 Hours)
Norman Wells	(867) 587 - 3500
Fax:	(867) 587 - 3516

Deh Cho Region

Wildlife Emergency	(867) 695 - 7433 (24 Hours)
Fort Simpson	(867) 695 - 7450
Fax:	(867) 695 - 2381

BEAR AWARENESS TRAINING

ENR supports the NWT Mine Health and Safety Regulations (s.15.05), which requires that all field personnel involved in mineral exploration undertake bear-safety training. However, human/wildlife incident prevention is a key component to the training.

Training of personnel in preventing and responding to wildlife incidents can reduce the likelihood of injury to personnel and wildlife. Therefore, all field personnel working on the project must receive bear awareness training, preferably from a professional trainer.

The training should include:

1. Recognizing the causes of human/wildlife conflicts;
2. How to prevent and respond to bear incidents;
3. Proper storage, transfer and disposal of camp waste; and
4. Proper use and safe application of deterrents.

INCIDENT PREVENTION

Refer to the ***Camp Waste and Wildlife Attraction Guideline.*** This resource provides guidance on how to minimize or prevent attraction from bears to your camp, cabin or work site.

OCCURRENCE RESPONSE

Small scale exploration and tourism camps should develop and implement Bear Incident Standard Operating Procedures (SOPs) that can be used in the field. The SOPs will allow all members on site to have knowledge of how to minimize or prevent any loss of life or property if there is a bear within the vicinity of your camp area or work site. SOPs may include such things as:

a) Response team
b) Equipment
c) Action level
d) Emergencies
e) Reporting Requirement

1. ***SIGHTING - Bear in the general vicinity (>1km)***

    1. If it is within sight of your camp/cabin and it is safe to do so, use a ***Wildlife Sightings Log*** to record and report information regarding your observations.
    2. Continue to monitor, if necessary.

2. ***ENCOUNTER - Bear In Camp (<1km)***

    1. If safe to do so; take a quick note of the location, direction of travel and general behaviour of the bear(s).
    2. Sound the bear alarm.
    3. If necessary, phone the ENR Regional contacts listed above for guidance on necessary next steps to ensure human/wildlife safety and protection of property.
    4. If necessary, stay indoors or in your vehicle. **DO NOT APPROACH THE BEAR.**
    5. Keep all doors and windows closed.
    6. If necessary and safe to do so; continue to monitor the behaviour and movement until either the bear leaves on its own, deterrence is successful or response personnel arrive.
    7. If possible, start deterrence procedures.
    8. Report status of bear encounter to the ENR Regional contacts listed above when safe to do so.

3. ***Injury***

    1. Any injuries a bear may have obtained from direct or indirect contact with the camp or persons must be reported to the appropriate ENR Regional contact listed above.

4. ***Mortality***

    1. A bear may be destroyed if human life is in danger or destruction of property is imminent.
    2. Under the NWT Wildlife Act, mortalities must be reported to the appropriate ENR Regional contact listed as soon as is practicable. In some cases, the responsible party may be asked to:

a) Skin the bear leaving the claws and head attached.
b) Preserve the hide by freezing and/or salting it and store it in a cool place. Turn in the hide, the skull, evidence of sex and any other biological samples requested when filing the report to the nearest ENR Regional office or to an ENR Renewable Resource Officer.

If or when possible, the attached ***Bear Occurrence Checklist*** should be completed prior to calling ENR. It is critical that as much information as possible be provided in order for ENR to provide appropriate advice and guidance.

DENNING BEARS

A. For exploration camps, if a bear is located in, at or near a den site, work in the area must halt. All employees should safely retreat from the area and report the incident to the Site Supervisor and/or Wildlife Monitor and the appropriate ENR Regional contact listed above for further advice and assistance.

B. For cabin owners, if a bear is located in, at or near a den site, safely retreat from the area and report the incident to the appropriate ENR Regional contact listed above for further advice and assistance.

C. Staff from ENR will be required to assess the den site and may implement measures to ensure both human safety and that the bear(s) remain undisturbed. This may include the establishment of a buffer zone of at least 300 meters around the den.

D. Work inside the buffer zone may not be permitted until after den emergence.

Office Use Only
File#:

Environment & Natural Resources (ENR)
BEAR OCCURRENCE CHECKLIST

- Fill out or check all that apply

1. **Complainant Details:**				
Name, job title and affiliation:				
Contact information:				
Location of complainant: *(coordinates, lake or property name)*				
Other on-site contact information: *(wildlife monitors/site supervisors)*				
2. **Bear Occurrence Details:**				
Date/Time:		**Location:** *(coordinates, lake or property name)*		
Type of bear occurrence:	☐ sighting	☐ encounter	☐ injury	☐ mortality *Ear tag/tattoo #*
	☐ Other, explain:			
Number of bears:		**# of cubs**		
Type:	☐ black	☐ grizzly	☐ unknown	
Sex :	☐ male	☐ female	☐ unknown	
Age Class:	☐ cub (<1)	☐ juvenile	☐ adult	☐ unknown

Behaviour:	☐ fearful	☐ not fearful	☐ aggressive	☐ other
General Observations	☐ moving toward site	☐ moving away from site	☐ at site	
Other observations: *(i.e,. walking, resting, eating, mortality, injury, den site, number of cubs, etc.)*				
Has bear(s) been involved in a previous incident:	☐ No ☐ Yes	**If yes, explain:**		
Did the bear obtain a reward	☐ No ☐ Yes	**If yes, explain:**		
Any property damage or loss of life:	☐ No ☐ Yes	**If yes, explain:**		

