Transmission Line 271 Star Lake to Valentine Gold Project Environmental Registration

Final Report

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Executive Summary

Newfoundland and Labrador (NL) Hydro is proposing to construct and operate a new 69 kiloVolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a proposed new terminal station (Valentine Terminal Station) being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site in the west-central region of the Island of Newfoundland, southwest of the town of Millertown. Project construction activities will include upgrades to the Star Lake Terminal Station, which will occur within the existing station property, and installation of a new 69 kV wood pole transmission line, approximately 40 km in length, with a right of way (RoW) approximately 25 m wide. Operational activities over the life of the Project will include asset inspection and repair as required, and vegetation control. Pending approvals, construction may begin in 2021, with TL271 being operational within the first quarter of 2023. TL271 is planned for decommissioning and removal once all power requirements for the Valentine Gold Project have been met.

The Project represents an undertaking requiring registration under the Environmental Assessment (EA) Regulations of the NL *Environmental Protection Act* (NL EPA) since it is “an undertaking that will be engaged in the construction of new electric power transmission lines or the relocation or realignment of existing lines where a portion of a new line will be located more than 500 m from an existing RoW” and also…“will occur within 200 m of the high water mark of a river that is a scheduled salmon river under the *Fisheries Act* (Canada)”. This document represents the Registration document that is being submitted to the EA Division of the Department of Environment and Climate Change (NLDECC) for review. The Valentine Gold Project is currently undergoing provincial and federal assessment. If the Valentine Gold Project does not obtain release from both the federal and provincial EA processes, this Project is not required and NL Hydro will inform NLDECC of Project cancellation. Therefore, there is no risk seen to conducting concurrent regulatory reviews for both projects. Construction of TL271 will be scheduled to begin after the anticipated EA approval date for the Valentine Gold Project. Baseline studies were conducted to support ongoing Project planning and design and to support the EA of the Project with respect to surface water resources, caribou, flora and fauna, and heritage resources. These studies were prepared based on a desktop analysis of publicly available data, supported by information from field studies previously conducted for the Valentine Gold Project, the study area of which overlaps part of the proposed RoW for the Project. Baseline studies have been appended to this document.

The Project is located in a remote area in rural Newfoundland with the nearest community being the Town of Buchans, approximately 45 km away. There are approximately 151 seasonal dwellings (registered and unregistered cabins, outfitters) within 5 km of the Project and 15 within a 250 m radius. This includes an active outfitter’s camp at Lloyd’s River, which is approximately 147 m from the proposed transmission line RoW. NL Hydro distributed Project information packages to local cabin owners, outfitters, relevant stakeholder groups and Indigenous groups (Qalipu Mi’kmaq First Nation and Miawpukek First Nation) to provide information about the Project and provide contact information for any questions and concerns.

The route for the transmission line has been selected to follow existing linear features (e.g., resource access roads), thereby limiting the amount of clearing and construction. The amount of habitat lost or altered due to RoW construction will be approximately 1 km^2 (40 km * 25 m). Based on a desktop review, it is estimated that the proposed RoW and/or new routes to access the RoW includes 50 watercourse crossings, although some of these will be spanned by the transmission line and may not require temporary or permanent crossing structures. There are no known archaeological sites within the proposed RoW, although there are areas of moderate and high archaeological potential which will require survey in the field prior to construction. With the exception of caribou which are known to migrate through the Project Area, there are no known occurrences of species at risk (SAR) or species of conservation concern (SOCC) within the RoW. However, based on records of these species in the proximal area and occurrence of preferred habitat types within the RoW, potential interactions with the Project are likely to occur.

Construction activities will be conducted in accordance with a construction Environmental Protection Plan (EPP). In addition, NL Hydro will require the construction contractor to provide a Contract-Specific EPP (C-SEPP) for review and acceptance by NL Hydro prior to the start of construction. The C-SEPP will include erosion and sediment control plans (ESPP), as well as a Spill Contingency Plan. Construction will adhere to best management practices and mitigation measures presented in these Plans, as well as applicable regulatory requirements. Operations will abide by NL Hydro’s existing standard operating procedures.

The Project is predicted to have adverse environmental effects on fish and fish habitat, caribou, avifauna, and other SAR. However, with the implementation of best management practices and mitigation measures described in this report, residual environmental effects, including cumulative effects are predicted to be not significant, with the exception of cumulative effects on caribou. As assessed in the Valentine Gold Project Environmental Impact Statement (EIS) (Marathon 2020), the development of the Valentine Gold Project is predicted to disrupt an existing migratory corridor for the Buchans Herd, resulting in a significant residual adverse effect on change in movement (Marathon 2020). In the Valentine Gold Project EIS, a potentially significant cumulative effect is also predicted in combination with other projects and activities, including TL 271, given the significant residual effect predicted for the Valentine Gold Project. Although the contribution of TL271 to cumulative effects on caribou is low, any contribution to adverse effects on the Buchans herd that are already predicted to be potentially significant, must therefore be acknowledged as a potential cumulative significant effect.

Follow-up and monitoring to be conducted for the Project includes the following:

- NL Hydro will conduct an archaeological field survey program in 2021 to investigate areas of moderate and high archaeological potential within the Project Area prior to ground disturbance. This field program will be designed and conducted in consultation and cooperation with the NL PAO and in accordance with applicable standards and requirements.
- NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how information from Marathon’s Environmental Effects Monitoring (EEM) program at the Valentine Gold Project can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou.

- Transmission line infrastructure will be monitored periodically for avifauna nests during Project operation in accordance with Nalcor's Standard Operating Procedures for Nesting Birds in Vegetated Areas (NAL-ENV-SOP-01). This information will assist in compliance with MCBA regulations and SARA and inform NL Hydro planning and decision making around operations and decommissioning.
- The discovery of roosts, hibernacula, or dens by on-site personnel will be reported to the OSEM and Environmental Services Manager and appropriate action or follow-up will be guided by consultation with a qualified biologist and/or federal or provincial regulators.

NL Hydro is committed to supplying electrical power to the proposed Valentine Gold Project through the construction and operation of TL271 in a manner which meets regulatory requirements and minimizes adverse effects on the surrounding environment.

Abbreviations

°C	degrees Celsius
AC CDC	Atlantic Canada Conservation Data Centre
ATV	all-terrain vehicle
CCA	chromated copper arsenate
CERP	Corporate Emergency Response Plan
CNF	Central Newfoundland Forest
CNWA	*Canadian Navigable Waters Act*
COSEWIC	Committee on the Status of Endangered Wildlife Species in Canada
C-SEPP	Contract-Specific Environmental Protection Plan
dB	Decibels
dBA	A-weighted Decibels
DFO	Fisheries and Oceans Canada
EA	Environmental Assessment
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
ELCA	Ecological Land Classification Area
EPP	Environmental Protection Plan
ERMA	Environment Resource Management Association
ESPP	erosion and sediment control plans
GPS	Global Positioning System
HADD	harmful alteration, disruption or destruction
km	kilometre
km^2	square kilometre
kV	kiloVolt
LAA	Local Assessment Area
m	metre

m^2	square metre
m^3	cubic metre
μm	micrometre
μg	micorgram
Marathon	Marathon Gold Corporation
MBCA	*Migratory Birds Convention Act, 1994*
mg/L	milligrams per litre
NL	Newfoundland and Labrador
NLDECC	Newfoundland and Labrador Department of Environment and Climate Change
NLDFFA	Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture
NL EPA	Newfoundland and Labrador *Environmental Protection Act*
NL ESA	Newfoundland and Labrador *Endangered Species Act*
OSEM	On-Site Environmental Monitor
PAO	Provincial Archaeology Office
Penta	pentachlorophenol
PM	particulate matter
RAA	Regional Assessment Area
RoW	right of way
SAR	Species at Risk
SARA	*Species at Risk Act*
SOCC	Species of Conservation Concern
TL271	Transmission Line 271
TSP	total suspended particles
TSS	total suspended solids
VC	valued component

1.0 INTRODUCTION

1.1 NAME OF UNDERTAKING

Transmission Line 271 (TL271) Star Lake to Valentine Gold Project (the Project)

1.2 PROPONENT INFORMATION

Name of the Corporate Body:	Newfoundland and Labrador Hydro A Nalcor Energy Company
Address:	500 Columbus Drive PO Box 12400 St. John's NL A1B 4K7
Company Representative:	Mr. Michael Lahda Vice President, General Counsel, Corporate Secretary & Commercial (709) 737-1400 MichaelLahda@nlh.nl.ca
Principal Contact for Environmental Assessment:	Mr. Chad Evans Environmental Specialist (709) 691-4759 chadevans@nlh.nl.ca

1.3 PROJECT OVERVIEW

Newfoundland and Labrador (NL) Hydro is proposing to construct and operate a new 69 kiloVolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a proposed new terminal station (Valentine Terminal Station) being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site in the west-central region of the Island of Newfoundland, southwest of the town of Millertown (see Figure 1-1). Project construction activities will include upgrades to the Star Lake Terminal Station, which will occur within the existing station property, and installation of a new 69 kV wood pole transmission line, approximately 40 km in length, with a right of way (RoW) approximately 25 m wide. Operational activities over the life of the Project will include asset inspection and repair as required, and vegetation control. Pending approvals, construction may begin in 2021, with TL271 being operational within the first quarter of 2023. TL271 is planned for decommissioning and removal once all power requirements for the Valentine Gold Project have been met.

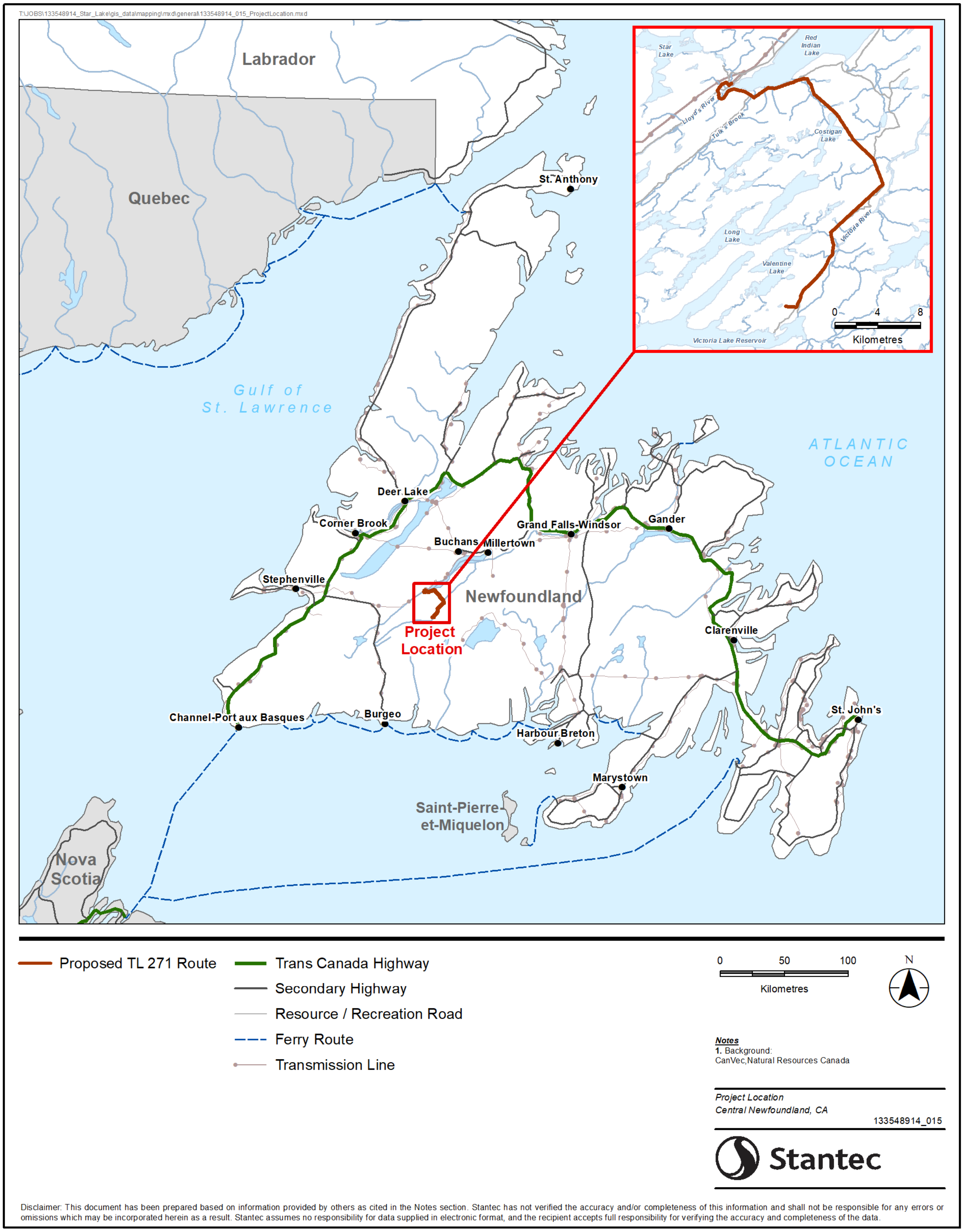


Figure 1-1 Project Location

1.4 PURPOSE/NEED/RATIONALE FOR THE PROJECT

The purpose of the Project is to enable the supply of electrical power to the Valentine Gold Project proposed by Marathon (the Customer). The Valentine Gold Project is currently undergoing environmental assessment (EA) in accordance with the former *Canadian Environmental Assessment Act, 2012* and provincial *Environmental Protection Act, 2002*. If the Valentine Gold Project does not obtain release from both the federal and provincial EA processes, this Project is not required and NL Hydro will inform NLDECC of Project cancellation. Therefore, there is no risk seen to conducting concurrent regulatory reviews for both projects. Construction of TL271 will be scheduled to begin after the anticipated EA approval date for the Valentine Gold Project.

Marathon has indicated that a peak demand of 23 megawatts of power is required for the Valentine Gold Project and that the mine will include a main terminal station and electrical distribution system (including overhead power lines and various substations) to operate various facilities at the mine. The life of the mine is estimated to be 12 years, with commissioning to begin, pending regulatory approvals, in early 2023 (Marathon 2020).

Marathon has approached NL Hydro to supply power to the mine. Power from the grid would be transmitted via NL Hydro's Star Lake Terminal Station and TL271. Marathon will be the sole customer on TL271. Station upgrades (within the existing footprint) and the new 69 kV transmission line are required to supply electrical power to the mine site and fulfill the future power purchase agreement.

1.5 APPROVAL OF THE UNDERTAKING

The EA Regulations made pursuant to the NL *Environmental Protection Act* (NL EPA) require the registration of "an undertaking that will be engaged in the construction of new electric power transmission lines or the relocation or realignment of existing lines where a portion of a new line will be located more than 500 m from an existing RoW". Additionally, the Project represents "an undertaking that will occur within 200 m of the high water mark of a river that is a scheduled salmon river under the *Fisheries Act* (Canada)". This document represents the Registration document and will be submitted to the EA Division of the Department of Environment and Climate Change (NLDECC) for review. Following a public review period, the Minister will make one of four decisions: the undertaking may be released; an Environmental Preview Report may be required; an Environmental Impact Statement (EIS) may be required; or the undertaking may be rejected.

Applicable permits, approvals or authorizations may only be issued after the Project is released from the EA process. The permits and authorizations, or amendments to existing permits and authorizations, that may be required for the Project are provided in Table 1.1.

Table 1.1 Permits and Authorizations that may be Required for the Project

Permit or Authorization	Agency	Notes
Release of the Undertaking under the EA Regulations	NL Department of Environment and Climate Change (NLDECC) - EA Division,	This Registration document represents the "application" for this regulatory process.
Approval of Capital Works	NL Public Utilities Board	
Crown Land Approval for TL271 Easement	NL Department of Fisheries, Forestry and Agriculture (NLDFFA) - Crown Lands Division	NL Hydro will apply via crown lands division to obtain legal easement for TL271. The crown lands review process involves a referral process managed by government agencies, a government review committee and legal survey.
Permit to Alter a Waterbody (Watercourse Crossing)	NLDECC - Water Resources Management Division	Required for stream crossings (e.g., culvert, bridge)
Water Use Licence	NLDECC - Water Resources Management Division	Required if water is being pumped from a local waterbody for Project use
Road Construction Permitting	NL Department of Transportation and Infrastructure	May be required if new access roads are required
Quarry Permit	NLDIET– Mineral Lands Division	A permit will be required to dig for, excavate, remove and dispose of Crown quarry material
Permit to Cut Crown Timber	NLDFFA - Forest Management	A permit is required for cutting of timber on crown land
Pesticide Operator License	NLDECC – Pesticide Control Section	NL Hydro currently holds a Pesticide Operator License 19-043
Letter of Advice	Fisheries and Oceans Canada (DFO)	NL Hydro currently holds a Letter of Advice from DFO regarding transmission line maintenance which will expire at year end (2021). NL Hydro will work with DFO for the applicable approval under the revised *Fisheries Act* for 2022 and beyond.

2.0 PROJECT DESCRIPTION

2.1 LOCATION

The Project is located in a remote location in rural central Newfoundland, approximately 52 km southwest from the town of Millertown and 45 km southwest from the town of Buchans. Located in the Red Indian Lake Subregion of the Central Newfoundland Forest (CNF) Ecoregion, this region is characterized by boreal forest with mainly coniferous trees and a continental climate. The Project is located primarily on provincial crown land. Land use in the general area is characterized by mining and other land and resource uses, including commercial forestry, outfitting, and recreational land use. The proposed route for the transmission line from the Star Lake Terminal Station to the Valentine Terminal Station is shown on Figure 2-1. The preferred route leaves the Star Lake Terminal Station, and generally follows the existing station access road and existing road to Lloyd's River. The transmission line will span Lloyd's River, to the east of the existing bridge and then will generally follow the existing forestry road along the southern shoreline of Red Indian Lake then will deviate south cross-country toward Costigan Lake, passing east of the lake where it eventually reaches the access road to the Valentine Gold Project. The line will continue to follow the mine access road until it reaches the proposed Valentine Terminal Station. Figure 2-1 also shows an alternate route which NL Hydro has assessed during Project planning; Project alternatives, including alternate routing, are further discussed in Section 2.9. A description of the biophysical and socio-economic setting for the Project is provided in Section 3.

2.2 PROJECT COMPONENTS

The Project comprises two main components: Star Lake Terminal Station modifications and a new 69 kV TL271.

The Star Lake Terminal Station connects energy generated at the Star Lake Hydroelectric Generating Station to the NL Hydro transmission system, and includes a transformer and associated protection / controls to connect to the electrical grid, via an existing transmission line (TL280) at Buchans, NL. The Star Lake Terminal Station will be expanded to allow connection of an additional TL271 to supply power to the Valentine Terminal Station being proposed by Marathon. Modifications to the Star Lake Terminal Station will occur primarily within the existing station footprint (which will require a 1-2 m movement of the fence line) and include an extension to the overhead structural steel supports and addition of new high voltage circuit breaker, disconnect switches, and associated protection and controls equipment required for the safe and reliable operation of TL271. Figure 2-2 shows the existing site plan and proposed modifications.

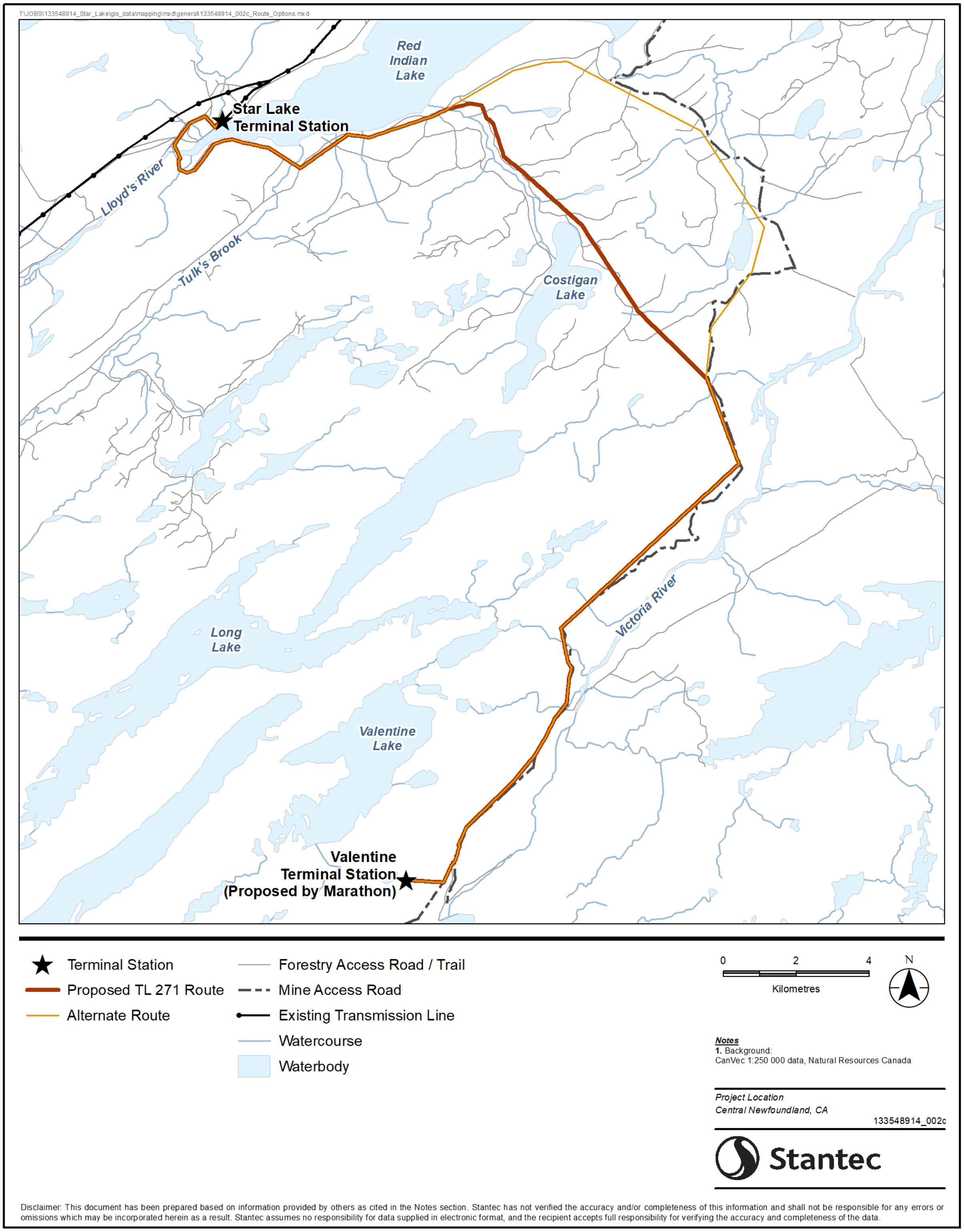
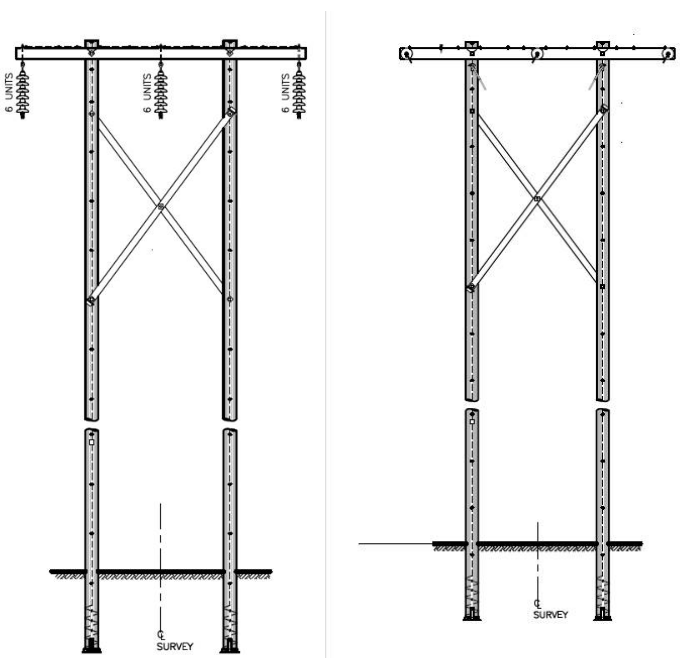


Figure 2-1 Transmission Line Routing

Figure 2-2 Star Lake Terminal Station Site Plan with Proposed Modifications

The transmission line will consist primarily of H-frame wood pole structures with required anchor points (see Figure 2-3 for drawings of a typical H-frame structure and three-pole dead-end structure and Figure 2-4 for a photo of a typical H-frame structure). The RoW will be approximately 25 m wide. A survey of the RoW will be conducted during project planning and design to help determine specific pole locations and may result in minor modifications to the proposed route. Typical span length (i.e., the distance between poles) for a 69 kV line using H-frame structures is 180 m; however, this will be adjusted to accommodate features, such as waterbodies, wetland, terrain, etc. Anchors will consist of 1.5 m and 3 m treated logs buried approximately 1.8 m deep as per engineering standards. Poles will be treated in accordance with NL Hydro specifications with pentachlorophenol (Penta) or chromated copper arsenate (CCA) for long term protection against fungi and insects. RoW access will be created primarily using existing forest access roads where possible. Culverts and/or ford sites will be required along access points and the RoW to facilitate the movement of equipment and materials during construction.

For the purpose of this Registration document, the Project Area is defined as the area encompassing the area of modification at the Star Lake Terminal Station, a 25 m-wide RoW for the transmission line, and areas of access road upgrades / construction.



Typical H-Frame (Tangent) Structure   Typical Three Pole Dead-end Structure

Figure 2-3   Drawings of Typical Pole Structures

Figure 2-4 Photo of Typical H-Frame (Tangent) Structure

2.3 PROJECT SCHEDULE

Pending regulatory approvals, construction activities are scheduled to start in 2021 with operations commencing in early 2023. Construction activities will be undertaken in consideration of sensitive time periods for fish and wildlife. Where sensitive periods cannot be avoided, additional mitigation may be required, which would be identified in consultation with applicable regulators.

The proposed schedule for the Project is outlined in Table 2.1. The start and completion dates are provided primarily to indicate the preferred window for the scheduled activity and are not intended to reflect the period of time required for the activity.

Table 2.1 Project Schedule

Activity	Estimated Start	Estimated Completion
Station Construction	August 2022	September 2022
Station Commissioning	September 2022	September 2022
Line Clearing and Access Road Construction/Upgrades	October 2021 May 2022	December 2021 June 2022
Line Construction	June 2022	January 2023
Line Commissioning	January 2023	January 2023
Line Energization	March 2023	

TL271 is expected to be in operation for approximately 12 to 14 years, to coincide with the expected 12-year operational life of the Valentine Gold Project (Marathon 2020) and allow continued electrical service during post-mining activities at the site. If the life of the mine is extended, TL271 will remain operational, with maintenance conducted as required to maintain reliable service for the mine.

2.4 CONSTRUCTION ACTIVITIES

2.4.1 Terminal Station Modifications

Construction activities associated with the terminal station will occur primarily within the existing station footprint, with site preparation and construction consisting of the following activities:

- Excavation and disposal of fractured rock (approximately 5 m x 12 m in size; 140 m^2 in rock volume) using an excavator with a pneumatic rock hammer; this work will excavate approximately 600mm below station grade to allow for placement of fills and new foundations
- Installation of two new foundations for a steel structure
- Removal of inside fence and substation extended to the outer fence to the east (1-2 m)
- Installation of new concrete foundations for 69 kV circuit breaker
- Installation of buried ground conductors, connected to existing ground grid, covered by 40 m2 of imported crushed stone
- New steel gantry and beam to form box structure, with connection to existing steel gantry structure
- Installation of new 69 kV circuit breaker and disconnect switches
- Removal and relocation of transmission line terminations; and
- Installation of new conductors, ancillary equipment and control/power cables.

These activities will result in minor ground disturbance within the existing station footprint (industrial site) but will require moving the existing fence line by approximately 1-2 m. Limited noise and air emissions are anticipated associated with the operation of vehicles and machinery.

2.4.2 Transmission Line Construction

Site preparation and construction associated with the transmission line will consist of the following activities:

- Access road development (including quarrying if required)
- RoW clearing and construction
- Pole installation and framing
- Conductor stringing
- Testing and commissioning.

Further details on each of these activities are provided below.

2.4.2.1 Access Road Development

A preliminary access plan has been developed to identify existing access roads that may be used to access various points along the RoW and also identify segments of the RoW where access needs to be constructed or upgraded and/or water crossings need to be installed. RoW access construction may include access road upgrades and/or new development including construction of water crossings (e.g., bridge, culvert) and potential infilling in bog areas. Refer to the mapbook in Appendix A for proposed access points along the RoW.

RoW access will be created primarily using existing forest access roads where possible. Given the proximity of the transmission line to existing roads along much of the preferred route, the need for access road development will be limited. The total length of new access currently planned along the RoW is approximately 950 m, with the shortest route being approximately 40 m and the longest length being approximately 300 m. Culverts and/or ford sites will be required along access points and the RoW to facilitate the movement of equipment and materials during construction and operations.

Smaller watercourses may be forded during construction. This may result in minor disturbance to watercourse banks and substrate and sedimentation in the watercourse. All work in or near watercourses will be conducted in accordance with the terms and conditions of permits from the Water Resources Division and Fisheries and Oceans Canada (DFO). Watercourse crossings and proposed access points along the RoW are shown on the mapbook in Appendix A. Details on the watercourses to be crossed can be found in the Water Resources Baseline Study (Appendix B).

NL Hydro will seek approval for permanent construction of access roads/crossings, if required, to allow uninhibited access over the course of the Project.

Construction along the RoW, particularly for access road upgrades and/or new development will require materials for fill and aggregates. Existing quarries and borrow pits will be used where possible, with additional fill being obtained as required from within the new or existing rights of way. Any new quarries and borrow pits that may be required for Project construction will be identified, permitted, established and decommissioned in accordance with applicable regulatory requirements.

2.4.2.2 RoW Clearing and Construction

The RoW will be approximately 25 m wide (to be determined by final routing and design) and approximately 1 km^2 in total area. RoW clearing will include a combination of hand cutting, mechanical harvesting and mechanical mulching with chainsaws being used for small scale clearings (e.g., tree removal adjacent to a watercourse vegetated buffer zone). Vegetation that exceeds 1-2 m at maturity will be removed within the RoW, with the exception of vegetated buffer zones that will remain at watercourse crossings. Forestry data from NLDFFA indicates the majority (60.7%) of the RoW is considered stocked commercial forest, of which approximately 27.6% would be considered good quality timber. Approximately 17.6% of commercial forest within the RoW is not stocked, and 17.3% is disturbed commercial forest (Government of NL 2020e). Harvested timber will be processed in accordance with provincial regulations and will be either stockpiled along the RoW or in a pre-determined location. Figure 2-5 shows a typical drawing of RoW clearing and stockpiling of timber.

The starting point for construction can vary and may be at multiple points depending on final schedule, number of crews, availability of equipment and any sensitivities that may need to be taken into consideration.

Helicopter support will likely be required for RoW access until suitable access can be established, particularly in more remote areas where existing roads are not available (e.g., near Costigan Lake). Existing highways, access roads and trails will be used as appropriate to transport construction equipment and materials to select staging and storage sites along the transmission line route. Access points to the RoW will generally be opportunistic and established to provide options for access to specific segments of a line to avoid excessive travel along the RoW (see Section 2.4.2.1).

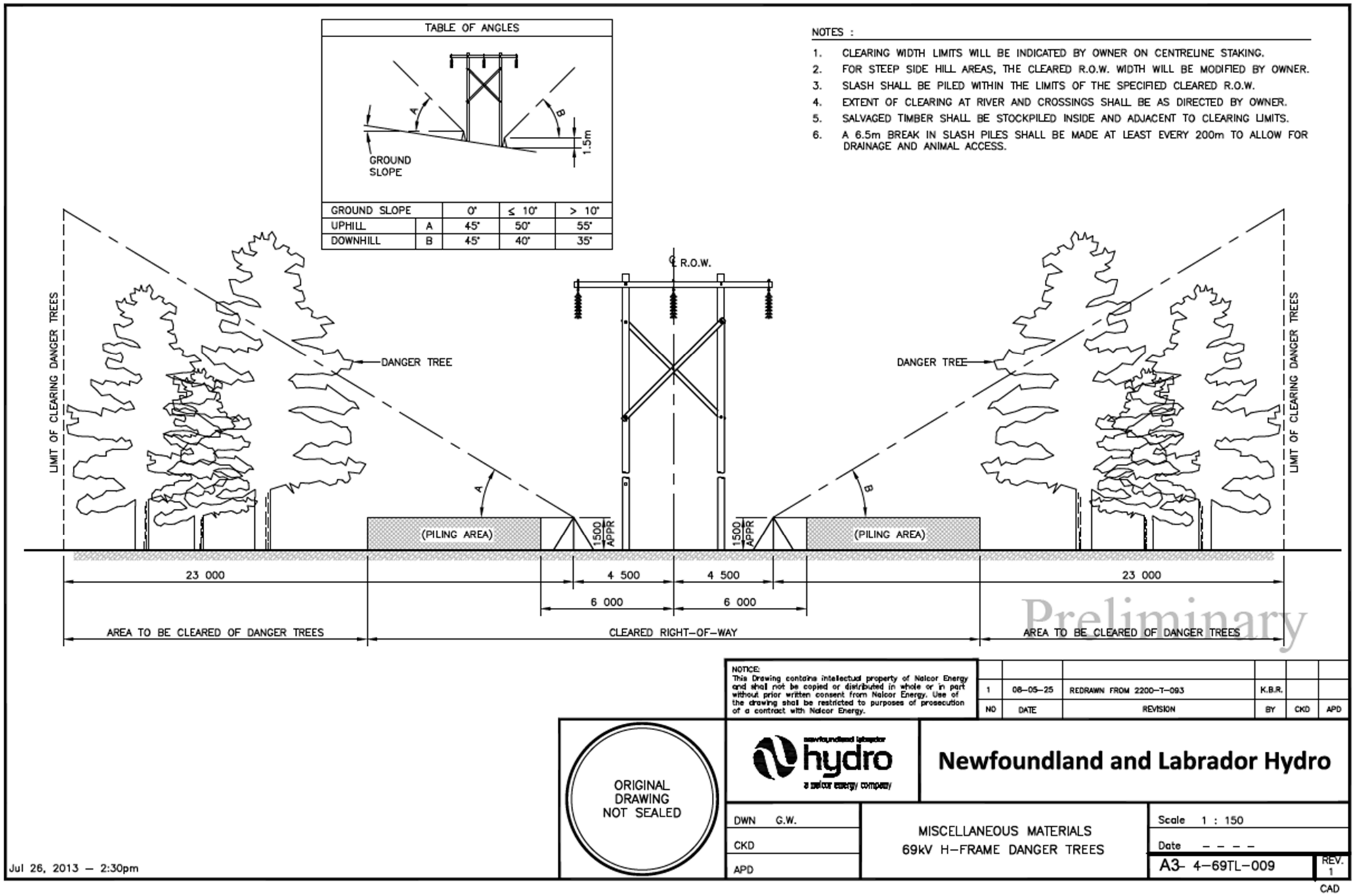


Figure 2-5 Typical Drawing of RoW Clearing

2.4.2.3 Pole Installation and Framing

Once the RoW survey, design, and clearing are completed, structure locations will be staked in the field.

The transmission line will consist of multi-pole structures with required anchor points. Poles will be treated in accordance with NL Hydro specifications with Penta or CCA for long term protection against fungi and insects. Anchors will consist of 5’ (1.5 m) and 10’ (3 m) treated logs buried approximately 6’ (1.8 m) deep as per engineering standards. Where shallow bedrock is encountered, an air drill may be required to penetrate the rock and install anchors.

At this time, blasting is not anticipated to be required during construction. Should it be deemed necessary during construction, blasting activity will be completed in accordance with provincial regulation, control measures, applicable permits and restoration.

Pole installation and framing will be completed by the use of tracked excavators. Access for this equipment will be restricted to pre-determined access roads or routes along the RoW.

2.4.2.4 Conductor Stringing

Conductor stringing will involve several crews installing conductor once poles have been erected and necessary framing, such as insulators, cross arms and bracing, has been installed.

The process involves using tracked equipment to travel the line and pull conductor off a stationary wire spool located at the start of each line segment. Technicians will use aerial equipment, such as boom trucks, to connect the conductor to insulators at each pole location.

Once all conductors are in place, the appropriate tension is applied to adjust the line sag and to bring the conductor to the design specifications. After the line is tensioned, the RoW is travelled and inspected by NL Hydro crews to note any visible deficiencies.

2.4.2.5 Testing and Commissioning

Commissioning is the means of verifying and documenting that each component, system and assembly of a facility is built, installed and tested as planned and designed to meet Project requirements. Commissioning for the transmission line is a process of inspection. Once all conductors are in place, the appropriate tension is applied to adjust line sag and bring the conductor to design specifications. After the line is tensioned, the RoW is travelled using an all-terrain vehicle (ATV) for ground structure inspection and helicopter for conductor phasing inspection. Once these steps are complete, power can be applied to the line to verify successful transmission of power to the end-user.

2.5 OPERATION AND MAINTENANCE ACTIVITIES

Operation and maintenance activities will primarily involve asset inspection and vegetation control.

New assets added to the terminal station as part of the Project will be added to the current inspection routine at the station. Major station equipment, such as the circuit breaker and disconnect switches, will have a six-year preventative maintenance schedule for inspection of major components, mechanical function and manufacturer specifications.

Based on the life expectancy of the Project, asset inspection and replacement/refurbishment activities are expected to be minimal. NL Hydro does not typically start formal wood pole inspections until Year 20, with refurbishment work typically occurring after the asset is at least 30 years old. Asset inspection and replacement / refurbishment will therefore be minimal over the life of the Project. Yearly snowmobile patrols will be completed for visual pole inspection.

Vegetation management activities are subject to approval from the Pesticide Control Section, NLDECC and will be undertaken in accordance with NL Hydro's Integrated Vegetation Management Program and the *Pesticide Control Regulations* under the NL EPA.

Vegetation management will involve application of herbicides and manual cutting of brush. The requirement for vegetation control on the RoW will be assessed approximately three to four years after initial RoW clearing, with the first spray application occurring the following year after inspection. After the initial treatment, frequency of spray application would increase to a five- to seven-year frequency as needed. Cutting / brushing activity would occur around watercourse buffers (where spray activity would be prohibited) at the same frequency.

Asset repair will be conducted as required to ensure reliable power supply to the customer. As the line will be designed for current extreme weather standards, asset repair requirements are expected to be limited.

2.6 DECOMMISSIONING

TL271 will be decommissioned once all power requirements for the Valentine Gold Project have been met. Typical line decommissioning involves using tracked equipment, such as excavators and tracked off-road construction vehicles, to remove all assets. Once the conductors have been removed, the poles can be dropped to ground level and framing/hardware disassembled for removal from the RoW. Removed equipment is either reused, recycled or sent to an appropriate facility for disposal. Once all materials have been removed, the access to the RoW can be rehabilitated and culverts / bridges can be removed (if required).

Once TL271 has been removed from service, the expansion at the Star Lake Terminal would no longer be required. The circuit breaker, disconnect switches, conductors, and items, such as oil filled equipment, would be removed and either reused or disposed of via licensed contractors. It is unlikely the steel box structure constructed within the terminal station would be removed.

2.6.1 General Rehabilitation Measures

The following general rehabilitation measures would be undertaken:

- Rehabilitation will be required for all temporary works, including roads, stream crossings, camps, marshal areas and quarry and borrow areas.
- No temporary buildings or structures associated with the work will be left on Site upon completion of the work.
- All solid waste, including petroleum, oil and lubricant containers will be removed from Site.
- A pre/post occupation inspection will be completed by the OSEM.
- The OSEM will prepare a report for all sites documenting Site conditions prior to disturbance and upon Site abandonment and rehabilitation. Each report will include a description of the condition of vegetation and other aspects of the natural environment.

2.6.2 Quarry/Borrow Area Rehabilitation Measures

The following measures are specific to quarry and borrow areas and will be considered in rehabilitation plans for those areas:

- Any organic material or overburden removed during development of the borrow pits and quarries will be stockpiled near the pit or quarry area for future use during rehabilitation of the borrow pit or quarry. Overburden that is not suitable for rehabilitation purposes will be stockpiled for temporary use or permanent disposal. Stockpiling will be in stable configurations and contoured to match the surrounding landscape. Temporary stockpiles it will be returned to the borrow pit or quarry opening once extraction from the pit or quarry is complete.
- Arrangements will be made with the representatives of the Department of Industry, Energy and Technology for an inspection to be conducted prior to abandonment of the site.
- All equipment and material will be removed from the site.
- All pit and quarry slopes will be graded to slopes less than 20%, or to a slope conforming to that existing prior to quarrying.
- Excess overburden may be used for sloping but topsoil or organic material may not be used for sloping. Following sloping, topsoil or organic material may be spread over the entire quarry area to promote re-vegetation.
- Quarry conditions, including slope on rock walls, will be determined through a rehabilitation plan. Each quarry will be evaluated on a site-specific basis to determine if cliff faces should be converted to rubble slopes.

2.6.3 Roads/Trails Rehabilitation Measures

The following measures are specific to road and culvert/bridge rehabilitation and will be considered in rehabilitation plans for those areas:

- The Contractor will submit a plan for controlling erosion during rehabilitation activities. This plan would address construction activities that have the potential for stream sedimentation.

- When working in a stream or waterbody, fill will be removed around pipes before water bypass installation and pipe removal.
- Fill material that requires temporary storage will be placed in stable areas outside of stream channels and flood plains.
- Channel banks will be armoured with large rock, woody debris and vegetation where needed.
- Channel and vegetation rehabilitation will be required if there are disturbances upstream and downstream of the stream crossing site.
- Stream channels will be restored to natural grades and dimensions.
- Culverts will be removed if required by regulators and based upon operational requirements. Approaches to channels will be stabilized so they may be used as ford sites for future maintenance and inspections.
- Temporary bridges in all areas of the site will be removed.
- Removed culverts and other structural materials will be properly disposed of.

2.7 WASTES, DISCHARGES, AND EMISSIONS

A variety of equipment will be used during Project construction and decommissioning. The operation of construction vehicles and machinery will generate air and noise emissions. Fuel combustion from construction vehicles and machinery will result in the emission of greenhouse gases and air contaminants, including carbon dioxide, sulfur dioxide, nitrogen oxides, carbon monoxide, volatile organic compounds, and particulate matter (PM, PM_{10}, $PM_{2.5}$). These emissions will be localized and short-term in any one location (i.e., as construction activities move along the RoW). Project vehicles, machinery, and equipment will generate noise emissions during construction and decommissioning. During operations, there will be fewer vehicles and machinery associated with RoW maintenance and line inspection, generating lower noise emissions at infrequent periods.

Project-related vehicles and equipment will be maintained in good working order and idling will be reduced to reduce air and noise emissions.

Construction activities, including clearing and site preparation and movement of equipment and vehicles, will also result in fugitive dust emissions. Dust from construction activities will be controlled where possible by using frequent applications of water. Waste oil will not be used for dust control, but other agents, such as wood chips, calcium chloride, matting and revegetation may be considered on a site-specific or as needed basis. Effects associated with dust emissions are anticipated to be temporary and localized.

Potential waste streams from Project construction include:

- Construction and demolition waste (e.g., wire, wood crates/pallets, poles)
- Waste fuels, oil, and lubricants
- Wood waste from RoW clearing
- Domestic waste generated by work crews

Waste management will comply with provincial requirements. Fuels, oil and lubricants will be stored, handled and disposed of according to applicable regulations and NL Hydro's Construction Environmental Protection Plan (EPP) for the Project. Non-merchantable timber, slash and cuttings from cleared areas will be mulched and/or piled to reduce the amount of slash (woody debris). If slash piles are used, they will be piled so as not to cause unnecessary damage to vegetation outside the RoW.

Portable washrooms and toilets used during Project construction will be routinely inspected and properly maintained, with sewage sludge transported off site by an approved service provider for approved treatment and disposal.

During the operations phase, there will be limited air and noise emissions associated with occasional vehicle and equipment use during line inspections and RoW maintenance.

As described in Section 2.6, upon decommissioning, Project equipment will be reused, recycled or sent to an appropriate facility for disposal.

2.8 ACCIDENTAL EVENTS AND MALFUNCTIONS

NL Hydro has a Corporate Emergency Response Plan (CERP), which provides clear and concise guidance for emergency support actions to be taken under emergency situations that could reasonably be expected to occur. The purpose of the CERP is to reduce the probability of emergency events escalating to catastrophic proportions and to reduce losses. The end goal is the return to normal operation as quickly and as safely as possible. The CERP is intended to ensure effective corporate response to emergency situations and execute necessary corporate emergency support actions. Accidental events that could occur during Project construction and/or operations include asset damage during extreme events, spills, and/or fire. The Project EPP will also include contingency plans for fuel and hazardous material spills, wildlife encounters, discovery of historic and archaeological resources, and forest fires.