3. Detection/Deterrent:

Detection system on site:	☐ Alarm	☐ Dog	☐ Motion detector	☐ Other:
Deterrence on site:	☐ Bear boards	☐ Auditory *(Yelling/Flares/Alarm/Horn/Bell / Whistle/Cracker shells)*	☐ Projectile *(Rubber Bullets/Firearms)*	
	☐ Electric Fence	☐ Chased *(Dog, vehicle)*	☐ Other:	
Was deterrence used:	☐ No ☐ Yes	**Explain:**		
Was the deterrence successful:	☐ No ☐ Yes	**Explain:**		
Present status of bear with dates:	☐ at large	☐ captured	☐ deterred	☐ other

4. Additional Comments	

APPENDIX E

Operating Procedure for Use of Boreal Caribou Collar Data to Mitigate Impacts from Construction of the TASR

OPERATING PROCEDURE – USE OF BOREAL CARIBOU COLLAR DATA TO MITIGATE IMPACTS FROM THE CONSTRUCTION OF THE TŁĮCHǪ ALL-SEASON ROAD

Purpose

This protocol outlines the procedure for communication between the Department of Infrastructure (INF), Department of Environment and Natural Resources (ENR), and Project Co. regarding the location of collared boreal caribou near the proposed Tłı̨chǫ All-season Road (TASR) during road construction carried activities carried out under land use permit W2016E0004.

The objective of this protocol is to alert Project Co. and INF when collared caribou approach construction activities within pre-defined distances, or "cautionary zones", so that mitigation measures can be implemented to:

- Reduce sensory disturbance and unnecessary energy expenditure by caribou during the most sensitive periods – late-winter and calving
- Avoid sensory disturbance that would reduce the likelihood of calf survival during the calving period
- Avoid injury or mortality of caribou, or risk of personal injury

This protocol is intended to address the following construction activities:

- Vegetation clearing along the TASR right of way, at borrow sources, and borrow source access roads in advance of road bed construction and borrow source operations
- Blasting at borrow sources and, if required, along the right of way
- Other construction activities along the cleared right of way, and at borrow sources such as hauling granular materials from borrow sources to construct the road embankment and driving surfaces, extraction of granular materials at borrow sources, any grading, cutting or filling necessary to construct the road embankment, preparation of the driving surface, construction of water crossing and bridges, etc.

Limitations of using the collar data to trigger mitigation measures:

- ENR will attempt to increase the number of collared female caribou in proximity to the TASR alignment in winter 2017, but it must be recognized that only a small portion of the boreal caribou population will be collared. Therefore, an absence of collar locations in proximity to TASR construction activities cannot be considered to indicate an absence of boreal caribou near construction activities. Collar data needs to be supplemented by visual surveys conducted by environmental monitors

in and around active construction areas to verify that no boreal caribou are present.

- ENR receives updated collar data every 24 hours, and when the updated collar data is received it is already 24 hours old. If ENR provides INF and Project Co. with updated maps of collar locations every 48 hours during the most sensitive periods, the collar locations will already be 48-72 hours out of date. Therefore collar data indicates where boreal caribou were 2-3 days ago, not where they are presently located. Again, the use of collar data must be supplemented by real-time visual surveys of active construction areas by environmental monitors to confirm presence or absence of boreal caribou.

Assumptions:

- Given the low density of boreal caribou within the RSA for the TASR, interactions with boreal caribou will be infrequent and unlikely.
- Boreal caribou are expected to avoid active construction areas during most times of the year due to the noise associated with these activities. However, exceptions may occur during times of the year where boreal caribou exhibit restricted daily movements, i.e. the late-winter period (mid-March to early April) and the calving period (early April to early June), and construction activities advance upon areas where boreal caribou are residing or if caribou choose to use an area where there is currently little to no construction activity and activities subsequently start up in that area.
- Boreal caribou tend to aggregate in small groups during the winter season, thus the use of location data from collared individuals to trigger mitigation measures should help to protect more than just those collared individuals.
- Prior to calving (pre-calving period), females increase their movement rates to locate suitable calving areas.
- During calving season, female boreal caribou spread out to calve individually; therefore the use of collar data to trigger mitigation measures will only protect the collared females and their calves.
- Most vegetation clearing will take place between September and April to avoid the migratory bird nesting season, and therefore most vegetation clearing required for the project will occur outside of the calving season for boreal caribou.

Sensitive periods:

Although boreal caribou may be sensitive to disturbance from construction activities throughout the year, ENR considers there to be two key periods when boreal caribou

should receive additional protection from sensory disturbance to increase the likelihood of successful calving and thus recruitment of new individuals into the population. The following sensitive periods are based on the seasonal activity periods reported in Table 6 in the status report for boreal caribou in the NWT (Species at Risk Committee 2012), but some year-to-year variation should be expected based on snow and weather conditions:

- Late-winter (16 Mar – 4 April): Boreal caribou are exhibiting their shortest daily movements at this time of year, likely reflecting the increased energetic costs of travelling through deep snow at this time of year, or limited areas that provide easier access for foraging on round lichens (wind swept areas and closed canopy forests with shallow snow). As boreal caribou are depleting their stores of fat throughout the winter, and movement through deep snow or displacement from good foraging habitat could have high energetic costs, disturbance events at this time of year could have negative impacts on female body condition and subsequently have negative impacts on calving and calf survival.

- Calving (05 April – 6 June): Female boreal caribou spread out during the pre-calving period (05-30 April) and increase daily movements to find suitable calving locations. Females spread out during calving as an anti-predator strategy to make themselves and their calves rare in the midst of other prey species and predators. Once a calving location is selected, daily movement rates drop considerably during calving (30 Apr – 6 June). During the calving period, sensory disturbances that may cause energetic stress to the calving female, or cause the calving female to flee and leave her calf temporarily may reduce the odds of calf survival. There are high energetic demands on females while they are lactating and raising their calves. Caribou tend to avoid suitable calving locations that are close to sensory disturbance from development (Carr *et al.*. 2007; Schaefer and Mahoney 2007; Vors *et al.*. 2007; Vistnes and Nellemann 2008 *cited in* OMNR 2014) , so they may avoid calving in close proximity to active TASR construction areas. However, in instances where construction activities may advance upon or in close proximity to an area where a female has chosen to calve, displacement of the female from that area could have negative impacts on calf survival.

Boreal caribou are considered to be less sensitive to sensory disturbance at other times of the year, as they are moving greater distances on a daily basis and will likely avoid active construction areas or move away from them quickly if and when they encounter them.

Protocols for sharing information:

- INF and Project Co. will provide ENR with weekly updates of where construction activities will take place (i.e., which sections of the alignment will be active, which borrow sources will be active), and the type of activities taking place. Specifications in regards to how information will flow, to be determined.
- ENR will provide INF and Project Co. with maps of collar locations according the schedule outlined in Table 1 for different periods of the year. Project Co. will provide the maps to its Environmental Monitors and any other relevant designated staff and sub-contractors. Project Co. will inform ENR of who the maps are being shared with.
- The maps will illustrate the location of collared caribou in proximity to the TASR alignment, borrow sources and Whatì access road and the date of the collar location information.
- Implementation of mitigation measures will be determined by the proximity of collared caribou, the time of year, and the type of construction activity taking place as outlined in Table 1.
- INF and Project Co. will provide ENR with weekly records of the timing and location of all planned blasting events.
- The data provided by ENR is to be used only for the purpose of assisting Project Co. and INF in conducting construction work as provided for under land use permit W2016E0004.
- Collar data should be considered sensitive information. INF and Project Co. will not share the data provided by ENR with anyone other than the Site Supervisor.
- INF and Project Co. acknowledge that collared caribou represent only a portion of the caribou in the North Slave Region. INF and Project Co. recognize that the lack of collared caribou in an area does not mean that caribou are not present and will make an effort to visually confirm that caribou are not present when undertaking construction work in a new area, and will remain vigilant for the presence of caribou that choose to move into or across an active construction area.
- A project management team will host monthly and weekly meetings.
- An oversight committee will receive regular updates from the project management team.

Table 1: Protocols for sharing boreal caribou collar data, cautionary zones and resulting mitigation measures during periods of the year when boreal caribou are "Sensitive" and "Less Sensitive" to sensory disturbance from construction activities.

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
Vegetation clearing of the right of way	Cautionary Zone: 2 km Maps will be provided every 2 days to evaluate presence of collared caribou within 2 km of the TASR alignment and borrow sources. Mitigation: If collared caribou are within 2 km of an area that will be cleared within the next 48 hours, wildlife monitors will survey 500 m ahead of vegetation clearing operations, to confirm	Cautionary Zone: 3 km Maps will be provided every 2 days to evaluate presence of collared caribou within 3 km around the TASR alignment and borrow sources. Mitigation: If collared caribou are within 3 km of an area that will be cleared within the next 48 hours, suspend vegetation clearing in the active construction area.	Cautionary Zone: 500 m No regular collar data maps will be provided. It is assumed that since boreal caribou move greater distances during this period, the disturbance associated with vegetation clearing will cause them to avoid the area, thus reducing the risk of injury or mortality. As collar data is always at least 24 hours out of date, and caribou are moving greater distance each day during these times of year, it

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
	whether or not caribou are present. If fresh caribou sign is detected within 500 m, delay clearing and re-evaluate every 24 hours until the collar data or on the ground surveys for caribou sign indicate that they have moved out of the 2 km cautionary zone.	ENR will re-evaluate the collar locations every 24 hours and will notify INF and Project Co. when the collared caribou moves out of the 3 km cautionary zone. At this point, vegetation clearing can resume.	will not be as useful for providing advance warning of caribou presence near active construction areas. Wildlife monitors will conduct visual scans 500 m ahead of clearing operations to determine presence of caribou. This will involve travelling along the existing road/trail ahead of the vegetation clearing operations to look for boreal caribou or fresh sign such as tracks or scat. Mitigation: If a caribou is seen within 500 m ahead of clearing operations, operations will be temporarily suspended by the Project Supervisor to allow

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	Calving (05 April – 6 June)	Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)
			wildlife to move away from the area of their own accord. If they do not leave the area within 15 minutes, they will be gently encouraged to move away from construction activities, and an incident report will be completed. This will involve the slow approach of Environmental Monitors towards the caribou to encourage them to move. If a caribou is reluctant to leave the area, this could be a sign that it is a female that is hiding a calf in close proximity. If this is the case, suspend operations, and contact regional ENR biologist for advice.
Blasting	Cautionary Zone: 2 km	Cautionary Zone: 3 km	Cautionary Zone: the danger zone of the blast area, as