Terminal station facilities, as well as the transmission line, will be designed for extreme weather standards and are not anticipated to incur damage over the life of the Project. However, in the unlikely event of an extreme event that results in malfunction or damage to Project assets, repair will be conducted as needed to maintain an acceptable level of service and reduce environmental damage in accordance with electrical utility practices and standards.

A spill could occur from machinery use during construction and/or during transmission line inspection, which could result in contamination of sediment and/or water resources. Equipment will be inspected prior to entering each work site to reduce the potential for drips or leaks of hydraulic oil, fuel or antifreeze. Fuel, hazardous and controlled product storage areas, including temporary fuelling and fuel storage facilities, will be designed in accordance with applicable codes and regulations. NL Hydro will require the construction contractor to provide a Contract-Specific Environmental Protection Plan (C-SEPP) for review and acceptance by NL Hydro prior to construction start. This C-SEPP will include a site-specific fuel and hazardous materials response plan. NL Hydro also requires a spill kit dedicated to each crew that will be on site during construction.

Construction activities could potentially increase the risk of fire in the natural environment, potentially resulting in effects on human health, damage to vegetation, and adverse effects on wildlife and air and water quality. Precautions will be taken to prevent fire hazards including proper storage, handling and disposal of flammable materials.

In the unlikely case of a forest fire, contingency measures will be implemented in accordance with the CERP and contingency plans in the EPP.

2.9 PROJECT ALTERNATIVES

Alternative means of carrying out the Project include different RoW route options and alternative construction materials and methods.

2.9.1 Alternative Routes

NL Hydro has evaluated various route options for the transmission line RoW (see Figure 2-6). Factors considered in the route selection process included:

- Overall length of RoW (which affects cost and footprint of physical disturbance)
- Constructability (e.g., length of spans, wetlands, terrain stability)
- Proximity to existing access roads
- Proximity to existing landowners
- Ease of access for line maintenance and improved reliability
- Environmental sensitivities (e.g., watercourses, wetlands, species at risk)
- Known caribou migration corridors (refer to Section 5.2 including Figures 5-5 and 5-6)

An early preliminary route for the transmission line RoW between Star Lake and the proposed terminal station for the Valentine Gold Project focused on reducing the overall length of the RoW (green line on Figure 2-6). However, using the shortest route between the two endpoints would have resulted in a larger environmental footprint for the Project when considering the need for access along the RoW and the creation of a new linear corridor on the landscape. Based on knowledge of sensitivities in the Project Area and feedback from regulators during the environmental assessment process for the Valentine Gold Project, NL Hydro, in consultation with Marathon, developed routing options with the RoW following existing access roads (previously established linear development) to the extent practical to reduce effects on habitat and wildlife (including caribou migration). In addition, this very preliminary route shows a lengthier crossing for Red Indian Lake to the east that would not be technically or economically preferred due to the amount of in-water work required and potential conflict with navigation and land and resource users. Crossing Lloyd’s River instead of Red Indian Lake is preferred based on topography and constructability issues.

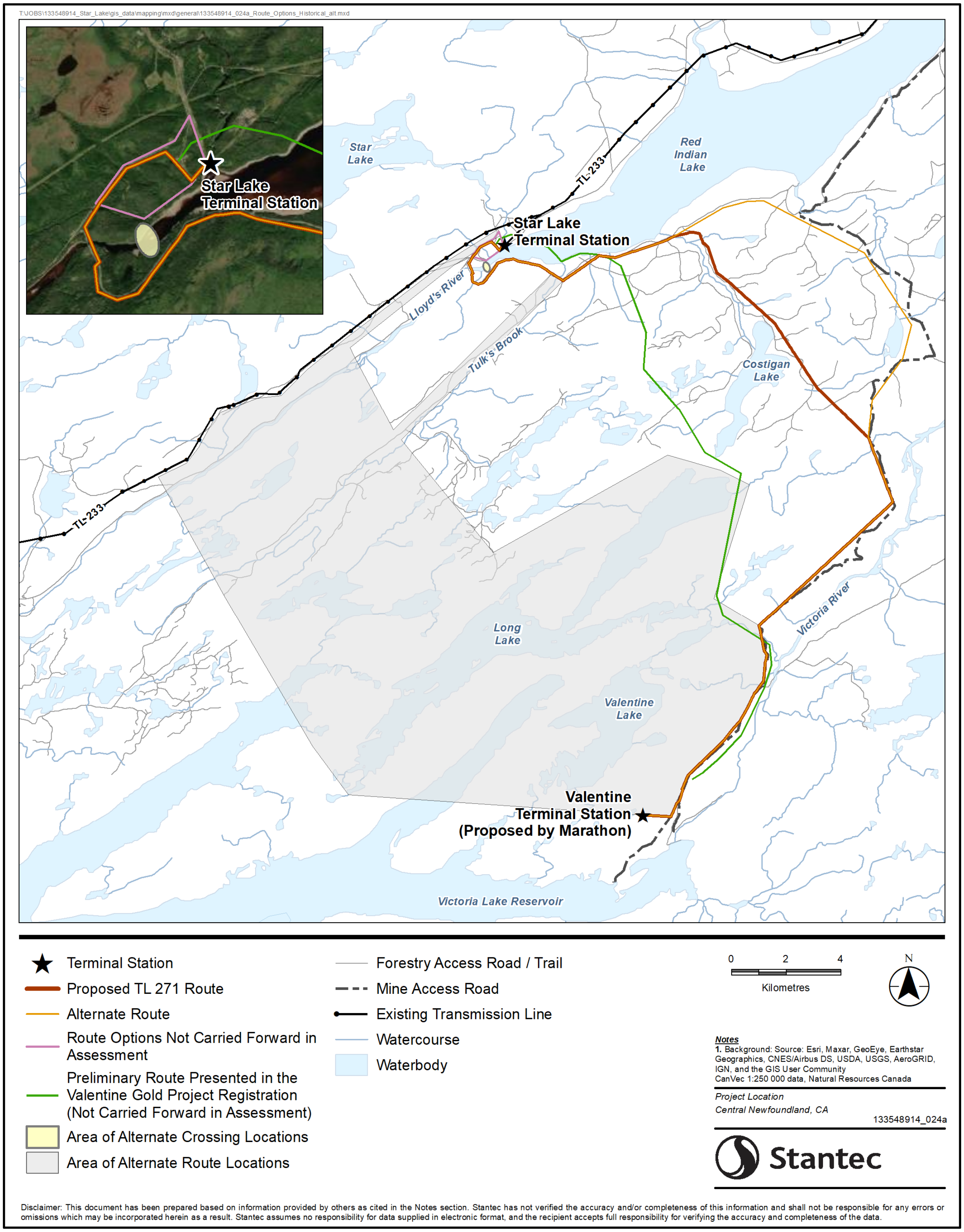


Figure 2-6 Transmission Line Route Alternatives

As a part of the environmental assessment process for the Project, additional preliminary routes were considered to the west of the preferred route. These alternatives, located within the shaded grey area shown in Figure 2-6, resulted in increased environmental disturbance with respect to RoW clearing, access road development, water crossings, wetland disturbance and ultimately resulted in increased interaction with caribou migration paths as compared to the preferred (current proposed) route. As a result of these contributing factors, these routes were not considered feasible for further assessment:

- Possible routes to the southwest of Valentine Lake ranged in length from 42 to 50 km and the percentage of route length paralleling existing resource roads in the area ranged from 48% to 56% (i.e., these routes would require the construction of approximately 18 to 26 km of new access roads). The shorter of these routes would require up to a 730 m span of Victoria Lake Reservoir.
- Alternative options to the northeast of Valentine Lake were also considered and ranged in length from 40 to 46 km. The percentage of route length paralleling existing resource roads in the area ranged from 68% to 78%. The shortest route (40 km), which parallels existing resource roads for approximately 78% of the alignment, requires spanning Long Lake in two locations, with the longest span being approximately 500 m long. As the length of these spans would exceed normal limitations for the design of this line, the water crossings would require the installation of steel towers, resulting in significant ground disturbance near the water body to install the required foundations. It would also involve use of heavy equipment (e.g., heavy duty drill, crane), requiring more substantial access roads. Note that each of these routes would require crossing back and forth through the current migratory corridor for the Buchans herd such that each route crosses the migratory corridor multiple times in order to reduce line length and large water crossings (see Section 5.2, including Figures 5-5 and 5-6 for more information on Project interaction with caribou habitat and migration routes).
- All of the western alignment options described above require crossing Lloyd's River at the same location as selected for the current proposed route. Therefore, they all require crossing of the current migratory corridor for the Buchan's herd and also do not remove the potential for interaction with caribou migration routes near Red Indian Lake (see Section 5.2 for more information on Project interaction with caribou habitat and migration routes). Twinning of the existing route for TL233 and crossing Lloyd's River valley upstream of the current proposed crossing was considered but dismissed due to the steepness and width of the upper reaches of the Lloyd's River valley. The length of span required at this location (approximately 1200 m) would involve significant structures and additional heavy equipment (e.g., heavy duty drill, crane), and corresponding access requirements. This option also would require crossing of the current migratory corridor for the Buchan's herd.
- Given the remoteness of the routes, reliability of service is also a consideration. The access road to the mine site will be cleared and maintained by Marathon year-round, providing improved access to the transmission line in the event of outages and required service. The western routes would be located along more remote access roads or access roads purpose-built by NL Hydro for Project construction that would not be maintained year-round.

An environmental constraints analysis was conducted for technically feasible routing options to the east of Valentine Lake where the routes could take advantage of existing resource roads and reduce the overall physical footprint of the transmission line RoW. A desktop exercise which mapped environmental attributes, such as watercourses and wetlands, known archaeological sites, species at risk (SAR) records, and land uses (e.g., wildlife management area, cabins, infrastructure crossings) concluded the two main route options were similar from an environmental impact perspective. These versions of the two main route options also both included a southern exit route from the Star Lake Terminal Station, following closer to Red Indian Lake (see Figure 2-6). In consideration of the proximity of the potential transmission line route to cabins on the lake, NL Hydro decided to relocate the preferred entry route to the terminal station to the north, taking advantage of other existing access roads more removed from cabin properties.

The preferred route which has been evaluated as the proposed route in this Registration was selected based on overall length (shorter by approximately 4.6 km), associated costs and consideration of environmental constraints in the Project Area. Figure 2-1 shows the proposed route along with the main alternative routing option considered during Project planning and design.

During recent consultations with NLDFFA-Wildlife Division, a concern was identified regarding the proposed location of the TL271 crossing of Lloyd's River and its proximity to an area identified as a high to moderate use migration path by Buchans herd caribou. Based on this feedback, NL Hydro initiated a review of alternative crossing locations for Lloyd's River / Red Indian Lake to the northeast (i.e., further from the migration path). NL Hydro's review identified limited options when considering the length of the span required. Crossing a wider section of Red Indian Lake would require substantial structures and could subsequently interfere with land and resource use associated with the lake. Crossing at locations requiring a shorter span (i.e., the shaded area on the inset of Figure 2-6, which represents a 250 to 275 m span) also presents challenges with respect to potential slope and bank stability issues and the proximity of cabins on both shores of Lloyd's River/Red Indian Lake.

Based on an analysis of migration patterns for the Buchans herd that was completed for the Valentine Gold Project (Marathon 2020) (and summarized in Section 5.2 of this document, including Figures 5-5 and 5-6), the current proposed crossing falls within a low use area with respect to migration of the Buchans herd. The proposed crossing location parallels an existing road crossing of Lloyd's River and will be located immediately east of the existing road (i.e., on the side further from the high to moderate use migration path). As such, the TL271 RoW will not create, and nor is anticipated to function as, a new linear feature in relation to the migratory corridor, thereby mitigating effects of the Project on caribou movement. Note that the current road and proposed TL271 crossing are located at a point along the Lloyd's River with steep slopes, where caribou are unlikely to cross during the spring or fall migration. Caribou are known to cross both upstream and downstream of this location.

In summary, the proposed route as assessed in this Environmental Registration is the preferred alignment in consideration of the environmental, socio-economic and engineering criteria described above.

2.9.2 Alternative Structures

Another alternative relates to construction of the transmission line. Wood pole construction is considered to have the least impact with regards to environmental disturbance and has been selected as NL Hydro's preferred option. The other alternative would be steel tower construction although this would result in a much larger ground disturbance for the installation of foundations and a significant increase in cost for a project with a short lifespan. Also, as noted above, larger structures require special equipment (e.g., cranes) which require more substantial clearance for construction access.

2.10 EMPLOYMENT

2.10.1 Occupations

Construction of the Project will involve NL Hydro and contractor staff, with occupational categories and estimated numbers as shown below in Table 2.2.

Table 2.2 Enumeration of Occupations Required for Project Construction

Component / Activity/ Occupation	Estimated Number (Preliminary)	NOC Code
TRANSMISSION LINE CONSTRUCTION		
Clearing		
Heavy Equipment Operator	10	7421
Foreman	1	7205
Mechanic	1	7312
Labourer	5	7611
Chainsaw Operator	4	8421
Engineering		
Civil Engineer	1	2131
Project Manager	1	711
Land Surveyor	1	2154
Geo Technician	1	2144
CAD	1	2253
Field Survey (2 crews)		
Land Surveyor	4	2154
Labourers	2	7611
Pole Erection (1 crew)		
Heavy Equipment Operator	6	7421
Foreman	1	7421
Linemen	6	7244
Stringing (1 crew)		
Heavy Equipment Operator	2	7421
Linemen	10	7244

Table 2.2 Enumeration of Occupations Required for Project Construction

Component / Activity/ Occupation	Estimated Number (Preliminary)	NOC Code
Labourer	5	7611
Foreman	1	8421
Support		
Safety Officer	2	2263
Environmental Inspector	2	2263
QA / QC Tech	4	2233
Cost Control	1	1411
Labourer	3	7611
Heavy Equipment Operator	3	7421
Scheduling	1	1474
Construction Manager	4	7205
TERMINAL STATION UPGRADES		
Steel Erection and Buswork		
Heavy Equipment Operator	1	7421
Labourer	2	7611
Linemen	2	7244
Foreman	1	7205
Equipment Installation		
Heavy Equipment Operator	1	7421
Electrician	6	7241
Foreman	2	7205
Commissioning		
Technicians	3	7246
Foreman	1	7205
Engineering/Support		
Project Manager	1	0211
Civil Engineer	1	2131
Structural Engineer	1	2148
Electrical Engineer	2	2133
CAD Operator	1	2253
QA / QC Tech	1	2233
Superintendent	1	7205
Safety Officer	1	2263

The construction workforce will be housed primarily in existing and available accommodations which may include one or more of the following options:

- Hotel/lodges in Millertown or Buchans (primary plan)
- Use of local outfitter facilities, if available
- Temporary recreation vehicles or trailers located near/at Star Lake or along the transmission line route (if permitted)
- Marathon's Valentine Gold Project construction camp

Following construction, the Star Lake Terminal Station and TL271 will be operated and maintained by existing staff from NL Hydro.

2.10.2 Diversity and Inclusion

NL Hydro is a proud, diverse energy company, whose people are committed to building a bright future for NL, unified by our core values:

- Open Communication – Fostering an environment where information moves freely in a timely manner.
- Accountability – Holding ourselves responsible for our actions and performance.
- Safety – Relentless commitment to protecting ourselves, our colleagues, and our community.
- Honesty and Trust – Being sincere in everything we say and do.
- Teamwork – Sharing our ideas in an open and supportive manner to achieve excellence.
- Respect and Dignity – Appreciating the individuality of others by our words and actions.
- Leadership – Empowering individuals to help guide and inspire others.

Our core values have helped us define how we do business and are our guiding principles. These values help guide our team and fulfill our commitment to our customers, employees, and the people of NL. We value our employees, we take care of each other, we recognize excellence, we respect individuality, and we work hard to create an inclusive and welcoming workplace.

2.11 ENVIRONMENTAL MANAGEMENT

Construction activities will be conducted in accordance with NL Hydro's Construction EPP. In addition, NL Hydro will require the construction contractor to provide a C-SEPP for review and acceptance by NL Hydro prior to construction start. The C-SEPP will include erosion and sediment control plans (ESPP), as well as a Spill Contingency Plan. Construction will adhere to best management practices and mitigation measures presented in these Plans, as well as applicable regulatory requirements.

The Project will have full-time On-Site Environmental Monitors (OSEMs) to inspect worksites and activities for conformance with the EPP, C-SEPPs and government regulations and permits. The purpose of this is to effectively implement and monitor the mitigation measures during construction.

A summary of generic mitigation measures and best management practices is presented below. More specific mitigation is presented in Section 5. A complete summary of mitigative commitments for the Project can be found in Section 9.

- Construction activities will be scheduled in consideration of sensitive time periods for fish and wildlife. If timing is not ideal, alternative mitigation measures will be identified and implemented in consultation with applicable regulatory authorities.
- Disposal of cleared non-merchantable timber, slashing and cuttings from cleared areas will take place through mulching and/or piling to reduce the amount of slash. No burning of materials is permitted for this Project.
- Maintenance and refuelling of vehicles will be restricted to designated areas.
- Equipment will be regularly maintained and inspected. If problems are identified the equipment will be taken out-of-service and either repaired or replaced to prevent release of hydrocarbons into the environment.
- To control noise, applicable equipment will have exhaust systems which will be regularly inspected and maintained so mufflers remain operating in accordance with manufacturer's recommendations.
- Dust from construction activities will be controlled where possible by using frequent applications of water. Waste oil will not be used for dust control, but other agents, such as wood chips, calcium chloride, matting and revegetation may be considered on a site-specific or as needed basis.
- The amount of on-site lighting will be reduced. Only the amount of lighting required for safe conduct of construction and operation activities will be installed, and exterior lights will be shielded from above (where the need is identified).
- Fuel, hazardous and controlled product storage areas, including temporary fuelling and fuel storage facilities, will be designed in accordance with applicable codes and regulations. Hazardous wastes will be stored, removed and disposed of in accordance with regulatory requirements.
- Prior to the commencement of construction, equipment will be inspected for the presence of soil that could contain seeds and/or propagules of invasive and non-native species. If equipment is found to have soil attached, it will be cleaned (i.e., pressure washed) to remove the potential seed source.
- RoW access will be created primarily using existing forest access roads where possible.
- Cutting activities will be limited to those areas that are required for construction of infrastructure and RoW clearing. Natural vegetation will be left in place where possible.
- Buffer zones (to be determined by the OSEM) will be flagged prior to disturbance activities, as required.
- A minimum buffer zone of natural vegetation 20 m from the high water mark of waterbodies, watercourses and ecologically sensitive areas will be maintained around work areas, where available space poses a constraint, except where specified otherwise. If space is available, then wider buffer zones of 100 m will be maintained between construction areas and watercourses, waterbodies and ecologically sensitive areas.
- Erosion prevention and sediment control measures will be installed to reduce and control runoff soil erosion and transport of sediment laden water. These measures will be monitored regularly and cleaned / repaired as necessary to maintain their effectiveness.

- If blasting is required, the timing of this activity will be conducted in consideration of potential environmentally sensitive periods (e.g., bat hibernation and caribou migration). Use of explosives in or near water will be avoided, however, if required, will follow DFO blasting guidelines.
- Project contractors and staff will be prohibited from fishing, hunting, or otherwise interacting with (e.g., harassment, feeding) wildlife at or near the site while working on the Project.
- Personal pets (domestic or wild) will be prohibited on site during construction.
- Non-residual herbicides and mechanical methods will be used for vegetation removal, where practical, and the use of herbicides will be restricted to avoid buffer areas around watercourses. The requirements of applicable regulations will be met or exceeded, including their application by qualified, trained personnel following manufacturers' instructions and as per the Pesticides Control Regulations, 2012 under the NL EPA.
- Known archaeological sites will be avoided. In case of a suspected discovery of an archaeological site or artifact, the encounter will be reported to the OSEM and the site will be flagged for protection and avoidance. The Provincial Archaeology Office (PAO) will be informed of the discovery to provide direction and determine if additional assessment and/or mitigation is required.

3.0 ENVIRONMENTAL SETTING AND POTENTIAL RESOURCE CONFLICTS

An overview of the biophysical and socio-economic settings is provided below. Appendix A contains a detailed mapbook showing Project components and key environmental features. Additional information can be found in baseline studies appended to this report for water resources (Appendix B), caribou (Appendix C), flora and fauna (Appendix D), and historic resources (Appendix E).

3.1 BIOPHYSICAL ENVIRONMENT

The Project is in the Red Indian Lake Subregion of the CNF Ecoregion, one of nine ecoregions on the Island of Newfoundland (Government of NL n.d.). The CNF Ecoregion is primarily inland and has a more continental climate than other surrounding ecoregions. This ecoregion also has the warmest summers and coldest winters on the island, with the potential for night frost year-round (Government of NL n.d.).

There are limited anthropogenic sources of greenhouse gas, light or noise emissions in this remote area of the province as there are no nearby communities or major roadways. The Star Lake Terminal Station represents a local source of noise and light emissions in an otherwise remote area scattered with seasonal dwellings (cabins and outfitters).

Ambient air quality monitoring conducted for the Valentine Gold Project in June 2020 measured concentrations of nitrogen dioxide, sulphur dioxide, total suspended PM with an aerodynamic diameter less than 30 µm (Total suspended particles [TSP]), respirable PM with an aerodynamic diameter less than 10 µm (PM_{10}) and metals well below applicable 24-hour ambient air quality criteria in NL. Measured concentrations of PM (TSP and PM_{10}) ranged from 5.1 $\mu g/m^3$ to 13.8 $\mu g/m^3$ and the concentrations of TSP and PM_{10} were consistent, suggesting that the existing PM in the vicinity of the Project is made up mostly of PM_{10} (Marathon 2020).

The Project is located within the Exploits River Watershed which is the largest watershed on the Island of Newfoundland, with a total area of 10,241 km^2 (Marathon 2020). The Exploits River is one of the most important Atlantic salmon (*Salmo salar*) rivers on the Island. In addition to Atlantic salmon, ouananiche (landlocked salmon), brook trout (*Salvelinus fontinalis*), Arctic char (*Salvelinus alpinus*), American eel (*Anguilla rostrata*) and threespine stickleback (*Gasterosteus aculeatus*) are known to occur within the upper Exploits River Watershed (Cunjak and Newbury 2005; Porter et al. 1974). Water discharge from the Exploits River is highly regulated by three dams located in Millertown, Grand Falls-Windsor and Bishops Falls (Marathon 2020).

The proposed RoW crosses the Victoria River and Lloyd's River subwatersheds, as well as a number of smaller headwater streams and smaller sub-watershed which flow into Red Indian Lake. Historically, Victoria Lake drained to Red Indian Lake via the Victoria River, however, with the construction of the Victoria Dam in 1967, flow from Victoria Lake was directed to the hydrogeneration station in Bay d'Espoir. In recent years, the Victoria Lake Reservoir has contributed very little flow to the Victoria River because the Victoria Dam operates as an overflow spillway, and spilling occurs infrequently. Lloyd's River flows from the Annieopsquotch Mountains into the upper end of Red Indian Lake. There are no major obstructions on the main river or larger tributaries, however many of the headwater tributaries cascade over steep mountains (Porter et al. 1974). The mouth of Red Indian Lake is controlled by a dam located in Millertown.

There are 50 assumed watercourse crossings (based on provincial mapping and air photo interpretation) along the proposed RoW. Forty-nine of these crossings are associated with the transmission line and one is associated with proposed access road construction (see Figure 3-1).

The Red Indian Lake Subregion is characterized by glacial terrain with rolling hills, dense boreal forest and domed bogs (PAA 2008). There are numerous lakes, ponds, streams and rivers in the region. An Ecological Land Classification (ELC) conducted for the Valentine Gold Project provides approximately 89% coverage of the Project Area, ending at Red Indian Lake near Lloyd's River, and reveals 12 habitat types that occur in the Project Area, including forest habitat types, wetland habitat types, and areas currently or historically subject to human disturbance and use. More information on habitat types in the ELC and RoW can be found in the Flora and Fauna Baseline Study (Appendix D).

Balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), and black spruce (*Picea mariana*) are dominant tree species, and areas of rich, productive soils are present, particularly along the southern slopes of Red Indian Lake (Government of NL n.d.). Disturbances such as logging or fire often lead to the succession of alder (*Alnus* spp.) thickets, which has become an issue for silviculture within the subregion (Government of NL n.d.).

As described in the Flora and Fauna Baseline Study (Appendix D), there are six rare plant species (i.e., native species which exist in low or declining numbers or in very restricted areas nationally and/or in NL) that have been reported in the vicinity of the Project and are presumed to occur within or near the proposed RoW based on habitat preferences (see Figure 3-2):

- Perennial bentgrass (*Agrostis perennans*)
- Short-scale sedge (*Carex dewevana*)
- Nnodding water nymph (*Najas flexilis*)
- Red pine (Pinus resinosa)
- Fragrant cliff wood-fern (*Dryopteris fragrans*)
- Common water primrose (*Ludwigia palustris*)

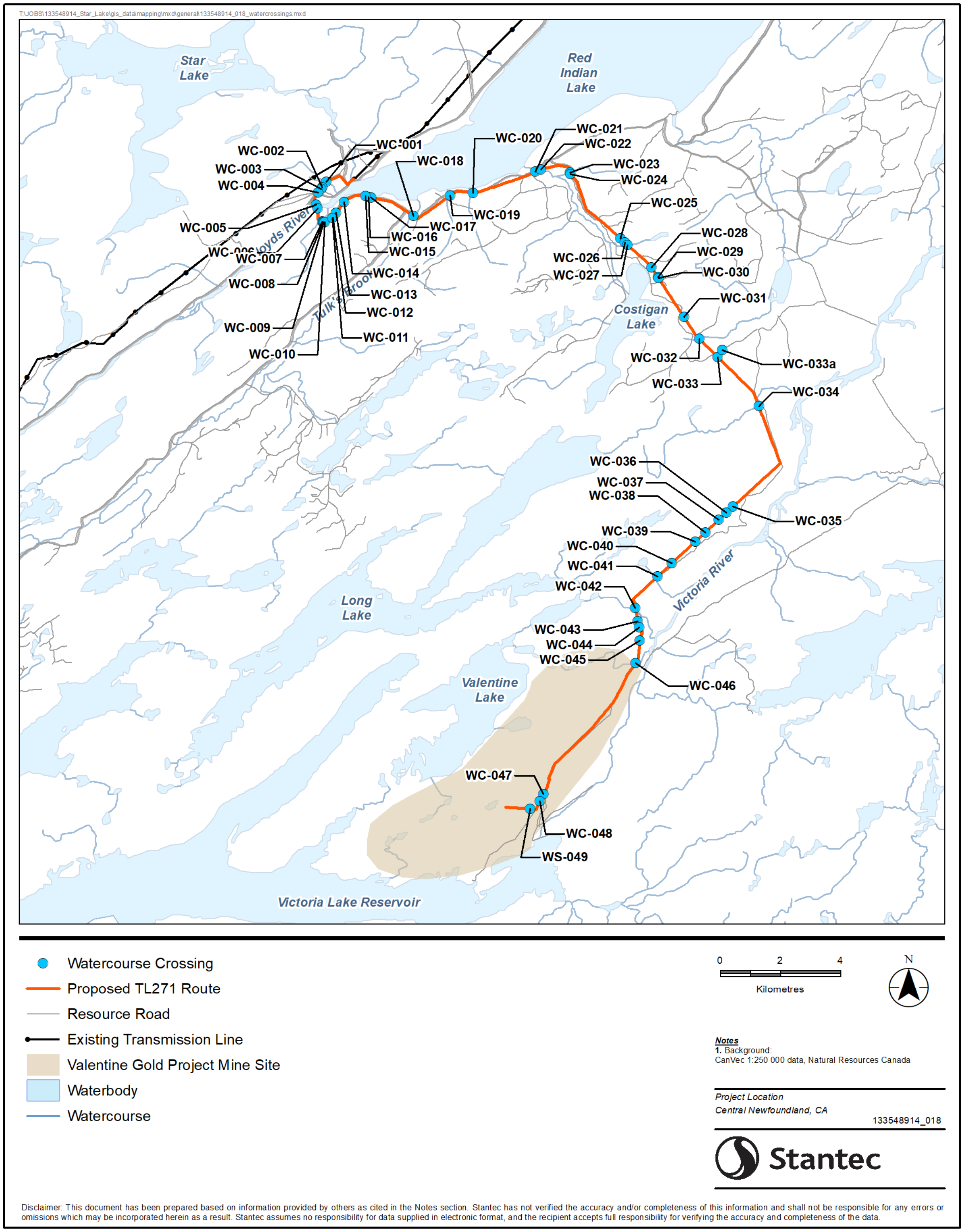


Figure 3-1 Watercourse Crossings within the Project Area

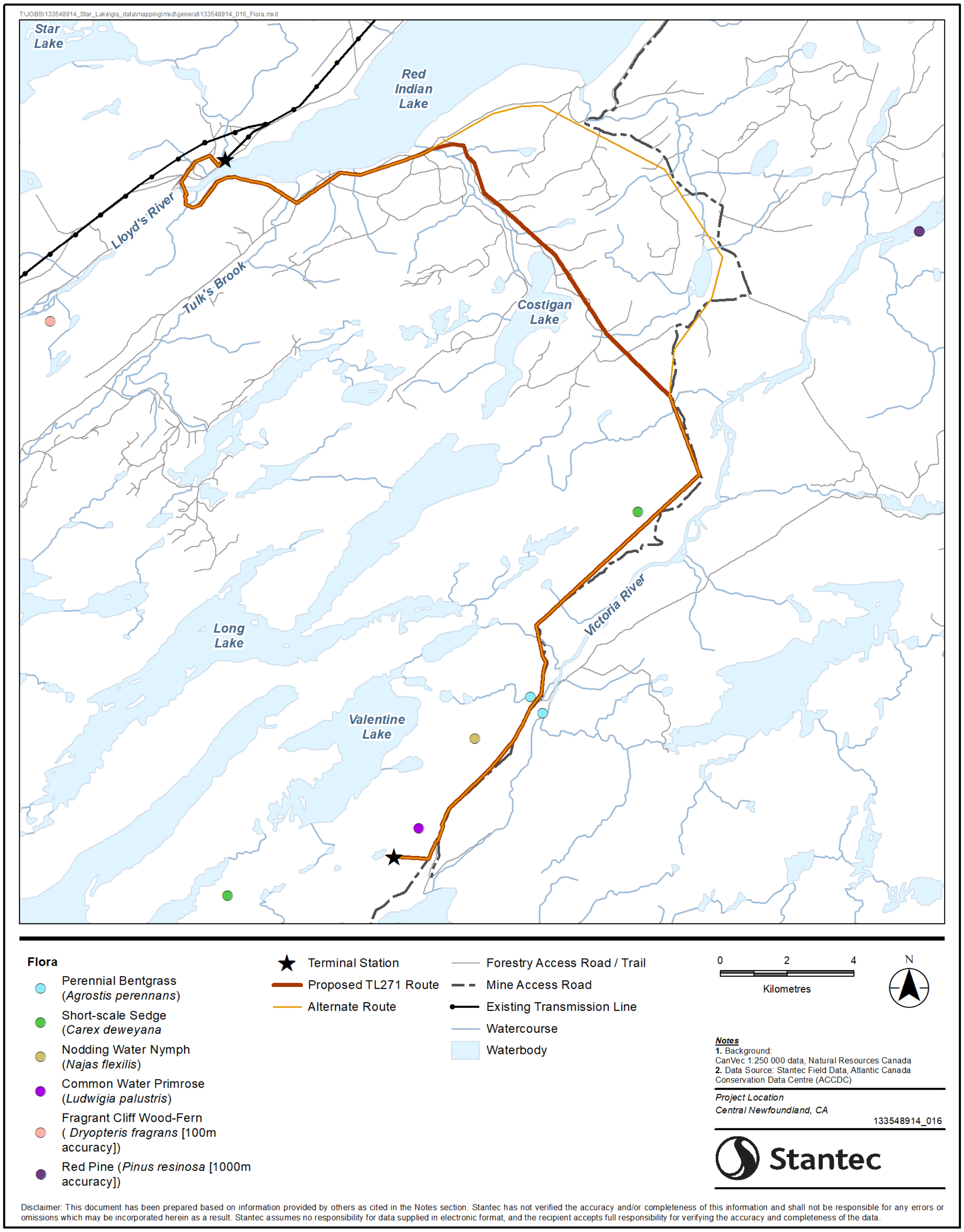


Figure 3-2 Known Occurrences of Rare Flora in the Vicinity of the Project (AC CDC 2020)

Wildlife species confirmed to occur in the vicinity of the Project Area through visual observation or wildlife sign (e.g., tracks, scat, lodges/dams, etc.) include woodland caribou (*Rangifer tarandus caribou*), moose (*Alces alces*), Canada lynx (*Lynx canadensis*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), muskrat (*Ondatra zibethicus*), river otter (*Lontra canadensis*), southern red-backed vole (*Myodes gapperi*), meadow vole (*Microtus pennsylvanicus*), snowshoe hare (*Lepus americanus*), Newfoundland marten (*Martes americana atrata*) and American red squirrel (*Tamiasciurus hudsonicus*) (Marathon 2020). Black bear (*Ursus americanus*), mink (*Neovison vison)*, and ermine (*Mustela erminea)* are known to occur in the vicinity of the Project Area and northern long-eared myotis (*Myotis septentrionalis)* and little brown myotis (*Myotis lucifugus*) are expected to roost in mature mixedwood forest (Marathon 2020), or in the case of little brown myotis, also buildings. Ninety-eight avifauna species have been documented in the area based on field studies completed for the Valentine Gold Project (Marathon 2020) and publicly available literature and databases. This includes 7 raptor species, 81 species of migratory birds, and 10 other avifauna species (e.g., non-raptor species not protected under the *Migratory Birds Convention Act, 1994* [MBCA]).

For the purpose of this Registration, SAR include those species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL *Endangered Species Act* (NL ESA), or the federal *Species at Risk Act* (SARA).

For the purpose of this Registration, SOCC include those species:

- Assessed by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC) as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern
- recommended for listing by the Species Status Advisory Committee as Endangered, Threatened, Vulnerable, or Special Concern but not yet listed under NL ESA or SARA
- considered provincially rare, i.e., those species with provincial status ranks (S-ranks) of S1 (Critically Imperiled), S2 (Imperiled), or combinations thereof (e.g., S1S2) upon review by the Atlantic Canada Conservation Data Centre (AC CDC) (AC CDC 2021)

Avifauna SAR identified during baseline field surveys for the Valentine Gold Project and/or other publicly available data sources include: common nighthawk (Chordeiles *minor*), olive-sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*), red crossbill (Loxia *curvirostra*), bank swallow (*Riparia riparia*), gray-cheeked thrush (*Catharus minimus*), and evening grosbeak (*Coccothraustes vespertinus*) (Marathon 2020). Three avifauna SOCC, Caspian tern, Nashville warbler (*Leiothlypis ruficapilla*) and bay-breasted warbler (*Setophaga castanea*) were detected during baseline field surveys (Marathon 2020). These three species are listed as S2B by the AC CDC, indicating that their breeding populations are Imperiled on the Island of Newfoundland. Of these, four SAR – olive-sided flycatcher, gray-cheeked thrush, red crossbill, and rusty blackbird – and two SOCC – Nashville warbler and bay-breasted warbler – have the potential to occur in suitable habitats in the Project Area during the breeding season for migratory birds on the Island of Newfoundland. Figure 3-3 shows the location of records of occurrence of avifauna SAR and SOCC in the vicinity of the Project.

Wildlife SAR likely to occur in or near the RoW include the Newfoundland population of American marten (*Martes americana atrata)* and little brown myotis (*Myotis lucifugus*) and Northern long-eared myotis (*Myotis septentrionalis*) (Marathon 2020). The Newfoundland population of American marten is listed as Threatened under SARA and the NL ESA, and the AC CDC ranks marten as S3 (or Vulnerable). Martens have been recorded in the vicinity of the Project as confirmed by AC CDC (2020) data and observations during field surveys conducted for the Valentine Gold Project (Marathon 2020). Segments of the proposed RoW overlaps proposed critical habitat for the Newfoundland marten (Figure 3-3). The little brown myotis and northern long-eared myotis are currently listed as Endangered under SARA, following an emergency listing in 2014. A portion of the RoW is within a 10 km grid cell where a hibernaculum for myotis species is known to exist (AC CDC 2020) (Figure 3-3).

Caribou on the Island of Newfoundland have been assessed as Special Concern by COSEWIC (COSEWIC 2014). The Project Area overlaps or is in proximity to the ranges of caribou herds including the Buchans, Grey River, Gaff Topsails, and La Poile herds. Collectively, these herds represent approximately 36% of the caribou population on the Island of Newfoundland (Marathon 2020). The caribou population on the Island of Newfoundland has recently undergone a decline, most likely due to a combination of food limitation with predation by coyotes. Recent surveys indicate that population trends for the caribou herds noted above may be stabilizing (Marathon 2020). The Project Area overlaps with the Grey River Caribou Management Area. Animals from the Buchans herd migrate through the Project Area biannually, while resident caribou from the Grey River herd, occur year-round.

3.2 SOCIO-ECONOMIC ENVIRONMENT

The Project is located on provincial crown lands in a rural region of central Newfoundland where there is a history of mineral exploration and mining, hydroelectric development, and forestry. The nearest communities are the Town of Millertown (52 km) and the Town of Buchans (45 km). These communities, along with Buchans Junction, Badger, Grand Falls-Windsor and Bishop's Falls, have been shaped primarily by natural resource-based industries, including mining, forestry and hydroelectric developments (Marathon 2020). Logging has taken place in the region since the turn of the twentieth century, however, with the closing of Abitibi-Bowater Inc.'s pulp and paper mill in Grand-Falls-Windsor in 2009, forestry in the area has decreased (Marathon 2020). Although there are currently no active mines in the area, mineral exploration activity does take place throughout the general region, including south of the Project Area, where Marathon is proposing to develop an open pit gold mine (Valentine Gold Project).

Other land and resource use activities in the area include outfitting, camping, fishing, hunting, trapping, and recreational vehicle use (all-terrain vehicle use, snowmobiling). There are approximately 151 seasonal dwellings (registered and unregistered cabins, outfitters) within 5 km of the Project and 15 within a 250 m radius. This includes an active outfitter's camp at Lloyd's River, which is approximately 147 m from the proposed transmission line RoW. The closest permanent residences would be associated with the Town of Buchans, approximately 45 km away.

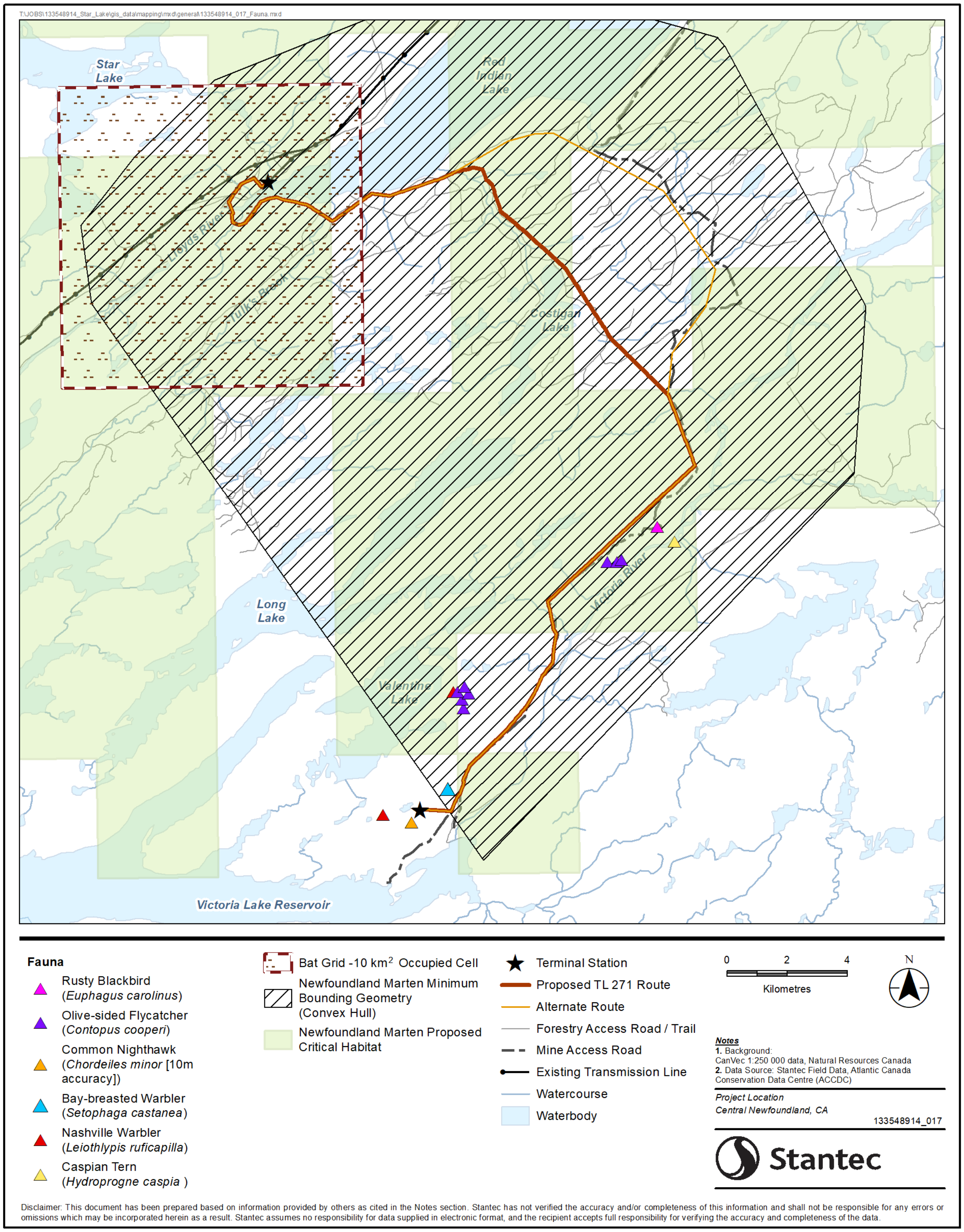


Figure 3-3 Known Occurrences of Avifauna SAR and SOCC and Other SAR in the Vicinity of the Project (AC CDC 2020)

Angling occurs on a number of waterbodies in the region. Watercourses and waterbodies in the vicinity of the Project Area support established recreational fisheries for brook trout and ouananiche, and may support a limited recreational fishery for sea-run Atlantic salmon, where they reside. There is an active recreational salmon fishery on the Exploits River, which flows northeast from Red Indian Lake. The Exploits River (including tributaries) is a scheduled salmon river, regulated by DFO under the *Fisheries Act* and the *Canada Wildlife Act.* Any stream, brook, or river that flows into Red Indian Lake is considered scheduled waters. Indigenous fishing activity is also known to occur in other watercourses or waterbodies surrounding Red Indian Lake (Stantec 2020). There are no known commercial fisheries in the area. Fishways at the Grand Falls and Bishop's Falls dams, owned by DFO and operated by Environment Resources Management Association (ERMA), allow upstream migrating Atlantic salmon to get past the dams. Additional fish passage for migrating Atlantic salmon is also provided at Red Indian Lake Dam. A hatchery located near the Grand Falls fishway, operated by ERMA provides brook trout fingerlings for a fish habitat compensation (restocking) program at Star Lake.

Protected areas (e.g., ecological reserves, provincial and national parks, wildlife reserves, wilderness reserves) comprise approximately 6.7 percent of the Island of Newfoundland (Wilderness and Ecological Reserves Advisory Council 2020). There are two provincial protected areas in the RAA: Little Grand Lake Provisional Ecological Reserve (approximately 15 km from the Project Area); and Little Grand Lake Wildlife Reserve (approximately 25 km from the Project Area).

Indigenous groups on the Island include the Qalipu Mi'kmaq First Nation (Qalipu) and Miawpukek First Nation (Miawpukek). The Miawpukek Reserve is located at the mouth of the Conne River on the south coast of the Island of Newfoundland, approximately 114 km from the Project Area. Qalipu does not manage any reserve lands; its members reside within 67 communities across the Island, with the nearest communities to the Project being Buchans and Millertown.

A Historic Resources Baseline Study was conducted for the Project (Appendix E) which consisted of review of archaeological, historic, and ethnohistoric literature, along with reports and site record forms provided by the PAO, pertaining to known archaeological sites in the vicinity of the Project Area. Previous archaeological work on the Island of Newfoundland indicates approximately 5,000 years of precontact Indigenous occupation in four distinct periods: two Palaeo-Inuit and two of Amerindian affiliation. Indigenous occupation was demonstrably intensive along the coast. Interior occupation, primarily by Amerindian groups, but increasingly including some evidence for Palaeo-Inuit occupation, appears to have been focused on near-coastal interior lakes, and major NE-SW-oriented lakes and rivers traversing the deep interior. Historic European archaeological sites are known primarily from coastal areas until the 20th century, although historic Mi'kmaq and Beothuk sites have been recorded, and may be anticipated, in deep interior settings on the Island.