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
	Collar data maps will be provided every 2 days to evaluate the presence of collared caribou within 2 km around areas where blasting will take place in the next week. Mitigation: If collared caribou are within 2 km in the last 48 hours of an area where there will be blasting, Environmental Monitors will survey within 500 m of blast the blast site. Blasting will be delayed if fresh caribou sign is found within 500 m. Blasting will proceed once no caribou are found or seen within 500 m by the Environmental Monitors.	Collar data maps will be provided every 2 days to evaluate the presence of collared caribou within 3 km around areas where blasting will take place in the next week. If collared-caribou are within 1 km of blast site, delay blasting for 48 hours to determine if caribou is calving (relatively stationary, e.g. hourly locations <1 km apart). If the caribou is calving, suspend blasting until an ENR biologist indicates that calving is completed.	determined by the blast manager. Mitigation: Blasting will be proceeded by a horn signal which should scare any nearby caribou away from the area prior to the blast. Blasting can proceed, subject to approval by the blast manager, if no caribou are sighted by the environmental monitor or the blast manager within the danger zone of a blast based on visual survey of the area conducted immediately before the blast.

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
	Collar data will be re-evaluated every 24 hours, and if collared caribou remain within the 2 km cautionary zone, on the ground surveys within 500 m of the blast site, will be repeated before every blast. Project Co. will be notified when collared caribou have moved out of the 2 km cautionary zone, at which point the on-the-ground surveys will no longer be needed before blasting. At all times, environmental monitors and the blast manager will also visually confirm that no caribou are present within the danger zone of the blasting site before blasting proceeds.	If the caribou is moving more than 1 km/day, suspend blasting and re-evaluate every 48 hours until the caribou moves out of the area or it is confirmed that the caribou is calving within the 1 km buffer, in which case suspend blasting until an ENR biologist indicates that calving is completed.	

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
Other construction activity along the cleared right of way and borrow sources and quarries Applies to activities taking place within areas that have already been cleared of vegetation	Cautionary Zone: 2 km Collar data maps will be provided every 2 days to evaluate presence of collared caribou within 2 km around the TASR alignment and borrow sources. Mitigation: If collared caribou are within 2 km of sections of the road that have regular vehicle traffic (e.g. trucks travelling to and from borrow pits to lay down the road embankment), speed limits along the road within 2 km on either side of the collar locations shall be reduced to 30 km/h to reduce the likelihood of	Cautionary Zone: 3 km Collar data maps will be provided every 2 days to evaluate presence of collared caribou within 3 km around the TASR alignment and borrow sources. Mitigation: If a collared caribou chooses to calve within 3 km of an already active construction area, then activities other than blasting can continue as it assumed that noise from construction is not bothering them since they chose to calve there.	Cautionary Zone: the cleared TASR right of way, cleared areas along access roads, and cleared areas of borrow sources. It is assumed that since boreal caribou move greater distances during these periods, the disturbance associated with construction activities will cause them to avoid the area, thus reducing the risk of injury or mortality. As collar data is always at least 24 hours out of date, and caribou are moving greater distances each day during these times of year, it will not be as useful for providing advance warning of caribou presence near active construction areas.

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
	wildlife-vehicle collisions should collared caribou cross the right of way.	If a situation arises where a caribou chooses to calve within 500 m of an active construction area, there may be a risk to calving success. Construction activities will be suspended, and collar locations re-evaluated every 24 hours, until the ENR biologist confirms that the individual has moved >500 m away. If a collared caribou is calving within 3 km of a cleared construction area, that is not presently active but is planned to become active within the next 48 hours, collar locations will be re-evaluated every 24 hours, and construction in	Mitigation: Environmental Monitors will conduct daily patrols along active sections of the TASR alignment, borrow source access roads and at active borrow sources. Project Co. staff will immediately report any caribou sightings within cleared areas surrounding construction activities to the Environmental Monitors who will record the time and location of the sightings. Speed limits along the road within 2 km on either side of caribou sighting will be reduced to 30 km/h while the caribou remains within the

Construction Activity	Sensitive Periods		Less Sensitive Periods
	Late-winter (16 Mar – 4 Apr)	**Calving (05 April – 6 June)**	**Summer, Fall, Early to Mid-Winter (07 June – 15 Mar)**
		that area shall be delayed until the caribou moves out of the 3 km cautionary zone.	cleared right of way in order to reduce the risk of wildlife-vehicle collisions.
Aircraft	Follow GNWT "Flying low? Think Again…" guidelines.	Cautionary zone: 3 km Collar data maps will be provided every 2 days to evaluate location of collared caribou within TASR RSA. No low-level flights (<1000 FT) within 3 km of known calving sites based on collar data.	Follow GNWT "Flying low? Think Again…" guidelines.

Contacts

Environment and Natural Resources contacts
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Project Co. contacts
2. Project Co Contact • Phone: TBDEmail: TBD

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APPENDIX F

Brochures

PLEASE:

- do not fly below 1,000 feet;
- obey Transport Canada regulations;
- find out where outfitter camps are located and avoid them during hunting season;
- avoid barren-ground caribou calving grounds during calving season;
- do not take-off or land in a calving area during calving season;
- do not chase or harass wildlife by flying too close; and
- respect our wildlife – keep to a safe altitude.

Remember, flying close enough to an animal so that it runs away is too close!