Ethnohistoric evidence indicates that important caribou migration corridors approach and traverse the Project Area, and that there is theoretical potential for precontact sites of all periods, particularly for sites of Maritime Archaic and late precontact Amerindian peoples, but also, to a lesser extent, potential for Palaeo-Inuit sites. The Project also lies within the territory of the Beothuk prior to the second quarter of the 19th century, so there is potential for historic Beothuk sites, and also for historic Mi'kmaq sites dating to the second half of the 19th century into the 20th century.

Three archaeological surveys previously been undertaken in the vicinity of the Project (including a targeted survey of the northeastern corner of Costigan Lake) found no evidence of archaeological sites (Madden 1975; Schwartz 1993, 2020). However, a desktop archaeological study conducted for the Valentine Gold Project identified registered archaeological sites from a broader area in west-central and south-central Newfoundland including a cluster of historic Beothuk and precontact sites on Red Indian Lake northeast of the Project and a reported wigwam site on Costigan Lake (approximately 750 m from the transmission line RoW). The Historic Resources Baseline Study for this Project identified several areas of moderate and high archaeological potential along the RoW (see Appendix E for more information).

3.3 RESOURCE USE CONFLICT

Table 3.1 describes potential Project interactions and resource use conflicts with biophysical and socio-economic resources. Where there are no potential resource conflicts predicted or potential resource conflicts may exist but can be resolved with standard mitigation measures, no further assessment is considered warranted. Where potential resource conflicts may exist and additional analysis of effects is warranted to better understand the interaction and develop appropriate mitigation measures, further assessment is presented in Section 5.

Table 3.1 Potential Resource Conflict Considerations and Recommendations for Further Assessment

Resource	Potential Interactions and Resource Conflicts Considerations	Further Assessment Recommendation
Atmospheric	During construction and decommissioning, the Project will generate air, noise and dust emissions. During the operations phase, there will be minimal air and noise emissions associated with occasional vehicle and equipment use during line inspections and RoW maintenance. Given the temporary nature of construction and decommissioning activities, reduced emissions during operations, standard mitigation measures to reduce emissions, and the limited presence of sensitive receptors, these interactions will be limited and do not require further assessment. Refer to Section 2.7 for more information on atmospheric emissions and proposed mitigation measures.	Not carried forward in Registration for further assessment.
Geology/Soils	Excavation, backfilling and grading of rock and other materials may be required at various locations within the Project Area. This could result in changes in soil quantity or quality. Existing quarries and borrow pits will be used where possible, with additional fill being obtained as required from within the new or existing rights of way. Any new quarries and borrow pits that may be required for Project construction will be identified, permitted, established and decommissioned in accordance with applicable regulatory requirements. Erosion control will be managed through standard mitigation measures in the EPP.	Not carried forward in Registration for further assessment.
Groundwater	Project activities are not predicted to interact with groundwater resources. The only known active groundwater user in the proximity to the Project Area is the exploration camp owned and operated by Marathon (Marathon 2020).	Not carried forward in Registration for further assessment.
Surface Water	Watercourses and waterbodies in the vicinity of the Project support established recreational fisheries for brook trout and ouananiche and may support a recreational fishery for Atlantic salmon. Indigenous fishing activity is also known to occur in watercourses or waterbodies surrounding Red Indian Lake (Stantec 2020). Construction of TL271 will require the operation of equipment in and/or near watercourses along the RoW which could result in sedimentation of watercourses and changes to fish health and fish habitat. Access road development could require the installation of water crossing structures (e.g., culverts) which could also affect fish health and fish habitat. Operations will have limited interaction with watercourses but RoW maintenance (vegetation management) could potentially result in adverse effects on surface water resources (e.g., sedimentation and/or introduction of deleterious substances in watercourses). Vegetation management activities are subject to approval from the Pesticide Control Section, NLDECC and will be undertaken in accordance with NL Hydro's Integrated Vegetation Management Program and the *Pesticide Control Regulations* under the NL EPA.	Further assessment of potential Project interactions with Fish and Fish Habitat is recommended (refer to Section 5.1).

Table 3.1 Potential Resource Conflict Considerations and Recommendations for Further Assessment

Resource	Potential Interactions and Resource Conflicts Considerations	Further Assessment Recommendation
Terrestrial Habitat	Construction activities (i.e., clearing) will result in habitat loss and changes within the Project Area. This may include changes in vegetation species diversity or community diversity due to direct habitat loss or indirect changes to habitat (e.g., changes in soil, hydrological effects, dust, light exposure changes, competition from invasive plants). Surface disturbance for the Project will be reduced to the extent practicable, particularly in and near wetland habitat and near watercourses. As noted in Section 2.11, construction activities will adhere to best management practices and mitigation measures presented in the EPP and C-SEPP, including ESPP, a Spill Contingency Plan, and measures to reduce risk of invasive species introduction. These mitigation measures will help to reduce effects on the terrestrial environment during construction. During operations, vegetation management of the RoW may involve application of herbicides and manual cutting, although given the expected life of the Project, these activities are not expected to occur frequently (approximately one to two times over the life of the Project). Vegetation management activities are subject to approval from the Pesticide Control Section, NLDECC and will be undertaken in accordance with NL Hydro's Integrated Vegetation Management Program and the *Pesticide Control Regulations* under the NL EPA. There are no plant SAR (i.e., listed by SAR or NL ESA) predicted to occur in the Project Area. Effects on rare plants will be mitigated by measures described above.	Potential Project interactions with terrestrial habitat are addressed with respect to effects on wildlife (e.g., caribou (Section 5.2), avifauna (Section 5.3) and other SAR and species of conservation concern (Section 5.4)).
Terrestrial Wildlife	Project activities, particularly clearing of the RoW during construction, will change the quality and availability of habitats used by terrestrial wildlife and avifauna in the vicinity of the Project Area. Changes in habitat and potentially food availability may result in changes in wildlife abundance, diversity and distribution within the affected area. Additionally, noise and light emissions from Project construction activities may result in sensory disturbances to wildlife and avifauna. Construction activities will be scheduled in consideration of sensitive time periods for wildlife. To the extent possible, clearing will be conducted outside the breeding season for most birds (e.g., April to August). If work must be completed during this timing window, activities will be conducted in accordance with avifauna mitigation measures in the EPP and Nalcor's Procedure for Nesting Birds in Vegetated Areas (Operations and Maintenance) (NAL-ENV-SOP-01). . The area of vegetation clearing will also be minimized to the extent possible to achieve the necessary standards for RoW development and maintenance, particularly in and near wetland habitat and near watercourses.	Further assessment is recommended for potential Project interactions with caribou (Section 5.2), avifauna (Section 5.3) and other SAR and of species conservation concern (Section 5.4).

Table 3.1 Potential Resource Conflict Considerations and Recommendations for Further Assessment

Resource	Potential Interactions and Resource Conflicts Considerations	Further Assessment Recommendation
Species at Risk and Species of Conservation Concern	Clearing for the transmission line during construction could result in changes in vegetation species diversity or community diversity due to direct habitat loss or indirect changes to habitat (e.g., changes in soil, hydrological effects, dust, light exposure changes, competition from invasive plants). Surface disturbance for the Project will be reduced to the extent practicable, particularly in and near wetland habitat and near watercourses. As noted in Section 2.11, construction activities will adhere to best management practices and mitigation measures presented in the EPP and C-SEPP, including ESPP, a Spill Contingency Plan, and measures to reduce risk of invasive species introduction. These mitigation measures will help to reduce effects on terrestrial habitat and rare plant species during construction and decommissioning activities. During operations, vegetation management of the RoW may involve application of herbicides and manual cutting, although given the expected life of the Project, these activities are not expected to occur frequently (approximately one to two times over the life of the Project). Vegetation management activities are subject to approval from the Pesticide Control Section, NLDECC and will be undertaken in accordance with NL Hydro's Integrated Vegetation Management Program and the *Pesticide Control Regulations* under the NL EPA. Wildlife SAR and SOCC may also be affected by changes in habitat quantity and quality. Measures taken to reduce effects on terrestrial habitat as described above, will also help to reduce adverse effects on wildlife SAR and SOCC. More information on SAR and SOCC can be found in Sections 5.3 and 5.4, and the Flora and Fauna Baseline Study (Appendix D).	Further assessment is recommended for potential Project interactions with wildlife SAR (see Section 5.4).
Land and Resource Use	The Project is located in a rural region and not located within municipal boundaries. The nearest protected area (Little Grand Lake Provisional Ecological Reserve) is located approximately 15 km away from the Project. Project construction and operation activities at the terminal station are expected to have limited interaction with current land use given activities will occur primarily within the existing station footprint. Construction of TL271 will result in loss of habitat (approximately 1 km^2), changing the landscape and viewscape for land users and changing access for recreational vehicle use. However, these effects have been mitigated through route design, using existing access roads to the extent practical and directing the route away from seasonal dwellings (e.g., avoiding cabins on Red Indian Lake near the Star Lake Terminal; placing transmission line on the opposite side (east of Lloyd's River bridge)). Residual changes will persist through the operational period of TL271 until the infrastructure is removed and vegetation on the RoW is allowed to regenerate. During construction, there will be increased traffic with heavy machinery travelling on rural resource roads, although this will be temporary and short-term and there are few seasonal dwellings within close proximity to the access roads. Dust and noise emissions associated with construction activities will be short-term and minimized through the implementation of NL Hydro's EPP and standard mitigation measures (see Section 2.11). NL Hydro will continue to provide information and updates to local stakeholders, including timing and location of construction activities. In some areas, existing access roads will be upgraded to accommodate	Not carried forward in Registration for further assessment. Potential Project interactions with natural resources for fishing, hunting and/or outfitter operations are assessed with respect to fish and fish habitat (Section 5.1), caribou (Section 5.2) and avifauna (Section 5.3).

Table 3.1 Potential Resource Conflict Considerations and Recommendations for Further Assessment

Resource	Potential Interactions and Resource Conflicts Considerations	Further Assessment Recommendation
	access for construction vehicles and machinery. These road improvements will occur during construction; NL Hydro will not conduct ongoing road maintenance during operations. The Project is expected to have limited effects on local outfitter operations in the area or other current land or resource use, including fishing, hunting, trapping, forestry or mineral exploration. Given the extent of existing resource roads and trails in the area and the routing of the RoW to parallel existing access roads to the extent practical, the Project will not substantially increase access to remote areas. Potential effects on fish and fish habitat and caribou (i.e., Project effects that may affect availability of resources) are addressed in Sections 5.1 and 5.2. NL Hydro has reached out to local stakeholders including outfitters operations and has received feedback about concerns of potential effects on wildlife resources and outfitting operations. Outfitter operations and the Newfoundland and Labrador Outfitters Association have recommended that NL Hydro develop a plan to work with local outfitting operations. NL Hydro will continue to provide information and updates (including timing and location of construction activities) to communities, outfitter operations, relevant organizations, local cabin owners, and Indigenous communities as required to facilitate good communication and planning and to proactively avoid or reduce land or resource use conflicts. Refer to Appendix F for a sample of public engagement materials for the Project distributed to date.	
Historic and Heritage Resources	The Project will not affect any known archaeological sites. However, various watercourses within the LAA have been identified as having archaeological potential. Ground disturbance associated with Project construction could disturb or destroy previously unidentified archaeological resources present within the disturbance footprint. As recommended in the Historic Resources Baseline Study (Appendix E), NL Hydro will conduct an archaeological field survey program in 2021 to investigate areas of moderate and high archaeological potential within the Project Area prior to ground disturbance. This field program will be designed and conducted in consultation and cooperation with the NL PAO and in accordance with applicable standards and requirements. The findings of this field program will be used to advance Project planning and design and develop appropriate mitigation measures to be implemented in the event that an archaeological site is accidentally discovered during Project construction activities. In case of a suspected discovery of an archaeological site or artifact during construction, the encounter will be reported to the OSEM and the site will be flagged for protection and avoidance (50 m minimum buffer). The PAO will be informed of the discovery to provide direction and determine if additional assessment and/or mitigation is required. Additional details on mitigation and contingency planning will be provided in the Project EPP.	Not carried forward in Registration for further assessment. NL Hydro will conduct an archaeological field survey program in 2021 which may inform development of appropriate mitigation measures and contingency planning.

4.0 ENVIRONMENTAL EFFECTS METHODS AND APPROACH

4.1 OVERVIEW OF METHODS

The approach for this environmental effects assessment is based on methods developed by Stantec to fulfill requirements of the provincial NL EPA for an Environmental Registration document.

The scope of assessment considers the proposed Project components and activities; knowledge of the existing conditions and sensitivities of the surrounding environment; other Environmental Registrations and EISs that have been prepared for projects of a similar nature and/or occurring in the same region; applicable regulations, policies and guidelines; the influence of consultation and engagement conducted thus far; and professional experience and expertise of NL Hydro and its consultants. The approach assumes a precautionary, conservative approach with assumptions generally applied to overestimate potential adverse effects.

In recognition of spatial and temporal boundaries set for the assessment, baseline conditions are described for each Valued Component (VC), drawing heavily on baseline studies / programs conducted for the Valentine Gold Project. Potential interactions between the Project and VCs are identified and residual effects characterized by standard descriptors in recognition of mitigation to be applied. This analysis considers direct Project-related effects, as well as potential cumulative effects that may occur as a result of Project residual effects interacting with residual effects of other projects/activities and/or threats to the VC. The significance of these residual effects (including cumulative effects) is then determined against established criteria. Where there may be data gaps or some uncertainty around an effects prediction or effectiveness of mitigation, follow-up and monitoring is proposed.

4.2 SCOPE OF THE ASSESSMENT

4.2.1 Scope of the Project

The scope of the Project to be assessed includes the components and activities described in Section 2 and includes the construction, operation and maintenance, and eventual decommissioning of TL271, as well as activities associated with the Star Lake Terminal upgrades to accommodate the new transmission line.

4.2.2 Regulatory and Policy Setting

Various federal and provincial legislation inform the scope of the assessment including the following described below:

- The SARA provides a framework to facilitate recovery of species listed under the Act as Threatened, Endangered or Extirpated and to prevent species listed as Special Concern from becoming Threatened or Endangered. SARA prohibits: 1) the killing, harming, or harassing of Endangered or Threatened SAR (sections 32 and 36); and 2) the destruction of critical habitat of Endangered or Threatened SAR (sections 58, 60 and 61).
- The MBCA provides protection for migratory birds as well as their nests and eggs. This act affords protection to most native bird species expected to occur in the RAA, except some non-migratory groups, and some species, such as raptors, kingfishers and cormorants. Those species not protected under the MBCA but are afforded protection under provincial legislation described below.
- The NL ESA provides protection for terrestrial vegetation and animal species considered to be Endangered, Threatened or Vulnerable in NL. The Wildlife Division, within the NL Department of Fisheries, Forestry and Agriculture (NLDFFA) coordinates the assessment and listing of SAR and develops recovery and management plans, monitoring programs and research projects to promote conservation of species listed under the Act.
- The NL *Wild Life Act* affords protection of wildlife (including avifauna species) and prohibits the hunting, taking or killing of wildlife or classes of wildlife, whether in particular places or at particular times or by particular methods, except under license or permit. The Act, in combination with other provincial regulations and Acts including the *Wilderness and Ecological Reserves Act* and the NL ESA, protects the biodiversity and wildlife resources of NL from being compromised.
- The *Fisheries Act*, as amended in 2018, reintroduced provisions for the protection of fish and fish habitats, notably the prohibition against harmful alteration, disruption or destruction (HADD) of fish habitat. The Act also prohibits activities that cause the “death of fish” (other than permitted fishing activities), considers the cumulative effects of development activities, and provides improved protection of highly productive, sensitive, rare or unique fish and/or fish habitats. These prohibitions are limited through authorization of the project, compliance with all conditions established by the Minister, and/or other exceptions within the *Fisheries Act* and regulations. DFO regulates scheduled salmon rivers (e.g., all Exploits watershed above Red Indian Lake dam) under the *Fisheries Act* and *Canada Wildlife Act*.
- The *Canadian Navigable Waters Act* (CNWA) came into force in August 2019, replacing the former *Navigation Protection Act*. This Act applies to anyone planning activities that will affect navigation in navigable waters. The CNWA has been developed to regulate major works and obstructions on navigable waters, even those not listed on the schedule of navigation, and creates a new category for “major” works (i.e., those likely to substantially interfere with navigation and which require approval from Transport Canada). Although the transmission line will span navigable waters, the construction and operation of the transmission line will not affect navigation and an approval under the CNWA is not required.

4.2.3 Influence of Consultation and Engagement

At the outset of the EA process, NL Hydro consulted with the EA Division of the NLDECC to introduce the Project and understand key issues of concern. Although the construction and operation of transmission lines in the province is a standard activity with well understood effects and standard mitigation, concerns were raised regarding cumulative effects on wildlife (particularly caribou) and SAR given the Project's proximity to the Valentine Gold Project. Feedback obtained from this meeting was used to help inform the detail of assessment presented in this Registration document and to help inform the selection of VCs on which the assessment is based.

NL Hydro also had a project briefing session with the Wildlife Division of the NL Department of Fisheries, Forestry and Agriculture. The purpose of this briefing was to present the key findings of the assessment work completed to date and actively seek input for incorporation into the Registration document. The Impact Assessment Agency of Canada was also informally consulted to confirm the Project is not a physical activity that is likely subject to impact assessment under the federal Impact Assessment Act.

Prior to submission of this Registration document to NLDECC, NL Hydro disseminated Project information packages (see sample in Appendix F) to numerous relevant stakeholders, including local cabin owners, municipalities (namely, Millertown and Buchans), Indigenous groups (Qalipu First Nation and Miawpukek First Nation), outfitters, and the provincial salmonid council to provide information about the Project and provide contact information for any questions and concerns. The information was also made available on the NL Hydro website and social media, and was supplemented with radio ads targeted at the project area.

Based on the outreach by NL Hydro, there were several submissions received and multiple groups requested virtual briefings on the project. Appendix F summarizes NL Hydro's consultation to date on the Project.

Based on a review of the feedback and comments received related to the undertaking, the following table summarizes the topics and themes that were discussed during virtual sessions, phone calls and written comments received by NL Hydro. Also included in Table 4.1 below is a reference to various sections of this registration document where these items are discussed.

Table 4.1 Summary of Questions/Issues Raised During Consultation and Engagement

Question / Issued Raised	Addressed in Registration
Why proceed to register project now and not after Marathon project is approved?	Section 1.3
Were alternative routes considered?	Section 2.9
How much land will be cleared for the transmission line right of way?	Section 2.4.2.2
Will there be new generation at Star Lake, how much power will the line transmit, will there be other users of the transmission line?	Section 1.4
Will the line create new access to areas that currently have little public presence?	Section 2.4.2.1
Water resources – will the line impact waterbodies?	Section 5.1
Wildlife – how will the construction and operation of the line impact wildlife in the area?	Section 5
Caribou – the Buchans herd is prominent in the area	Section 5.2; Appendix C
Historic Resources – the area has documented and high potential for archaeological finds	Section 3.2; Appendix E
Cumulative effects of the project on wildlife and the environment	Section 6
What is the construction schedule?	Section 2.3
Waste – how will this be managed?	Section 2.7
Outfitters – will there be impacts to these operations and a plan to work with outfitters?	Section 3.3
First Nations – general environmental concerns such as impacts due to water crossings, rare lichens, species at risk, caribou, and fish. How will groups be engaged and will there be opportunities for different groups during and after the project?	Section 3.3
Vegetation control – use of herbicide on water quality	Section 2.5

4.2.4 Selection of Valued Components

VCs upon which this assessment is focused, were selected in consideration of the following:

- Regulatory guidance and requirements
- Preliminary discussions with regulatory agencies prior to Registration
- Technical knowledge of the Project
- Existing conditions for the physical, biological and socio-economic environments and potential resource conflicts (see Section 3.3)
- Lessons learned from previous similar EAs
- Professional judgement of the Study Team

The following VCs were selected for focused analysis:

- Fish and Fish Habitat
- Caribou
- Avifauna (including Raptors and SAR)
- Other SAR

For each selected VC, existing conditions are described, Project interactions and effects pathways identified, mitigation is proposed and residual effects are evaluated. The significance of residual effects is determined based on pre-existing criteria. Follow-up and monitoring is proposed where necessary to validate EA predictions and/or confirm effectiveness of mitigation measures.

4.2.5 Spatial and Temporal Boundaries

The scope of the assessment is defined by spatial boundaries (i.e., geographic extent of potential effects) and temporal boundaries (i.e., timing of potential effects). The spatial boundaries reflect the geographic range over which potential environmental or socio-economic effects may occur, whereas temporal boundaries identify when an environmental or socio-economic effect may occur throughout all phases of the Project.

Spatial boundaries for the assessment are described below and presented on Figure 4-1.

- The **Project Area** represents the anticipated area of direct physical disturbance associated with construction, operation and decommissioning of the Project. It comprises the proposed RoW for TL271, including access points and the portion of the Star Lake Terminal Station where upgrades will occur.
- The **Local Assessment Area (LAA)** encompasses the area within which Project-related environmental effects can be predicted or measured for assessment. The LAA encompasses the Project Area and includes a 500 m buffer to account for the geographic extent of most prevalent effects on any given VC.
- The **Regional Assessment Area (RAA)** is the area established for context in determination of significance of Project-specific effects. It is also the area which informs the assessment of cumulative effects. For the purpose of this assessment, the RAA for caribou (Caribou RAA) includes the combined population ranges of the Buchans, Gaff Topsails, Grey River and La Poile Herds as defined by caribou telemetry data and presented in the Valentine Gold Project EIS (Marathon 2020). The RAA for Fish and Fish Habitat, Avifauna (including Raptors and SAR), and Other SAR (Other VC RAA) falls within the Caribou RAA and is based on the boundaries of the Red Indian Lake subregion within the CNF Ecoregion. This area roughly equates to the ELC coverage developed for the Valentine Gold Project EIS (Figure 4-1).

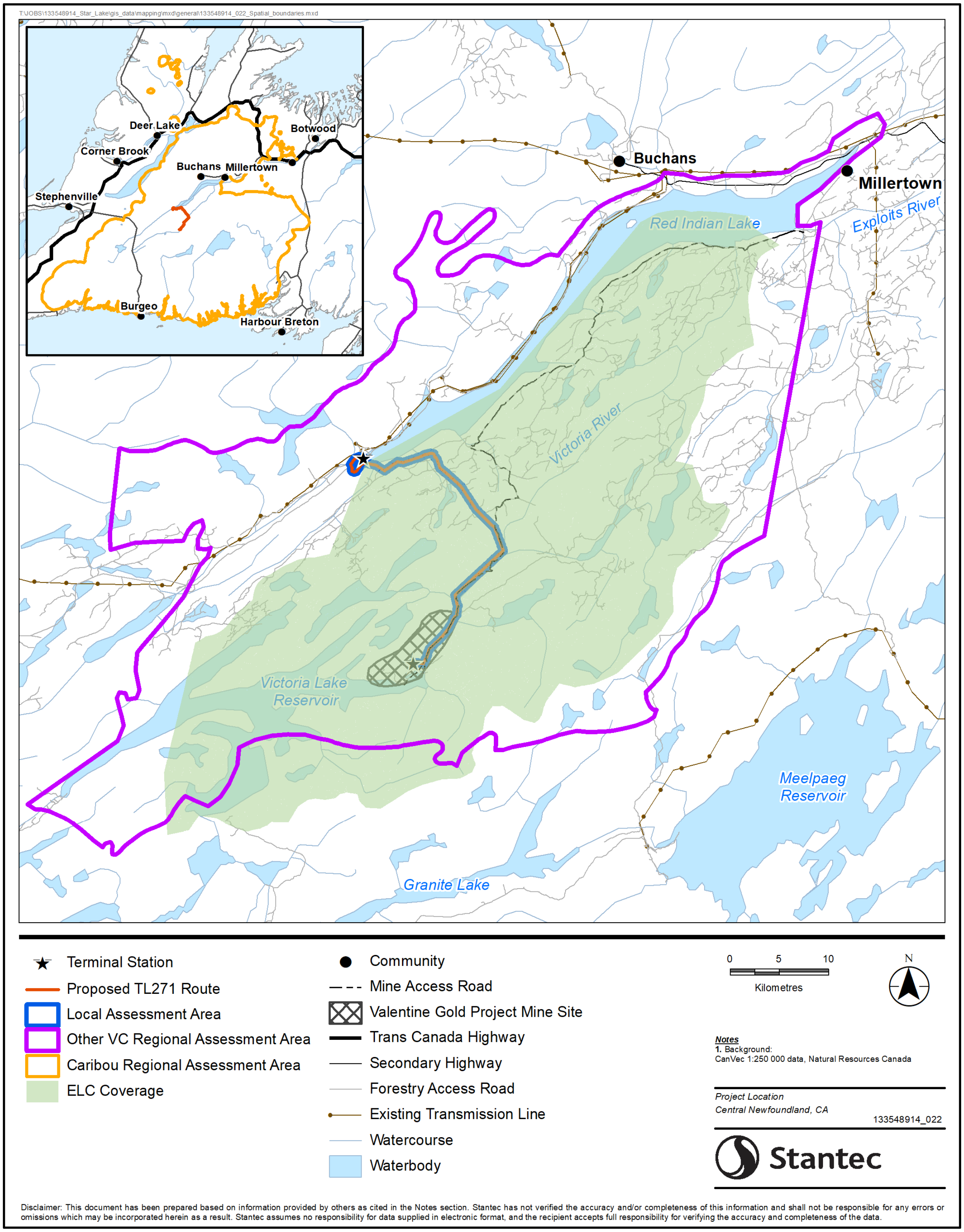


Figure 4-1 Spatial Assessment Boundaries

4.3 RESIDUAL EFFECTS CHARACTERIZATION

Following the analysis of environmental effects pathways and mitigation measures, the residual environmental effects are characterized using the following criteria: direction, magnitude, geographic extent, timing, frequency, duration, reversibility, and ecological or socio-economic context. The descriptors used to characterize residual environmental effects for each VC are defined in Table 4.2.

Table 4.2 Characterization of Residual Environmental Effects

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The long-term trend of the residual effect	**Positive**—an effect that moves measurable parameters in a direction beneficial to the VC relative to baseline **Adverse**— an effect that moves measurable parameters in a direction detrimental to the VC relative to baseline **Neutral**—no net change in measureable parameters for the VC relative to baseline
Magnitude	The amount of change in measurable parameters relative to existing conditions	**No Measurable Change**— no measurable adverse effect anticipated **Low**— effect occurs that is detectable, but is within normal variability of baseline conditions **Moderate**— effect occurs that would cause an increase (or decrease) with regard to baseline, but is within regulatory limits and objectives **High**— effect occurs that would cause exceedances of objectives or standards
Geographic Extent	The geographic area in which an environmental, effect occurs	**Project Area**—residual effects are restricted to the Project Area **LAA**—residual effects extend into the LAA **RAA** – residual effects extend into the RAA
Timing	Considers when the residual effect is expected to occur, where relevant to the VC	**No sensitivity -** Effect does not occur during critical life stage or timing does not affect the VC **Moderate sensitivity -** Effect may occur during a lower sensitive period of a critical life stage; for many species this is the start or end of the critical period **High sensitivity -** Effect occurs during a critical life stage
Duration	The period of time required until the measurable parameter returns to its existing condition, or the effect can no longer be measured or otherwise perceived	**Short-term**—residual effect restricted to construction phase or decommissioning phase **Medium-term**—residual effect extends through the operations phase **Long-term**—residual effect extends beyond the operations phase **Permanent** – recovery to baseline conditions unlikely

Table 4.2 Characterization of Residual Environmental Effects

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Frequency	Identifies how often the residual effect occurs and how often during the project or in a specific phase	**Single event** **Multiple irregular event** – occurs at no set schedule **Multiple regular event –** occurs at regular intervals **Continuous –** occurs continuously
Reversibility	Pertains to whether a measurable parameter can return to its existing condition after the project activity ceases	**Reversible**—the effect is likely to be reversed after activity completion and rehabilitation **Irreversible**—the effect is unlikely to be reversed

4.4 SIGNIFICANCE DEFINITIONS

For each environmental effect, threshold criteria or standards are identified beyond which a residual environmental effect is considered significant. The thresholds are defined in consideration of federal and provincial regulatory requirements, standards, objectives, or guidelines, as applicable to the VC. Where thresholds are not set by guidelines or regulations, a threshold is developed using the measurable parameters established for the VC, along with professional judgement of the assessors. The thresholds define the limits of a change in a measurable parameter or state of the VC beyond which it would be considered significant, based on resource management objectives, community standards, scientific literature, or ecological processes (e.g., desired states for fish or wildlife habitats or populations).

5.0 ENVIRONMENTAL EFFECTS ASSESSMENT

5.1 FISH AND FISH HABITAT

For the purposes of the assessment, the Fish and Fish Habitat VC includes fish and fish habitat, which are defined under the federal *Fisheries Act* as follows:

- Fish includes: (i) parts of fish, (ii) shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals, and (iii) the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals
- Fish habitat means waters frequented by fish and any other areas on which fish depend directly or indirectly to carry out their life processes, including spawning grounds and nursery, rearing, food supply and migration areas

Fish and fish habitat provide ecological, cultural, recreational and economic value to Indigenous groups and stakeholders including the public, local businesses, and government agencies and has therefore been assessed as a VC. Fish and fish habitat occur within the Project Area and may be affected by planned Project activities. In Canada and in NL, fish and fish habitat are protected by federal and provincial legislation, as well as relevant policies and guidance. The Water Resources Baseline Study (Appendix B) was used to inform potential Project effects on fish and fish habitat.

5.1.1 Significance Definition

For the purposes of this environmental assessment, a significant residual environmental effect on fish and fish habitat is defined as a Project-related environmental effect that results in one or more of the following:

- A Project-related HADD of fish habitat or the death of fish, as defined by the *Fisheries Act*, that cannot be mitigated, authorized or offset
- An unauthorized Project-related alteration of fish habitat
- A change to the productivity or sustainability of fish populations or fisheries within the LAA where recovery to baseline is unlikely

5.1.2 Existing Conditions

An overview of the environmental setting is provided in Section 3. There are approximately 50 watercourses along the proposed RoW which may be associated with the transmission line or crossed by an access road. Fish species including sea-run Atlantic salmon , ouananiche (*Salmo salar*), brook trout (*Salvelinus fontinalis*), Arctic char (*Salvelinus alpinus*), American eel (*Anguilla rostrata*), and threespine stickleback (*Gasterosteus aculeatus*) are known to occur within the upper Exploits River Watershed (Cunjak and Newbury 2005; Porter et al. 1974), with brook trout, ouaninache and threespine stickleback being the most common and abundant resident fish species within in the vicinity of the Project Area (Stantec 2020). A detailed description of the existing conditions for fish and fish habitat can be found in the Water Resources Baseline Study (Appendix B).

5.1.3 Project-Component Interactions and Effects Pathways

Table 5.1 lists the potential Project effects on fish and fish habitat and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent environmental assessments for similar projects in NL and other parts of Canada, and professional judgment.

Table 5.1 Potential Effects, Effect Pathways and Measurable Parameters for Fish and Fish Habitat

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement*
Change in fish habitat	• Use of industrial equipment in or near water • Alteration of riparian vegetation • Sedimentation • In-water infrastructure • Entry of deleterious substances • Obstruction or interference to fish passage	• Areal extent of altered instream or riparian habitat (m^2) • Water quality, including total suspended solids (TSS) (mg/L); dissolved oxygen (mg/L); water temperature (°C); pH; deleterious substances
Change in fish health and survival	• Use of industrial equipment in or near water • Sedimentation • In-water infrastructure • Entry of deleterious substances • Use of explosives near water • Increased recreational fishing pressure	• Abundance (numbers of fish) • Mortality (numbers of fish)
*Considered qualitatively in effects assessment		

Project activities that might interact with fish and fish habitat for each potential effect are identified in Table 5.2. These interactions are indicated by check marks and are discussed in detail in Section 5.1.5. A justification is also provided for non-interactions (dash marks).

Table 5.2 Project Interactions with Fish and Fish Habitat

Physical Activities	Effects to be Assessed	
	Change in Fish Habitat	Change in Fish Health and Survival
Construction		
Terminal Station Upgrades	✓	✓
Access Road Development	✓	✓
RoW Clearing and Construction	✓	✓
Pole Installation and Conductor Stringing	-	-
Testing and Commissioning	-	-
Operations		
Presence and Operation of TL271	-	-
Asset Inspection and RoW Management	✓	✓
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Notes: ✓ = Potential interaction – = No interaction		

During construction, pole installation and conductor stringing, and testing and commissioning are not anticipated to affect fish and fish habitat, as the works will be conducted on land, outside a 15 m buffer from the watercourse, and vehicles will follow the RoW and use designated fording locations. The presence and operation of TL271 is not anticipated to affect fish habitat, or fish health and survival as there will be no poles located within 15 m of a watercourse or waterbody and there are no emissions or discharges that would interact with fish habitat.

5.1.4 Mitigation

In addition to the standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.11, the following specific measures will be implemented to reduce or eliminate adverse effects on fish and fish habitat:

- Where possible, in-water works will be completed inside the appropriate fisheries timing windows (June 1 – September 30). Work outside the fisheries timing windows will be done in consultation with DFO and the NL Water Resources Division. Work will follow best management practices as provided in any Letter of Advice from DFO.
- Pole placement will avoid watercourses, and access road construction through watercourses will be reduced where possible.
- Construction activities in waterbodies or watercourses shall be scheduled to occur during low flow or frozen conditions, to avoid sensitive periods for fish, and shall be shut down during heavy precipitation events.

- Works will be conducted on land to the extent feasible. Heavy equipment shall be kept outside the high water mark of bodies of water, where possible.
- Work shall be performed in such a way that deleterious substances, such as sediment, fuel and oil do not enter watercourses and waterbodies.
- Mulching and/or piling of cleared non-merchantable timber, slashing and cuttings will be relocated to areas where it cannot enter watercourses. Excavated rock will be disposed of properly.
- Banks and flood plains of watercourses will be adequately protected from erosion using an applicable erosion prevention method, as outlined in the EPP.
- Fording of streams will follow NL Environmental Guidelines for Fording and the DFO Interim code of practice: temporary stream crossings (DFO 2020a) and EPP.
- Watercourse crossings (e.g., spanning of the transmission line, fording and culvert crossings) will comply with permits issued by the NLDECC Water Resources Management Division and will be undertaken in accordance with DFO requirements.
- When working in water, minimum flows will be maintained and obstructions or interference with the movement or migration of fish will be avoided.
- The use of temporary coffer dams or diversion channels for instream work will follow the DFO Interim code of practice: temporary cofferdams and diversion channels (DFO 2020b).
- A fish rescue by a qualified environmental professional will be completed for watercourse crossing installations (i.e., culverts), as required.

5.1.5 Assessment of Residual Effects

5.1.5.1 Change in Fish Habitat

Construction

The Star Lake Terminal Station is located within the riparian area, above the high-water mark, approximately 8 m from Star Brook near the inflow to Red Indian Lake. Construction activities associated with the terminal station will generally be within the existing station footprint (with the exception of moving the existing fence line approximately 2 m). Therefore, effects to fish or fish habitat are not anticipated due to terminal station upgrades. Through careful planning, the RoW has been routed to avoid waterbodies to the extent practically feasible, thereby reducing potential effects to fish habitat. Where avoidance was not feasible, mitigation will reduce potential effects, as described in Section 5.1.4 and below. With the application of these mitigations and employment of best practices in accordance with DFO's "Measures to Protect Fish and Fish Habitat", residual Project-related effects to fish habitat are reduced. The installation of water crossing structures at road crossings will be conducted and designed to allow fish passage.

There are approximately 50 watercourses along the proposed RoW, which may be spanned by the transmission line or crossed by a watercourse crossing. Prior to construction, the proposed RoW will be surveyed and additional watercourses will be flagged and included in permit applications as applicable.

RoW clearing and construction has the potential to result in changes to fish habitat by the use of industrial equipment in and near water, the alteration of the bed and banks, riparian vegetation, sedimentation of watercourses and the entry of deleterious substances. The use of industrial equipment in and near water has the potential to effect physical habitat characteristics through direct alteration of habitat or indirect alteration through sedimentation or introduction of deleterious substances (hydrocarbons).

Alteration of riparian vegetation may alter water quality through changes in shade which may result in increases in water temperature. Sedimentation associated with the loss of riparian vegetation and clearing or through road dust as a result of Project-related transportation may negatively affect water quality through changes in TSS, pH and trace metals. Temporary stream crossings (including fords) may be used to access the RoW during clearing, construction, and operations. Fording has the potential to harm stream banks and beds, release sediments or other deleterious substances, and result in damage to riparian vegetation. Although it may be necessary to ford smaller watercourses during RoW clearing and construction, the access plan for Project construction will provide numerous access points along the RoW to reduce the requirement for fording. Where fording is required, a single designated location will be adhered to for crossing purposes.

Construction of the RoW access may involve placement of permanent water crossings structures (i.e., culverts). This may result in a direct loss of fish habitat within the in-water footprint and reduce the available habitat for fish to carry out their life processes. Stream crossing structures have the potential to result in an obstruction to fish passage if not properly designed, which could limit access to upstream habitats that are required to carry out life processes (Khan and Colbo 2008; Dunham et al. 1997).. Installation of culverts will be conducted and designed to allow fish passage and work will be conducted in accordance with DFO standards and codes of practice. In-stream work is scheduled to be conducted between June and September, during low flow periods, as is practically feasible.

NL Hydro will mitigate effects to fish habitat through the mitigation described in Section 5.1.4 above, adherence to the EPP, and compliance with applicable approvals under the *Water Resources Act* and/or *Fisheries Act*. Effects of Project construction on fish habitat are expected to be low in magnitude, restricted to the LAA, have moderate timing sensitivity, occur as a single event and be reversible.

Operations

Asset inspection and RoW management may result in changes to fish habitat. Inspections will involve transportation of Project vehicles along access roads and could result in suspended sediments and dust from the unpaved roadbed being carried into adjacent waterbodies, thereby affecting water quality. Accessing the RoW for repairs and vegetation management (application of herbicides and manual cutting of brush) may require the use of temporary fords and may result in vehicles entering the watercourse, which could result in changes in fish habitat through instream or riparian disturbances (e.g., bank erosion and sedimentation). Herbicide application will be prohibited within the watercourse buffer zone. The need for spraying and manual cutting will be assessed approximately three to four years after initial RoW clearing and will increase to a frequency of five-to-seven-years, thereafter. Alteration to riparian vegetation during manual cutting could affect fish habitat by disrupting habitat structure, water quality and solar energy transmission (Pusey and Arthington 2003). However, given the infrequent occurrence and adherence to best management practices, effects to fish habitat are anticipated to be negligible to low.

Effects of Project operations on fish habitat are expected to be low in magnitude, restricted to the Project Area, have no sensitivity timing, occur at irregular frequencies and be reversible. Effects may be irregular in frequency, based on the need for RoW maintenance and/or equipment maintenance or repair.

Decommissioning

Similar to construction, dismantling and removal of equipment will involve using tracked equipment, such as excavators and nodwells, to remove assets.

Deleterious substances (e.g., oil, fuel) could be introduced into streams and other waterbodies when machinery is working near water. The use of industrial equipment in or near fish habitat can also result in sedimentation and direct alteration of fish habitat, reducing habitat quality (Sweka and Hartman 2001; Herbert and Merkens 1961; Kjelland et al. 2015).

Transportation along the access roads or the RoW during decommissioning could result in suspended sediments and dust being carried into adjacent waterbodies, thereby affecting water quality. As described during construction, it may be necessary to use temporary stream crossings, which include fords to access the RoW during decommissioning. Fording has the potential to harm stream banks and beds, release of sediments or other deleterious substances and result in damage to riparian vegetation. Although it may be necessary to ford smaller watercourses during decommissioning, the access plan for Project will provide numerous access points along the RoW to reduce the requirement for fording. Where fording is required, a single designated location will be adhered to for crossing purposes. Mitigation measures as described above for construction will be implemented as applicable during decommissioning to reduce adverse effects on fish habitat.

Similar to construction, effects of Project decommissioning on fish habitat are expected to be low in magnitude, restricted to the Project Area, have moderate timing sensitivity, occur as a single short-term event and be reversible.

5.1.5.2 Change in Fish Health and Survival

Construction

Construction activities associated with the terminal station will occur within the existing station footprint (with the exception of moving the existing fence line approximately 2 m) and any rock or debris produced during excavation will be disposed of appropriately. Therefore, terminal station upgrades are not anticipated to have an effect on fish health and survival.

The timing of construction could influence the environmental effects of the Project on fish health and survival (e.g., Project-related sedimentation during the spawning, incubation, or hatching period of a fish species). Work will be conducted to respect DFO timing windows for the Island of Newfoundland, to protect fish and avoid direct mortality of fish larvae or eggs (DFO 2019).

Fish health and survival could be affected directly or indirectly through injury due to industrial equipment working in or near watercourses during watercourse crossing installation (i.e., culverts). A fish rescue will be conducted to remove fish from areas of in-water work, as required by DFO.

It may be necessary to use temporary stream crossings, which include fords to access the RoW during clearing and construction. Fording has the potential to result in injury or death of fish during wet fording. Although it may be necessary to ford smaller watercourses during RoW clearing and construction, the access plan for Project construction will provide numerous access points along the RoW to reduce the requirement for fording. Where fording is required, a single designated location will be adhered to for crossing purposes.

Introduction of deleterious substances (e.g., grease, fuel) from machinery operating in or near waterbodies could also affect fish health and survival. Smothering of eggs, as well as behavioural or physiological changes in fish, such as inhibition of foraging, can occur during siltation events resulting from construction and clearing during periods of high rainfall (Sweka and Hartman 2001; Herbert and Merkens 1961; Kjelland et al. 2015). Fish eggs and larvae have been shown to be the life stage most sensitive to increased sedimentation through the reduction of water flow and oxygen delivery to eggs (Greig et al. 2007; Wood and Armitage 1997; Kemp et al. 2011). The effect of increased sediment reaching fish habitat may be compounded if it occurs during the spawning, incubation or hatching period of a fish species (DFO 2019).

Increased access from the construction of the RoW may result in an increase in recreational fishing which may result increased pressures on fish populations. However, given that there are currently existing forestry access roads adjacent to the majority of the RoW, the construction of the Project is not anticipated to result in a measurable increase in access to remote areas.

Effects of Project construction on fish health and survival are expected to be low in magnitude, restricted to the LAA. have moderate timing sensitivity, occur as a single event and be reversible. Key mitigation is avoidance of watercourses and reducing construction within riparian areas, to the extent practically feasible.

Operations

Asset inspection and RoW management may have an adverse effect on fish health and survival. Accessing the RoW to trim vegetation or repair equipment could result in heavy equipment entering the watercourse which could result in changes to fish health (including possible direct mortality of fish). However, fording of streams will follow NL Environmental Guidelines for Fording and the DFO Interim code of practice: temporary stream crossings (DFO 2020a).

Herbicide application will be prohibited within the watercourse buffer zone, but manual cutting may be required. Spraying and manual cutting will be assessed approximately three to four years after initial RoW clearing and will increase to a five-to-seven-year frequency, thereafter. Effects to fish habitat (Section 5.1.5.1) resulting from alteration to riparian vegetation during manual cutting could cause indirect effects on fish health and survival by reducing nutrient inputs to waterbodies. A change in nutrients entering waterbodies may affect primary and secondary productivity, which alter food sources for fish (Zalewski et al. 2001). Some herbicides have also been shown to have sublethal effects on fish (Solomon et al. 2013). Indirect effects may also occur if herbicide runoff results in the removal of aquatic vegetation that provides oxygen or food for fish (Solomon et al. 2013). However, given the infrequent use of herbicides, the prohibited application of herbicides in the watercourse buffer zone, and that the intent of NL Hydro to apply herbicides in accordance with NL Hydro's Integrated Vegetation Management Program and the *Pesticide Control Act* and associated regulations, effects from herbicide application and manual cutting within the watercourse buffer zone are anticipated to be negligible.

Effects of Project operations on fish health and survival are expected to be low in magnitude, restricted to the Project Area, occur at irregular frequencies, have no sensitivity timing, and be reversible. Effects may be irregular in frequency, based on the need for RoW maintenance and/or equipment maintenance or repair.

Decommissioning

Decommissioning activities have the potential to interact with fish in that heavy equipment may require the use of temporary crossings to remove poles, conductors and hardware. In areas where soil disturbance due to decommissioning causes erosion, measures will be taken to stabilize the affected area to prevent effects to fish health and survival as described in Section 5.1.5.1.

Like construction, the timing of decommissioning could influence the environmental effects of the Project on fish health and survival (e.g., Project-related sedimentation during the spawning, incubation, or hatching period of a fish species), hence work will be conducted to respect DFO timing windows for the Island of Newfoundland, to protect fish and avoid direct mortality of fish larvae or eggs (DFO 2019).