If aerial survey or exploration work is planned at any time, but especially during outfitting or calving seasons, please contact the regional ENR office for information before flying.

Mackenzie Mountains and Mackenzie Valley

Sahtu Region ..... (867) 587-3500
Dehcho Region ..... (867) 695-7433
South Slave Region ..... (867) 872-6400

Tundra

Inuvik Region ..... (867) 678-6650
North Slave Region ..... (867) 873-7184
South Slave Region ..... (867) 872-6400

Visit the Department of Environment and Natural Resources website at www.enr.gov.nt.ca

Flying Low? Think Again...

Flying Low? Think Again...

A variety of wildlife, quality guides and outfitters, spectacular scenery and solitude that only a location away from human habitation can offer...

The Northwest Territories (NWT) is a popular destination for big game hunters and eco-tourists alike. But the experience can easily be ruined by low-flying aircraft that disturb wildlife.

Increased exploration and development throughout the NWT means increased air traffic. Increased interest in wildlife viewing and tourism also means increased air traffic. If you are a fixed wing or rotary pilot, please respect our wildlife and keep to an elevation that does not disturb them.

Wildlife are Protected Under NWT Law

Section 52 of the NWT *Wildlife Act* protects wildlife by making it illegal to disturb or harass game and can result in a penalty of up to $100,000 and/or one year in jail. Flying close enough to an animal so that it runs away is too close!

Please keep your aircraft at a safe elevation so animals are not disturbed.

In the Mackenzie Mountains

Big game hunters pay sizable fees for the chance to take home a trophy animal from the Mackenzie Mountains. Much of the hunting in this area is done on foot or on horseback and it is a time consuming process. Sound is amplified by the mountains and low flyovers can frighten an animal into flight, causing hours, or even days, of stalking to be wasted.

Wildlife that are affected by low level flyovers in the Mackenzie Mountains include Dall's sheep, mountain goat, mountain caribou and moose.

During the mid-July to end of September hunting season, please be cautious and avoid outfitter areas.

In the Mackenzie Valley

Boreal caribou are a threatened species found throughout the boreal forest. Unlike barren-ground caribou, during the May calving period boreal caribou can go into hiding to have their calves. Low flying is especially harmful, stressing the female, which can cause separation from calves and lead to calf death. If low-level flights are going to be conducted in April or May, please contact the regional ENR office for information.

On the Tundra

During calving season

Caribou are a valuable resource to the people of the NWT. From the end of May to the end of June, female barren-ground caribou come together at herd-specific locations on the tundra to give birth to their calves. Low flyovers, take-offs and landings in these areas are especially harmful as they can stress the females, which can cause separation from calves and increased calf mortality.

Avoid barren-ground caribou calving grounds from mid-May to early July. This is especially important during times of low barren-ground caribou numbers. Please contact the regional ENR office in your area for more information.

Wildlife Viewing and Filming

View wildlife from a safe distance to minimize disturbing and stressing the animal. If the animal changes its behaviour, you are too close. Limit your time in the area and avoid surprising (e.g. sneaking up on) wildlife.

For commercial activities (i.e., expeditions, safaris, or cruises) involving big game or birds of prey viewing, including filming, a permit is required.

Other Wildlife

Grizzly bears, pelicans, whooping cranes, polar bears, muskoxen, black bears, eagles and other wildlife are also disturbed by low flying aircraft. Please respect our wildlife and keep to a safe altitude.