Effects of Project decommissioning on fish health and survival are expected to be low in magnitude, restricted to the Project Area, occur as a single short-term event and be reversible. Key mitigation will include adhering to the existing RoW and previously disturbed areas.

5.1.6 Summary of Residual Effects

The Project has been planned to reduce interactions with waterbodies, thereby reducing potential adverse effects on fish and fish habitat. Where the RoW and associated access is unable to avoid watercourses, appropriate mitigation and best practices as described above and included in the EPP, will be followed to reduce Project-related effects to fish and fish habitat.

Table 5.3 summarizes residual effects of the Project on fish and fish habitat.

Table 5.3 Project Residual Effects on Fish and Fish Habitat

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Fish Habitat	C	A	L	LAA	MS	ST	S	R
	O	A	L	PA	NS	ST	IR	R
	D	A	L	PA	MS	ST	S	R
Change in Fish Health and Survival	C	A	L	LAA	MS	ST	S	R
	O	A	L	PA	NS	ST	IR	R
	D	A	L	PA	MS	ST	S	R

KEY
See Table 4.2 for detailed definitions
Project Phase
C: Construction
O: Operation
D: Decommissioning
Direction:
P: Positive
A: Adverse
N: Neutral
Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area
Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity
Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous
Reversibility:
R: Reversible
I: Irreversible

5.1.7 Determination of Significance

With the implementation of environmental protection measures, the residual effects on fish and fish habitat are predicted to be not significant. No effects are expected to fish and fish habitat as result of Project activities at the Star Lake Terminal Station and in-stream work along the RoW will be reduced to the extent practical. The potentially affected fish species are widely distributed, and their habitat preferences are well known to allow for prediction of effects. Therefore, the overall determination is made with a high level of confidence, given that best management practices and standard mitigation will be in place when working in and around water and in-stream work will be reduced through the use of existing access roads.

5.1.8 Follow-up and Monitoring

Construction activities will be undertaken in accordance with NL Hydro's EPP. In addition, NL Hydro will require the construction contractor to provide a C-SEPP for review and acceptance by NL Hydro prior to the start of construction. The Project will have full-time OSEMs to inspect worksites and activities for conformance with the EPP, C-SEPP, and government regulations and permits. Compliance monitoring confirms that mitigation measures are properly implemented. Any follow-up or monitoring required by applicable permits, will be provided, as appropriate to regulators. The results of inspections will be documented in daily field reports and submitted to regulators as required.

5.2 CARIBOU

Caribou was identified as a VC because of its distribution throughout the Island of Newfoundland and its ecological role. Caribou also have cultural, aesthetic, recreational and economic value to stakeholders including the public, Indigenous groups, local businesses, and government agencies. Often considered an indicator species (ECCC 2018b) of the health of the environment, caribou on the Island of Newfoundland have the potential to be affected by the Project. As caribou is valued by stakeholders, it is important to maintain a stable or increasing caribou population. This assessment considers the species and its habitat, which includes elements required for feeding, movement, reproduction, calving, and refuge.

Caribou is regulated under the Newfoundland and Labrador (NL) *Wild Life Act*, RSNL 1990, c W-8 and *Wild Life Regulations*, NLR 1156/1996.

5.2.1 Significance Definition

Given the extent of ranges of four woodland caribou herds on the Island of Newfoundland – Buchans, Gaff Topsails, Grey River and La Poile herds –, there is potential for these herds to interact with the Project. For this assessment, a significant adverse residual Project effect on caribou and their habitat is defined as one that threatens the long-term persistence or viability of one or more of these four herds within the RAA, including effects that are contrary to or inconsistent with the goals, objectives and activities of recovery strategies, action plans, and management plans.

The Newfoundland Population of woodland caribou is not currently listed under SARA or the NL ESA. However, the status of Newfoundland caribou has been identified as Special Concern by COSEWIC (COSEWIC 2014), which is a precursor to potential listing under SARA. Additionally, the Government of NL has developed a Caribou Strategy to address caribou population declines (Government of NL 2020a).

5.2.2 Existing Conditions

An overview of the environmental setting is provided in Section 3.1. A detailed description of the existing conditions for caribou can be found in the Caribou Baseline Study (Appendix C).

5.2.3 Project-Component Interactions and Effects Pathways

Table 5.4 lists the potential Project effects on caribou and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential effects, pathways, and measurable parameters for caribou were selected based on a review of recent assessments for similar projects in NL and other parts of Canada, and on professional judgment.

Table 5.4 Potential Effects, Effect Pathways and Measurable Parameters for Caribou

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement
Change in habitat	• Direct and/or indirect loss or alteration of habitat arising from vegetation clearing and installation of infrastructure, and/or sensory disturbance (e.g., avoidance)	• Amount of high and moderate -ranked caribou habitat (km^2) directly or indirectly lost or altered relative to its availability in the Ecological Land Classification Area (ELCA)
Change in caribou movement	• Change in movement paths or patterns arising from change in habitat and/or sensory disturbance	• Amount of high and moderate -high existing migration paths (km^2) directly lost or altered relative to availability in the migration corridor • Proportion of relative amount of use of the preferred migration path within the Project Area
Change in mortality risk	• Direct change in mortality risk due to vegetation clearing and installation of infrastructure, vehicular collisions, and indirect change in mortality risk (e.g., increased predation)	• Number of caribou sightings and collisions during the life of the Project • Likelihood of interactions with Project infrastructure, vehicles, and equipment

Project activities that may interact with caribou for each potential effect are identified in Table 5.5. These interactions are indicated by check marks and are discussed in detail in Section 5.2.5 (Residual Environmental Effects). Cumulative Effects, including the effects of the Project in combination with the Valentine Gold Project, are assessed in Section 6.

Table 5.5 Project Interactions with Caribou

Physical Activities	Effects to be Assessed		
	Change in Habitat	Change in Movement	Change in Mortality Risk
Construction			
Terminal Station Upgrades	✓	✓	✓
Access Road Development	✓	✓	✓
RoW Clearing and Construction	✓	✓	✓
Pole Installation and Conductor Stringing	✓	✓	✓
Testing and Commissioning	✓	✓	✓

Table 5.5 Project Interactions with Caribou

Physical Activities	Effects to be Assessed		
	Change in Habitat	Change in Movement	Change in Mortality Risk
Operations			
Presence and Operation of TL271	✓	✓	✓
Asset Inspection and RoW Management	✓	✓	✓
Decommissioning			
Dismantling and Removal of Equipment	✓	✓	✓
Notes: ✓ = Potential interaction; – = No interaction			

5.2.4 Mitigation

- Through Project design, the area of disturbance has been limited by selecting a RoW route that parallels existing linear features along most of its length (93% of the RoW) and using existing access roads wherever feasible. The total length of new access currently planned along the RoW is approximately 950 m, with the shortest route being approximately 40 m and the longest length being approximately 300 m. In addition to standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.11, the following measures will be implemented to avoid or reduce adverse effects on caribou:
- The timing and location of Project activities will be adjusted to avoid key movement paths during the spring and fall migration of the Buchans caribou herd.
- Natural vegetation will be left in place where possible, to act as a buffer to reduce sensory disturbance.
- Should NL Hydro be required to clear access roads during the winter months as part of construction or operation, snowbanks will be less than 1 m tall to facilitate caribou crossing, and breaks in the snowbanks will be aligned on opposing sides, created at approximately 200 m intervals, to the extent practicable, to provide wildlife crossing opportunities.
- Project vehicles will be required to comply with posted speed limits. Additional speed restrictions will be implemented during sensitive periods for caribou (e.g., calving and migration).
- To reduce the risk of caribou-vehicle collisions, speeds will be reduced and the vehicle stopped (if necessary) to allow caribou to leave the road.
- Caribou-vehicle collisions, near misses, or observations of road mortality will be reported to the OSEM and the NLDFFA-Wildlife Division. Adaptive management measures will be implemented should locations of high frequency caribou-vehicle interactions be identified.
- The OSEM will be notified if caribou are observed within 500 m of Project activities and the environmental manager will determine if the activity should be reduced or delayed (in consultation with NLDFFA-Wildlife Division, as applicable). Personal pets (domestic or wild) will be prohibited on site during construction.
- Project contractors and staff will be prohibited from fishing, hunting, or otherwise interacting with (e.g., harassment, feeding) wildlife at the site while working on the Project.

NL Hydro understands that Marathon will be developing an Environmental Effects Monitoring program for the Valentine Gold Project. NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how this information can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou.

5.2.5 Assessment of Residual Effects

5.2.5.1 Boundaries

In addition to the spatial boundaries outlined in Section 4.2.5 (refer also to Figures 3-1 and 3-2 in the Caribou Baseline Study, Appendix C), the Caribou VC refers to caribou habitat availability in the Ecological Land Classification Area (ELCA).

The ELCA is the 1,830.6 km^2 area within which habitat types (ecotypes) were classified, based on various physical characteristics including terrain, soils, moisture and nutrient regime, and plant species richness, for the Valentine Gold Project (Marathon 2020). The amount of caribou habitat that is changed because of the Project is considered relative to its availability in the ELCA, which covers approximately 89% of the Project Area.

5.2.5.2 Change in Habitat

Project Pathways for Change in Habitat

Construction

Caribou habitat will be changed through Project construction activities, either directly or indirectly. Direct effects on habitat will occur because of vegetation clearing in the RoW, development or upgrade of access roads, and the installation of water crossings. These activities will result in the direct loss of trees, shrubs and understory vegetation, including lichens, which are important to caribou (Government of NL 2020b). Project activities also have the potential to affect caribou habitat indirectly through sensory disturbance (e.g., dust, noise and human activity) associated with RoW clearing, installation of infrastructure, and terminal station upgrades.

Direct and indirect effects on habitat could displace caribou to habitats that are less secure, have lower forage value, or require higher energetic costs for movement, which could lead to reduced reproductive success and survival. Direct effects on habitat will occur during the construction phase and persist throughout the life of the Project until the completion of rehabilitation activities. The duration, magnitude and location of sensory disturbances will vary depending on the type and timing (e.g., during calving) of construction activity. Direct and indirect effects on caribou habitat are discussed below in more detail.

Operations

While no additional change in habitat will occur during operations, vegetation management activities in the RoW (e.g., cutting, herbicide application) will cause sensory disturbance and affect habitat indirectly. The extent of sensory disturbance from these activities will vary with the type and intensity of disturbance, season, and spatial scale, and may have a greater effect on caribou during sensitive life cycle periods (e.g., calving).

Decommissioning

Decommissioning will include removal of transmission line infrastructure, rehabilitation of access roads, and removal of culverts and bridges. Vegetation control activities in the RoW will cease. Regenerating habitat is generally considered low-quality for caribou, however, the revegetated areas would mature following decommissioning and are expected to become more suitable for caribou over time.

Sensory disturbance from decommissioning activities, such as removal of infrastructure and transportation along the access roads, could affect caribou habitat indirectly, as caribou may continue to avoid the area while physical activities are occurring. However, sensory disturbance will be of shorter duration than other phases and will gradually return to baseline conditions following decommissioning.

Direct Effects on Change in Habitat

Caribou require large contiguous patches of mature, lichen-rich, coniferous forests mixed with patches of open barrens and wetlands (Weir et al. 2014; ECCC 2019; Government of NL 2020b) to meet their resource requirements (Government of NL 2015). Lichens are the principal forage item for caribou (Government of NL 2020b) and are consumed year-round (Boertje 1984; Thomas et al. 1994; Thompson et al. 2015). Caribou not only select habitat types that provide the greatest amounts of lichen and other preferred forage (Courbin et al. 2009; Macander et al. 2020), but also on its ability to provide an optimal balance of features, such as forage opportunities and reduced predation risk (e.g., Appendix H in ECCC 2019), or to avoid areas of disturbance (e.g., Hornseth and Rempel 2016).

Caribou have been shown to increase home range size in disturbed areas, likely as a behavioral response to avoid the disturbance (Courtois et al. 2007). Though caribou home range size has been found to initially increase with increasing disturbance, home ranges begin to contract when the amount of disturbance increases beyond a certain level (Beauchesne et al. 2014; Wilson et al. 2018). Other research has shown that caribou shift their individual home ranges to avoid overlap with disturbed areas, which may result in less use of previously used ranges (MacNearey et al. 2016) and potentially move them into habitat that was not previously selected (i.e., less preferred or less suitable) (Sawyer et al. 2006).

Fragmentation, or the “breaking apart” of contiguous habitat into smaller, isolated habitat patches (Bennett and Saunders 2010), further reduces the availability and the suitability of adjacent habitats for caribou and other wildlife in general (Mullu 2016). Fragmentation creates habitat edges, and subsequent edge effects, which can include changes in microclimate, vegetation structure, and wildlife presence and/or abundance, and behavioral responses (Murcia 1995; Harper et al. 2005). As caribou require large, interconnected tracts of lichen-rich forest (ECCC 2019), linear features, such as roads and transmission lines, can affect connectivity between patches of optimal caribou habitat. In fragmented habitats, caribou have been shown to avoid assemblages of different habitats types and the boundaries between them (Stuart-Smith et al. 1997; Smith et al. 2000). Caribou are also less likely to use smaller habitat patches in a fragmented landscape (Lesmerises et al. 2013). The transmission line for this Project will parallel existing roads for approximately 93% of the RoW and therefore reduce the potential for fragmentation.

Habitat types in the ELCA ranked as high value to caribou include Balsam Fir Forest, Black Spruce Forest, Kalmia-Black Spruce Woodland and Open Wetlands and ranked as moderate value include Mixedwood Forest, Wet Coniferous Forest, and Open Water (Marathon 2020), based on their selection by caribou (Chubbs et al. 1993; Rettie and Messier 2000; Mahoney and Virgl 2003; Courtois et al. 2004; Leblond et al. 2011; Bastille-Rousseau et al. 2015, 2018; Schaefer et al. 2016). The amount of high and moderate-ranked caribou habitat directly affected by the Project (i.e., vegetation removal within the RoW) is 0.6 km^2, which represents less than 0.04% of their total availability in the ELCA (Table 5.6). This estimate is conservative, as it assumes that all habitat with the 25 m RoW is affected, although the actual amount will likely be less, as not all the habitat will be cleared.

Table 5.6 Residual Project-Related Change in Caribou Habitat

Habitat Value Ranking	Availability in the ELCA (km^2)	Change in Habitat (km^2)			Percent of High and Moderate Value Change in Habitat in the ELCA (RoW + LAA)
		RoW	LAA	Total	
High	849.1	0.4	14.6	15.0	1.8%
Moderate	718.5	0.2	11.3	11.6	1.6%
Total (High and Moderate)	1,567.6	0.6	25.9	26.6	1.7%

As indicated, Project-related change in habitat will have the greatest effect on caribou herds whose home-ranges overlaps the Project Area. An analysis of caribou telemetry data showed overlap between the Project Area and the seasonal ranges of the Buchans and Grey River herds (Table 5.7; see also Figures 4-1 to 4-8 in the Caribou Baseline Study, Appendix C). The spring migration / pre-calving and calving ranges of the Grey River herd overlapped the proposed route, with the percentage of overlap for each season approximately 0.01% of the Grey River herd seasonal range (Table 5.7; Figures 5-1 and 5-2). The Buchans herd also overlapped the proposed route, with the amount of overlap among seasons ranging from 0% to 0.01% (Table 5.7; Figures 5-3 and 5-4). Change in habitat for the Gaff Topsails and La Poile herds is not expected, as their calculated seasonal ranges do not overlap the Project Area (Appendix C).

Table 5.7 Overlap Between Areas of Seasonal Use by Collared Caribou from the Assessed Caribou Herds and the RoW

Season	Overlap of Seasonal Use Areas with RoW km² (%)							
	Buchans		Gaff Topsails		Grey River		La Poile	
	50% kernel	95% kernel	50% kernel	95% kernel	50% kernel	95% kernel	50% kernel	95% kernel
Winter	-	0.74 (0.01%)	-	-	-	-	-	-
Spring Migration / Pre-Calving	0.28 (0.01%)	1.01 (0.01%)	-	-	-	0.33 (0.01%)	-	-
Calving	-	0.14 (0.01%)	-	-	-	0.12 (0.01%)	-	-
Post-Calving Migration / Dispersal	0.01 (0%)	0.03 (0%)	-	-	-	-	-	-
Post-Calving Rearing	0.2 (0%)	0.6 (0%)	-	-	-	-	-	-
Fall Rut	0.19 (0.01%)	0.17 (0.01%)	-	-	-	-	-	-
Fall Migration / Dispersal	-	0.71 (0.01%)	-	-	-	-	-	-

Notes:

1. – indicates no overlap.
2. Amounts calculated using only collars with more than 50 locations in the season.
3. Based on telemetry data from 2005-2018 (Buchans Herd), 2006-2013 (Gaff Topsails, Grey River and La Poile Herds).
4. Numbers are rounded to two decimal places.

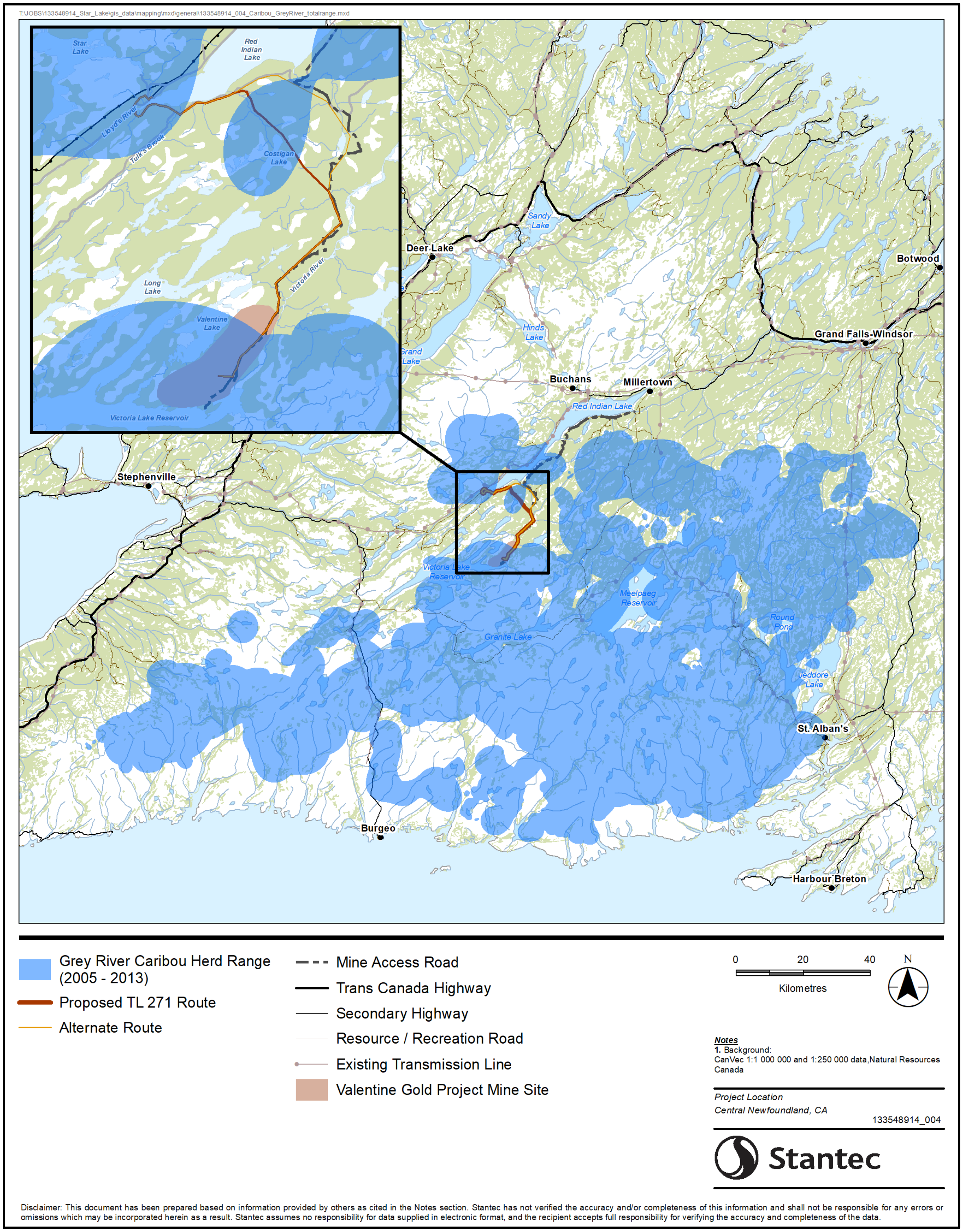


Figure 5-1 Distribution of the Grey River Caribou Herd

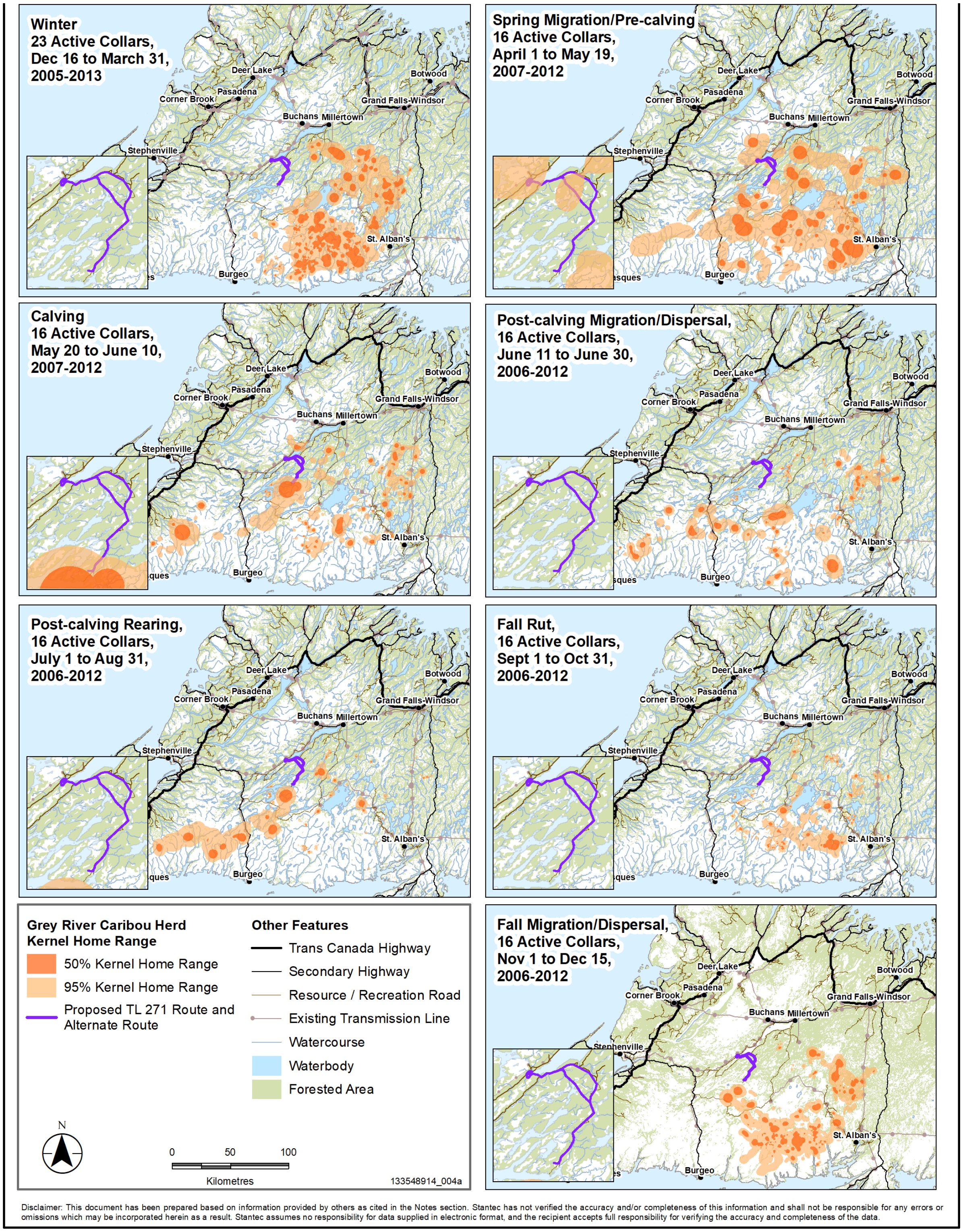


Figure 5-2 Seasonal Ranges of the Grey River Caribou Herd

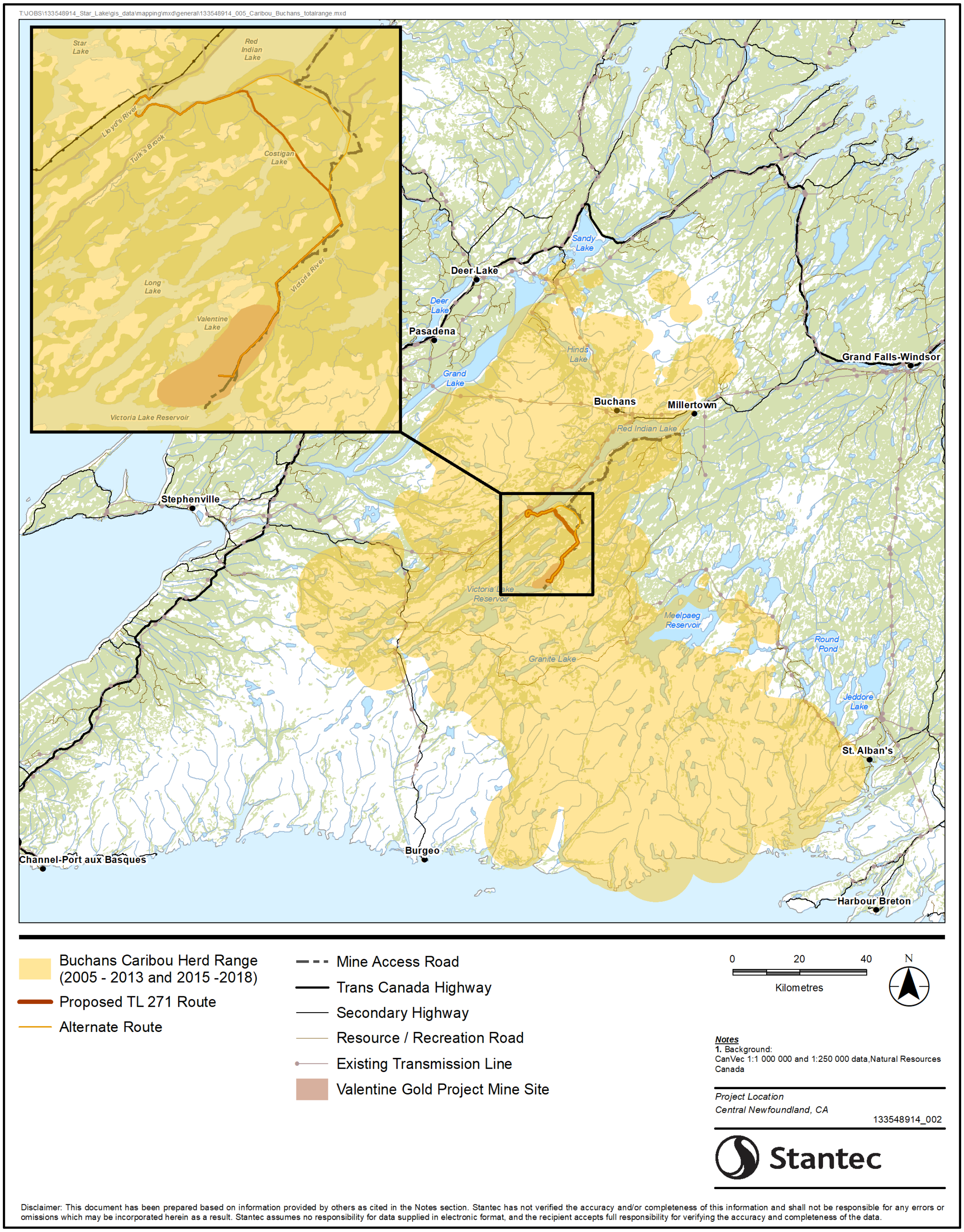


Figure 5-3 Distribution of the Buchans Caribou Herd

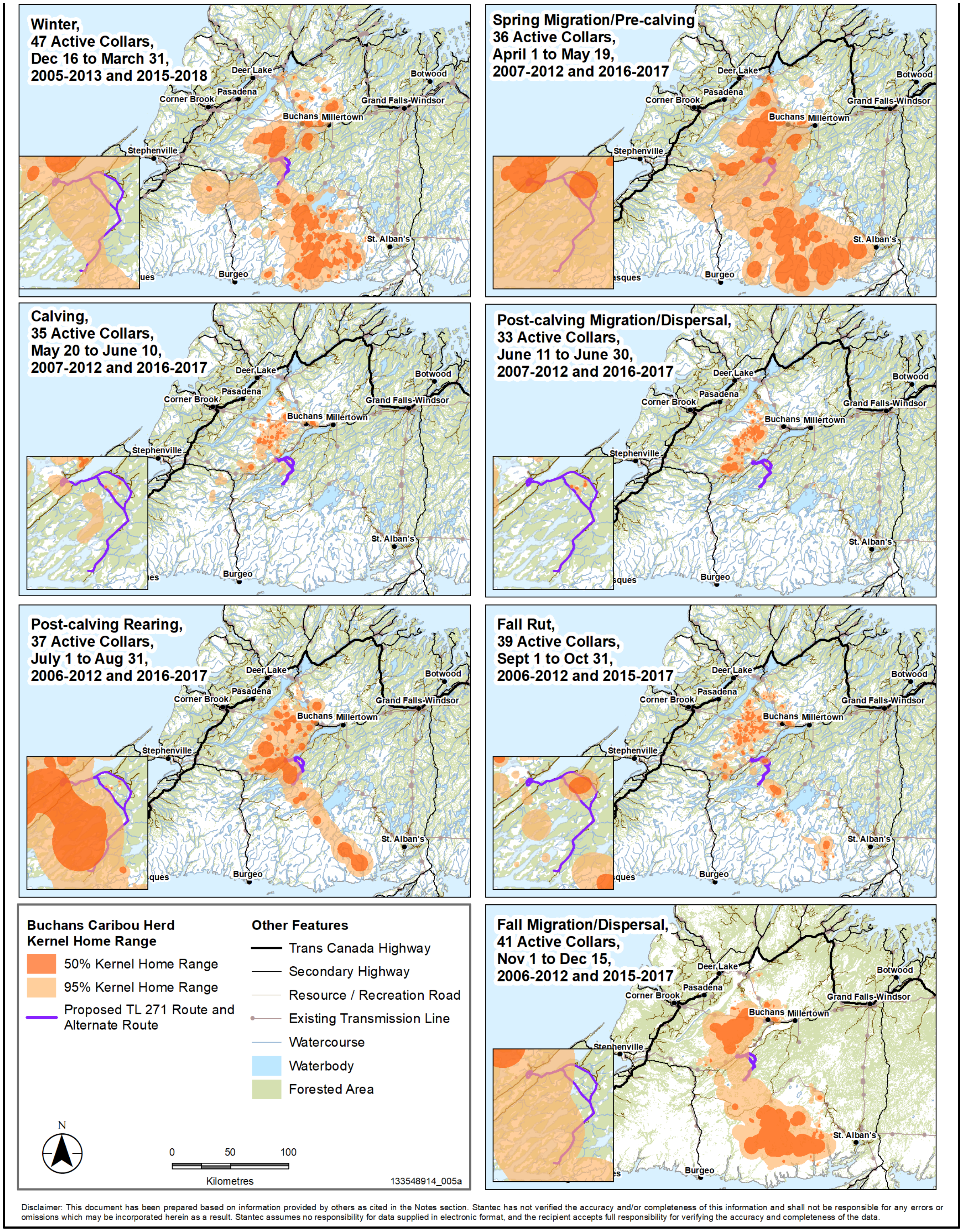


Figure 5-4 Seasonal Ranges of the Buchans Caribou Herd

Indirect Effects on Change in Habitat (Sensory Disturbance)

Caribou habitat is expected to be affected indirectly by sensory disturbance arising from construction, operation, and decommissioning activities. Project effects related to specific activities (e.g., clearing, installation of poles, stringing of conductor) are likely to be confounded with other potential factors (e.g., human activity, dust, noise, and lighting) and therefore activity-specific effects may not be discernable.

Caribou react to both the presence of physical structures in their habitat (visual disturbance) and to sensory disturbances (e.g., dust, noise, light) caused by human activity. Research has shown that caribou avoid anthropogenic activity, infrastructure, and linear features including transmission lines and roads (Table 5.8). Caribou have been documented to avoid transmission lines at distances of 2.5 km to 6 km (e.g., Nellemann et al. 2001; Vistnes and Nellemann 2001; Nellemann et al. 2003), while other research has found no avoidance of transmission lines (Reimers et al. 2007, 2020; Plante et al. 2018), or avoidance during construction phases only (Eftestøl et al. 2016).

The type and intensity of the disturbance may affect the degree of avoidance by caribou. Although research has shown that caribou avoid inactive roads (Oberg 2001) and roads with little traffic (Dyer et al. 2001), indicating that some avoidance is attributable to the physical presence of the road and not just human activity, the greatest amount of avoidance was of roads with greater disturbance levels (i.e., active roads compared to derelict roads) (Leblond et al. 2013) or during the highest traffic period (Dyer et al. 2001). Other ungulates (i.e., red deer) avoid crossing roads during periods of increased traffic (Kušta et al. 2017). This variability in response to disturbance indicates that the extent of sensory disturbance for caribou may vary due to several factors including location, season, habitat, terrain, intensity, or type of disturbance.

Table 5.8 Avoidance of Anthropogenic Structures by Caribou

Type of Activity or Structure	Amount of Avoidance	Source
Linear Features		
Transmission lines	No avoidance (66 kV transmission line)	Reimers et al. 2007
	No avoidance (upgraded 132 kV transmission line)	Reimers et al. 2020
	No avoidance during winter (735 kV)	Plante et al. 2018
	No avoidance within 5 km (semi-domestic reindeer) (132 kV)	Bergmo 2011
	2.5 km (300-420 kV transmission line)	Nellemann et al. 2001
	4 km (66 kV transmission line)	Vistnes and Nellemann 2001
	4 km (300-420 kV transmission line)	Nellemann et al. 2003
	3.5 km during summer and fall (during construction) 6 km during calving (during construction) (300-420 kV transmission line)	Eftestøl et al. 2016

Table 5.8 Avoidance of Anthropogenic Structures by Caribou

Type of Activity or Structure	Amount of Avoidance	Source
Roads	250 m (gravel roads)	Dyer et al. 2001
	250 m (inactive roads) 500 m (active roads)	Oberg 2001
	1.75 km	Johnson et al. 2015
	4 km for calving females	Cameron et al. 2005
	Up to 5 km (forest road and paved road)	Leblond et al. 2014
	Up to 8 km (gravel road)	Plante et al. 2018
Mines		
Not specified	Up to 5 km	Leblond et al. 2014
	2 km in winter 0.25 km during summer	Polfus et al. 2011
Quartzite (Sydvaranger Mine – Surface Mining)	1.5 km	Eftestøl et al. 2019
Coal Mine (Wolverine and Trend Mines – Open Pit)	3 km	Johnson et al. 2015
Gold Mine (Hope Brook Gold Mine – Open Pit and Underground)	Up to 4 km year-round Up to 6 km during calving	Weir et al. 2007
Diamond Mine (Ekati and Diavik Diamond Mines – Open Pit)	11-14 km in winter	Boulanger et al. 2012
Nickle and Copper Mine (Raglan Mine – Underground)	Up to 19-23 km (only summer was analyzed)	Plante et al. 2018
Oil and Gas Development		
Wells, Pipelines	1 km during mosquito harassment 2 km during post-calving season 5 km during calving season (well pads, pipelines, processing stations and associated roads)	Johnson et al. 2020
	4.25 km during summer (mountainous habitat) 2-12.5 km during summer (boreal habitat) (oil and gas wells and facilities)	Johnson et al. 2015
Seismic Lines	100-200 m	Dyer et al. 2001
	2-2.5 km	Johnson et al. 2015
Wells	250 m-1 km	Dyer et al. 2001
Hydroelectric Dam	3 km	Mahoney and Schaefer 2002

Table 5.8 Avoidance of Anthropogenic Structures by Caribou

Type of Activity or Structure	Amount of Avoidance	Source
Forestry Activity		
Recent Cut Blocks	1.2 km (recently fragmented areas)	Smith et al. 2000
	10 km (females from new cut block) 4 km (males from new cut block) 2 km (males from 1-year old cut block)	Chubbs et al. 1993
	5.5 km	Johnson et al. 2015
	9.2 km (females, active cut blocks)	Schaefer and Mahoney 2007
Source: Marathon 2020		

Studies have shown that effects of acoustic emissions on wildlife have the potential to occur above 40 dBA (Shannon et al. 2016). Bradshaw et al. (1997) found that following exposure to simulated blasting noise (sound levels between 90 and 110 dB measured at the source), caribou had an increased rate of movement. Caribou demonstrate a range of reactions to aircraft activity from little response to a strong response (e.g., escape) depending on sound level, altitude and duration of the noise event (AMEC Americas Ltd. 2005). Caribou calf survival has been linked to exposure to overflights (Harrington 2003) and startle responses following sudden noise (see Harrington and Veitch 1991). Research that modelled effects of sudden noise disturbance on caribou indicated that energetic costs associated with repeated disturbance (e.g., movement, flight response) could result in a substantial loss in body mass (Bradshaw et al. 1998). Body weights are also lower in caribou exposed to petroleum development (Cameron et al. 2005). As body weight is correlated with parturition (Cameron et al. 1993), repeated avoidance behavior that results in reduced body weight could also reduce calving rates.

Sound quality monitoring for the Valentine Gold Project determined baseline levels in the Valentine Gold Project Area were less than 47 dBA (Marathon 2020). Project-related operation of vehicles and machinery is anticipated to generate noise and dust disturbance that will be of short duration and localized, as Project activities will be focused on the portion of the RoW under construction, inspection, maintenance or decommissioning. With the exception of periodic inspection and maintenance activities, the operation phase of the Project is not expected to require vehicle or equipment use or other activities that could result in sensory disturbance beyond existing activities at the terminal station and the physical presence of the transmission line.

Change in habitat attributed to sensory disturbance was based on a 500 m buffer applied around the Project Area, consistent with the federal Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada (Environment Canada 2011). Sensory disturbance within the 500 m buffer is expected to be more substantive than in areas more than 500 m from the Project Area, and habitat within the 500 m buffer is expected to have reduced suitability for caribou during all Project phases. As indicated in Table 5.8, avoidance behaviour for transmission lines and access roads has been shown to extend beyond 500 m and indirect effects may extend into the RAA. These effects, however, are expected to decrease with increasing distance from the Project Area. For example, while Rudolph et al. (2012) detected avoidance of roads by woodland caribou at distances greater than 2 km, the analysis showed that avoidance dissipated exponentially with increasing distance. At distances of 500 m and 1,000 m from roads, the relative probability of caribou occurrence was approximately 60% and 80%, respectively, of the estimated maximum caribou occurrence (see Figure 13 in Rudolph et al. 2012). This suggests that while caribou may avoid habitats beyond the LAA, those habitats would not be lost to all caribou.

Approximately 25.9 km^2 of high and moderate-ranked habitat will be indirectly affected within the LAA, and when combined with direct habitat change, 26.5 km^2 of habitat, or 1.7% of the ELCA, will be affected (Table 5.6). Project-related sensory disturbance is anticipated to be greatest for the Buchans and Grey River herds as their calculated seasonal ranges overlap the Project Area in one or more seasons (Table 5.7).

Mitigation measures to reduce the effects of sensory disturbance on caribou (Section 2.11 and 5.2.4) include the requirement for on-site vehicles and heavy equipment to be equipped with appropriate mufflers to reduce noise, reduced idling times, limited Project lighting or the use of directional lighting, and the reducing the Project footprint. Dust associated with movement of vehicles and equipment will be localized, occur over a short duration, and will be managed using standard mitigation measures (Section 2.11) and is therefore not anticipated to have residual effects on caribou habitat or health. In addition, Project-related air travel (i.e., helicopters) will maintain a minimum ferrying altitude of 500 m, where feasible, to reduce noise disturbance. As well, the timing and location of Project activities will be adjusted to avoid key movement paths during the spring and fall migration of the Buchans caribou herd, thereby reducing the potential for sensory disturbance to the Buchans herd.

Summary

With mitigation, the Project is anticipated to result in residual adverse effects on caribou habitat that will be moderate in magnitude during construction (due to combined effects of direct and indirect changes in habitat) and low in magnitude during other Project phases. Residual effects from a change in habitat will occur continuously and will be long-term in duration. As caribou are known to avoid disturbance by more than 500 m, the geographic extent of the effect will extend into the RAA. Over time habitats are expected to rehabilitate, gradually changing from open shrubby vegetation to forested habitats, thereby reversing most of the habitat loss. Change in habitat will be greatest for caribou from the Grey River and Buchans herds, however the residual effect is anticipated to be low to moderate in magnitude for all assessed herds.

5.2.5.3 Change in Movement

Project Pathways for Change in Movement

Construction

The pathways for change in caribou movement during construction include RoW preparation (i.e., clearing and cutting of vegetation), development or upgrade of access roads, installation of water crossings, and expansion of the Star Lake Terminal Station. The physical placement of Project infrastructure (e.g., RoW, access roads, staging and storage areas) may overlap migration paths and act as a semi-permeable barrier to existing movement patterns. Caribou may be reluctant to move past these features if they are perceived as obstacles that are too high or wide to cross. Sensory disturbance associated with construction, primarily from dust, noise, light, and human presence, also has the potential to affect caribou movement indirectly. Sensory disturbance during construction could result in altered movement patterns (e.g., avoidance of existing migration paths).

Operations

The primary mechanism for change in movement during operations is the continued presence of Project infrastructure (e.g., transmission line, RoW, access roads) that could alter caribou movement patterns. Additionally, caribou may avoid maintenance activities during operations (e.g., asset inspection and repair, vegetation clearing in the RoW) because of sensory disturbance (e.g., noise, light, or human presence).

Decommissioning

Pathways that will affect caribou movement will change over time throughout the decommissioning phase. Vegetation management in the RoW may be slow to regenerate and the composition and quantity of vegetation may differ from baseline conditions, leading to continued avoidance of the Project Area if the regenerated habitat is not suitable for caribou migration. Decommissioning activities (e.g., removal of conductors and poles) will likely have a reduced level of sensory disturbance compared to construction but may still cause avoidance by caribou. Indirect effects of sensory disturbance on caribou movement during decommissioning is expected to cease at the end of the phase.

Direct and Indirect Effects on Change in Movement

Maintaining connectivity (i.e., allowing movements) between seasonal ranges is vital to sustaining viable populations of migratory ungulates (Monteith et al. 2018) and has been identified in recovery strategies as an important component of caribou persistence (e.g., Government of Alberta 2017; ECCC 2019).

Caribou can exhibit several responses to linear features, including delayed or failed crossing of linear features, such as power lines and roads, and increased activity near a disturbance (Curatolo and Murphy 1986; Wolfe et al. 2000; Dyer et al. 2002; Vistnes et al. 2004). While caribou demonstrate a degree of avoidance to seismic lines (Dyer et al. 2001), seismic lines generally are not barriers to caribou movement (Dyer et al. 2002). Other research has indicated that migrating caribou do not cross elevated pipelines (Smith and Cameron 1985) and generally avoid roads (Baltenspergber and Joly 2019). In central Newfoundland, caribou avoided the Star Lake hydroelectric development and altered the timing of migration following its construction (Mahoney and Schaefer 2002).

Anthropogenic disturbance may also affect selection of migration paths. Migrating caribou select movement routes that provide adequate forage and resting habitat (Saher 2005), are less energetically demanding (e.g., less rugged, open terrain) (Saher and Schmigelow 2005), and have a lower predation risk compared to other potential routes (Bergerud et al. 1990; Ferguson and Elkie 2004). Caribou movement during migration has been found to increase when linear features are encountered (Murphy and Curatolo 1987) and daily movement rates increase with increasing anthropogenic disturbance within the range (MacNearney et al. 2016). Caribou that encounter linear features during migration may also delay crossing and increase movement rates following crossing (Wilson et al. 2016). Avoidance of the Project and a change in migration pathways could affect caribou energetic costs, predation risks, and/or forage availability during migration (Fullman et al. 2017; Wyckoff et al. 2018).

Project-related changes to existing movement patterns, including an increase in the amount of movement and diversions or delays from existing migration patterns (particularly if they move into more difficult terrain or conditions such as deep snow), could have higher energetic costs and possibly lead to decreases in body condition, pregnancies, and calving rates. Pregnancy rates during the fall are linked to caribou body condition (Gerhart et al. 1997; Russell et al. 1998) and body weight is correlated with parturition (Cameron et al. 1993). Caribou in areas with higher levels of disturbance have been shown to have decreased parturition rates (Cameron et al. 2005) and McCarthy et al. (2011) found that calving rates decreased with increasing disturbance in caribou herds in central Newfoundland.

An analysis of migration patterns for the Buchans herd completed for the Valentine Gold Project (Marathon 2020) identified areas used by GPS-collared Buchans caribou in the spring and fall migration periods. The assessment defined the ‘migration corridor’ as the area used for migration at the population-level. The corridor contained numerous 'migration paths', which were used by individual caribou. Individual migration paths could be used by one caribou or by several. In both the spring and fall migration periods caribou followed similar paths through the migration corridor between the calving and winter range, thereby overlapping the Project Area twice annually (Figures 5-5 and 5-6. During spring migration, caribou used a wider portion of the migration corridor and therefore more dispersed than during fall migration which was narrower and more condensed.

The width of the Project Area (25 m) relative to the length of the migration corridor (145 km) is less than 0.02% (Figures 5-5 and 5-6). In spring, the proposed RoW route overlaps approximately 0.03% of the total area of the spring migration paths and does not overlap with high or moderate use areas within the corridor (Figure 5-5). In fall, the proposed route overlaps approximately 0.02% of the total area of the fall migration paths, which also was identified as moderate-high use area. Because the RoW parallels existing roads along most of its length (approximately 93%), the RoW will not create, and nor is anticipated to function as, a new linear feature through the migration paths. Mitigation measures such as limiting Project activities during sensitive periods (e.g., calving, migration), and limiting activities to the Project Area, are expected to reduce Project effects on caribou movement.

Summary

Project effects on the movement patterns of the Gaff Topsails and La Poile herds are predicted to be negligible in magnitude and neutral in direction because their ranges do not overlap the Project Area. The Grey River herd has some overlap with the Project Area during the summer season, and changes to movement for this herd are predicted to be adverse and low in magnitude because of the limited overlap.

The transmission line RoW overlaps the migration corridor of the Buchans herd and therefore Project-related effects on a change in movement are predicted to be adverse and moderate in magnitude as most of the RoW will parallel existing roads and will extend into the RAA. Duration will be long term and effects are anticipated to be reversible. Potential cumulative effects with the Valentine Gold Project on a change in movement for caribou during migration are discussed in Section 6.2.2. To reduce effects on movement, mitigation measures will reduce sensory disturbance within the Project Area (e.g., limiting activities during sensitive periods, facilitating caribou crossings across snowbanks or ditches) and limit the size of the Project footprint (e.g., limiting RoW width where possible).

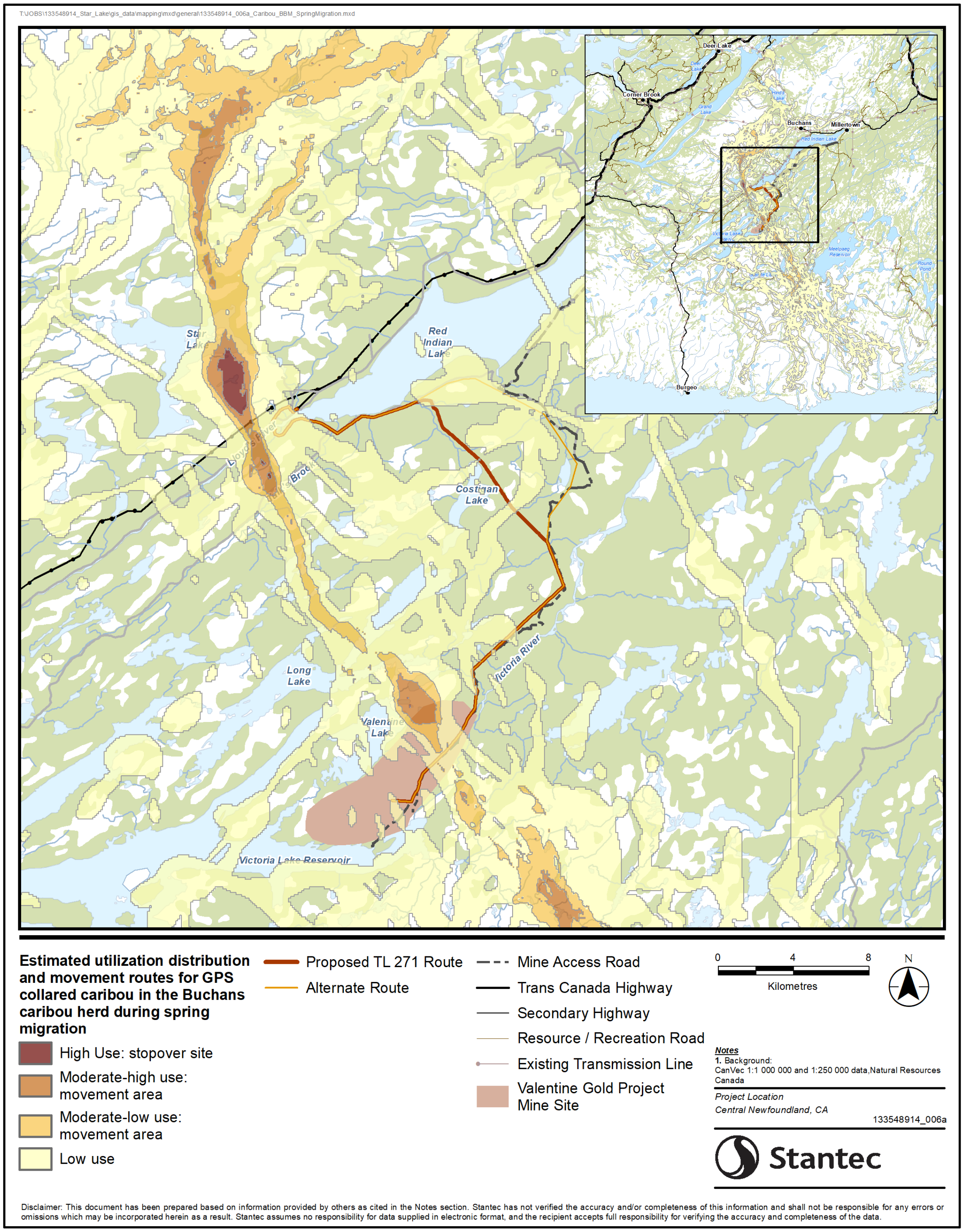


Figure 5-5 Estimated Utilization Distribution and Migration Corridors of GPS Collared Caribou in the Buchans Herd - Spring Migration

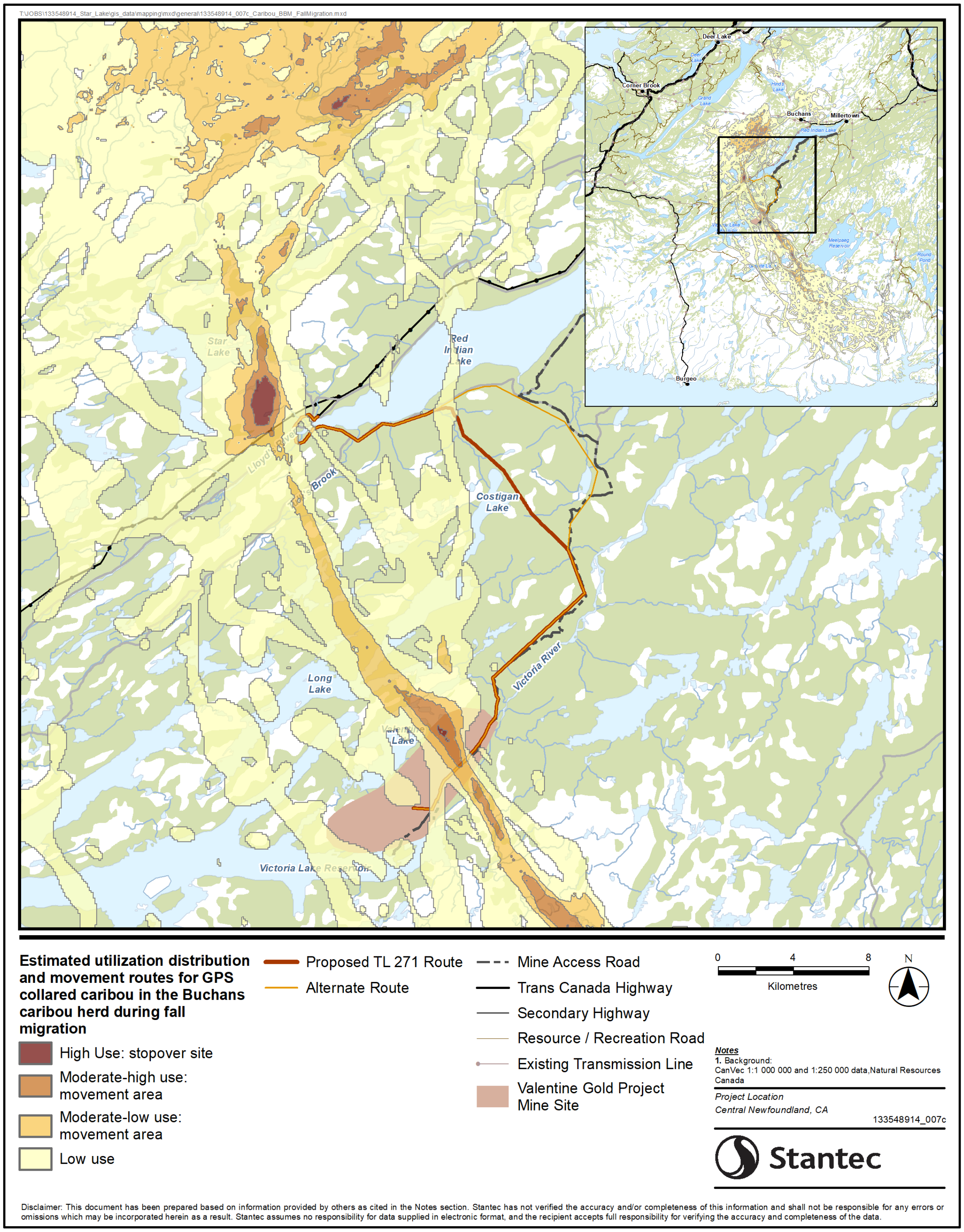


Figure 5-6 Estimated Utilization Distribution and Migration Corridors of GPS Collared Caribou in the Buchans Herd - Fall Migration

5.2.5.4 Change in Mortality Risk

Project Pathways for Change in Mortality Risk

Construction

Change in caribou mortality risk could be affected by the Project directly (e.g., vehicle collisions) and indirectly (e.g., increased predation risk). Construction and commissioning activities including vegetation clearing, site preparation, construction of infrastructure and construction-related transportation are expected to be the primary pathways through which direct construction-related changes in mortality risk may occur. Project-related transportation and heavy equipment use have the potential to result in vehicle-caribou collisions.

Project-related changes to vegetation communities, directly or indirectly, could affect the predator-prey community (e.g., linear features can improve predator mobility) or displace caribou to areas where predation risk is greater. For example, alteration of vegetation communities could create habitat that supports increased moose abundance (e.g., regenerating habitat, edge habitat) (Ardea Biological Consulting 2004; Peters 2010; Peek 2007 in Michaud et al. 2014), which could also result in an increase in predator populations (e.g., black bear, coyote). An increase in the predator population, or the efficiency of their access to caribou ranges, can affect the mortality risk for caribou.

The Project RoW will parallel existing roads along much of its length thereby limiting the amount of new access for hunters. As such, no increase in mortality risk from hunting is expected.

Operations

Vehicle and equipment traffic during operations is the most likely source of a potential increase in direct mortality risk to caribou, although asset inspection and maintenance are expected to be minimal over the life of the Project. Snowmobile patrols will be conducted annually to visually inspect the transmission line and the need for vegetation management will be assessed approximately three to five years after initial RoW clearing, with manual cutting and herbicide application occurring thereafter to a five- to seven-year frequency.

Indirect change in mortality risk could occur through increased predation and hunting, as described above for construction. Project effects may also lead to decreased body condition, for example through caribou displacement to lower suitability habitat or through higher energetic costs related to change in movement or reduced forage value. Repeated or persistent use of sub-optimal forage and increased energy requirements over time could result in decreased body condition, which could lead to decreased survival over time (Crête et al. 1996). The potential effects of the Project on energetics, forage availability, and body condition are also discussed in direct and indirect effects on Change in Movement.

Decommissioning

The risk of vehicle collisions during decommissioning would be similar to construction phase (limited in geographic extent and duration) and activities are not expected to further affect caribou mortality risk through increased predation or hunting. Transmission line infrastructure will be removed, and vegetation suppression will cease, allowing passive regeneration. Access to the RoW can be rehabilitated and culverts / bridges can be removed (if required).

Direct Effects on Change in Mortality Risk

There will be sensory disturbance associated with Project construction and decommissioning activities such that caribou are expected to avoid or have reduced use of areas proximal to these activities, thereby reducing the risk of direct mortality during these phases.

The highest risk of direct Project-related caribou mortality is expected to occur from collisions with vehicles on access roads, although caribou-vehicle collisions are expected to be infrequent. The mortality rate from vehicle collisions for adult caribou on the Island of Newfoundland (between 2005 and 2011) was approximately 4% (where the cause of mortality was known) (Lewis and Mahoney 2014). Rates of wildlife-vehicle collisions are influenced by many factors including vehicle speed, traffic volume, animal speed, seasonality, and time of day (Litvaitus and Tash 2008).

As the amount of overlap between the assessed herds and the Project Area is less than 0.01% for both the Grey River and Buchans herds (Table 5.7), the risk of direct mortality resulting from vegetation clearing, site development, and installation of infrastructure is considered low because of the limited exposure of caribou to machinery and equipment within their seasonal ranges. Risk to other herds assessed will be negligible, because their calculated ranges do not overlap the Project Area.

Mitigation measures will be applied to avoid or reduce a potential increase in mortality risk caused by the Project, including adhering to posted speed limits, yielding the right-of-way to caribou where safe to do so, and facilitating caribou crossings on roads (e.g., including low areas in plowed snowbanks and crossing points across ditches). Additional measures may be applied during sensitive caribou periods (e.g., caribou migration, calving) or if caribou are observed within 500 m of Project activities. With the proposed mitigation measures, the effects of construction, operation, and decommissioning on a change in mortality risk is predicted to be low.

Indirect Effects on Change in Mortality Risk

Mortality risk for caribou may be affected through indirect mechanisms, such as increased predation risk or increased energy expenditure. While some research on predation risk for caribou on the Island of Newfoundland has been completed, there is little information in general on areas (such as Newfoundland) where black bear and coyote are the primary predators of caribou (Mahoney and Weir 2009; Lewis et al. 2014) in the absence of a breeding wolf population. Regardless, studies have shown that a change in habitat can attract or displace predators, thereby altering predator-prey dynamics. For example, black bear selects for disturbed habitats where there is increased forage availability (Mosnier et al. 2008). Black bear also select anthropogenic edges (Stewart et al. 2013), possibly for efficient access and availability of forage. Coyote selects for disturbed habitats where those disturbed habitats are selected by moose (i.e., where moose are available in disturbed habitats as either prey or carcasses) (Boisjoly et al. 2010). An increase in moose abundance in disturbed areas has been correlated with coyote abundance, and coyote abundance negatively influences caribou calf recruitment (Frenette et al. 2020). In systems such as NL where moose are the primary prey of predators, high predator densities could be supported by abundant moose populations, and caribou are disproportionately preyed upon even if only secondarily to moose (McCutchen 2007; Kittle et al. 2017; Newton et al. 2017).

Predators of caribou have also been shown to select linear features, such as seismic lines (Tigner et al. 2014) and roads (Latham et al. 2013; Hinton et al. 2015; Tomchuk 2019), although avoidance of such features has also been observed (Ellington 2015). Selection of linear features by predators could increase predation of caribou through increased access to caribou range (DeMars and Boutin 2017), particularly in areas such as NL with a reduced risk of predation by wolf and increased risk of predation by black bear (Dussault et al. 2012).

Habitat fragmentation resulting from linear features can also affect caribou mortality risk as caribou may restrict movement between habitat patches. This could increase caribou density within remaining suitable habitat patches, which may increase the risk of predation within those patches (Seip 1991; Wittmer et al. 2005). Predators have also been shown to select for disturbed habitat. Caribou survival also decreases with increasing levels of disturbance within the home range (Courtois et al. 2007).

Anthropogenic disturbance may also trigger a physiological stress response in caribou. The levels of stress hormones in caribou have been shown to increase with exposure to anthropogenic disturbance (e.g., Freeman 2008; Renaud 2012; Wasser et al. 2011; Ewacha et al. 2017; Plante et al. 2020). Increased stress may reduce fitness (i.e., the ability of an individual to produce offspring), although the evidence has not been consistent (Bonier et al. 2009). Prolonged stress could potentially lead to poor body condition, which could result in lower survival and reproductive rates (Escribano-Avila et al. 2013). Immune function may also be affected by prolonged stress, which could affect wildlife health through mechanisms, such as increased parasite load or susceptibility to disease (Hing et al. 2016). Increased levels of stress hormones were detected in caribou up to 10 km away from winter recreational activities (i.e., snowmobiling) (Freeman 2008). Recent research on the effects of chronic stress on caribou survival indicate uncertainty (Plante et al. 2020). Project-related physiological stress could affect caribou body condition and health, which could impact individual fitness and, ultimately, population demographics.

Hunting pressure, and therefore mortality risk, can increase with increased access to caribou range. Historical and current access by hunters using linear features may have contributed to decreases in caribou populations through overharvest (Bergerud et al. 1984; Adamczewski et al. 2003; James and Stuart-Smith 2000, Schmelzer et al. 2004; Latham and Boutin 2015). Access to caribou herds via winter roads can contribute to an increase in hunting efficiency (Boulanger et al. 2012) and the likelihood of caribou being hunted increases with proximity to roads (Plante et al. 2017).

As indicated, caribou are known to avoid or use areas less frequently when proximal to anthropogenic disturbance (e.g., Vistnes and Nellemann 2001; Dyer et al. 2002; Weir et al. 2007; Polfus et al. 2011; Boulanger et al. 2012; COSEWIC 2014; Johnson et al. 2015; Eftestøl et al. 2016; Plante et al. 2018).

However, some research has found that caribou may select anthropogenically disturbed habitat (Faille et al. 2010; Dussault et al. 2012; St-Laurent and Dussault 2012) and caribou density can increase near human disturbance (Fortin et al. 2013). While selection for disturbed areas appears contradictory, the underlying mechanism may be a function of site fidelity (i.e., the propensity to return to a previously used site). Caribou exhibit a high degree of seasonal site fidelity, particularly during calving (Schaefer et al. 2000; Ferguson and Elkie 2004), which can result in some individuals returning to disturbed locations despite an increased risk of predation or a reduction in forage abundance or quality (Faille et al. 2010; Dussault et al. 2012; Lesmerises et al. 2013). This maladaptive behavior could result in decreased recruitment rates and a population decline if recruitment rates remain low.

Creation of a new linear feature by the Project will be limited, as most of the transmission line will parallel existing roads, thereby reducing effects on change in mortality risk. The Buchans and Grey River herds have the greatest potential to be affected by an increase in predator density as those herds have overlap with the Project, however Project-related changes in predator abundance or distribution could extend into the RAA and therefore it is possible that other caribou herds may experience changes in predation risk. However, the most pronounced effect of increased predation is expected to occur near the Project Area, as much of the effect is associated with linear features (e.g., selection of linear features by black bears and moose) and habitat changes (e.g., selection of regenerating habitat). Mitigation measures are expected to avoid or reduce significant changes in mortality risk including prohibiting Project employees and contractors from hunting caribou at or near the site while working on the Project, implementing speed limits, and implementing site rehabilitation following decommissioning.

Summary

With the implementation of mitigation measures, residual effects on change in mortality risk for caribou is expected to be adverse. Caribou herds could experience an increase in mortality risk, although the effects are predicted to be limited to the Buchans and Grey River herds. Direct mortality risks will be limited to the Project Area, however indirect risks will extend into the RAA, based on caribou, predator, and primary prey home range sizes, movement patterns, and expected response to disturbance. Project-related change in mortality risk, through an increase in predator density and subsequently an increase in predation rate, is predicted to be low in magnitude for all herds assessed. Mortality events are expected to occur at an irregular frequency and the change in mortality risk will be medium term in duration. The effect is anticipated to be reversible following decommissioning.

5.2.6 Summary of Residual Effects

Table 5.9 summarizes residual effects on caribou. Project-related residual effects on caribou and their habitat are predicted to be adverse, low to moderate in magnitude and could potentially occur during sensitive periods for caribou. The geographic extent of residual effects on change in habitat are predicted to extend into the RAA. Effects are predicted to be long term and occur continuously throughout the life of the Project. Changes to habitat are considered reversible, as habitats are expected to rehabilitate over time.

Residual effects on change in movement are predicted to be adverse and to extend into the RAA. Although Project effects on change in movement are predicted to be negligible to low in magnitude for the Grey River, La Poile and Gaff Topsails herds, the magnitude of residual effects on change in movement for the Buchans herd is predicted to be moderate due to the degree of overlap with the Project. Effects on change in movement may occur during sensitive periods. Project-related change in movement is predicted to be long term, occur continuously throughout the life of the Project, and considered reversible following decommissioning.

Residual effects on change in mortality risk are predicted to be low in magnitude and adverse. A change in mortality risk is predicted to extend into the RAA and may occur during highly sensitive periods. Effects associated with a change in mortality risk are predicted to be medium term during construction and operation, and short-term during decommissioning. The frequency of mortality events is expected to occur irregularly and Project effects on change in mortality are expected to be reversible following decommissioning.

Table 5.9 Project Residual Effects on Caribou

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Habitat	C	A	M	RAA	HS	LT	C	R
	O	A	L	RAA	HS	LT	C	R
	D	A	L	RAA	HS	LT	C	R
Change in Movement	C	A	M	RAA	HS	LT	C	R
	O	A	M	RAA	HS	LT	C	R
	D	A	M	RAA	HS	LT	C	R
Change in Mortality Risk	C	A	L	RAA	HS	ST	IR	R
	O	A	L	RAA	HS	MT	IR	R
	D	A	L	RAA	HS	ST	IR	R

KEY
See Table 4.2 for detailed definitions
Project Phase
C: Construction
O: Operation
D: Decommissioning
Direction:
P: Positive
A: Adverse
N: Neutral
Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Development Area
LAA: Local Assessment Area
RAA: Regional Assessment Area
Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity
Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous
Reversibility:
R: Reversible
I: Irreversible

5.2.7 Determination of Significance

With mitigation and environmental protection measures, the residual effects of the Project on caribou are predicted to be not significant, and therefore not threaten the long-term persistence or viability of one or more of the four assessed caribou herds within the RAA, including effects that are contrary to or inconsistent with the goals, objectives and activities of recovery strategies, action plans and management plans. Confidence in this prediction is high, based on the following considerations:

- The potential environmental effects and effect pathways for the Project are common to transmission line projects and are generally well understood for caribou.
- The understanding of existing conditions for caribou is supported by existing literature, provincial databases, and analyses completed in the region.
- The mitigation measures are well understood and align with standard management practices.

NL Hydro also recognizes the potential for cumulative adverse effects on caribou associated with the spatial and temporal overlap of Project activities with the Valentine Gold Project and these effects are further assessed in Section 6.2.2.

5.2.8 Follow-up and Monitoring

Construction activities will be undertaken in accordance with NL Hydro's EPP. In addition, NL Hydro will require the construction contractor to provide a C-SEPP for review and acceptance by NL Hydro prior to the start of construction. The Project will have full-time OSEMs to inspect worksites and activities for conformance with the EPP, C-SEPP, and government regulations and permits. Compliance monitoring confirms that mitigation measures are properly implemented.

NL Hydro understands that Marathon will be developing an Environmental Effects Monitoring (EEM) program for the Valentine Gold Project. NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how this information can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou.

5.3 AVIFAUNA

Avifauna was selected as a VC because of the potential for interactions between Project activities and avifauna species and their habitat, as well as their importance to the public, Indigenous groups and resource managers. Avifauna are valuable for recreational viewing and hunting, as a domestic food supply, and provide economic benefits for residents of NL. The status of avifauna populations is generally indicative of the health of an ecosystem, because they feed on vegetation and at lower trophic levels in the food chain (e.g., insects, fish and small mammals).

For this assessment, the term avifauna includes raptors, migratory birds (e.g., passerines, waterfowl), and other species of avifauna (e.g., upland game birds), including SAR and SOCC (refer to Section 3.1 for definitions).

The protection of SAR is a legal requirement for those species listed under Schedule 1 of SARA and the NL ESA. Avifauna are also regulated under the federal MBCA and the NL *Wild Life Act*.

Given the widespread availability of habitat types in the vicinity of the Project (e.g., wetlands, rivers, lakes, forests) and the many avifauna species using these habitats, the assessment of avifauna focused on key groups (e.g., raptors, migratory birds, SAR) confirmed in the RAA that have the most potential to be affected by the Project.

5.3.1 Significance Definition

For the purposes of this EA, a significant residual environmental effect on avifauna is defined as one that threatens the long-term persistence, viability or recovery of an avifauna species population in the RAA, including effects that are contrary to or inconsistent with the goals, objectives or activities of recovery strategies, action plans and management plans for SAR and their habitats.

5.3.2 Existing Conditions

An overview of the environmental setting is provided in Section 3. A more detailed description of the existing conditions for avifauna can be found in Section 4.3.1 of the Flora and Fauna Baseline Study (Appendix D).

In total, 98 avifauna species have been documented in the Project RAA, based on field studies completed for the Valentine Gold Project (Marathon 2020) and publicly available literature and databases. This includes seven raptor species, 81 species of migratory birds, and 10 other avifauna species (e.g., non-raptor species not protected under the MBCA). Because of the large number of avifauna species occurring in the region, it is not practical to assess each species in detail. Rather, the following five main groups of avifauna are considered in this assessment, based on general habitat requirements, trophic level and/or conservation status:

- **Raptors**: Birds of prey that use a variety of habitats for nesting, hunting and breeding. They are situated high in the food chain and therefore are indicators of ecosystem health. Osprey (*Pandion haliaetus*), northern harrier (*Circus hudsonius*), northern goshawk (*Accipiter gentilis*), bald eagle (*Haliaeetus leucocephalus*), great horned owl (*Bubo virginianus*), boreal owl (*Aegolius funereus*) and merlin (*Falco columbarius*) have been documented in the region (Marathon 2020).
- **Migratory Birds – Waterfowl and Other Waterbirds**: Primarily occupy wetland and open water habitats during spring breeding, brood rearing and fall staging. Canada goose (*Branta canadensis*), American black duck (*Anas rubripes*) and ring-necked duck (*Aythya collaris*) are common examples (Marathon 2020).
- **Migratory Birds – Passerines**: Occupy diverse terrestrial habitats during the breeding season, including riparian areas, burns, mature forests, regenerating areas and other habitat types. Species common in the region include white-throated sparrow (*Zonotrichia albicollis*), ruby-crowned kinglet (*Regulus satrapa*), Swainson's thrush (*Catharus ustulatus*), black-capped chickadee (*Poecile atricapillus*) and yellow-bellied flycatcher (*Empidonax flaviventris*) (Marathon 2020). Most species in this group are protected under the MBCA.

- **Other Avifauna – Upland Game Birds**: Year-round residents that are often hunted for recreation and/or sustenance, including spruce grouse (*Falcipennis canadensis*), ruffed grouse (*Bonasa umbellus*) and willow ptarmigan (*Lagopus lagopus*) (Marathon 2020).
- **SAR / SOCC**: SAR and their habitats are protected under SARA and the NL ESA. While not protected by federal or provincial legislation, SOCC may be important indicators of ecosystem health and regional biodiversity.

Three avifauna SAR and three avifauna SOCC were identified during field surveys for the Valentine Gold Project, and an additional five SAR have been recorded in the region, based on other data sources [AC CDC, Breeding Bird Surveys or Christmas Bird Counts] (Marathon 2020). Of these, four SAR – olive-sided flycatcher (*Contopus cooperi*), gray-cheeked thrush (*Catharus minimus*), red crossbill (*Loxia curvirostra*) and rusty blackbird (*Euphagus carolinus*) – and two SOCC – Nashville warbler (*Leiothlypis ruficapilla*) and bay-breasted warbler (*Setophaga castanea*) – have the potential to occur in suitable habitats in the RAA during the breeding season for migratory birds on the Island of Newfoundland (April – August).

5.3.3 Project-Component Interactions and Effect Pathways

Table 5.10 lists the potential Project effects on avifauna and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent environmental assessments for similar projects in NL and other parts of Canada and professional judgment.

Table 5.10 Potential Effects, Effects Pathways and Measurable Parameters for Avifauna (including Raptors and Species at Risk)

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement*
Change in Habitat	• Direct and/or indirect loss or alteration of habitat due to vegetation clearing, sensory disturbance and/or edge effects.	• Amount (km^2) of habitat directly or indirectly lost or altered.
Change in Mortality Risk	• Direct change in mortality risk due to vegetation clearing activities, collisions with vehicles or conductors, or electrocution, and indirect change in mortality risk due to predation and harvest pressure.	• Interactions with Project infrastructure, vehicles and equipment. • Increase in predation, hunting and/or poaching because of improved access or other habitat changes.
*Considered qualitatively in the assessment		

Project activities that might interact with avifauna for each potential effect are identified in Table 5.11. These interactions are indicated by check marks and are discussed in detail in Section 5.3.5. Justification where no interaction is predicted is provided following the table.

Table 5.11 Project Interactions with Avifauna

Physical Activities	Effects to be Assessed	
	Change in Habitat	**Change in Mortality Risk**
Construction		
Terminal Station Upgrades	–	–
Access Road Development	✓	✓
RoW Clearing and Construction	✓	✓
Pole Installation and Conductor Stringing	✓	✓
Testing and Commissioning	–	–
Operations		
Presence and Operation of TL271	✓	✓
Asset Inspection and RoW Management	✓	✓
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Notes: ✓ = Potential interaction; – = No interaction		

While some Project activities may interact with avifauna and their habitat, standard mitigation measures and environmental protection practices will be implemented to effectively mitigate these interactions (discussed in Section 2.11). Construction activities associated with upgrading the existing terminal station will occur primarily within the existing footprint and are therefore expected to have a negligible effect on habitat loss or avifauna mortality. Sensory disturbances (e.g., noise, light) associated with upgrade activities will occur over a short duration and can be mitigated with standard (Section 2.11) and species-specific (Section 5.3.4) measures. Testing and commissioning during Project construction are also anticipated to have negligible effects with the implementation of standard and species-specific mitigation measures.

Residual environmental effects on avifauna habitat and mortality risk are expected as a result of RoW clearing and access construction, the presence and operation of TL271 (including maintenance) and Project decommissioning (discussed in Section 5.3.5).

5.3.4 Mitigation

In addition to the standard mitigation measures to be implemented for Project construction, operation and decommissioning discussed in Section 2.11, specific measures will be implemented to reduce or eliminate adverse effects on avifauna.

- To the extent possible, vegetation removal will be conducted outside the breeding season for most birds (e.g., April 1 to August 31). If work must be completed during this timing window, activities will be conducted in accordance with avifauna mitigation measures in the EPP to reduce the likelihood of inadvertently destroying nests and/or eggs of migratory birds (known as incidental take). This would include nest searches for avifauna, including SAR/SOCC, prior to clearing activities, and the establishment of appropriate buffers around active or suspected nests (e.g., 30 m for passerines, 100 m for waterfowl/waterbirds, 200 m to 800 m for raptor nests). Project-related activities within an established buffer would be avoided until the birds have left the nest.

- Adherence to Nalcor's Standard Operating Procedures for Nesting Birds in Vegetated Areas (NAL-ENV-SOP-01) will address activities during the operations and maintenance phases, which outlines procedures for nest avoidance during operations.
- Prior to clearing, NL Hydro will identify locations of bald eagle and osprey nests (i.e., nests that are reused in subsequent years) and determine appropriate mitigation.
- The discovery of nests by on-site personnel will be reported to the OSEM and Environmental Services Manager and appropriate action or follow-up will be guided by the EPP.
- Hunting or harassment of avifauna and other wildlife by on-site Project personnel will be prohibited.
- Work activities will be conducted in a manner that does not deliberately harass wildlife, including avifauna.
- Safe driving practices including speed limits to avoid collisions with avifauna and other wildlife will be implemented.
- Collisions, near misses or observations of mortalities on site roads and/or involving Project vehicles will be reported to the OSEM and adaptive management measures implemented should locations of high frequency interactions be identified.
- Avian avoidance devices may be installed to minimize bird collisions with Project infrastructure, should high risk areas be identified during the course of operations.
- Ecologically sensitive areas (e.g., wetlands and watercourses) will be avoided to the extent feasible.
- Trees that provide actual or potential avifauna habitat will be retained to the extent feasible and where it is safe to do so.
- During operation, use of herbicides will be restricted in buffer areas around watercourses and will be scheduled to avoid the migratory bird nesting period (April 1 to August 31). Any manual clearing of brush would also be scheduled to avoid the nesting period.
- Shrub or scrub (i.e., non-tree) vegetation will be allowed to establish along transmission corridors, to the extent feasible, to promote their use by avifauna.

5.3.5 Assessment of Residual Effects

5.3.5.1 Change in Habitat

Construction

Clearing of the RoW and access roads during Project construction will have direct impacts on habitat. The amount of habitat lost due to access road construction is expected to be minimal as primarily existing roads will be used for access. The total length of new access currently planned along the RoW is approximately 950 m, with the shortest route being approximately 40 m and the longest length being approximately 300 m. Partial vegetation removal is expected along most of the RoW (e.g., some low shrubs and ground cover vegetation will remain within the RoW, particularly in wetland areas). Complete ground cover removal will be required along vehicle passages. Indirect changes to abiotic habitat features, such as changes in light availability, temperature or humidity, are also expected. Mitigation measures presented in Section 5.3.4, in addition to standard mitigation measures outlined in Section 2.11 will reduce the total amount of habitat lost or altered during construction.

While all habitat types identified in the region may be used by avifauna during breeding and other life stages (Table 5.12), the amount of habitat lost or altered due to RoW construction will be approximately 1 km^2 (40 km * 25 m) and thus will likely have a small measurable effect on habitat availability at the local scale and little effect, if any, at the regional scale. Many species would be expected to move into available adjacent habitats, while others may benefit from an increase in suitable habitat through the partial clearing of the RoW (providing increased cover for species that nest in open or shrubby habitats). Some species will benefit from the creation of habitat edge while the habitat of forest interior species will be fragmented. Table 5.12 summarizes the main habitat types used by key species groups and the amount that will be lost or altered due to the Project. In general, forest-nesting species such as most passerines, raptors and upland game birds are likely to be most affected by the direct loss of habitat, compared to open water and wetland species (waterfowl and other waterbirds) whose habitats were largely avoided during RoW routing.

The greatest impact on avifauna habitat will be due to the construction of the RoW that may intercept home ranges and/or preferred habitats of some avifauna species, including SAR and SOCC. Fragmentation can also cause altered movements between resulting patches. Some species are reluctant to cross and/or avoid crossing clearings, resulting in isolated populations in habitat fragments. Studies by St. Clair et al. (1998) found that chickadees were unwilling to cross gaps greater than 50 m when they had forested alternatives, although they sometimes crossed gaps up to 200 m when no choice existed. More specifically, at a gap size of 100 m they were 25% less likely to cross and were more than 80% less likely to cross gaps of 200 m. The Project Area considered in this assessment is a 25 m RoW.

In general, linear features such as transmission lines and access roads contribute to habitat fragmentation because of the large amount of edge they produce relative to the area disturbed. The placement of the approximately 40 km-long RoW adjacent to existing linear corridors along approximately 93% of the preferred route will reduce additional fragmentation on the landscape. Furthermore, forested habitats in NL are “naturally and extensively fragmented” by the presence of bogs, fens, ponds and rivers, and many avifauna inhabiting the area are likely accustomed to such habitats (Warkentin and Newton 2009).

Table 5.12 Habitat Types in the Proposed RoW and LAA and their use by Avifauna Groups

ELC Habitat Type	Area in LAA (km^2 / %)	Area in 25m RoW (km^2 / %)[1]	Raptors	Waterfowl / Waterbirds	Passerines	Upland Game Birds	SAR				SOCC	
							Olive-sided Flycatcher	Gray-cheeked Thrush	Red Crossbill	Rusty Blackbird	Nashville Warbler	Bay-breasted Warbler
Balsam Fir Forest	4.46 / 12.1	0.12 / 13.5	✓		✓	✓	✓	✓	✓		✓	✓
Kalmia-Black Spruce Woodland	2.15 / 5.8	0.04 / 4.0			✓	✓		✓				
Mixedwood Forest	7.20 / 19.5	0.19 / 21.2	✓		✓	✓		✓	✓		✓	✓
Regenerating Forest	5.06 / 13.7	0.14 / 15.2	✓		✓	✓	✓	✓		✓		
Alder Thicket	4.12 / 11.2	0.11 / 12.6			✓	✓		✓		✓		
Black Spruce Forest	6.17 / 16.7	0.16 / 18.4	✓		✓	✓	✓		✓		✓	✓
Open Wetlands	2.18 / 5.9	0.02 / 2.6	✓	✓	✓	✓	✓			✓		
Riparian Thicket	0.06 / 0.1	0	✓		✓	✓		✓		✓		
Wet Coniferous Forest	2.00 / 5.4	0.04 / 4.2	✓		✓	✓	✓			✓		
Open Water	2.36 / 6.4	0.01	✓	✓								
Exposed Sand / Gravel Shoreline	0.14 / 0.4	0		✓								
Anthropogenic	0.97 / 2.6	0.07 / 7.4	✓		✓	✓						

Adapted from Marathon (2020).

The installation of poles during construction will result in an increase in potential nesting habitat for raptor species, such as Osprey, Bald Eagle and Great-horned Owl, that often build (or use existing) nest structures on transmission line infrastructure. Residual effects from pole installation however, as well as conductor stringing and testing and commissioning, are primarily sensory disturbances from noise (e.g., equipment operation, human presence) and light. Some birds may be attracted to sensory stimuli, particularly those accustomed to humans as a potential food source (e.g., crows and jays) or species that use anthropogenic sites for nesting (e.g., robins), however sensory disturbances may cause some birds to abandon important habitats, including their nests. Noise levels that exceed 10 decibels (dB) above ambient levels in natural areas, or that are greater than 50 dB, have the potential to disrupt avifauna (Canadian Wildlife Service 2019). The presence of noise can mask acoustic signals or reduce the area that a bird is able to detect these signals. This can have potential impacts on foraging activities, anti-predator behavior and reproductive success, as well as affect bird densities and distribution (Barber et al. 2010; Halfwerk et al. 2011). Construction activities will generate noise levels exceeding 10 dB, and potentially higher than 50 dB in some instances, suggesting that there is the potential for noise-related residual effects on avifauna during construction. However, such disturbances will be of short duration in any one location along the RoW during construction.

Light stimuli from equipment, vehicles and buildings during construction can also result in adverse residual effects on avifauna habitat, including their potential to attract or disorient local or migrating birds (Poot et al. 2008). The amount of on-site lighting will be reduced during construction. Only the amount of lighting required for safe construction activities will be installed and exterior lights will be shielded from above (where the need is identified).

Operations

Direct effects on habitat will occur primarily during the construction phase (i.e., when habitats are lost / altered due to clearing of the RoW). Sensory disturbances during operations (noise and light) will be the same as discussed for construction.

RoW management during operations will include the application of herbicides and manual cutting of brush and is anticipated to occur four to five years following construction, and at a frequency of every five to seven years thereafter. Herbicide applications alter habitat conditions and may have varying effects on species of avifauna, including declines in the number of avifauna species or shifts in community structure, but these effects are generally temporary (Guynn et al. 2004). In a comparison of treated and untreated sites in Oklahoma five to six years following herbicide application, Schulz et al. (1992) found that sites treated with herbicides had higher species richness than untreated areas, however untreated sites were needed to maintain interior woodland species (e.g., hermit thrush, *Catharus guttatus*). The greater number of species on treated sites was attributed to a greater abundance of grasses and forbs (and likely seed availability), an increase in edge habitat (and edge-specialists), or a combination of both. In contrast, Stoleson et al. (2011) found areas treated by herbicides had fewer species when compared to control sites, although this difference was not significant in any given year over the 10-year study. The authors also found short-term declines (2-4 years) in shrub-, ground- and canopy-nesting species in treated sites.

Rivers et al. (2019) found that although intense herbicide treatment extensively reduced vegetation cover and thus nest concealment of early-successional species, there was no evidence of impacts on the daily nest survival or post-fledgling survival of white-crowned sparrow (*Zonotrichia leucophrys*). Similarly, Marshall and Vandruff (2002) found that selective herbicide treatment in a RoW did not affect the density or nesting success of species such as alder flycatcher (*Empidonax alnorum*) that prefer shrub vegetation around their nests.

Decommissioning

TL271 will be decommissioned once all power requirements for the Valentine Gold Project have been met. Residual effects on avifauna habitat will primarily be sensory disturbances, including noise and light effects as described for Project construction. Once all materials have been removed, the access to the RoW can be rehabilitated. Over the long term, this will increase habitat for some species (interior forest species) but will decrease habitat for any species using shrub and edge habitats created by the RoW.

5.3.5.2 Change in Mortality Risk

Construction

Site preparation activities have the greatest potential to result in increased mortality risk to avifauna, including SAR. The severity of potential environmental effects from RoW clearing and access construction will depend primarily on the schedule for vegetation removal.

In the absence of mitigation, a direct increase to mortality risk to eggs or young birds is anticipated should clearing activities occur during the nesting period. The change in mortality risk to adults (compared to eggs/young) is expected to be relatively low due to their ability to move. Primary mitigation will be to schedule clearing of vegetation to avoid the general nesting period (April 1 to August 31), with the development and implementation of avian mitigation measures (including pre-construction avian use and nest search surveys and the implementation of buffers) as a secondary option in situations where it is not possible to temporally avoid nesting birds. Regardless of timing, pre-construction nest surveys will be conducted for species such as osprey and bald eagle that reuse their nests annually, and an appropriate buffer established based on the nest status (i.e., active or inactive).

Vehicle collisions may also have a direct effect on mortality, primarily during construction when traffic volumes are expected to be greatest. Traffic will increase as a result of the Project, particularly during construction, however the volume is anticipated to be relatively low given the scale of the Project. The relatively slow speed of traffic on access roads should provide adequate time for most species to hear or see the vehicles and move away. The low-flying behavior of some species (e.g., upland game birds and many passerines) may make them more susceptible to vehicle collisions, particularly during fall when juveniles are dispersing or where roads are adjacent to preferred habitats of low foraging species (e.g., rusty blackbird). Overall, however, vehicle collisions with avifauna are anticipated to be minimal.

Pole installation and conductor stringing have the potential to result in a change in mortality risk for some avifauna through direct collision. Migrating birds may also be attracted to and collide with lights or structures near lights. However, as indicated previously, the amount of on-site lighting will be reduced during construction and exterior lights will be shielded from above as needed.

Indirect mortality risk during construction includes the potential for increased poaching, hunting and/or predation because of increased access provided by the creation of roads and the RoW corridor itself. Impacts from increased poaching and hunting are primarily limited to upland game species and waterfowl and other waterbirds. The RoW will parallel existing roads and pathways for approximately 93% of the proposed route, thereby reducing potential impacts from increased access.

Cleared RoWs may provide indirect mortality risk to passerines by providing increased feeding opportunities for larger avian predators. Merlin (*Falco columbarius*), for example, prefer open habitats and edges for feeding, where they sit and wait for prey (primarily passerines), which they catch in the air (Warkentin and Newton 2009). Falk et al. (2011) found higher rates of predation on birds in agriculturally fragmented landscapes compared to continuously forested habitats, however there was no effect of distance to edge in either habitat type suggesting that forest patch size in the area studied was not great enough to protect breeding birds from the increased number of generalist predators.

Operations

Project effects on the mortality risk to avifauna will occur primarily during Project construction, however mortality risk may be increased during operations due to the potential for electrocution and collisions with overhead transmission structures. Site lighting during operations will be restricted to the existing terminal station and is therefore not anticipated to increase mortality risk during operations.

Birds colliding with transmission lines could result in injury or mortality. Local movements of birds between preferred habitats are expected to be below power lines, and the cleared RoW would naturally provide a separation between the lines and adjacent trees/perches which may allow for easier detection and avoidance. Generally, the flight heights of diurnal migrants (i.e., waterfowl, waterbirds, raptors) vary more than those of nocturnal migrants (i.e., passerines), however most migrating birds would be expected to be higher than powerline infrastructure and are therefore not prone to collision during flight. Luzenski et al. (2016) observed that migrating raptors responded to a new, higher powerline by adjusting their flight height (i.e., flew higher) and there were no collisions observed over nearly 4,500 recorded crossings. In Europe, D'Amico et al. (2019) identified species more susceptible to mortality through collisions as "large, long-lived and slow-reproducing birds, often habitat specialist with hazardous behavioral traits (especially flight height and flocking flight), with high spatial exposure to collision risk with powerlines and unfavorable conservation status". In Spain and Portugal where the research was conducted, large waterbirds and large raptors (including Osprey) were highlighted as particularly susceptible.