Did you know?
The Bank Swallow is a declining migratory bird species that has lost 98% of its Canadian population over the last 40 years.
This insectivorous bird is particularly drawn to sandpits, quarries, stock piles of sand and soil, and sandy banks along water bodies and roads. Bank Swallows generally dig their burrows in near-vertical banks (slopes of at least 70 degrees) that are more than 2 metres high. Bank Swallows typically use their nesting sites from mid-April to late August. This is the sensitive period during which the risk of harming the birds is especially high. The absence of the birds in August is a good indicator that the breeding season is over.
Bank with a slope of more than 70 degrees: not suitable for nesting
Bank with a slope of less than 70 degrees: suitable for nesting
The best way to minimize the possibility of contravening the Migratory Birds Convention Act, 1994 and its regulations is to fully understand the impact that your activities could have on migratory birds and their nests and eggs and to take reasonable precautions and appropriate avoidance measures. In fact, under the Act and its regulations, it is an offence for anyone to kill, hunt, capture, injure or harass a migratory bird or to damage, destroy, remove or disturb its nest or eggs without a permit.
The sand and gravel industry can play a major role in the conservation of Bank Swallows by adopting operating practices that do not harm the species.
www.ec.gc.ca/paom-itmb
Paper: Cat. No.: CW66-522/2016 ISBN 978-0-660-23221-8
PDF: Cat. No.: CW66-522/2016-PDF ISBN 978-1-100-25596-5
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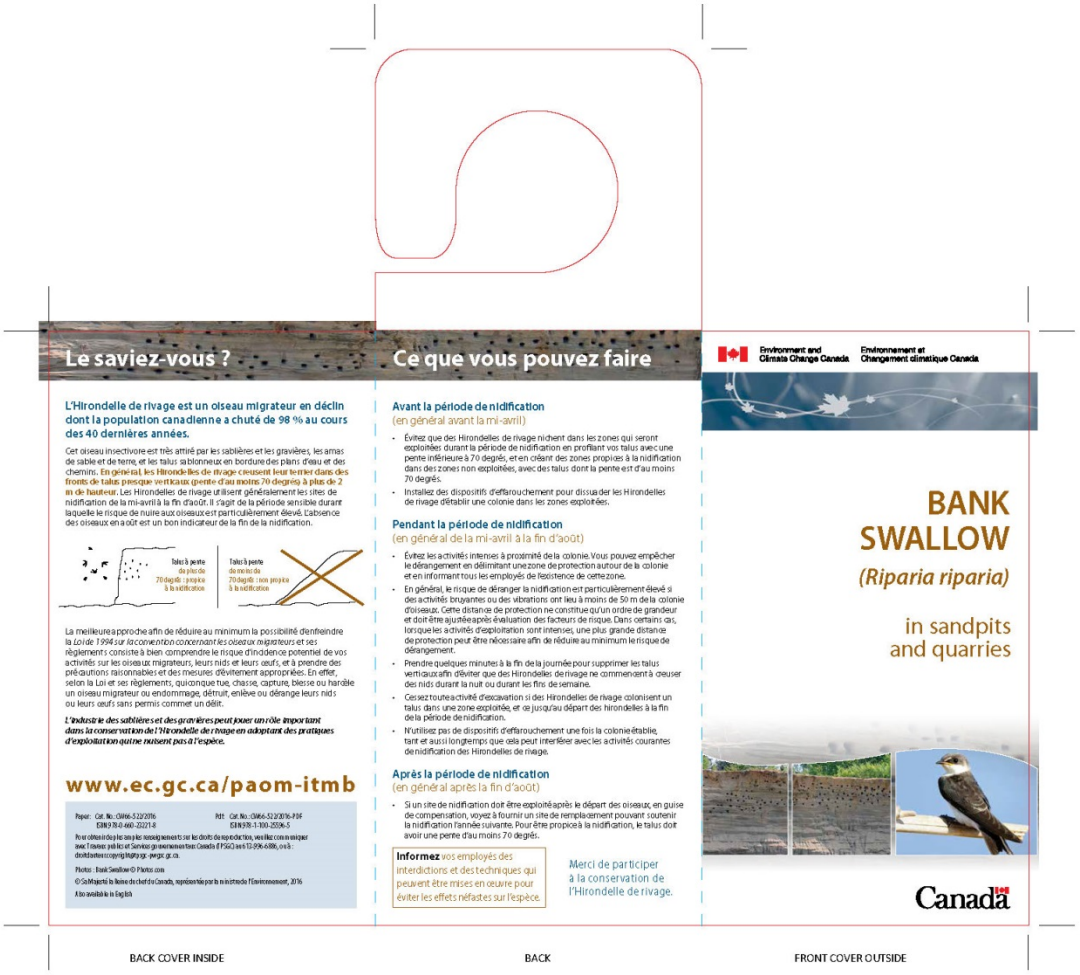
Photos: Bank Swallow © Photos.com
© Her Majesty the Queen in Right of Canada, represented by the Minister of the Environment, 2016
Aussi disponible en français
What you can do
Before the breeding season
(generally before mid-April)
Prevent Bank Swallows from nesting in areas where operations will be carried out during the breeding season by contouring your piles to have a slope of less than 70 degrees and by creating suitable nesting habitat in inactive areas with vertical faces of at least 70 degrees.
Install scaring devices to deter Bank Swallows from establishing colonies in active areas.
During the breeding season
(generally from mid-April to late August)
Avoid intense activity near the colony. You can prevent disturbance by marking off a protective buffer zone around the colony and notifying all employees of its existence.
Generally speaking, there is a particularly high risk of disturbing nesting when noisy activities or vibrations occur within 50 metres of the bird colony. This protective radius is only a rough guideline and must be adjusted after an assessment of the risk factors. In some cases, where operating activities are intense, a larger protective radius may be needed to minimize the risk of disturbance.
Spend a few minutes flattening vertical faces in active areas at the end of the day to prevent Bank Swallows from digging burrows in them overnight or on weekends.
Stop excavation work if Bank Swallows colonize a bank in an active area. Activities cannot resume until the birds leave at the end of the breeding period.
Do not use scaring devices once the colony is established as they may interfere with ongoing Bank Swallow breeding activities.
After the breeding season
(generally after late August)
If a nesting site needs to be excavated after the birds leave, compensate by providing an alternate site that can support nesting in the following year. To be suitable for nesting, the bank must have a slope of at least 70 degrees.
Notify your employees of the restrictions and techniques that can be implemented to prevent detrimental effects on the species.
Thank you for participating in the conservation of Bank Swallows.
Environnement et Changement climatique Canada
Environment and Climate Change Canada
L'HIRONDELLE DE RIVAGE
(Riparia riparia)
dans les sablières et les gravières
Canada
BACK COVER INSIDE
BACK
FRONT COVER OUTSIDE


Le saviez-vous ?
L'Hirondelle de rivage est un oiseau migrateur en déclin dont la population canadienne a chuté de 98 % au cours des 40 dernières années.
Cet oiseau insectivore est très attiré par les sablières et les gravières, les amas de sable et de terre, et les talus sablonneux en bordure des plans d'eau et des chemins. En général, les Hirondelles de rivage creusent leur terrier dans des fronts de talus presque verticaux (pente d'au moins 70 degrés) à plus de 2 m de hauteur. Les Hirondelles de rivage utilisent généralement les sites de nidification de la mi-avril à la fin d'août. Il s'agit de la période sensible durant laquelle le risque de nuire aux oiseaux est particulièrement élevé. L'absence des oiseaux en août est un bon indicateur de la fin de la nidification.
Talus à pente de plus de 70 degrés : propice à la nidification
Talus à pente de moins de 70 degrés : non propice à la nidification
La meilleure approche afin de réduire au minimum la possibilité d'enfreindre la *Loi de 1994 sur la convention concernant les oiseaux migrateurs* et ses règlements consiste à bien comprendre le risque d'incidence potentiel de vos activités sur les oiseaux migrateurs, leurs nids et leurs œufs, et à prendre des précautions raisonnables et des mesures d'évitement appropriées. En effet, selon la Loi et ses règlements, quiconque tue, chasse, capture, blesse ou harcèle un oiseau migrateur ou endommage, détruit, enlève ou dérange leurs nids ou leurs œufs sans permis commet un délit.
L'industrie des sablières et des gravières peut jouer un rôle important dans la conservation de l'Hirondelle de rivage en adoptant des pratiques d'exploitation qui ne nuisent pas à l'espèce.
www.ec.gc.ca/paom-itmb
Paper: Cat. No.: CW66-522/2016 ISBN 978-0-660-20227-8
PDF: Cat. No.: CW66-522/2016-PDF ISBN 978-1-100-25506-5
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Photos : Bank Swallow © Photos.com
© Sa Majesté la Reine du chef du Canada, représentée par le ministre de l'Environnement, 2016
Also available in English
BACK COVER INSIDE
Ce que vous pouvez faire
Avant la période de nidification
(en général avant la mi-avril)
• Évitez que des Hirondelles de rivage nichent dans les zones qui seront exploitées durant la période de nidification en profilant vos talus avec une pente inférieure à 70 degrés, et en créant des zones propices à la nidification dans des zones non exploitées, avec des talus dont la pente est d'au moins 70 degrés.
• Installez des dispositifs d'effarouchement pour dissuader les Hirondelles de rivage d'établir une colonie dans les zones exploitées.
Pendant la période de nidification
(en général de la mi-avril à la fin d'août)
• Évitez les activités intenses à proximité de la colonie. Vous pouvez empêcher le dérangement en délimitant une zone de protection autour de la colonie et en informant tous les employés de l'existence de cette zone.
• En général, le risque de déranger la nidification est particulièrement élevé si des activités bruyantes ou des vibrations ont lieu à moins de 50 m de la colonie d'oiseaux. Cette distance de protection ne constitue qu'un ordre de grandeur et doit être ajustée après évaluation des facteurs de risque. Dans certains cas, lorsque les activités d'exploitation sont intenses, une plus grande distance de protection peut être nécessaire afin de réduire au minimum le risque de dérangement.
• Prendre quelques minutes à la fin de la journée pour supprimer les talus verticaux afin d'éviter que des Hirondelles de rivage ne commencent à creuser des nids durant la nuit ou durant les fins de semaine.
• Cessez toute activité d'excavation si des Hirondelles de rivage colonisent un talus dans une zone exploitée, et ce jusqu'au départ des hirondelles à la fin de la période de nidification.
• N'utilisez pas de dispositifs d'effarouchement une fois la colonie établie, tant et aussi longtemps que cela peut interférer avec les activités courantes de nidification des Hirondelles de rivage.
Après la période de nidification
(en général après la fin d'août)
• Si un site de nidification doit être exploité après le départ des oiseaux, en guise de compensation, voyez à fournir un site de remplacement pouvant soutenir la nidification l'année suivante. Pour être propice à la nidification, le talus doit avoir une pente d'au moins 70 degrés.
Informez vos employés des interdictions et des techniques qui peuvent être mises en œuvre pour éviter les effets néfastes sur l'espèce.
Merci de participer à la conservation de l'Hirondelle de rivage.
BACK
Environment and Climate Change Canada
Environnement et Changement climatique Canada
BANK SWALLOW
(Riparia riparia)
in sandpits and quarries
Canada
FRONT COVER OUTSIDE

APPENDIX G

Literature Review: Roadway Effects on Wildlife in Response to the TASR Environmental Assessment Technical Session Commitment 6A

1.0 INTRODUCTION

DATE September 19, 2017 **PROJECT No.** 1665943

TO Lara Mountain
Government of the Northwest Territories

CC Katie Rozestraten; Stu Niven

FROM Damian Panayi **EMAIL** Damian_Panayi@golder.com

LITERATURE REVIEW: ROADWAY EFFECTS ON WILDLIFE IN RESPONSE TO THE TASR ENVIRONMENTAL ASSESSMENT TECHNICAL SESSION COMMITMENT 6A

A literature review of the effects of roads in wildlife corridors was conducted by Golder Associated Ltd. (Golder) on behalf of the Government of the Northwest Territories (GNWT), in response to a commitment made during the Tłı̨chǫ All-Season Road (TASR) environmental assessment technical session in Behchokǫ̀, Northwest Territories (NWT) (August 15 to 17, 2017). In commitment 6A, the "GNWT commits to a literature search for effects of a range of potential seasonal traffic rates; including a maximum of 200 vehicles per day for moose, caribou and bison. The GNWT will incorporate the result of the literature search into the draft WMMP, which will be provided by September 22, 2017."

The results below outline the identified road effects and best mitigation efforts collected to date.