Mortality risk may also increase when birds perch on towers or lines and are electrocuted. Electrocution may occur if a bird touches two conductors, or a conductor and an energized device simultaneously. The small size of passerines makes the potential for them being electrocuted relatively low. For species with larger wing spans, such as raptors, the risk would be greater.

The Project has been designed to reduce the overall footprint and will be approximately 40 km long. Devices such as the flapper flight diverter have been shown to reduce the mean avian mortality rate associated with transmission lines by 70.2% under a variety of different environmental conditions (Ferrer et al. 2020). NL Hydro does not typically install bird flight diverters on 69.5 kV transmission line infrastructure, although the feasibility of installing such devices would be investigated should locations of high mortality risk be identified during the course of operations.

Decommissioning

Line decommissioning will involve a variety of equipment (e.g., excavators) to remove assets. Once all materials have been removed, the RoW will be allowed to regenerate.

Increased traffic and sensory disturbances during decommissioning may increase the mortality risk of avifauna. However, with the application of mitigation measures, including speed limits and reducing the amount of site lighting, the likelihood of an increased mortalities will be low.

In addition, the removal of site infrastructure has the potential to result in mortality for avifauna species using these structures for nesting (e.g., Osprey). Proven mitigation including the timing of activities to avoid the breeding season or the implementation of additional mitigation measures will reduce the potential for removal activities to increase avifauna mortality risk.

5.3.6 Summary of Residual Effects

Successful application of standard (Section 2.11) and specific (Section 5.3.4) mitigation measures is key to reducing the magnitude and duration of potential effects on avifauna habitat and mortality risk. Potential residual environmental effects (i.e., following application of mitigation measures) of the Project on habitat change and mortality risk to avifauna are discussed below.

5.3.6.1 Change in Habitat

Changes in avifauna habitat will be mainly adverse, as there will be a loss of 1 km^2 of habitat during construction of the RoW. This estimate is conservative, as it assumes that all of the 25 m-wide RoW will be cleared, however in reality some shrub habitat will remain or be created as a result. Sensory disturbances will affect habitat use throughout the life of the Project, with effects anticipated to extend into portions of the LAA. The loss / alteration of habitat will be lowest for waterfowl and other waterbirds because the RoW route was designed to avoid primary habitat for these species (i.e., wetland, open water and shoreline habitats), however the loss / alteration of habitat for species, including SAR, is expected to be minimal. Habitat may also be lost or altered during decommissioning. Following decommissioning, secondary succession will result in the site gradually changing from open shrubby vegetation to forested habitats, thereby reversing most of the habitat loss.

Changes in habitat are expected to be low in magnitude, as the number of birds in general that will likely be exposed to habitat changes and/or sensory disturbances will be low and are expected to occur primarily in the LAA but may extend to portions of the RAA, with regard to edge habitat effects. Habitat changes will be continuous, long-term in duration and are expected to be reversible, as habitats are expected to recover following decommissioning.

5.3.6.2 Change in Mortality Risk

Successful application of mitigation measures is key to reducing the magnitude and duration of potential effects on the risk of mortality. The timing of clearing activities during construction of the RoW will have the single most adverse effect on mortality risk because of the increased risk of incidental mortality during the bird breeding season. There is also an increased risk of mortality during the operations and decommissioning phases due to the potential for collisions and electrocutions. Some birds such as low flying passerines and upland game birds will be more susceptible to increased mortality risk due to vehicle collisions, while larger raptors would be more prone to mortality risk from electrocutions compared to other avifauna groups. Increased access and associated hunting would primarily affect the mortality risk of upland game birds and waterfowl.

With mitigation, changes in mortality risk are expected to be low in magnitude for all avifauna groups, including SAR, because the number of direct mortalities resulting from the Project is expected to be small and to have little effect on regional populations. Mortality risk will be short-term in duration for risks associated with construction and decommissioning, and medium-term for risks associated with operations, and are expected to occur at the geographic extent of the LAA. Mortalities will occur irregularly and will be reversible following completion of the Project.

Overall, the Project is not predicted to result in a substantial decline in avifauna abundance or a substantial loss of habitat within the region. The timing of Project activities, however, is highly sensitive and construction activities should be scheduled to avoid avifauna breeding, nesting, and brood-rearing stages. Table 5.13 summarizes residual effects of the Project on avifauna.

Table 5.13 Project Residual Effects on Avifauna

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Habitat	C	A	L	LAA-RAA	HS	LT	C	R
	O	A	L	LAA-RAA	LS	LT	C	R
	D	A	L	LAA-RAA	HS	LT	C	R
Change in Mortality Risk	C	A	L	LAA	HS	ST-MT	IR	R
	O	A	L	LAA	LS	LT	C	R
	D	A	L	LAA	HS	ST	IR	R

KEY
See Table 4.2 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

5.3.7 Determination of Significance

Project-related activities may result in some localized, short- to long-term effects on habitat and mortality risk to avifauna in the Project Area and LAA, primarily from RoW clearing, collisions with vehicles or infrastructure, as well as sensory disturbance. Loss of habitat is predicted to be low in magnitude (<1 km^2 for all species, although a larger area will be altered primarily due to fragmentation), and is a conservative estimate, as it assumes that all habitat in the RoW would be lost.

Overall, with mitigation and environmental protection measures, the effects on avifauna are predicted to be not significant, as the residual environmental effects from the Project on avifauna, including SAR, do not threaten the long-term persistence, viability or recovery of an avifauna species in the RAA. Confidence in this prediction is high, based on the following considerations:

- The potential environmental effects and effect pathways for this Project are common to transmission line projects and are generally well understood.
- The mitigation measures are well understood and align with standard management practices.
- The understanding of existing conditions for avifauna is based on existing literature and supported by field surveys conducted in the region, which were used to indicate species that have the potential to occur in the Project Area.
- A conservative approach was used in estimating the amount of habitat lost due to Project construction (i.e., assumed that all habitat in the RoW would be lost).
- Indirect effects (i.e., sensory disturbances) were considered as if static over time and not influenced by other factors (e.g., season, vegetation cover, weather conditions).

5.3.8 Follow-up and Monitoring

Construction activities will be undertaken in accordance with NL Hydro's EPP. In addition, NL Hydro will require the construction contractor to provide a C-SEPP for review and acceptance by NL Hydro prior to the start of construction. The Project will have full-time OSEMs to inspect worksites and activities for conformance with the EPP, C-SEPP, and government regulations and permits. Compliance monitoring confirms that mitigation measures are properly implemented. In addition, transmission line infrastructure will be monitored periodically for avifauna nests during Project operation in accordance with Nalcor's Standard Operating Procedures for Nesting Birds in Vegetated Areas (NAL-ENV-SOP-01). This information will assist in compliance with MCBA regulations and SARA and inform NL Hydro planning and decision making around operations and decommissioning.

5.4 OTHER SPECIES AT RISK

Other SAR was selected as a VC because of the potential interactions between Project activities and SAR and their residences, as well as their ecological and cultural importance to the public, Indigenous groups, and resource managers. The Other SAR VC considers little brown myotis (*Myotis lucifugus*), northern long-eared myotis (*Myotis septentrionalis*), and the Newfoundland population of American marten (*Martes americana atrata*) (Newfoundland marten). Avifauna SAR are discussed in Section 5.3.

For the purpose of this assessment, SAR are defined as a species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL ESA, or SARA. Section 33 of SARA prohibits the damage or destruction of a residence of a SAR, defined as "the specific dwelling place, such as a den, nest or other similar area or a 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" (s.2[1]).

The protection of SAR and their residences is a legal requirement for those species listed under Schedule 1 of SARA and the NL ESA. Bats and Newfoundland marten are also regulated under the NL *Wild Life Act*.

5.4.1 Significance Definition

For the purposes of this environmental assessment, a significant adverse residual effect on other SAR is defined as one that threatens the long-term persistence, viability, or recovery of a wildlife species population in the RAA, including effects that are contrary or inconsistent with the goals, objectives, or activities of the federal *Recovery Strategy for the Little Brown Myotis (Myotis lucifugus), the Northern Myotis (Myotis septentrionalis), and the Tri-colored Bat (Perimyotis subflavus) in Canada*[1] (Environment and Climate Change Canada [ECCC] 2018a), the federal *Recovery Strategy for the American Marten (Martes americana atrata), Newfoundland population, in Canada* (Environment Canada 2013), the provincial *Recovery Plan for the Threatened Newfoundland Population of American Marten (Martes americana atrata)* (The Newfoundland Marten Recovery Team 2010), or other action plans and management plans.

5.4.2 Existing Conditions

An overview of the environmental setting is provided in Section 3. A detailed description of the existing conditions for other SAR can be found in Section 4.3.3 of the Flora and Fauna Baseline Study (Appendix D). Wildlife SAR likely to occur in or near the RoW include Newfoundland marten and little brown myotis and long-eared myotis (Marathon 2020). The Newfoundland population of American marten is listed as Threatened under SARA and the NL ESA, and the AC CDC ranks marten as S3 (or Vulnerable). Martens have been recorded in the vicinity of the Project as confirmed by AC CDC (2020) data and observations during field surveys conducted for the Valentine Gold Project (Marathon 2020). Segments of the proposed RoW overlaps proposed critical habitat for the Newfoundland marten. The little brown myotis and northern long-eared myotis are currently listed as Endangered under SARA, following an emergency listing in 2014. A portion of the RoW is within a 10 km grid cell where a hibernaculum for myotis species is known to exist (AC CDC 2020).

5.4.3 Project-Component Interactions and Effects Pathways

Table 5.14 lists the potential Project effects on other SAR and provides a summary of the Project effect pathways and measurable parameters to assess potential effects. Potential environmental effects and measurable parameters were selected based on review of recent environmental assessments for similar projects in NL and other parts of Canada and professional judgment.

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[1] Tri-colored bat is not known to occur in NL (COSEWIC 2013) and is therefore not considered in the assessment of other species at risk.

Table 5.14 Potential Effects, Effect Pathways and Measurable Parameters for Other Species at Risk (Bats and Marten)

Potential Effect	Effect Pathway	Measurable Parameter(s) and Units of Measurement*
Change in habitat	• Direct and/or indirect loss or alteration of habitat due to vegetation clearing, sensory disturbance, and/or edge effects.	• Amount (km^2) of habitat directly or indirectly lost or altered.
Change in mortality risk	• Direct change in mortality risk due to vegetation clearing activities, vehicular collisions, and indirect change in mortality risk due to predation and harvest pressure	• Interactions with Project infrastructure, vehicles and equipment • Increase in predation, hunting and/or poaching because of improved access or other habitat changes
*Considered qualitatively in this assessment		

Project activities that might interact with other SAR for each potential effect are identified in Table 5.15. These interactions are indicated by check marks and are discussed in detail in Section 5.4.5. Justification where no interaction is predicted (dash marks) is provided following the table.

Table 5.15 Project Interactions with Other Species at Risk (Bats and Marten)

Physical Activities	Effects to be Assessed	
	Change in Habitat	Change in Mortality Risk
Construction		
Terminal Station Upgrades	–	–
Access Road Construction	✓	✓
RoW Clearing	✓	✓
Pole Installation and Conductor Stringing	✓	✓
Testing and Commissioning	–	–
Operations		
Presence and Operation of TL271	✓	✓
Asset Inspection and RoW Management	✓	✓
Decommissioning		
Dismantling and Removal of Equipment	✓	✓
Notes: ✓ = Potential interaction; – = No interaction		

Construction activities associated with upgrading the existing terminal station will occur primarily within the existing footprint and are therefore expected to have a negligible effect on change in habitat loss and mortality risk for other SAR. Testing and commissioning during Project construction are also anticipated to have negligible effects on other SAR. Project activities that are not predicted to interact with other SAR are not considered further in the assessment.

Residual effects of the Project on habitat and mortality risk for SAR expected as a result of RoW clearing and access construction, pole installation and conductor stringing, the presence and operation of TL271 (including RoW maintenance), and Project decommissioning are discussed in Section 5.4.5. Sensory disturbances (e.g., noise, light) associated with upgrade activities will occur over a short duration and may be mitigated with standard (Section 2.11) and species-specific (Section 5.4.4) measures. While some Project activities may have effects on SAR and their habitat, standard mitigation measures and environmental protection practices (Section 2.11) and species-specific measures (Section 5.4.4) will be implemented to reduce or avoid these interactions.

5.4.4 Mitigation

In addition to the standard mitigation measures to be implemented for Project construction, operations and decommissioning discussed in Section 2.11, the following specific measures will be implemented to avoid or reduce adverse effects on other SAR:

- Vegetation removal and herbicide application is planned to occur outside of the general nesting period for migratory birds (April 1 to August 31). This restricted activity period will also mitigate potential effects of the Project on change in habitat for bats and marten as it overlaps sensitive activity periods for bats (i.e., maternity roosting) and marten (i.e., natal denning and early rearing).
- The discovery of roosts, hibernacula, or dens by on-site personnel will be reported to the OSEM and Environmental Services Manager and appropriate action or follow-up will be guided by consultation with a qualified biologist and/or federal or provincial regulators.
- Shrub or scrub (i.e., non-tree) vegetation will be allowed to establish along transmission corridors, to the extent feasible, to promote their use by prey for other SAR.
- Observations of bat colonies, potential hibernacula sites, sick or dead bats will be reported to the provincial Wildlife Division at 709-637-2025. Bat sightings may also be reported to the toll-free bat hotline: 1-833-434-2287 (BATS).
- Caves, sinkholes, fishers, or other underground cavities that are identified as a result of Project activities will be reported to Wildlife Division and further inspected for signs of previously overwintering bats.
- Whenever possible, buckets, garbage bins, tubs and containers will be kept covered. Bats may be attracted to standing water in open containers and may fly into them. As bats cannot climb slippery surfaces and are unable to fly straight up into the air, they can become trapped.
- Travel within the RoW for inspection and maintenance of the transmission line will be restricted to existing or approved access routes.
- Hunting or harassment of SAR and other wildlife by on-site Project personnel will be prohibited.
- Work activities will be undertaken in a manner that does not deliberately harass wildlife, including SAR.
- Safe driving practices, including speed limits, will be implemented to avoid collisions with SAR and other wildlife.

5.4.5 Assessment of Residual Effects

5.4.5.1 Change in Habitat

Construction

Direct and indirect changes in habitat due to construction of TL271 have the potential to affect SAR. Direct change in habitat will occur primarily through clearing of the RoW, access roads, and areas for pole installation. However, the amount of direct habitat loss due to access road construction is expected to be reduced by the use of existing access roads and trails, as appropriate, to transport construction equipment and materials to select staging sites along the transmission line route. The total length of new access currently planned along the RoW is approximately 950 m, with the shortest route being approximately 40 m and the longest length being approximately 300 m. Indirect change in habitat for other SAR can also result from sensory disturbance from noise and lighting associated with Project construction.

Direct loss of habitat for other SAR will occur as a result of RoW clearing and access construction. During the construction phase, there is potential for important habitat features, including bat roosting sites and hibernacula and marten denning sites, to be altered or destroyed. Approximately 1 km^2 of habitat is expected to be lost or altered as a result of RoW clearing for the Project, which is predicted to have a small measurable effect on habitat availability at the local scale and little or no measurable effect at the regional scale. Table 5.16 summarizes the main habitat types used by other SAR and the amount that will be lost or altered due to the Project. The Project will affect both forest and wetland habitat types used by bats and marten. Forest and wetland habitat types account for approximately 54% and 38% of the RoW, respectively.

Table 5.16 Habitat Types in the RoW and LAA and their use by Other Species at Risk

Habitat Type	Area in LAA (km^2 / %)	Area in RoW (km^2 / %)[1]	Little Brown Myotis	Northern Long-eared Myotis	Newfoundland Marten
Forest Habitat Types					
Balsam Fir Forest	4.46 / 12.1	0.12 / 13.5	✓	✓	✓
Kalmia-Black Spruce Woodland	2.15 / 5.8	0.04 / 4.0	✓	✓	✓
Mixedwood Forest	7.20 / 19.5	0.19 / 21.2	✓	✓	✓
Regenerating Forest	5.06 / 13.7	0.14 / 15.2			✓
Wetland Habitat Types					
Alder Thicket	4.12 / 11.2	0.11 / 12.6			
Black Spruce Forest	6.17 / 16.7	0.16 / 18.4	✓	✓	✓
Open Wetlands	2.18 / 5.9	0.02 / 2.6	✓		
Riparian Thicket	0.06 / 0.1	0			
Wet Coniferous Forest	2.00 / 5.4	0.04 / 4.2	✓	✓	✓

Table 5.16 Habitat Types in the RoW and LAA and their use by Other Species at Risk

Habitat Type	Area in LAA (km^2 / %)	Area in RoW (km^2 / %)[1]	Little Brown Myotis	Northern Long-eared Myotis	Newfoundland Marten
Sparsely Vegetated, Naturally Non-vegetated, and Anthropogenically Altered / Disturbed Habitat Types					
Open Water	2.36 / 6.4	0.01	✓	✓	
Exposed Sand / Gravel Shoreline	0.14 / 0.4	0	✓		
Anthropogenic	0.97 / 2.6	0.07 / 7.4	✓		
Source: Adapted from Marathon (2020) [1]Area in PA is the 25 m RoW for the preferred route.					

Little brown myotis and northern long-eared myotis hibernate in underground openings, including caves, abandoned mines, wells, and tunnels (ECCC 2018a). A portion of the RoW is within a 10 km grid cell where a hibernaculum for little brown myotis is known to exist (AC CDC 2020). There is a known bat hibernaculum located approximately 3 km from the RoW (Government of NL 2020d as cited in Marathon 2020), corresponding to the 10 km grid cell provided by AC CDC. Preferential summer roosting habitat occurs in older forest stands with increased snag availability (ECCC 2018a). Foraging habitat for little brown myotis is associated with open habitats (e.g., ponds, roads, open canopy forests) (Segers and Broders 2014), although this species has been recorded gleaning prey within forests and using vegetation along riparian edges (Rogers et al. 2006). Northern long-eared myotis have been observed foraging along forest covered creeks and forested road corridors (Owen et al. 2003; Henderson and Broders 2008). Threats to little brown myotis and northern long-eared myotis include habitat loss or alteration due to commercial development, energy production and mining, biological resource use, human intrusions and disturbance, and natural system modifications and pollution (ECCC 2018a).

The Recovery Plan for Newfoundland marten on the Island of Newfoundland identifies an area of critical habitat of approximately 6,200 km^2, based on Newfoundland marten occurrences and habitat suitability (The Newfoundland Marten Recovery Team 2010), of which a portion overlaps segments of the proposed transmission line route. Along with mortality from trapping and snaring, habitat loss or alteration is one of the main factors affecting marten populations (The Newfoundland Marten Recovery Team 2010). Habitat may be altered and become less suitable for marten through human activities including forest harvesting, mining operations, hydroelectric projects, construction of roads and power lines, and natural disturbances (e.g., infestation by insects, forest fire). Altered habitat may reduce the availability of breeding habitat, including denning sites, as well as resting sites and prey availability (Fuller and Harrison 2005; Godbout and Ouellet 2010), which may affect marten survival (Snyder and Bissonette 1987).

Project construction activities may also result in a change in habitat through fragmentation (i.e., discontinuity in preferred habitat), leading to altered movement of other SAR between resulting habitat patches. Utility corridors bisecting established communing routes between foraging and roosting sites can act as barriers to bat movement and result in habitat fragmentation. Although utility and service lines (e.g., hydro corridors and seismic lines) can create edge habitat used by bats for foraging and commuting (Grindal 1996; Grindal and Brigham 1999; Hogberg et al. 2002), evidence indicates that bat activity decreases with increasing distance from the tree line into an open area (ECCC 2018a). Little brown myotis and northern long-eared myotis have been shown to be least active in the centre of cutblocks up to 30 m from the forest edge (Hogberg et al. 2002). It is possible that utility and service lines with a wide-open area may alter bat movement and foraging behaviour (ECCC 2018a).

Marten occurrence has been shown to be substantially affected by seismic line density at the home range scale, with the mean probability of occurrence falling from almost 60% in home ranges with low seismic line density (0 km/km^2) to approximately 20% in home ranges with the highest density of seismic lines (26.4 km/km^2) (Tigner et al. 2015). Species, such as marten, that are dependent on interior and mature forests may be most adversely affected by edges. Many wildlife species select habitats with shrub or tree cover for travel, as these habitats provide increased security cover from predators (including humans). The proposed route for the transmission line is primarily aligned with existing roads and trails to reduce the amount of new edge effects and disturbance caused by Project construction; however, the creation of a 25 m RoW will result in a wider gap in vegetation cover which may alter or impede movement for species, such as marten, that avoid open areas due to increased predation risk (Moriarty et al. 2015).

Noise and lighting from equipment, vehicles, and buildings during construction, including RoW clearing, RoW access construction, pole installation, and conductor stringing, have the potential to result in indirect loss of habitat for SAR. Wildlife are expected to avoid habitat subject to high sensory disturbance, although responses are known to vary by species (Schaub et al. 2008; Naguib 2013; Shannon et al. 2016). Bats are expected to alter behaviour patterns through attraction to or disorientation by lighting at the Star Lake Terminal Station and construction equipment and buildings along the transmission line (Stone et al. 2009; Stone 2013). Little brown myotis have been shown to be attracted to artificial lights where insect prey are concentrated (ECCC 2018a). Some bat species avoid lights, including illuminated travel corridors, resulting in alteration of their commuting routes between foraging and roosting habitat (Stone et al. 2009; Stone 2013). Artificially lit corridors and structures may act as barriers to bat movement and result in habitat fragmentation for foraging bats (Stone et al. 2015). However, Project construction activities are not expected to extend beyond daylight hours so the amount of on-site lighting will be limited and incremental lighting associated with the Star Lake Terminal Station modification will be low. Sound levels related to Project construction will vary by location as activities change in position and intensity along the RoW but will involve the operation of chain saws, vehicles, and heavy machinery. While there is the potential for noise-related residual effects on other SAR during construction, such disturbances are expected to be short-term in duration and local in geographical extent. Vegetation clearing outside of the general nesting period for migratory birds (April 1 to August 31; Environment Canada 2018) will also reduce sensory disturbance to bats as this period overlaps the sensitive maternity roosting period. Regular maintenance will be performed on vehicles and other equipment to reduce air and sound emissions.

Operations

Direct effects on habitat will occur primarily during the construction phase of the Project. The presence and operation of the transmission line and routine inspections will occur in areas where other SAR are expected to have been already displaced as a result of vegetation clearing during Project construction. Sensory disturbances from Project noise and lighting during RoW management as well as mitigation measures are as discussed for the construction phase.

Vegetation management during operations will include the application of herbicides and manual cutting of brush and is anticipated to occur four to five years after initial RoW clearing, and at a frequency of every five to seven years thereafter. Herbicides can have an indirect effect on insects that are consumed by bats by changing the abundance and composition of plant communities upon which the insects rely (Guynn et al. 2004). Barré et al. (2018) showed that bat activity was 3.6-9.3 times higher at sites using the organic tillage system compared to sites using the tillage system with herbicides. Marten may be indirectly affected by herbicide use through changes in prey abundance and diversity. Marten prey on insects, small mammals and bird eggs and are also known to consume vegetation (Gosse and Hearn 2005; Government of NL 2019a). Changes in vegetation composition and cover due to the application of herbicides may temporarily affect small mammal populations (Sullivan et al. 1998) that are prey for marten. Use of herbicides for the Project will be restricted in buffer areas around watercourses.

Decommissioning

TL271 will be decommissioned once all power requirements for the Valentine Gold Project have been met. Line decommissioning is expected to use tracked equipment to remove all assets. Residual effects on other SAR will primarily be sensory disturbances as described for Project construction.

Shortly after dismantling and removal of equipment, the RoW is expected to become covered in low vegetation with the area remaining open. Over the long term, re-establishment of mature forest is expected to provide moderately suitable habitat for bats and marten that require older forest stands, although some previously vegetated communities within the RoW may not return to existing conditions (e.g., the loss of old forest).

5.4.5.2 Change in Mortality Risk

Construction

Site preparation activities have the greatest potential to result in adverse effects on the mortality risk of other SAR through the direct loss of habitat, including bat roosting sites and hibernacula and marten denning sites. Direct change in mortality risk is expected to occur if other SAR interact with RoW clearing, RoW access construction, and pole installation and conductor stringing. Vegetation clearing outside of the general nesting period for migratory birds will also reduce the risk of mortality for other SAR with the potential to breed, roost, or den within the Project Area during this period.

Direct effects of the Project can also occur through wildlife-human conflict, including collisions with vehicles. Traffic volumes are expected to be highest during the construction phase. Species that are difficult for drivers to see, such as nocturnal bats and marten, are susceptible to direct mortality caused by vehicles and machinery. Bats are at increased risk of mortality from collision with vehicles when crossing roads between foraging and roosting sites (Zimmerman and Glanz 2000; Russell et al. 2009). In deforested areas or where the canopy height has been reduced, bats have been shown to travel closer to the ground, increasing the risk of collision with vehicles (Russell et al. 2009). Although traffic will increase as a result of the Project, the volume of traffic is anticipated to be relatively low given the scale of the

Project. Mitigation measures including speed limits and safe driving practices will be implemented to reduce the risk of wildlife-vehicle collisions.

Lighting of construction equipment and infrastructure and additional lighting at the Star Lake Terminal Station have the potential to increase mortality risk for bats, although since construction activities will be primarily undertaken during daylight hours, additional lighting for Project construction is expected to be minimal. Localized concentrations of insect prey at lit structures can attract bats, which may increase the risk of mortality due to collisions with lighting infrastructure or vehicles, although not all bats are attracted to lit structures (Stone 2013). Artificial lighting can also result in bat mortality due reduced foraging time as a result of delayed emergence or roost abandonment (Laidlaw and Fenton 1971; Boldogh et al. 2007; Stone 2013). Bats that avoid illuminated corridors may experience increased mortality risk resulting from higher energy expenditure flying longer alternate routes between foraging and roosting sites (Stone 2013).

Lack of proper waste management practices can result in human-wildlife conflict with removal or destruction of nuisance animals. Risk of mortality associated with waste management practices will be mitigated so that potential residual effects will be reduced to negligible levels. Project waste management will comply with provincial requirements. In addition, the risk of wildlife-human conflicts will be reduced by prohibiting Project personnel from feeding and harassing wildlife.

Operations

Installed transmission line poles and conductor wires have the potential to result in a change in mortality risk for some SAR through direct collision, although there is a lack of literature on bat fatalities from power line collision. Bats have been found incidentally during bird mortality searches along transmission and distribution powerline corridors (Dedon et al. 1989; Manville 2016). Orbach and Fenton (2010) cite anecdotal reports of bat collisions with other stationary objects such as television towers.

Indirect effects on mortality risk may occur if the RoW results in an increase in human or predator access. Once operational, the Project has the potential to result in incidental mortality of Newfoundland marten as a result of increased access for trappers and hunters, although the increase in access will be low given existing linear features in the area and the proximity of the RoW to existing access roads along approximately 93% of its length. Trapping of marten has been prohibited on the Island of Newfoundland since 1934, although trapping of other furbearer species is permitted. There is potential for non-targeted mortality of Newfoundland marten during legal trapping of other furbearers. Trapping and snaring has been shown to account for close to 50% of marten mortalities in the Little Grand Lake/Red Indian Lake area (Hearn 2007). The Project Area is within the boundaries of the Red Indian Lake Modified Snare and Trapping Area, within which trapping for other furbearers is permitted only using legal snare wire (i.e., 6-strand picture cord or 22-gauge brass wire) as it is more effective at releasing accidentally snared marten (Government of NL 2019b). Best Management Practices developed by the provincial government to reduce non-targeted marten mortality include restrictions on areas where snaring and trapping are permitted, restrictions on the trapping techniques that can be employed, and development of snaring techniques that reduce the likelihood of Newfoundland marten being killed in snares (Government of NL 2020c). Increased linear feature density (e.g., increases in transmission line RoWs, roads) changes predator-prey interactions by allowing access and by opening up lines-of-sight for predators and human hunters. Increased linear feature density can also increase the potential for recreational activities (e.g., all-terrain vehicle use, snowmobiling) in the Project Area which could result in an increased risk of wildlife mortality through wildlife-vehicle collisions and human-wildlife conflicts. The Project-related increase in linear feature density is, however, limited since the Project parallels existing linear features (i.e., highways, access roads and trails) for approximately 93% of the route.

Decommissioning

Typical line decommissioning involves using tracked equipment, such as excavators and tracked off-road construction vehicles, to remove assets. Once materials have been removed, the access to the RoW can be rehabilitated and culverts / bridges can be removed (if required).

Increased vehicle traffic and sensory disturbances from light and noise during decommissioning may increase the risk of mortality for other SAR, particularly for individuals that have re-populated the RoW and adjacent habitat. However, with the implementation of applicable mitigation measures, including speed limits, reducing the amount of site lighting, and undertaking decommissioning activities outside of sensitive activity periods, the likelihood of an increased risk of mortality is expected to be low.

5.4.6 Summary of Residual Effects

Application of standard (Section 2.11) and species-specific (Section 5.4.4) mitigation measures is key to reducing the magnitude, timing, and duration of potential Project effects on habitat and mortality risk for other SAR. Potential residual effects of the Project (i.e., following the application of mitigation measures) on change in habitat and change in mortality risk for other SAR is summarized below and in Table 5.17.

5.4.6.1 Change in Habitat

Direct change in habitat will occur primarily through clearing of the RoW, access roads, and areas for pole installation. Project construction activities may also result in a change in habitat through fragmentation of suitable habitat for other SAR. Sensory disturbances (e.g., noise and lighting from equipment, vehicles, and buildings) will affect habitat use throughout Project phases. Implementation of mitigation measures outlined in Section 2.11 and Section 5.4.4 (e.g., alignment of the transmission line with existing linear features, reducing the amount of on-site lighting) is expected to reduce residual Project effects of change in wildlife habitat for other SAR.

Change in habitat for other SAR will be adverse, as there will be a loss of approximately 1 km^2 of habitat for construction of the transmission line. This is a conservative estimate as it assumes that all of the 25 m-wide RoW will be cleared; however, some shrub habitat may remain or be created as a result of construction and decommissioning activities. Residual effects of change in habitat are expected to be moderate in magnitude during construction and low in magnitude during operations and decommissioning, with effects anticipated to extend into portions of the LAA. Change of habitat is predicted to have a small measurable effect on habitat availability at the local scale and little or no measurable effect at the regional scale. Activities for all Project phases are scheduled to occur during sensitive activity periods for bats and marten. Residual effects of change in habitat will be continuous throughout all Project phases and long-term in duration, extending beyond the operations phase. Following decommissioning, secondary succession will result in cleared areas, including the RoW, gradually changing from open shrubby vegetation to forested habitats, thereby reversing most of the habitat loss. Although localized changes are predicted in movement patterns of SAR, adverse effects are spatially limited and reversible.

5.4.6.2 Change in Mortality Risk

The primary effect mechanism for change in mortality risk associated with the Project is alteration or destruction of bat roosting sites and hibernacula and marten denning sites during site preparation activities including RoW clearing, RoW access construction, and pole installation and conductor stringing. Vegetation clearing outside of the general nesting period for migratory birds will also reduce the risk of mortality for other SAR with the potential to breed, roost, or den within the Project Area during this period. There is also an increased risk of mortality through wildlife-human conflict, including collisions with vehicles and increased hunting pressure and predator access, and sensory disturbance from Project noise and lighting. Implementation of additional mitigation measures outlined in Section 2.11 and Section 5.4.4 (e.g., speed limits, reducing the amount of site lighting) is expected to reduce residual Project effects of change in wildlife habitat for other SAR. Although there are several interactions that may result in increased mortality risk for other SAR, the interactions are primarily associated with specific, finite activities occurring during the construction phase (e.g., vegetation clearing) that include the application of mitigation measures to avoid or reduce adverse effects. The potential increase in mortality risk associated with human and predator access is predicted to be low since the proposed route for the transmission line is aligned with existing access roads to reduce the amount of new disturbance caused by Project construction.

With mitigation, change in mortality risk is expected to be moderate in magnitude during construction and low in magnitude during operations and decommissioning, with effects anticipated to extend into portions of the LAA. Effects on mortality risk for other SAR are expected to be short-term in duration during construction and decommissioning and medium-term during operations, occurring at irregular intervals. Although clearing will occur during a lower period of sensitivity for bats and marten, in general, other Project activities may occur during sensitive activity periods. Residual effects of change in mortality risk are anticipated to be reversible.

Table 5.17 Project Residual Effects on Other Species at Risk (Bats and Marten)

Residual Effect	Residual Effects Characterization							
	Project Phase	Direction	Magnitude	Geographic Extent	Timing	Duration	Frequency	Reversibility
Change in Habitat	C	A	M	LAA	HS	LT	C	R
	O	A	L	LAA	HS	LT	C	R
	D	A	L	LAA	HS	LT	C	R
Change in Mortality Risk	C	A	M	LAA	HS	ST	IR	R
	O	A	L	LAA	HS	MT	IR	R
	D	A	L	LAA	HS	ST	IR	R

KEY
See Table 4.2 for detailed definitions

Project Phase
C: Construction
O: Operation
D: Decommissioning

Direction:
P: Positive
A: Adverse
N: Neutral

Magnitude:
NMC: No Measurable Change
L: Low
M: Moderate
H: High

Geographic Extent:
PA: Project Area
LAA: Local Assessment Area
RAA: Regional Assessment Area

Timing
NS: No sensitivity
MS: Moderate sensitivity
HS: High sensitivity

Duration:
ST: Short-term
MT: Medium-term
LT: Long-term

N/A: Not applicable

Frequency:
S: Single event
IR: Irregular event
R: Regular event
C: Continuous

Reversibility:
R: Reversible
I: Irreversible

5.4.7 Determination of Significance

With implementation of mitigation and environmental protection measures, residual effects of the Project on other SAR are predicted to be not significant. Residual effects are not expected to threaten the long-term persistence, viability, or recovery of other SAR in the RAA and are also not expected to contravene goals, objectives, or activities of recovery strategies, recovery plans, or management plans for SAR. Confidence in this prediction is high, based on the following considerations:

- The understanding of existing conditions for other SAR is based on existing literature and supported by field surveys undertaken in the region, which were used to indicate species that have the potential to occur in the Project Area.
- The potential Project effects and effect pathways are common to transmission line projects and are generally well understood.

- The mitigation measures outlined in Section 2.11 and Section 5.4.4 are well understood and align with standard management practices.
- A conservative approach was used in estimating the amount of habitat lost due to Project construction (i.e., assumed that all habitat in the RoW would be lost).

5.4.8 Follow-up and Monitoring

Construction activities will be undertaken in accordance with NL Hydro's EPP. In addition, NL Hydro will require the construction contractor to provide a C-SEPP for review and acceptance by NL Hydro prior to the start of construction. The Project will have full-time OSEMs to inspect worksites and activities for conformance with the EPP, C-SEPP, and government regulations and permits. Compliance monitoring confirms that mitigation measures are properly implemented. No additional follow-up and monitoring is proposed for other SAR.

6.0 CUMULATIVE EFFECTS ASSESSMENT

6.1 CUMULATIVE EFFECTS SCOPING

An assessment of cumulative environmental effects is carried out where residual environmental effects of the Project overlap with residual environmental effects from other projects or activities. Sources of potential cumulative effects (e.g., past, present and reasonably foreseeable physical activities) are presented in Table 6.1. Of particular relevance for this cumulative effects assessment is the Valentine Gold Project proposed by Marathon, and construction of TL271 is dependent on the Valentine Gold Project receiving regulatory approval to proceed. Residual effects from the Valentine Gold Project are predicted to overlap spatially and temporally with residual effects of the Project. Figure 6-1 shows the location of mining and exploration activities, hydroelectric development, and existing linear features which are present in the Caribou RAA. Figure 6-2 focuses in on the Other VC RAA (Red Indian Lake subregion) used for the cumulative effects assessment for the remaining VCs. At this scale, it is easier to see cumulative surface disturbances from existing and proposed land uses in the vicinity of the Project Area.

Table 6.1 Scoping of Other Past, Present and Likely Future Projects and Activities for Cumulative Effects

Physical Activity	Description	Spatial and Temporal Overlap Considerations
Mining and Exploration	Mining is one of the largest and oldest industries in NL with the history of mining in the cumulative effects RAA dating back to prospecting activities in 1905, and construction of the first base metals (copper, zinc and lead) mine in 1926 by the Buchan Minerals Corporation. Exploration has occurred near Valentine Lake as a precursor to the Valentine Gold Project, which is the gold mine development for which TL271 is intended to supply. Marathon proposes to develop an open pit gold mine near Valentine Lake within the RAA. The proposed Valentine Gold Project will consist primarily of two open pits, waste rock piles, crushing and stockpiling areas, a mill, tailings management facility, personnel accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities. Cape Ray Gold Project is another proposed mining project in the Caribou RAA. Matador Mining Ltd. is proposing to construct and operate a gold/silver mine (underground and open pit) and milling complex near Channel-Port aux Basques (approximately 135 km from the Project). The Cape Ray Gold Project is currently undergoing regulatory review and is expected to operate for approximately six years. Other mining and/or mineral exploration projects within the RAA include the decommissioned Buchans Barite Mine (37 km north of the Project), the decommissioned Buchans Mine (38 km north) and the ongoing mineral exploration project, Buchans-Mary March Project (40 km northeast).	Mining activities in the Caribou RAA have occurred in the past and will continue beyond the life of the Project. The purpose of TL271 is to provide electrical power to the proposed Valentine Gold Project. The proposed TL271 RoW will intersect with the mine access road and the RoW will terminate at the mine site. Components and activities of TL271 and the Valentine Gold Project are therefore predicted to overlap spatially and temporally.
Forestry	Forestry has been an integral part of the NL economy and a substantial portion of the province's forestry industry was once concentrated in the central area of the Island of Newfoundland to support the construction of the trans-island railway which was completed in 1898.	Forestry activities in the Caribou RAA have occurred in the past and will continue beyond the life of the Project. The Project Area is located within Forest Management Districts 12 and 13 within which there is past, current and proposed future timber harvesting, silviculture activities, and access road construction/operation.
Hunting, Trapping and Outfitting	Hunting provides recreational opportunities for residents and non-residents, and contributes to the province's wildlife management programs and economy through local spending, and the outfitting industry (NL Department of Fisheries and Land Resources 2019). Primary species of interest for hunting are moose, caribou, black bear, small game and migratory birds. Small game (e.g., snowshoe hare) are also subject to trapping activity.	Hunting, trapping and outfitting activities in the Caribou RAA have occurred in the past and present and are expected to occur beyond the life of the Project. The Project Area overlaps with Fur Zone 7 and is within Fur Bearing Trap Line Areas 83 and 239.

Table 6.1 Scoping of Other Past, Present and Likely Future Projects and Activities for Cumulative Effects

Physical Activity	Description	Spatial and Temporal Overlap Considerations
Angling/Fishing	Inland waters are divided into scheduled salmon rivers, scheduled rainbow and brown trout waters, and nonscheduled inland waters. Angling occurs on a number of waterbodies in the RAA, particularly for Atlantic salmon, ouananiche, and brook trout. Arctic char are also targeted on select waterbodies. Recreational salmon fishing occurs within the RAA, however, only as catch-and-release, with Class 0 salmon rivers present within the RAA. An outfitter operates within the LAA, offering guided, land locked salmon and brook trout fishing tours on Red Indian Lake (Notch Mountain Outfitters 2019). Additional outfitters operate in the RAA for Caribou and Other VCs.	Angling/fishing activities in the Caribou RAA have occurred in the past and present and are expected to occur beyond the life of the Project. The Project Area occurs within the Exploits River watershed and is in salmon fishing Zone 4. The proposed TL271 RoW crosses scheduled salmon rivers at multiple locations.
Off-road vehicle use (snowmobiles/ATVs)	The use of off-road vehicles occurs in the RAA on official trails, as well as through unofficial use of crown and private lands (e.g., forestry roads and powerline RoWs).	Off-road vehicle use in the RAA has occurred in the past and present and is expected to occur beyond the life of the Project.
Hydroelectric development	Central Newfoundland is an area of substantial hydroelectric development, with several hydroelectric generating stations in the RAA. The two nearest the Project include Star Lake (hydroelectric generating plant at Star Lake which was built in 1998 and is connected to the Star Lake Terminal Station) and Bay d'Espoir (includes Victoria Dam and Victoria Lake Reservoir immediately southwest of the proposed Valentine Gold Project).	Hydroelectric development has occurred in the past in the RAA and these activities are expected to continue beyond the life of the Project.
Existing linear features (e.g., roads, power lines)	Linear activities such as highways, roads and power lines occur throughout the RAA, including extensive forestry roads. These roads represent existing habitat fragmentation and open access to remote areas through use of all-terrain vehicles.	Linear features in the RAA currently exist and are expected to remain beyond the life of the Project. Access to the proposed RoW will rely heavily on existing access roads and paths. The proposed TL271 RoW will intersect with the access road currently used by Marathon to access the future mine site for ongoing exploration activities.
Modified from Marathon (2020)		

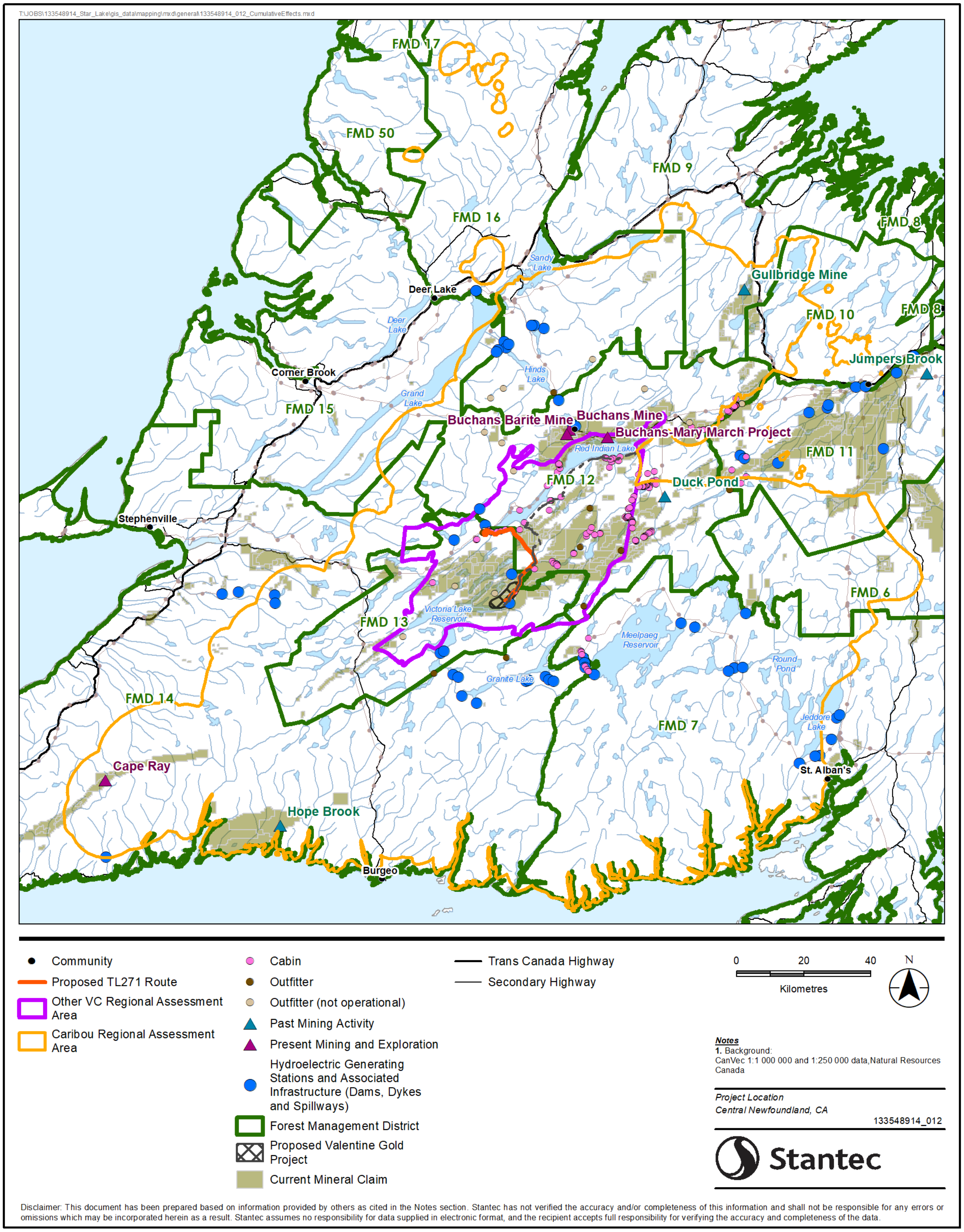

Figure 6-1 Other Projects and Activities Considered in the Caribou RAA

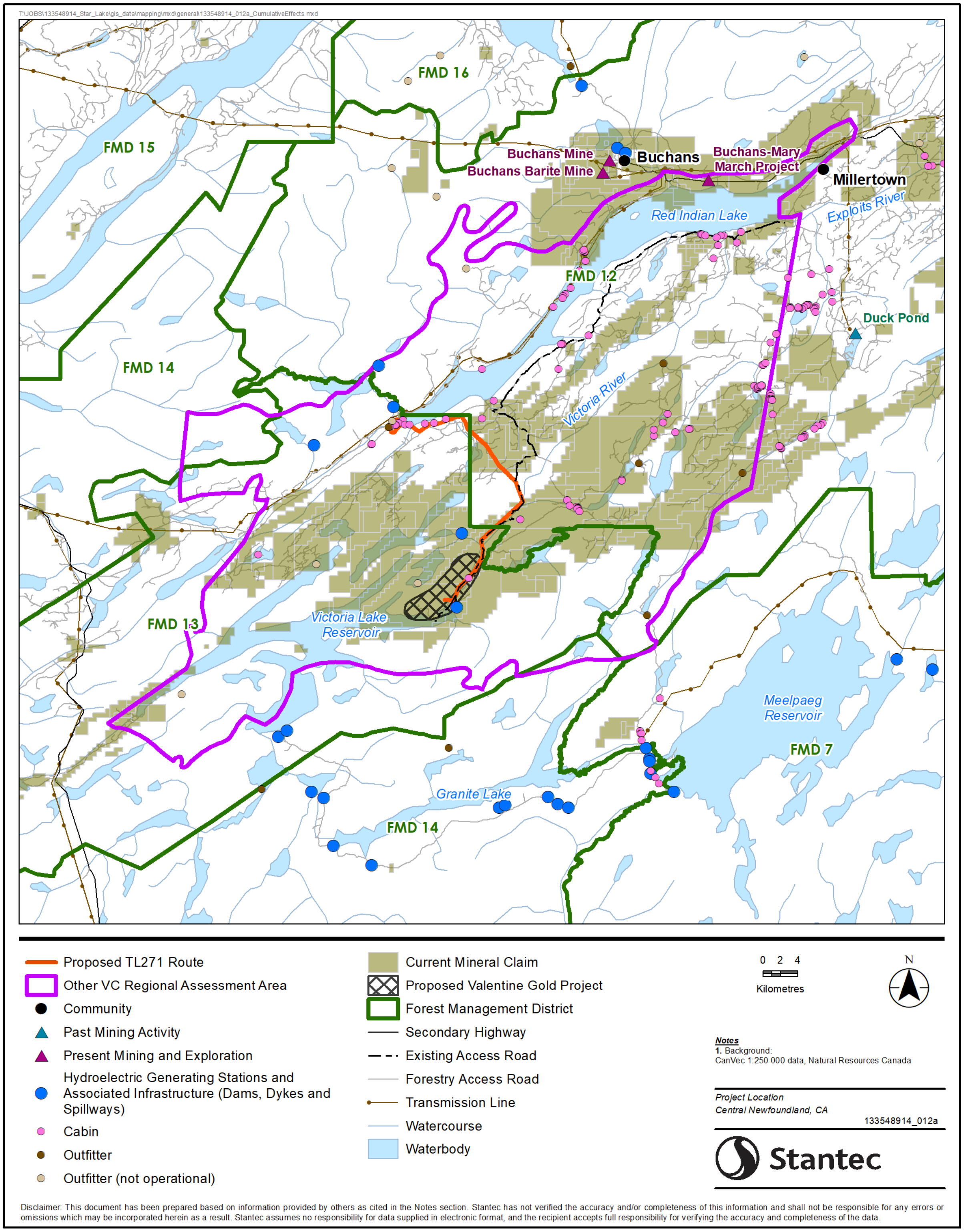

Figure 6-2 Other Projects and Activities Considered in the Other VC RAA

6.2 CUMULATIVE EFFECTS ASSESSMENT

6.2.1 Fish and Fish Habitat

Residual effects of the Project on fish and fish habitat include a change in fish habitat and a change in fish health and survival. These residual effects may combine with residual effects of other past, current and proposed future activities in the RAA to result in cumulative effects on fish and fish habitat.