2.0 METHODS

A literature search was conducted using Golder's subscription to the EBSCO Discovery Service (EDS), a powerful research tool that provides a single gateway to access full text and bibliographic scholarly journals and publications from content providers that include Environment Complete, Arctic and Antarctic Regions, ScienceDirect, and JSTOR. The search terms (used in combination with Boolean operators AND OR NOT) include:

- Concept 1: road; vehicle; traffic; transportation; highway; "road zone effect" AND volume; intensity; levels; rates; season*
- Concept 2: bison; moose; deer; caribou; ungulates; herbivores; wildlife; "large animals"
- Concept 3: collisions; mitigat*; accidents
- Concept 4: Banff; Montana; "National Park"

Note that the asterisk (*) indicates that the search term was used as a wildcard (i.e. mitigat* would include mitigat[tion], mitigat[es]).

Some documents were also provided by the GNWT.

3.0 ROAD EFFECTS

In Denali National Park, Alaska, woodland caribou and grizzly bear distribution was not impacted by roads and movement patterns indicated no pattern of traffic avoidance. Some habituated bears were drawn to roadways in this study. Moose, on the other hand, showed a mixed result. Some moose populations became habituated to disturbance, while others showed avoidance. Distribution of food sources and forage showed greater reliability in predicting moose distribution (Yost and Wright 2001).

A second study in Denali National Park, Alaska, showed that increased road traffic over a 20 year period measured no significant adverse behavioural responses due to increased road traffic on caribou, grizzly bear, Dall sheep, and moose in park road corridor. This road corridor receives roughly 10,000 vehicles per season (Burson et al. 2000). They caution that there may be some level of disturbance that would increase adverse behavioural responses, and ongoing management is necessary.

In the Canadian Rocky Mountains in southwestern Alberta, Canada, roadways negatively impacted both carnivores and ungulate movement throughout wildlife corridors. Carnivores showed negative responses at between 300 and 500 vehicles per day, while ungulates responded negatively to between 500 and 5000 vehicles per day (Alexander et al. 2005). These data were supported by Charry and Jones with traffic volume identified as the highest impact to wildlife due to road development (Charry and Jones, 2009).

Woodland caribou studied in an area of Quebec, Canada identified avoidance of habitat types selected at the home range scale due to the expansion of a road right-of-way from 25 m to 90 m. Higher movement rates were measures in the vicinity of the highway, especially when traffic density was high. Annual rate of caribou crossings was much lower on highway than on random linear transects projected throughout the study area (Leblond et al. 2013).

Two studies identified that the vehicle collisions with wildlife, specifically moose, were highest at night, and during periods of highest traffic. The peak accident volumes occurred when air temperature and atmospheric pressure were highest (Dussault et al. 2006). Bison-vehicle collisions also occur primarily at night, and are heaviest between August and November. Most bison were hit by pickup trucks and large transport trucks (Armstrong 2015).

Studies conducted in northwestern Ontario and southeastern Manitoba, caribou distance from roads increased corresponding with increased traffic volumes. Caribou were observed to avoid their ideal habitats within 1 kilometer of active roads, and have impact thresholds between 10 and 60 vehicles per day, showing the

greatest sensitivity to vehicle traffic. (Hunt 2001; Schindler et al. 2006) Additionally, these road corridors may increase incidental predation of all ungulates by wolves due to increased accessibility due to traffic/road clearing activities in winter.

4.0 MITIGATIONS

Mitigation efforts are primarily focused on reducing wildlife-vehicle collisions, rather than larger scale ecologic impacts due to disturbance and alterations in distribution. The consensus generally recommends exclusion fencing, earthen ramps for wildlife escape from roadways over the length of the roadway, and wildlife connectivity under- and over-passes (D'Angelo et al., 2005; Bisonette and Rosa 2012; Clevenger et al. 2001). In one study, wildlife collisions were reduced by 98.5% (Bisonette and Rosa 2012). Best management practices for road effect mitigations have been recommended to be implemented when roads become a barrier to carnivores, at between 300 to 500 vehicles per day, using exclusion fencing and crossing structures to mitigate (Alexander et al. 2005) Further recommendations are to minimize traffic to below 300 to 400 vehicles per day on remote roads to minimize disturbance and collisions (Charry and Jones 2009).

Fence boundaries have been identified as particularly problematic for wildlife-vehicle collisions, as the majority of collisions now occur at end-of-fence boundaries. Despite this, wildlife collisions as a whole are drastically along these roadways (Clevenger et al. 2001).

Further mitigations proposed to reduce wildlife collisions is consistent and repeated driver education programs during peak collision periods (migration periods, rut, calving), and in severe instances, lighting of roadways to reduce collisions after dark (Dussault et al. 2006; Neumann et al. 2012).

Mitigations to reduce moose-vehicle collisions included route selection to reduce proximity to swamps and black spruce bogs, and increase proximity to lakes, rivers, and streams (Rea et al. 2014), though this may not be ideal for all species present in this study area.

5.0 SUMMARY

Overall, there is very little research on impacts to wildlife due to road development of the scale proposed in the study area, though caribou distribution may be impacted at traffic activity levels as low as 10 to 60 vehicles per day. Higher mitigation efforts may be needed if road use increases above 300 vehicles per day to minimize disturbances to carnivore movement throughout the area, and above 500 vehicles per day to reduce impacts to most other ungulate species present. The most effective mitigation identified that would be relevant to the TASR is public education efforts during peak activity and collision risk periods.

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APPENDIX H

Procedural Flow Charts - TBD