Several watercourses and waterbodies in the RAA have already been modified by hydroelectric development in the region, resulting in alterations of flow and causing a direct change in habitat and fish health and survival. The presence of dam infrastructure creates obstructions to fish passage and can result in stranding of fish or fish injury, also potentially affecting fish health and survival.

In addition, mining and exploration, forestry, hunting, trapping, outfitting, cabin development and fishing activities, may contribute to cumulative effects on fish and fish habitat through the following effects pathways:

- Removal of riparian vegetation
- Alterations to stream flow
- Introduction of sediments and contaminants (e.g., herbicides)
- Direct injury or death of fish from the presence of equipment and/or use of explosives in or near water
- Increased fishing pressure due to increased access

The presence of linear features, such as roads, may increase access to fishing areas and result in a change in fish health and survival from overfishing; however, given fisheries regulations, such as catch quotas and seasonal closures, effects are anticipated to be low, affecting only individual fish and not populations.

The contribution of Project-related residual adverse effects to cumulative effects on fish habitat or fish health or survival will be negligible to low. Although the Project will involve upgrading of roads and some new access road development, due to the extensive trail network already present in the area, this is not expected to increase fishing activity in the area.

In-water works will be conducted in accordance with applicable permit conditions of approval. Erosion prevention and sediment control measures will be installed to reduce and control runoff soil erosion and transport of sediment laden water. A minimum buffer zone of natural vegetation 20 m from the high-water mark of waterbodies, watercourses and ecologically sensitive areas will be maintained around work areas, where available space poses a constraint, except where specified otherwise. If space is available, then wider buffer zones of 100 m will be maintained between construction areas and watercourses, waterbodies and ecologically sensitive areas. Where possible, in-water works will be completed inside the appropriate fisheries timing windows (June 1 – September 30). Work outside the fisheries timing windows will be done in consultation with DFO and the NL Water Resources Division.

Given the proximity of projects, the Valentine Gold Project will affect watercourses within the same watershed, although that project will be subject to the same regulatory requirements and Marathon will implement best management practices during construction and operations to reduce adverse effects on fish and fish habitat. Marathon will be required to develop and implement an Offset Plan to compensate for loss of fish habitat resulting from development of the Valentine Gold Project (Marathon 2020).

No additional mitigation is proposed to address cumulative effects on fish and fish habitat beyond the mitigation proposed to address Project-related effects. Given the negligible to low Project-related contributions to cumulative effects, it is anticipated that the resulting overall cumulative effects will not result in the alteration of fish habitat that exceeds regulatory requirements, or causes a change in the productivity or sustainability of fish populations or fisheries within the cumulative effects RAA. No significant cumulative effects on fish and fish habitat are predicted to occur as a result of the Project.

6.2.2 Caribou

The caribou population on the Island of Newfoundland has fluctuated considerably over the past century, with relatively recent declines being attributed to unsustainably high numbers that occurred in the 1990s (Government of NL 2015). Recent population estimates indicate that some caribou herds have decreased by 60-80% since the 1990s, although current trends indicate that populations in the RAA may be stabilizing (Government of NL 2019a).

Poor calf survival and poor recruitment rates appear to be important factors in population stabilization for caribou on the island. Predation rates for calves are considerably higher than for adults with approximately 90% of calf deaths attributed to predation (Ballard 1994; Lewis and Mahoney 2014; Mahoney and Weir 2009). Other limiting factors that can affect survival rates for caribou include the presence of parasites, insect harassment, climate change, hunting pressures, and habitat loss (refer to the Caribou Baseline Study, Appendix C for more information on limiting factors). Caribou are subjected to these stressors during migration and during other biologically sensitive periods (e.g., calving), which can affect population viability.

Past and present land and resource uses in the RAA have contributed to cumulative effects on the landscape and potentially have contributed to cumulative adverse effects on caribou populations, including indirectly through influencing one or more of the limiting factors described above. Caribou are known to avoid areas of anthropogenic activity (Table 5.8), and existing roads, power lines, and other infrastructure within the range of the assessed herds has likely contributed to direct and indirect habitat loss (e.g., habitat removal and fragmentation, avoidance due to sensory disturbance). Responses by caribou to linear features and other disturbances include avoidance of the disturbance and/or the assemblage of habitats and boundaries created by the disturbance (Stuart-Smith et al. 1997; Smith et al. 2000), an increase or a shift in home range size (Sawyer et al. 2006; Courtois et al. 2007; MacNearey et al. 2016), and in some cases no apparent response or response only during a particular project phase (e.g., construction) (Reimers et al. 2007, 2020; Eftestøl et al. 2016; Plante et al. 2018). On the Island of Newfoundland, caribou from the Buchans herd showed avoidance of the Star Lake hydroelectric facility by up to 3 km and a delay in the timing of migration following construction of the facility in 1997 to 1998 (Mahoney and Schaefer 2002). La Poile caribou similarly avoided the Hope Brook Gold Mine (Table 5.8), by up to 4 km year-round and 6 km during calving (Weir et al. 2007). Females on the island of Newfoundland have also been shown to avoid active cut blocks by more than 9 km (Schaefer and Mahoney 2007).

Past and present activities in the RAA may also contribute to an increased mortality risk, through direct collisions with vehicles, or indirect by altering predator-prey dynamics or improving hunter harvest opportunities. Studies have shown that caribou predation rates are generally higher near linear features (Mumma et al. 2017). Key predators of caribou in Newfoundland (i.e., coyote and black bear) are known to select for disturbed habitats, which could increase the amount of predation on caribou through higher encounter rates due to the ease of movement on linear features and/or increased access to caribou range (Mosnier et al. 2008; Boisjoly et al. 2010; McKenzie et al. 2012; Hinton et al. 2015; DeMars and Boutin 2017; Dickie et al. 2017; Mumma et al. 2018; Tomchuk 2019).

Hunting, outfitting, trapping, fishing, cabin development and ATV use in the RAA may contribute to cumulative adverse effects on caribou due to direct mortality and/or sensory disturbance, particularly where these activities may overlap with residual effects from the Project within the LAA.

Future developments (e.g., mining, forestry) may similarly contribute to habitat loss, sensory disturbance, and mortality risk. The Cape Ray Gold Project is a likely foreseeable future project in the RAA whose residual effects could temporally overlap with Project activities and result in habitat changes and sensory disturbance (e.g., noise and light emissions). The Valentine Gold Project will overlap spatially and temporally with the Project and will have similar pathways of effects including a change in habitat, sensory disturbance effects, and increased mortality risk. The development of the Valentine Gold Project is predicted to disrupt an existing migratory corridor for the Buchans Herd, resulting in significant residual adverse effects on their movement (Marathon 2020). As indicated in Marathon (2020), researchers have estimated reduced use of habitats or seasonal avoidance of mine sites ranging from 0.25 km to up to 23 km (e.g., Boulanger et al. 2012; Plante et al. 2018; Polfus et al. 2011), however the degree of reduced use or avoidance is expected to vary annually (Boulanger et al. 2021). Although there is uncertainty with how caribou from the Buchans herd will respond to the Valentine Gold Project, if caribou were to avoid the mine site during migration, potential alternate migration routes exist to the northeast of the current migratory route that caribou may use once that Valentine Gold Project is developed. These potential alternate routes would be in closer proximity to the proposed transmission line RoW. However, the contribution of the transmission line to cumulative effects would be reduced through its alignment with existing access roads as further discussed below.

Figure 6-3 shows the extent of existing and planned disturbance footprints with a 500 m radius buffer around the footprints (i.e., zone of influence), consistent with the federal Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada (Environment Canada 2011). This extent represents the area of direct (change/loss) and primary indirect (sensory disturbance) effects on caribou habitat. As indicated above, the Project's potential contribution to cumulative effects is substantially reduced because the Project is closely aligned with existing and planned footprints, resulting in the zones of influence being largely overlapping.

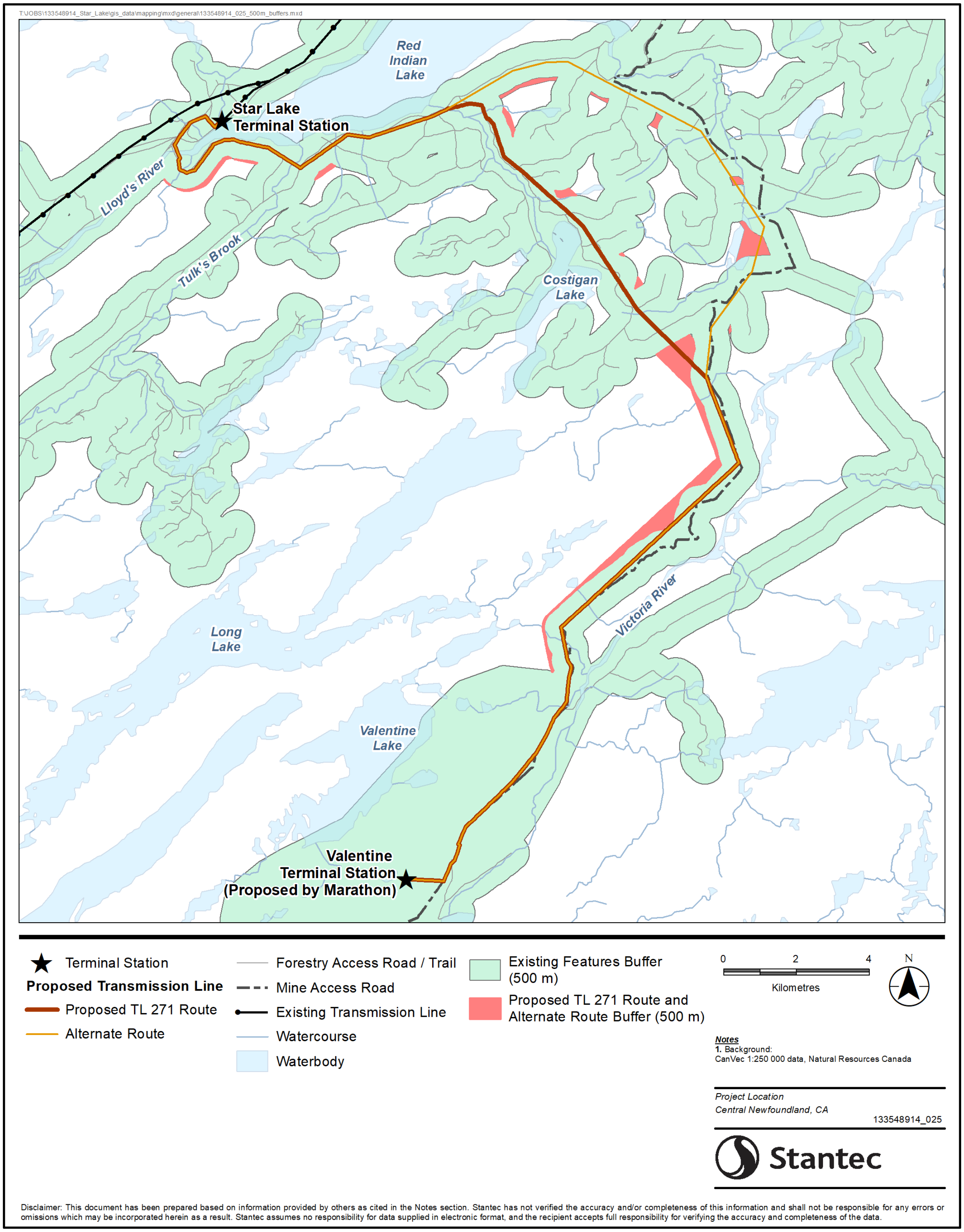

Figure 6-3 Cumulative Footprints of Disturbance

Adverse Project-related residual effects on caribou resulting from this Project are predicted to be low to moderate in magnitude and not significant, but residual effects may occur during sensitive periods for caribou and extend beyond the life of the Project. The contribution of Project-related residual effects to cumulative effects on change in habitat is anticipated to be low, as the amount of overlap between the Grey River and Buchans herds and the Project Area is less than 0.01% (there is no overlap with the range of the other two assessed herds), and only a small portion of suitable habitat will be directly or indirectly affected (1.7% of available suitable habitat in the ELCA). The Project may also result in residual effects on change in mortality risk, although this risk is expected to be low based on the low densities of predators and small amount of overlap between the Project Area and caribou range. The portion of the transmission line that will overlap the migration path of the Buchans herd will be aligned with existing roads and will be within the footprint of the Valentine Gold Project (see Figure 6-3); Project-related adverse residual effects on caribou movement are predicted to be moderate.

It is anticipated that the resulting overall cumulative effects will not threaten the long-term persistence or viability of caribou from the Gaff Topsails, Grey River and La Poile herds within the RAA, or result in effects that are contrary to or inconsistent with the goals, objectives and activities of recovery strategies, action plans and management plans for these herds. Therefore, no significant cumulative effects on these herds are predicted to occur because of the Project. Due to overlap of the Project with a portion of the migration corridor used by the Buchans herd, significant adverse project and cumulative effects identified for the Valentine Gold Project, and uncertainties surrounding how deviations from current migratory corridors will affect the herd (Marathon 2020), cumulative environmental residual effects on change in movement for the Buchans herd are predicted to be significant.

Mitigation proposed to reduce adverse environmental effects on caribou (refer to Section 5.2.4) will be implemented to help reduce the Project's contribution to cumulative adverse effects. NL Hydro understands that Marathon will be developing an EEM program for the Valentine Gold Project. NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how this information can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou.

6.2.3 Avifauna

Residual effects of the Project on avifauna include a change in habitat and change in mortality risk primarily associated with RoW clearing, collisions with vehicles or infrastructure and sensory disturbance. These residual effects may combine with residual effects of other past, current and proposed future activities in the RAA to result in cumulative effects on avifauna.

Past, present and likely future projects and activities which contribute to habitat fragmentation and edge habitat creation will contribute to cumulative effects on avifauna. Forestry activities in the RAA have had a measurable effect on habitat loss and alteration for avifauna, through tree harvesting and road development in the region. Mineral exploration and mining, including the proposed Valentine Gold Project have and will continue to contribute to habitat loss and fragmentation through clearing activities. Resource industry-related and recreational traffic (e.g., snowmobiles, ATVs) using existing road networks in the RAA will also contribute to sensory disturbance and create risk of collisions with avifauna. Although the Project will involve upgrading some roads, the increase in traffic in the RAA due to the Project is expected to be minor, particularly once Project construction is completed.

Overall, the Project is not predicted to result in a substantial decline in avifauna abundance or a substantial loss of habitat within the region, including for avifauna SAR. The cleared footprint of Project will result in less than 1 km^2 of habitat (conservatively assumes all habitat within a 25 m RoW will be lost), although a larger area will be altered due to fragmentation, contributing to a cumulative effect on a landscape that is already fairly fragmented due to past forestry and mining exploration activities and associated access road development. Sensory disturbance associated with construction noise may interact cumulatively with noise emissions from other nearby land use, including construction activities associated with the Valentine Gold Project which will overlap with Project construction activities temporally and spatially. Key mitigation to reduce the Project's contribution to adverse cumulative effects on avifauna will be to reduce the Project footprint to the extent practical and scheduling RoW clearing to avoid the nesting period.

Given the low magnitude of Project-related contributions to cumulative effects on avifauna and abundance of suitable habitat in the RAA , it is anticipated that the resulting overall cumulative effects will not threaten the long-term persistence, viability or recovery of an avifauna species population in the RAA, including effects that are contrary to or inconsistent with the goals, objectives or activities of recovery strategies, action plans and management plans for SAR and their habitats. No significant cumulative effects on avifauna are predicted to occur as a result of the Project.

6.2.4 Other Species at Risk

Residual effects from the Project on other SAR include a direct change in habitat through fragmentation (primarily due to clearing of the RoW and access construction) and change in mortality risk (primarily through alteration or destruction of bat roosting sites and hibernaculae and marten denning sites if present during construction). There is also an increased risk of mortality through wildlife-human conflict, including collisions with vehicles and increased hunting pressure and predator access, and sensory disturbance from Project noise and lighting.

As described in Section 5.4, the Recovery Plan for Newfoundland marten on the Island of Newfoundland identifies critical factors affecting marten mortality including trapping and snaring, and habitat loss or alteration (The Newfoundland Marten Recovery Team 2010). Habitat may be altered and become less suitable for marten through human activities including forest harvesting, mining operations, hydroelectric projects, construction of roads and power lines, and natural disturbances (e.g., infestation by insects, forest fire). Altered habitat may reduce the availability of breeding habitat, including denning sites, as well as resting sites and prey availability (Fuller and Harrison 2005; Godbout and Ouellet 2010), which may affect marten survival (Snyder and Bissonette 1987).

The Recovery Plan for Newfoundland marten also identifies an area of proposed critical habitat of which a portion (approximately 0.614 km^2) overlaps segments of the proposed transmission line route (The Newfoundland Marten Recovery Team 2010) (refer to Figure 3-3 and Appendix D). Other past, current and likely future activities in the RAA, including forestry, mineral exploration and mining, road development, and hydroelectric projects (including existing transmission lines), have already, or will likely in the future, contribute to habitat loss and fragmentation of critical habitat for the Newfoundland marten.

Similarly, cumulative habitat loss and fragmentation associated with these activities will result in a cumulative effect on change of habitat and mortality risk for bats. As described in Section 5.4, habitat fragmentation and edge habitat creation can contribute to changes in movement by SAR, including bats. For example, utility corridors bisecting established communing routes between foraging and roosting sites can act as barriers to bat movement (ECCC 2018a).

The largest threat to little brown and northern long-eared myotis in North America is white-nose syndrome. Populations of little brown and northern long-eared bats at known hibernacula in eastern Canada have declined by 94% since the arrival of white-nose syndrome (COSEWIC 2013). A portion of the transmission line Row is located within a 10 km grid cell where a hibernaculum for myotis species is known to exist (AC CDC 2020) and that hibernaculum site has tested positive for white-nose syndrome (Government of NL 2020d as cited in Marathon 2020). Adverse effects of the Project, as well as from other activities and projects which may affect bat mortality indirectly (e.g., through a change in habitat, or sensory disturbance) or directly (e.g., through wildlife-human conflict including collisions) could interact cumulatively with effects of the white-nose syndrome, resulting in a cumulative change in mortality risk for bats.

Overall, the contribution of the Project to cumulative effects on a change in habitat for other SAR is predicted to be low given that the overall footprint of the Project will be reduced by following existing corridors (e.g., existing roads/trails) and maximizing use of these corridors for access to the RoW where practical. The loss or alteration of approximately 1 km^2 of habitat as a result of RoW clearing will have a small measurable effect on habitat availability at the local scale and little or no measurable effect at the regional scale. Furthermore, clearing for RoW construction is planned to occur outside the bird breeding season, which also coincides with sensitive activity periods for bats and marten, thereby reducing Project-related risk of mortality for these SAR during construction. The discovery of roosts, hibernacula, or dens by on-site personnel during construction in the RoW will be reported to the OSEM and Project Environmental Manager and appropriate action or follow-up will be guided by consultation with a qualified biologist and/or federal or provincial regulators.

In summary, cumulative effects on other SAR are not predicted to threaten the long-term persistence, viability, or recovery of a wildlife species population in the RAA, including effects that are contrary or inconsistent with the goals, objectives, or activities of the federal *Recovery Strategy for the Little Brown Myotis (*Myotis lucifugus*), the Northern Myotis (*Myotis serptentrionalis*), and the Tri-colored Bat (*Perimyotis subflavis*) in Canada* (ECCC 2018a), the federal *Recovery Strategy for the American Marten (*Martes americana atrata*), Newfoundland population, in Canada* (Environment Canada 2013), the provincial *Recovery Plan for the Threatened Newfoundland Population of American Marten (*Martes americana atrata*)* (The Newfoundland Marten Recovery Team 2010), or other action plans and management plans. No significant cumulative effects on other SAR are predicted to occur as a result of the Project.

6.2.5 Summary of Cumulative Effects

Residual adverse effects from Project activities may combine with residual effects from mineral exploration/mining, forestry, hunting, outfitting, cabin development, trapping, fishing, off-road vehicle use, hydroelectric development and other linear features (e.g., existing roads, power lines) to result in cumulative effects. However, the Project's contribution to cumulative effects will be low and the assessed VCs will not result in significant cumulative effects, with the exception of cumulative effects on caribou. As assessed in the Valentine Gold Project EIS (Marathon 2020), the development of the Valentine Gold Project is predicted to disrupt an existing migratory corridor for the Buchans Herd, resulting in significant residual adverse effects on their movement (Marathon 2020). Although the contribution of the Project to cumulative effects on caribou is low, a significant cumulative effect already exists and the Project's contribution must therefore be acknowledged as a significant cumulative effect.

Mitigation measures detailed in Section 2.11 and throughout Section 5 of this Registration will reduce the Project's contribution to cumulative effects. It is also assumed that other projects and activities in the RAA will comply with applicable mitigation measures and regulatory requirements that will also help to reduce adverse cumulative effects. NL Hydro understands that Marathon will be developing an EEM program for the Valentine Gold Project for caribou. NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how this information can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou. No additional mitigation or monitoring is proposed to address cumulative effects.

7.0 FUNDING

This Project does not rely on public funding. Cost recovery will be provided by the Customer (Marathon).

8.0 PROJECT-RELATED DOCUMENTS

The following baseline reports support this Registration and have been appended to this report:

- Water Resources Baseline Study (Appendix B)
- Caribou Baseline Study (Appendix C)
- Flora and Fauna Baseline Study (Appendix D)
- Historical Resources Baseline Study (Appendix E)

9.0 CONCLUSION

NL Hydro is proposing to construct and operate a new 69 kV transmission line from their existing Star Lake Terminal Station to a new terminal station to be developed by Marathon for the proposed Valentine Gold Project. Minor upgrades to the Star Lake Terminal Station and a new transmission line are required to supply electrical power to the Valentine Gold Project mine site. Pending regulatory approvals, construction is scheduled to begin in the fall of 2021, with operations commencing in early 2023. TL271 is expected to be in operation for approximately 14 years, to coincide with the schedule of activities of Valentine Gold Project. When TL271 is no longer required to supply electrical power to the mine, it will be decommissioned, which will involve dismantling removing the poles, anchors and wires from the site. The Valentine Gold Project is currently undergoing provincial and federal assessment. If the Valentine Gold Project does not obtain release from both the federal and provincial EA processes, this Project is not required and NL Hydro will inform NLDECC of Project cancellation.

Clearing of the RoW will result in approximately 1 km^2 of lost habitat. The Project is predicted to have adverse environmental effects on fish and fish habitat, caribou, avifauna, and other SAR. However, with the implementation of best management practices and mitigation measures described in this report and summarized below, Project residual environmental effects are predicted to be not significant.

Cumulative effects on fish and fish habitat, avifauna and other SAR are also predicted to be not significant. However, as assessed in the Valentine Gold Project EIS (Marathon 2020), there already exists a significant adverse cumulative effect on caribou. Although the contribution of the Project to cumulative effects on caribou is low, this contribution must be acknowledged as a cumulative significant effect. Due to overlap of the Project with a portion of the migration corridor used by the Buchans herd, significant adverse project and cumulative effects identified for the Valentine Gold Project, and uncertainties surrounding how deviations from migratory corridors will affect the herd (Marathon 2020), cumulative environmental residual effects on change in movement for the Buchans herd are predicted to be significant. Mitigation proposed to reduce adverse environmental effects on caribou will be implemented to help reduce the Project’s contribution to cumulative adverse effects. NL Hydro also understands that Marathon will be developing an EEM program for the Valentine Gold Project. NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how this information can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou.

A summary of Project mitigation is presented in Table 9.1.

Table 9.1 Summary of Mitigation

Category	Mitigation Measures
General	• Construction activities will be scheduled in consideration of sensitive time periods for fish and wildlife. If timing is not ideal, alternative mitigation measures will be identified and implemented in consultation with applicable regulatory authorities. • Disposal of cleared non-merchantable timber, slashing and cuttings from cleared areas will take place through mulching and/or piling to reduce the amount of slash. No burning of materials is permitted for this Project. • Maintenance and refuelling of vehicles will be restricted to designated areas. • Equipment will be regularly maintained and inspected. If problems are identified the equipment will be taken out-of-service and either repaired or replaced to prevent release of hydrocarbons into the environment. • To control noise, applicable equipment will have exhaust systems which will be regularly inspected and maintained so mufflers remain operating in accordance with manufacturer's recommendations. • Dust from construction activities will be controlled where possible by using frequent applications of water. Waste oil will not be used for dust control, but other agents, such as wood chips, calcium chloride, matting and revegetation may be considered on a site-specific or as needed basis. • The amount of on-site lighting will be reduced. Only the amount of lighting required for safe conduct of construction and operation activities will be installed, and exterior lights will be shielded from above (where the need is identified). • Fuel, hazardous and controlled product storage areas, including temporary fuelling and fuel storage facilities, will be designed in accordance with applicable codes and regulations. Hazardous wastes will be stored, removed and disposed of in accordance with regulatory requirements. • Prior to the commencement of construction, equipment will be inspected for the presence of soil that could contain seeds and/or propagules of invasive and non-native species. If equipment is found to have soil attached, it will be cleaned (i.e., pressure washed) to remove the potential seed source. • RoW access will be created primarily using existing forest access roads where possible. • Cutting activities will be limited to those areas that are required for construction of infrastructure and RoW clearing. Natural vegetation will be left in place where possible. • Buffer zones (to be determined by the OSEM) will be flagged prior to disturbance activities, as required. • A minimum buffer zone of natural vegetation 20 m from the high water mark of waterbodies, watercourses and ecologically sensitive areas will be maintained around work areas, where available space poses a constraint, except where specified otherwise. If space is available, then wider buffer zones of 100 m will be maintained between construction areas and watercourses, waterbodies and ecologically sensitive areas. • Erosion prevention and sediment control measures will be installed to reduce and control runoff soil erosion and transport of sediment laden water. These measures will be monitored regularly and cleaned / repaired as necessary to maintain their effectiveness. • If blasting is required, the timing of this activity will be conducted in consideration of potential environmentally sensitive periods (e.g., bat hibernation and caribou migration). Use of explosives in or near water will be avoided, however, if required, will follow DFO blasting guidelines. • Project contractors and staff will be prohibited from fishing, hunting, or otherwise interacting with (e.g., harassment, feeding) wildlife at or near the site while working on the Project. • Personal pets (domestic or wild) will be prohibited on site during construction. • Non-residual herbicides and mechanical methods will be used for vegetation removal, where practical, and the use of herbicides will be restricted to avoid buffer areas around watercourses. The requirements of applicable regulations will be met or exceeded, including

Table 9.1 Summary of Mitigation

Category	Mitigation Measures
	their application by qualified, trained personnel following manufacturers' instructions and as per the Pesticides Control Regulations, 2012 under the NL EPA. • Known archaeological sites will be avoided. In case of a suspected discovery of an archaeological site or artifact, the encounter will be reported to the OSEM and the site will be flagged for protection and avoidance. The Provincial Archaeology Office (PAO) will be informed of the discovery to provide direction and determine if additional assessment and/or mitigation is required.
Fish and Fish Habitat	• Where possible, in-water works will be completed inside the appropriate fisheries timing windows (June 1 – September 30). Work outside the fisheries timing windows will be done in consultation with DFO and the NL Water Resources Division. Work will follow best management practices as provided in any Letter of Advice from DFO. • Pole placement will avoid watercourses, and access road construction through watercourses will be reduced. • Construction activities in waterbodies or watercourses shall be scheduled to occur during low flow or frozen conditions, to avoid sensitive periods for fish, and shall be shut down during heavy precipitation events. • Works will be conducted on land to the extent feasible. Heavy equipment shall be kept outside the high water mark of bodies of water, where possible. • Work shall be performed in such a way that deleterious substances, such as sediment, fuel and oil do not enter watercourses and waterbodies. • Mulching and/or piling of cleared non-merchantable timber, slashing and cuttings will be relocated to areas where it cannot enter watercourses. Excavated rock will be disposed of properly. • Banks and flood plains of watercourses will be adequately protected from erosion using an applicable erosion prevention method, as outlined in the EPP. • Fording of streams will follow NL Environmental Guidelines for Fording and the DFO Interim code of practice: temporary stream crossings (DFO 2020a) and EPP. • Watercourse crossings (e.g., spanning of the transmission line, fording and culvert crossings) will comply with permits issued by the NLDECC Water Resources Management Division and will be undertaken in accordance with DFO requirements. • When working in water, minimum flows will be maintained and obstructions or interference with the movement or migration of fish will be avoided. • The use of temporary coffer dams or diversion channels for instream work will follow the DFO Interim code of practice: temporary cofferdams and diversion channels (DFO 2020b). • A fish rescue by a qualified environmental professional will be completed for watercourse crossing installations (i.e., culverts), as required.
Caribou	• The timing and location of Project activities will be adjusted to avoid key movement paths during the spring and fall migration of the Buchans caribou herd. • Natural vegetation will be left in place where possible, to act as a buffer to reduce sensory disturbance. • Should NL Hydro be required to clear access roads during the winter months as part of construction or operation, snowbanks will be less than 1 m tall to facilitate caribou crossing, and breaks in the snowbanks will be aligned on opposing sides, created at approximately 200 m intervals, to the extent practicable, to provide wildlife crossing opportunities; • Project vehicles will be required to comply with posted speed limits. Additional speed restrictions will be implemented during sensitive periods for caribou (e.g., calving and migration). • To reduce the risk of caribou-vehicle collisions, speeds will be reduced and the vehicle stopped (if necessary) to allow caribou to leave the road. • Caribou-vehicle collisions, near misses, or observations of road mortality will be reported to the OSEM and the NLDFFA-Wildlife Division. Adaptive management measures will be implemented should locations of high frequency caribou-vehicle interactions be identified.

Table 9.1 Summary of Mitigation

Category	Mitigation Measures
	• The OSEM will be notified if caribou are observed within 500 m of Project activities and the environmental manager will determine if the activity should be reduced or delayed (in consultation with NLDFFA-Wildlife Division, as applicable). • Personal pets (domestic or wild) will be prohibited on site during construction. • Project contractors and staff will be prohibited from fishing, hunting, or otherwise interacting with (e.g., harassment, feeding) wildlife at the site while working on the Project.
Avifauna	• To the extent possible, vegetation removal will be conducted outside the breeding season for most birds (e.g., April 1 to August 31). If work must be completed during this timing window, activities will be conducted in accordance with avifauna mitigation measures in the EPP to reduce the likelihood of inadvertently destroying nests and/or eggs of migratory birds (known as incidental take). This would include nest searches for avifauna, including SAR/SOCC, prior to clearing activities, and the establishment of appropriate buffers around active or suspected nests (e.g., 30 m for passerines, 100 m for waterfowl/waterbirds, 200 m to 800 m for raptor nests). Project-related activities within an established buffer would be avoided until the birds have left the nest. • Adherence to Nalcor's Standard Operating Procedures for Nesting Birds in Vegetated Areas (NAL-ENV-SOP-01) will address activities during the operations and maintenance phases, which outlines procedures for nest avoidance during operations. • Prior to clearing, NL Hydro will identify locations of bald eagle and osprey nests (i.e., nests that are reused in subsequent years) and determine appropriate mitigation. • The discovery of nests by on-site personnel will be reported to the OSEM and Environmental Services Manager and appropriate action or follow-up will be guided by the EPP. • Hunting or harassment of avifauna and other wildlife by on-site Project personnel will be prohibited. • Work activities will be conducted in a manner that does not deliberately harass wildlife, including avifauna. • Safe driving practices including speed limits to avoid collisions with avifauna and other wildlife will be implemented. • Collisions, near misses or observations of mortalities on site roads and/or involving Project vehicles will be reported to the OSEM and adaptive management measures implemented should locations of high frequency interactions be identified. • Avian avoidance devices may be installed to minimize bird collisions with Project infrastructure, should high risk areas be identified during the course of operations. • Ecologically sensitive areas (e.g., wetlands and watercourses) will be avoided to the extent feasible. • Trees that provide actual or potential avifauna habitat will be retained to the extent feasible and where it is safe to do so. • During operation, use of herbicides will be restricted in buffer areas around watercourses and will be scheduled to avoid the migratory bird nesting period (April 1 to August 31). Any manual clearing of brush would also be scheduled to avoid the nesting period. • Shrub or scrub (i.e., non-tree) vegetation will be allowed to establish along transmission corridors, to the extent feasible, to promote their use by avifauna.

Table 9.1 Summary of Mitigation

Category	Mitigation Measures
Other SAR	• Vegetation removal and herbicide application is planned to occur outside of the general nesting period for migratory birds (April 1 to August 31). This restricted activity period will also mitigate potential effects of the Project on change in habitat for bats and marten as it overlaps sensitive activity periods for bats (i.e., maternity roosting) and marten (i.e., natal denning and early rearing). • The discovery of roosts, hibernacula, or dens by on-site personnel will be reported to the OSEM and Environmental Services Manager and appropriate action or follow-up will be guided by consultation with a qualified biologist and/or federal or provincial regulators. • Shrub or scrub (i.e., non-tree) vegetation will be allowed to establish along transmission corridors, to the extent feasible, to promote their use by prey for other SAR. • Observations of bat colonies, potential hibernacula sites, sick or dead bats will be reported to the provincial Wildlife Division at 709-637-2025. Bat sightings may also be reported to the toll-free bat hotline: 1-833-434-2287 (BATS). • Caves, sinkholes, fishers, or other underground cavities that are identified as a result of Project activities will be reported to Wildlife Division and further inspected for signs of previously overwintering bats. • Whenever possible, buckets, garbage bins, tubs and containers will be kept covered. Bats may be attracted to standing water in open containers and may fly into them. As bats cannot climb slippery surfaces and are unable to fly straight up into the air, they can become trapped. • Travel within the RoW for inspection and maintenance of the transmission line will be restricted to existing or approved access routes. • Hunting or harassment of SAR and other wildlife by on-site Project personnel will be prohibited. • Work activities will be undertaken in a manner that does not deliberately harass wildlife, including SAR. • Safe driving practices, including speed limits, will be implemented to avoid collisions with SAR and other wildlife.

Follow-up and monitoring proposed for the Project includes the following:

- NL Hydro will conduct an archaeological field survey program in 2021 to investigate areas of moderate and high archaeological potential within the Project Area prior to ground disturbance. This field program will be designed and conducted in consultation and cooperation with the NL PAO and in accordance with applicable standards and requirements.
- NL Hydro will work with Marathon and NLDFFA-Wildlife Division to determine how information from Marathon’s EEM program at the Valentine Gold Project can be used to determine caribou activity in the vicinity of the Project during sensitive periods (e.g., using telemetry data), as well as inform potential Project-related effects on caribou.
- Transmission line infrastructure will be monitored periodically for avifauna nests during Project operation in accordance with Nalcor’s Standard Operating Procedures for Nesting Birds in Vegetated Areas (NAL-ENV-SOP-01). This information will assist in compliance with MCBA regulations and SARA and inform NL Hydro planning and decision making around operations and decommissioning.
- The discovery of roosts, hibernacula, or dens by on-site personnel will be reported to the OSEM and Environmental Services Manager and appropriate action or follow-up will be guided by consultation with a qualified biologist and/or federal or provincial regulators.

NL Hydro is committed to supplying electrical power to the proposed Valentine Gold Project through the construction and operation of TL271 in a manner which meets regulatory requirements and minimizes adverse effects on the surrounding environment.

10.0 SIGNATURE

April 20, 2021
Date

Michael Ladha
Vice President, General Counsel, Corporate Secretary & Commercial

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APPENDIX A

Mapbook of Environmental Features

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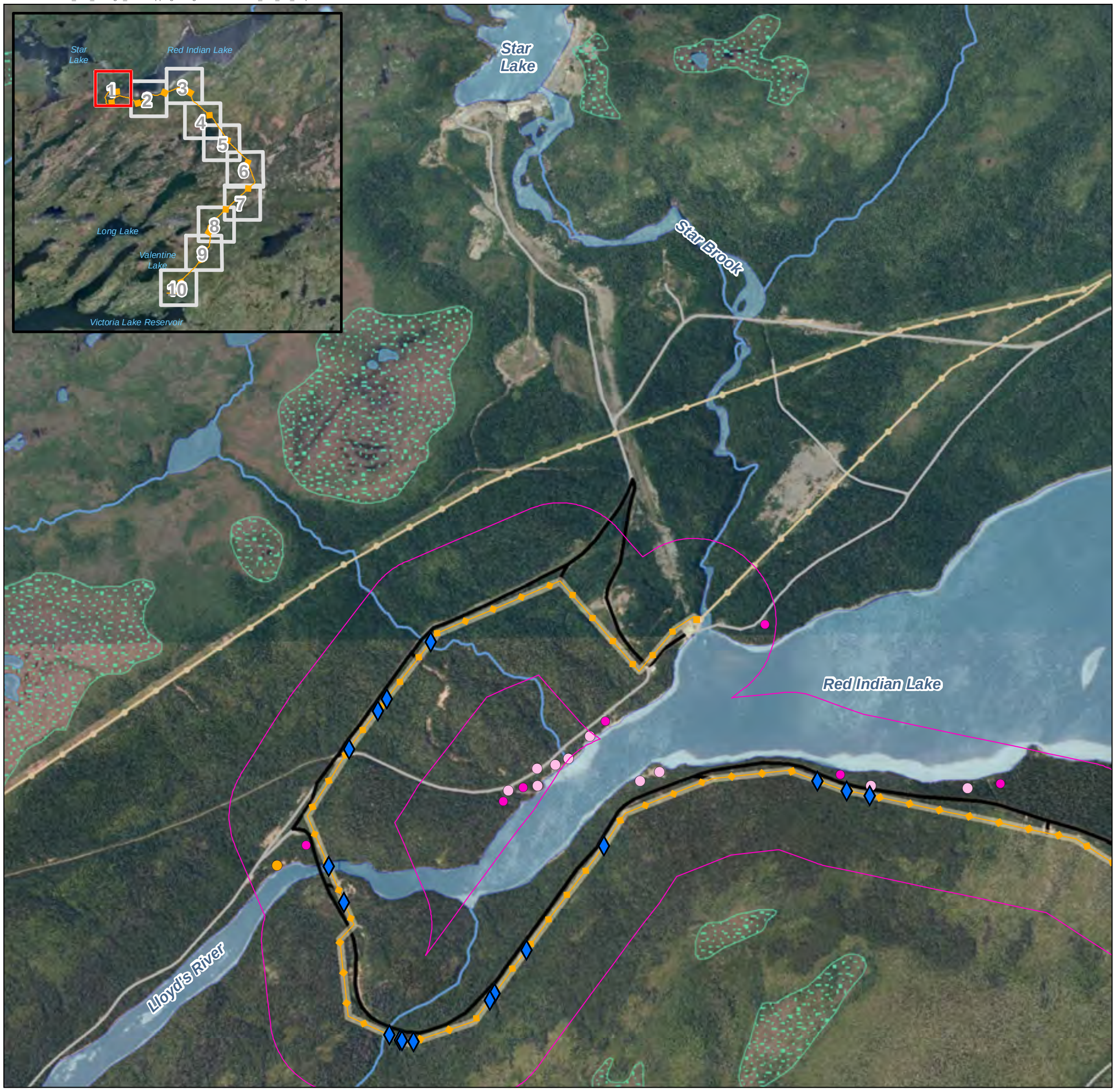

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Cabin
Cabin (Unregistered)
Outfitter Lodge
Watercourse
Existing Transmission Line
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 1
133548914_001

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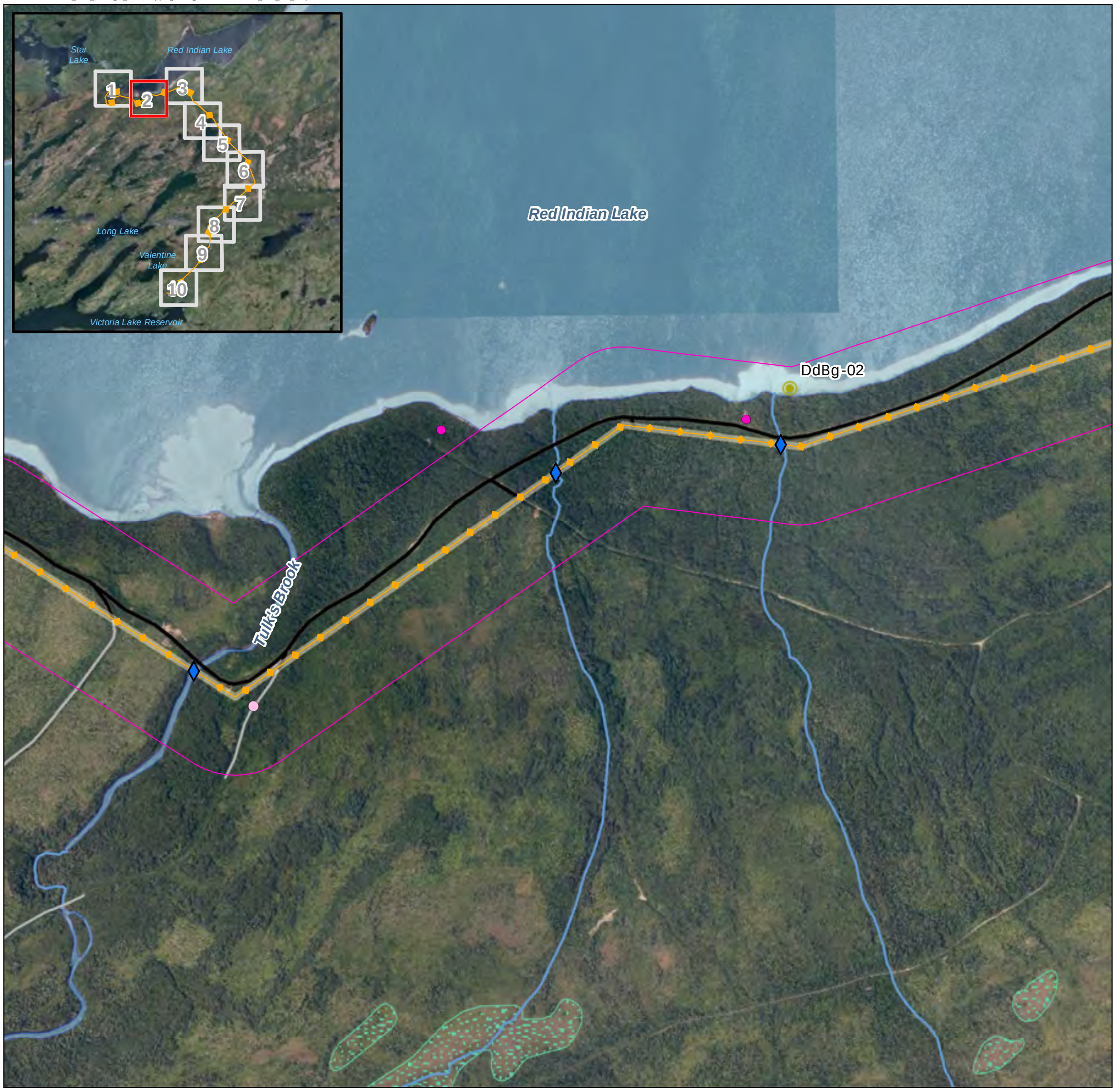

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Cabin
Cabin (Unregistered)
Known Archaeological Site
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 2
133548914_001

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Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Cabin
Cabin (Unregistered)
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 3
133548914_001

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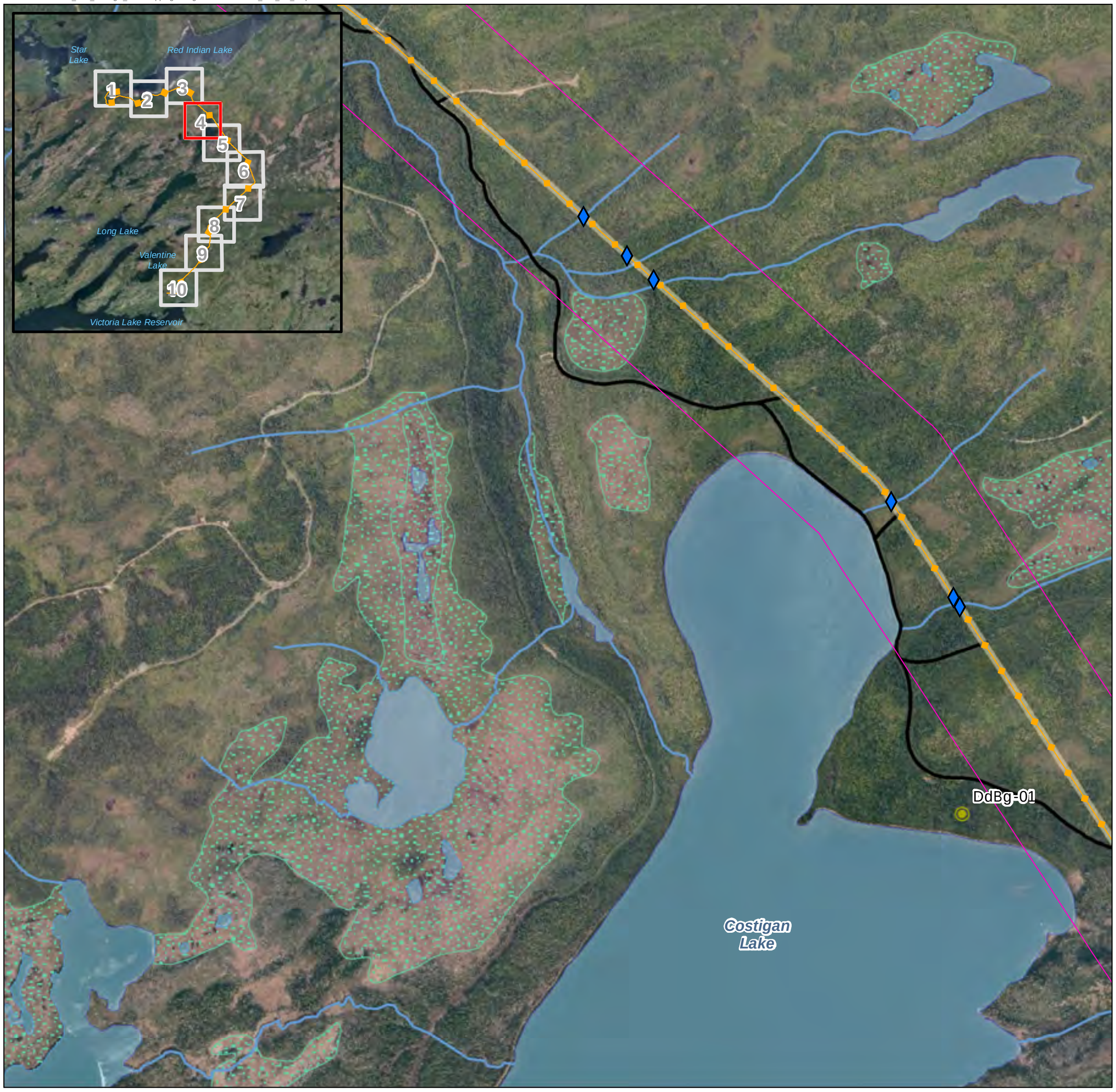

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Known Archaeological Site
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 4
133548914_001

Stantec

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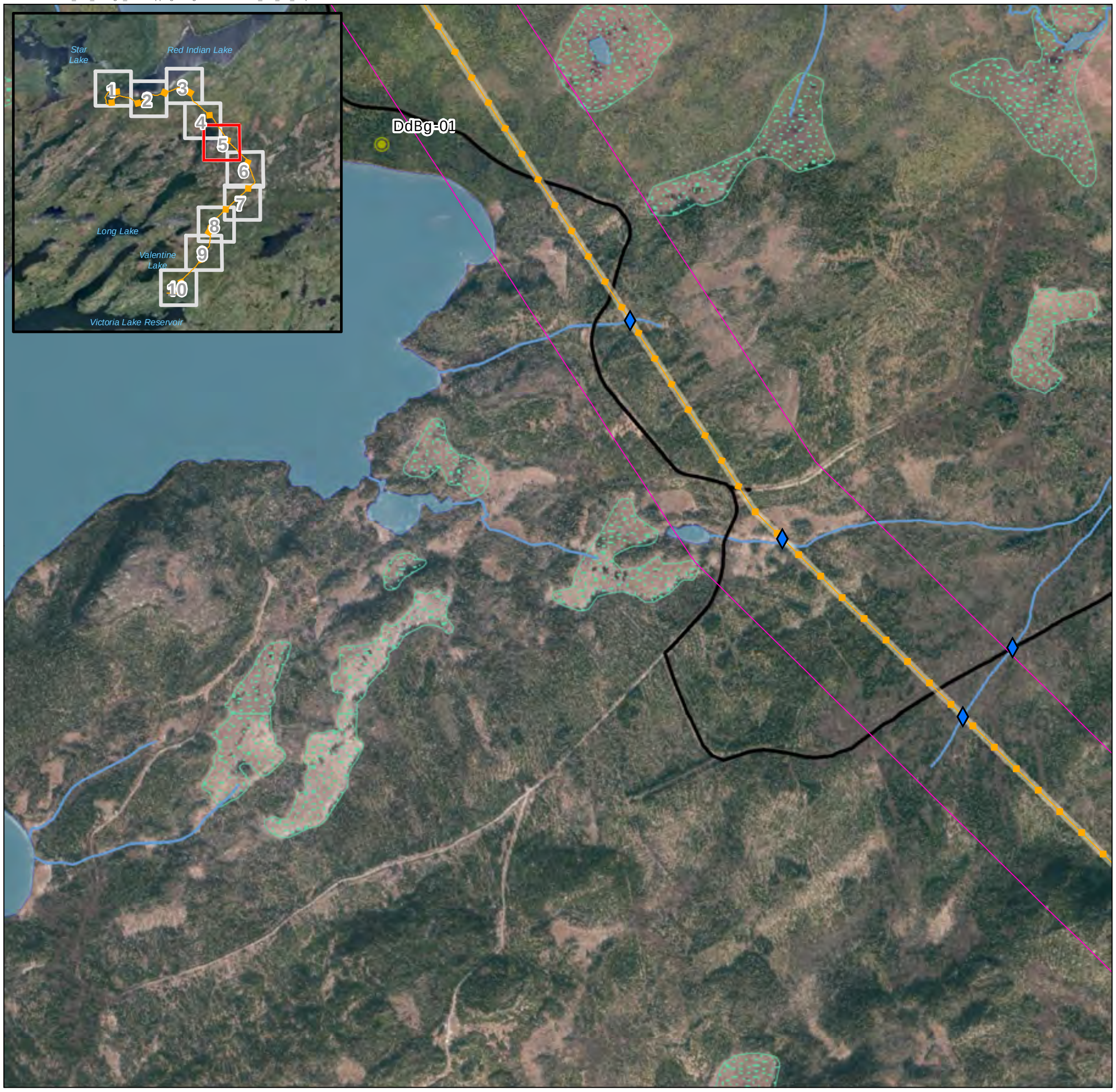

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Known Archaeological Site
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 5
133548914_001

Stantec

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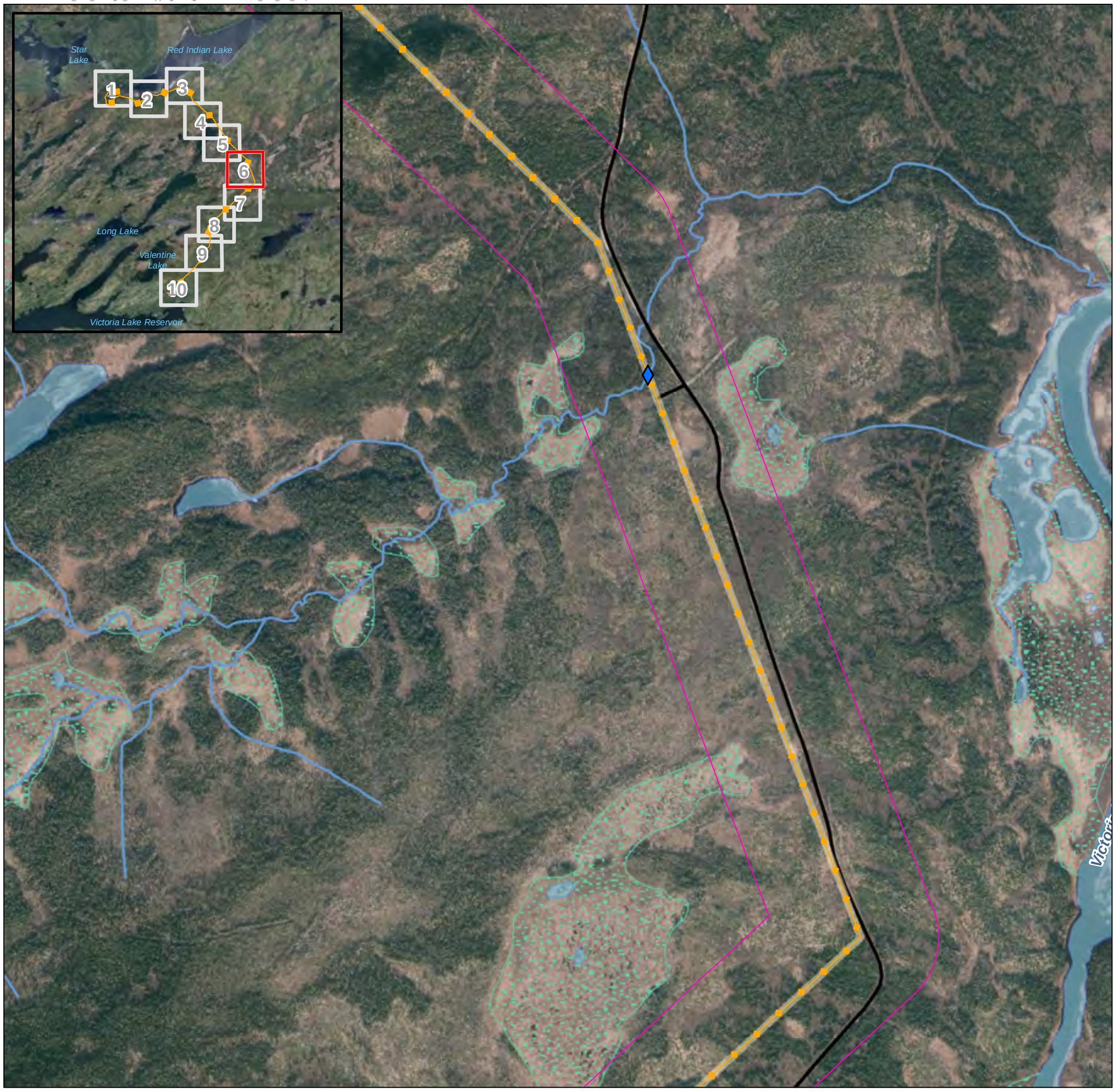

- Proposed TL271 Route
- 25 m Right of Way
- Local Assessment Area
- Proposed Access Routes
- Assumed Water Crossing
- Watercourse
- Wetland
- Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 6
133548914_001

Stantec

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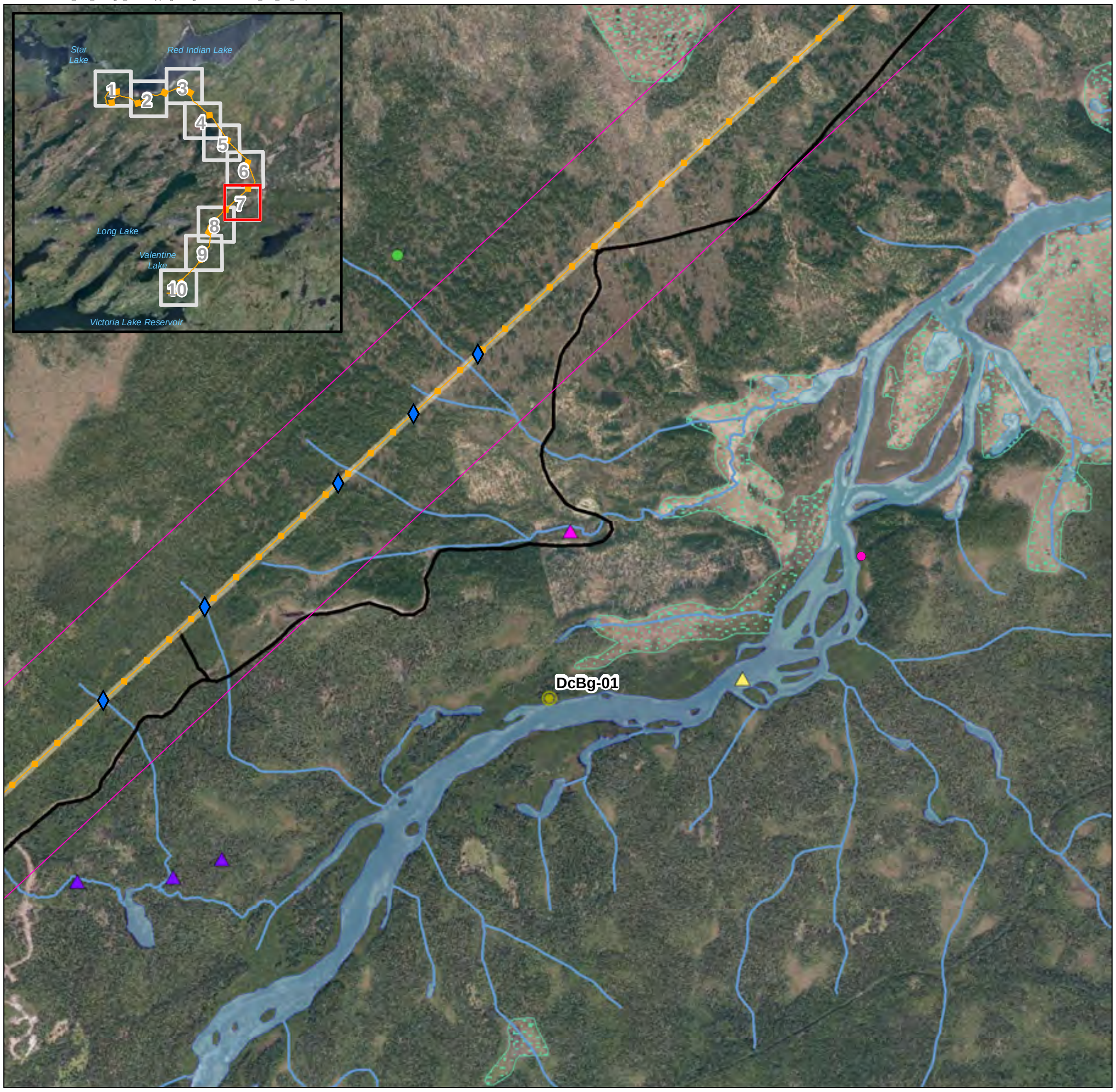

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Cabin
Known Archaeological Site
Rusty Blackbird (*Euphagus carolinus*)
Olive-sided Flycatcher (*Contopus cooperi*)
Caspian Tern (*Hydroprogne caspia*)
Short-scale Sedge (*Carex deweyana*
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 7
133548914_001

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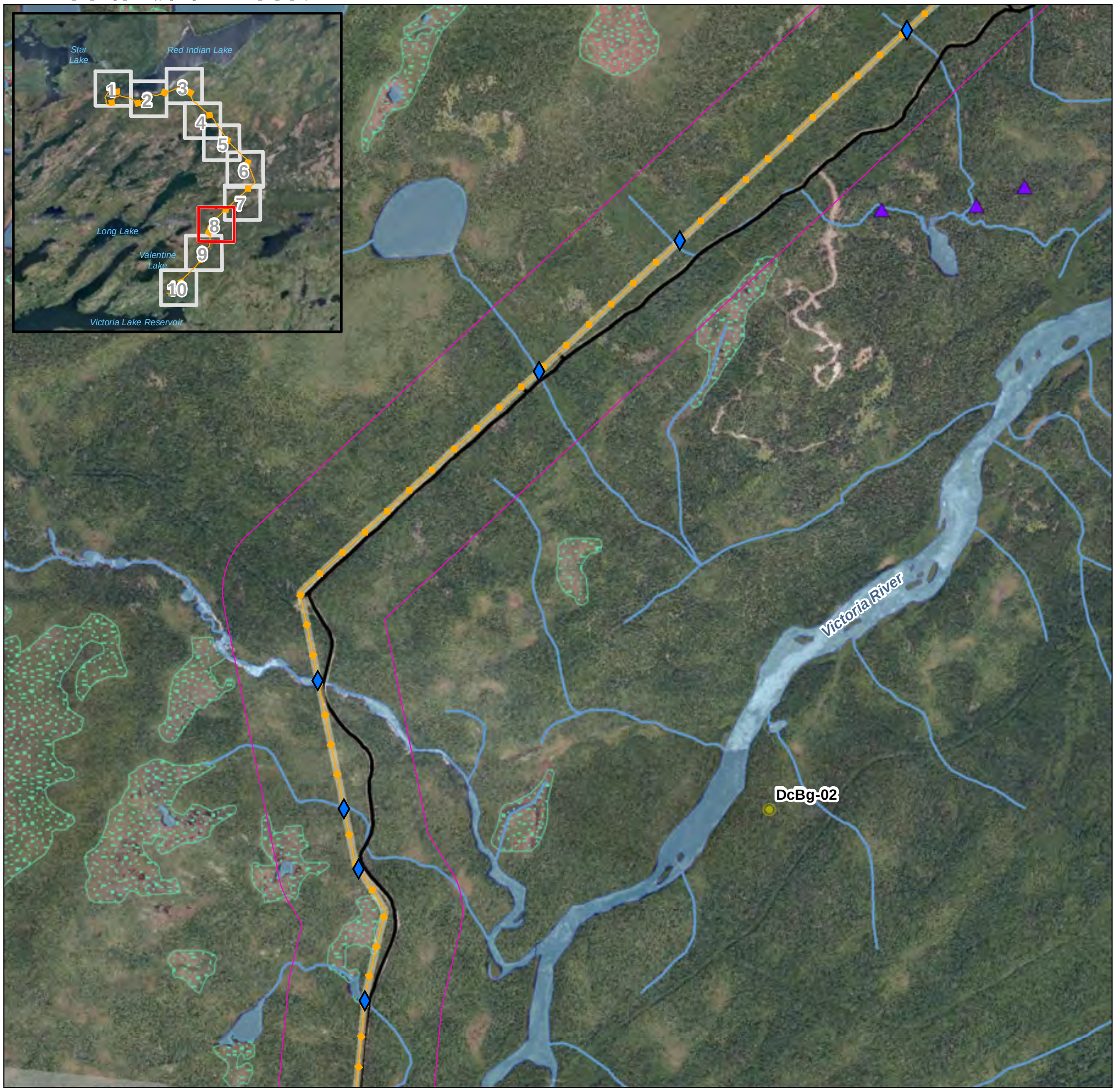

- Proposed TL271 Route
- 25 m Right of Way
- Local Assessment Area
- Proposed Access Routes
- Assumed Water Crossing
- Known Archaeological Site
- Olive-sided Flycatcher (*Contopus cooperi*)
- Watercourse
- Wetland
- Waterbody
- Valentine Gold Project Mine Site

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 8
133548914_001

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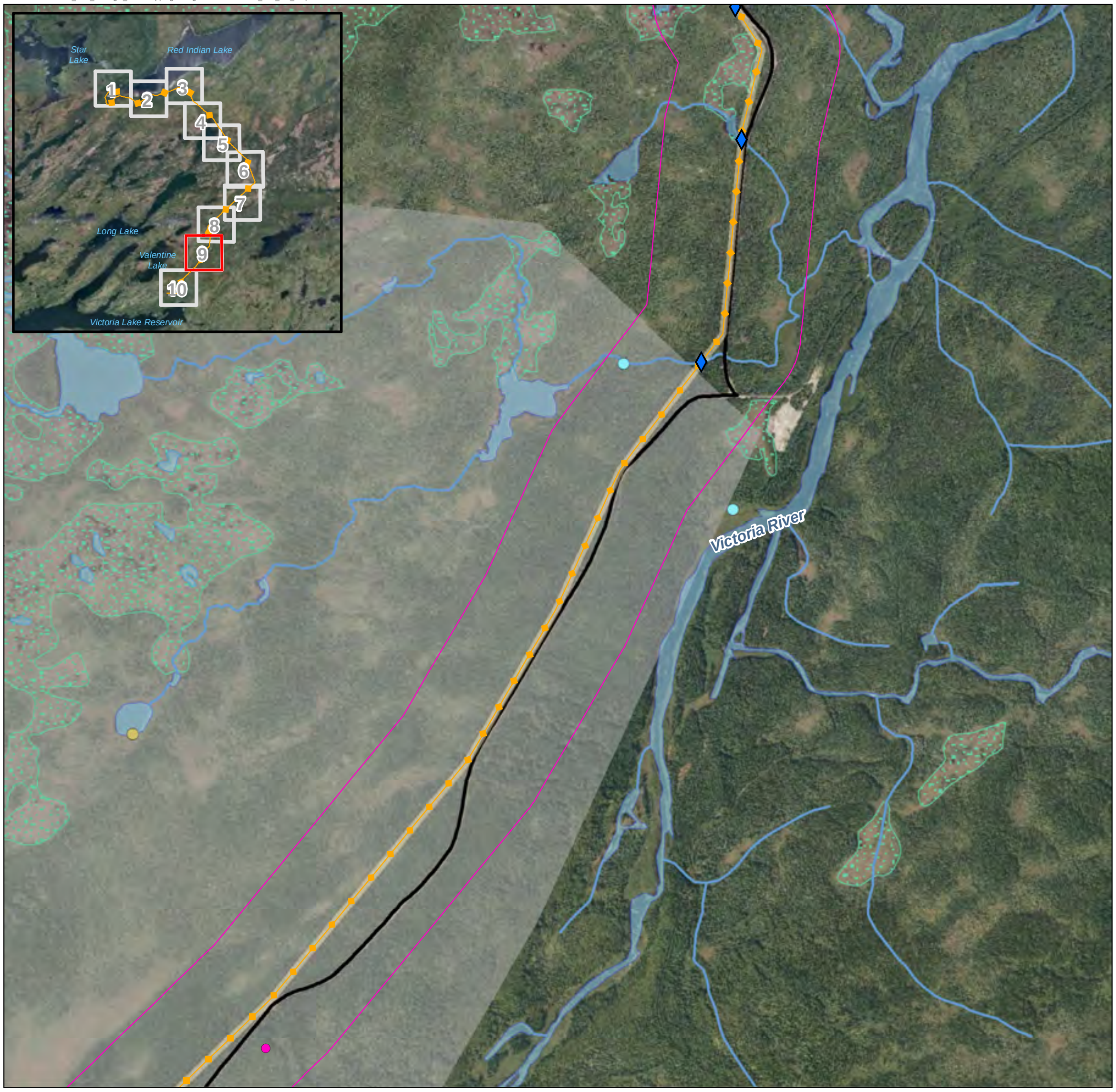

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Cabin
Perennial Bentgrass (*Agrostis perennans*)
Nodding Water Nymph (*Najas flexilis*)
Watercourse
Wetland
Waterbody
Valentine Gold Project Mine Site

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 9
133548914_001

Stantec

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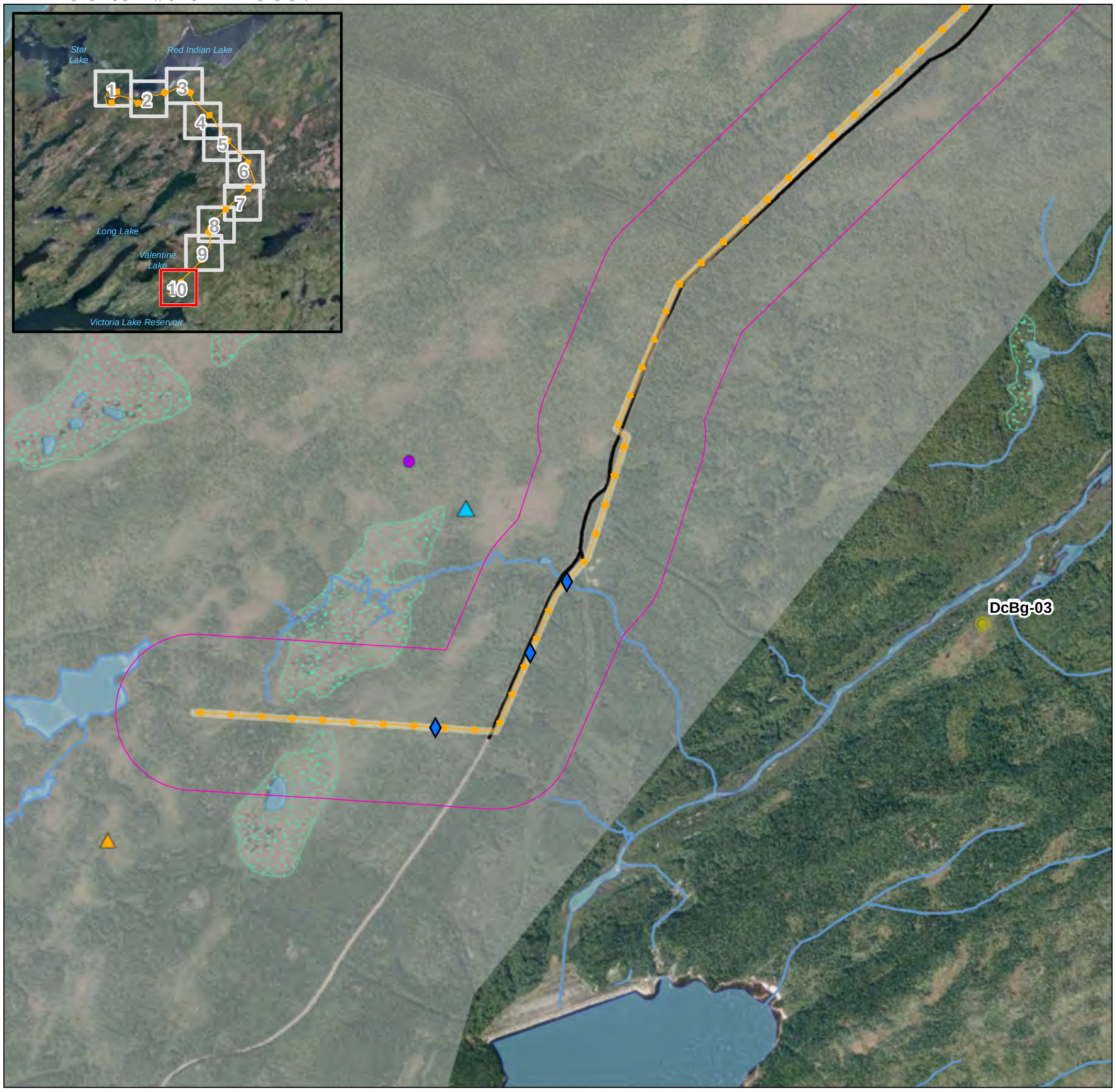

Proposed TL271 Route
25 m Right of Way
Local Assessment Area
Proposed Access Routes
Assumed Water Crossing
Known Archaeological Site
Common Nighthawk (*Chordeiles minor* [10m accuracy])
Bay-breasted Warbler (*Setophaga castanea*)
Common Water Primrose (*Ludwigia palustris*)
Watercourse
Wetland
Waterbody
Valentine Gold Project Mine Site

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 10
133548914_001

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APPENDIX B

Water Resources Baseline Study

Transmission Line 271 Star Lake to Valentine Gold Project Water Resources Baseline Study

Final Report

April 9, 2021

Prepared for:

Newfoundland and Labrador Hydro
500 Columbus Drive
PO Box 12400
St. John's NL A1B 4K7

Prepared by:

Stantec Consulting Ltd.
141 Kelsey Drive
St. John's, NL A1B 0L2
Tel: (709) 576-1458
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File No: 133548914

TRANSMISSION LINE 271 STAR LAKE TO VALENTINE GOLD PROJECT WATER RESOURCES BASELINE STUDY

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Abbreviations

°C	degees Celcius
µS/cm	microsiemens per centimetre
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWQG-FAL	Canadian Water Quality Guidelines – Freswater Aquatic Life
DFO	Fisheries and Oceans Canada
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
GIS	Geographic Information System
HADD	harmful alteration, disruption or destruction
km	kilometre
km^2	square kilometre
kV	kiloVolt
m	metre
mg/L	milligrams per litre
NL	Newfoundland and Labrador
NLDECCM	Newfoundland and Labrador Department of Environment, Climate Change and Municipalities
NL EPA	Newfoundland and Labrador *Environmental Protection Act*
NL ESA	Newfoundland and Labrador *Endangered Species Act*
RoW	right of way
SAR	Species at Risk
SARA	*Species at Risk Act*
WRMD	Water Resource Management Division

1.0 INTRODUCTION

Newfoundland and Labrador (NL) Hydro is proposing to construct and operate a new 69 kilovolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a proposed new terminal station (Valentine Terminal Station) being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site in the west-central region of the Island of Newfoundland (the Project; see Figure 1-1). Project construction activities will include upgrades to the Star Lake Terminal Station which will occur within the existing station property, and installation of a new 69 kV wood pole transmission line, approximately 40 km in length, with a right of way (RoW) approximately 25 m wide. Operational activities over the life of the Project will include asset inspection and repair as required, and vegetation control. Pending approvals, construction may begin in 2021 with TL271 being operational by early 2023. TL271 will be decommissioned once the power requirements for the Valentine Gold Project have been met.

The Water Resources Baseline Study has been prepared to support ongoing Project planning and design and to support the environmental assessment of the Project, which is being initiated through submission of a Registration document to the Government of NL. This report is a baseline study on surface water resources in the vicinity of the Project and was prepared based on desktop analyses of publicly available data, supported by information from field studies previously conducted for the Valentine Gold Project, the study area of which overlaps the proposed RoW for the Project. The surface water component of the Water Resources Baseline Study identifies mapped watercourses and waterbodies within or near the RoW. The fish and fish habitat component provides information on the presence, abundance and distribution of fish and their habitat within the Exploits River Watershed, in and near the RoW.

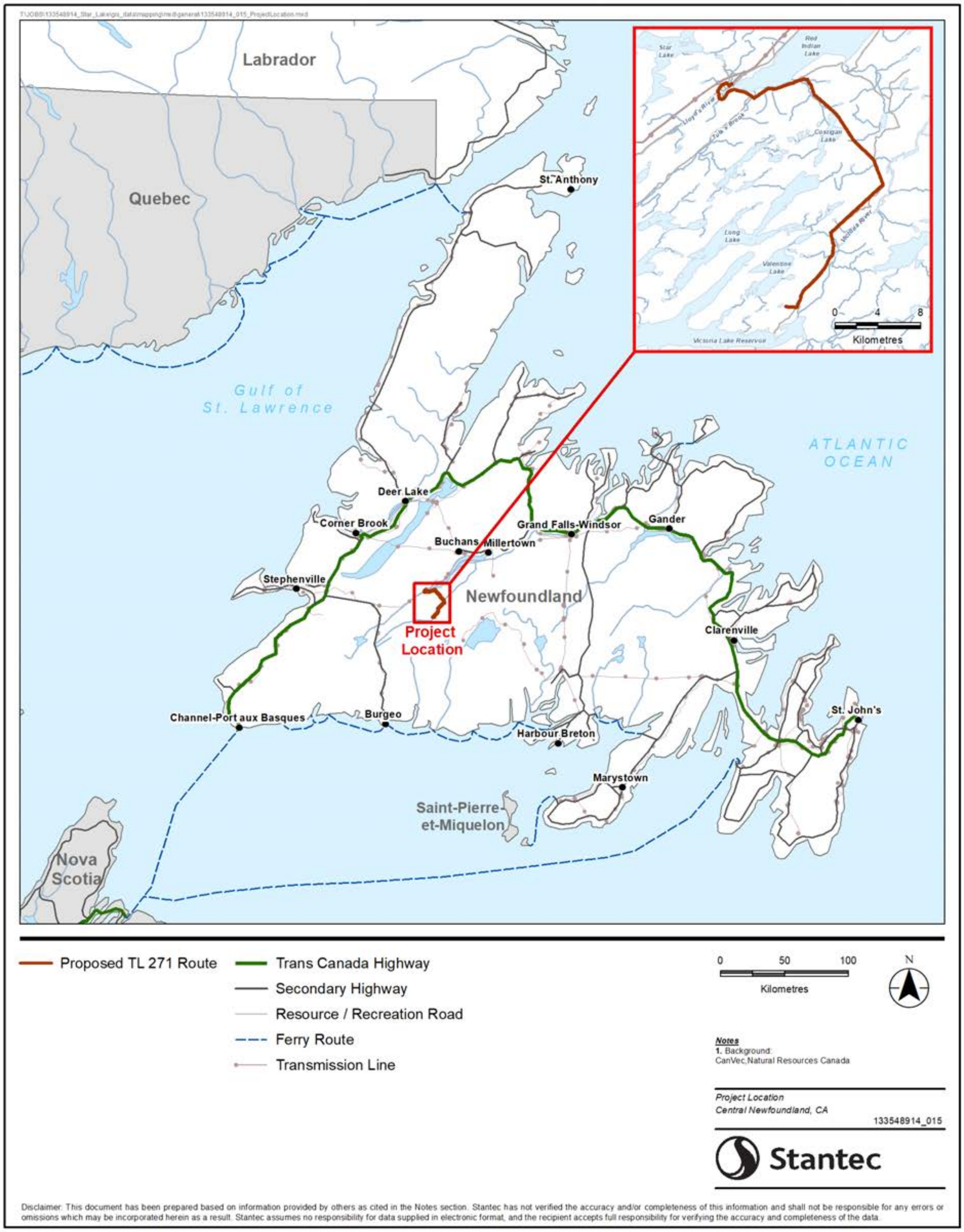

Figure 1-1 Project Location

The objectives of the Water Resources Baseline Study are to:

1. Identify potential watercourse crossings for the Project by reviewing 1:50,000 topographic mapping and aerial imagery
2. Compile information on fish presence and aquatic species at risk (SAR) in the Project Area that have the potential to interact with the Project
3. Characterize fish habitat at potential watercourse crossings (including clear spans) by use of site specific aerial imagery and field data available from the Valentine Gold Project
4. Prepare a report describing the surface water resources in the vicinity of the RoW to support the Registration of the Project

At the time of report preparation, the type of crossing (e.g., clear span, culvert, temporary bridge, etc) is unknown. Watercourse crossing design recommendations will be based on field identification prior to construction.

2.0 WATER RESOURCES REGULATORY CONTEXT

In addition to the NL *Environmental Protection Act* (NL EPA), the Project is subject to other federal and provincial legislation, policies and guidance. This section identifies the primary regulatory requirements and policies which influence the scope of the assessment on water resources and govern their management and protection in Canada and NL.

2.1 FEDERAL

2.1.1 Fisheries Act

The federal *Fisheries Act* is administered primarily by Fisheries and Oceans Canada (DFO) with some provisions administered by Environment and Climate Change Canada (ECCC). The *Fisheries Act* protects fish and fish habitat and addresses national interests in marine and fresh waters with the goal of protecting the long-term sustainability of aquatic resources. The *Fisheries Act* includes prohibitions against works, undertakings or activities that result in the harmful alteration, disruption or destruction (HADD) of fish habitat or the death of fish (section 35(1) and 34.4(1)). Works can be approved by and carried on in accordance with conditions established by the Minister of Fisheries, Oceans and the Canadian Coast Guard (Fisheries Minister) (section 35(2)(b)). This work requires an authorization with an appropriate offsetting of residual adverse effects after avoidance and mitigation steps have been taken.

HADD of fish habitat is defined under the *Fisheries Act* policies as “any temporary or permanent change to fish habitat that directly or indirectly impairs the habitat’s capacity to support one or more life processes of fish.”

2.1.2 Species at Risk Act

The federal *Species at Risk Act* (SARA) provides protection for SAR in Canada. The legislation provides a framework to facilitate recovery of species listed as Threatened, Endangered or Extirpated, and to prevent species listed as special concern from becoming threatened or endangered. SAR and their habitats are protected under SARA, which prohibits: 1) the killing, harming, or harassing of endangered or threatened SAR (sections 32 and 36), and 2) the destruction of critical habitat of an endangered or threatened SAR (sections 58, 60 and 61). There are no aquatic species identified in Schedule 1 of SARA with the potential to occur in the Project Area.

2.2 PROVINCIAL

2.2.1 NL Water Resources Act

The NL *Water Resources Act* gives the Water Resource Management Division (WRMD) of the NL Department of Environment, Climate Change and Municipalities (NLDECCM) the responsibility and legislative power for the management of water resources in the province. The NL *Water Resources Act* provides protection for bodies of water, including watercourses or waterbodies that appear on 1:50,000 topographic maps from alterations that may change the flow of water.

2.2.2 NL Endangered Species Act (NL ESA)

The NL ESA provides protection for plant and animal species considered to be Endangered, Threatened or Vulnerable. The NL ESA applies to species, sub-species and populations that are native to NL, however not to marine fishes. The designation under the NL ESA follows the recommendations of the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species Status Advisory Committee.

2.2.3 NL Fishery Regulation

The NL Fishery Regulations provide protection for fisheries within Newfoundland and Labrador. Schedule 1 of the NL Fishery Regulations lists rivers which are scheduled salmon rivers. Scheduled rivers are broken into various classes (i.e., Class 0 to 6) depending on the season and daily bag limit.

3.0 METHODS

Baseline information to describe existing conditions for the Water Resources Baseline Study was obtained through a review of existing literature and information. In addition, a desktop analysis of digital aerial imagery assisted in identifying unmapped watercourses (watercourses not shown on 1:50,000 topographic mapping) and characterizing fish habitat. Although no field surveys were conducted as part of this Project, field data was available from studies conducted for the Valentine Gold Project and these studies aided with determination of fish species presence and fish habitat characterization.

The review of existing literature and information included, but was not limited to:

- mapped watercourses GIS files (Government of Canada n.d.)
- Project specific aerial imagery
- Marathon Baseline Fish and Fish Habitat Data Report (Stantec 2012)
- Valentine Gold Project: 2018 Fish and Fish Habitat Data Report (Stantec 2019)
- Valentine Gold Project: 2019 Aquatic Study (Stantec 2020)
- Valentine Gold Project: Environmental Impact Statement (EIS) (Marathon 2020)
- Valentine Gold Project: 2020 Fish and Fish Habitat Data Report (Stantec 2021)
- Other pubically available information on water resources in the area

Watercourse sizes (i.e., small, medium, large) were classified based on stream order. Small watercourses were considered those with orders of 0, 1, 2, while medium watercourses were considered those between 3 and 4, and large watercourses were considered those with orders greater than 4.

When using aerial imagery to characterize fish habitat at watercourse crossings locations, the dominant substrate type was assigned based on the type of riparian vegetation present at the crossing. These assumptions were based on the field surveys completed as part of the Valentine Gold Project, where substrate type was found to be generally related to the type of riparian vegetation present (Stantec 2019, 2021). Thus, the following assumption of substrate type was applied when characterizing fish habitat from aerial imagery:

- Fine substrates are typically associated with wetland riparian vegetation
- Mixed substrates (i.e., fine and coarse) are associated with shrub riparian vegetation
- Coarse substrates are associated with treed riparian vegetation

4.0 RESULTS

This section describes the relevant sub-watersheds surrounding the Project Area, identifies potential watercourse crossings, describes fish species that are anticipated to be present, and characterizes fish habitat at watercourse crossings.

4.1 GENERAL SUB-WATERSHED DESCRIPTION

The Project is located within the Exploits River watershed, upstream of Red Indian Dam (Figure 1-1). The RoW crosses the Victoria River and Lloyd's River subwatersheds, as well as a number of smaller headwater watercourses and smaller sub-watersheds (i.e., Costigan Lake, Tulk's Brook) which flow directly into Red Indian Lake.

The Lloyd's River subwatershed is 476.6 km^2 (Porter et al. 1974). It flows from the Annieopsquotch Mountains into the upper end of Red Indian Lake. There are no major obstructions on the main river or larger tributaries, however many of the headwater tributaries cascade over steep mountains (Porter et al. 1974).

The Victoria River subwatershed is 872.8 km^2 (Porter et al. 1974). Prior to 1969, Victoria Lake was a large lake in the headwaters of the Victoria River. It was part of the Exploits River watershed and flowed to Red Indian Lake via the Victoria River. In 1968, the Victoria Dam was constructed at the extreme northeastern end of the lake at the former outlet (Victoria River) and water was divered south to hydroelectric generating stations for the Bay d'Espoir Hydro Electric Development and White Bear Watershed.

4.2 IDENTIFICATION OF POTENTIAL WATERCOURSE CROSSINGS

In total, 50 potential watercourses were identified through the review of existing information and aerial imagery collected for the Project as crossing the proposed RoW and/or RoW access roads (Figure 4-1).

Of the watercourses identified, 30 were mapped watercourses identified through the 1:50,000 topographic mapping and confirmed present during fish and fish habitat field surveys conducted in support of the Valentine Gold Project EIS (Stantec 2019, 2020, 2021; Government of Canada n.d.; Marathon 2020) and 20 potential watercourses were identified through the aerial imagery (Table 4.1). Mapped watercourses C0025, C0026, C0027, C0028, C0028a and C0029 from the Valentine Gold Project were not included in the list of watercourses provided in Table 4.1 below. Their channels within the Project RoW were not visible from the aerial imagery and fish and fish habitat surveys conducted for the Valentine Gold mine access road indicated the mapped watercourses located downstream at the access road were not present (Stantec 2021).

The proposed crossings of the RoW are listed in Table 4.1. These crossings will require field identification to determine crossing type (e.g., clear span, culvert, temporary bridge, fording site). Forty-five of the identified watercourses are considered small (first or second order headwater streams) and drain into larger tributaries or waterbodies. The remaining five are considered medium to large watercourses (i.e., WC-005, WC-018, WC-022, WC-034, WC-042), which drain into Red Indian Lake or the Victoria River.

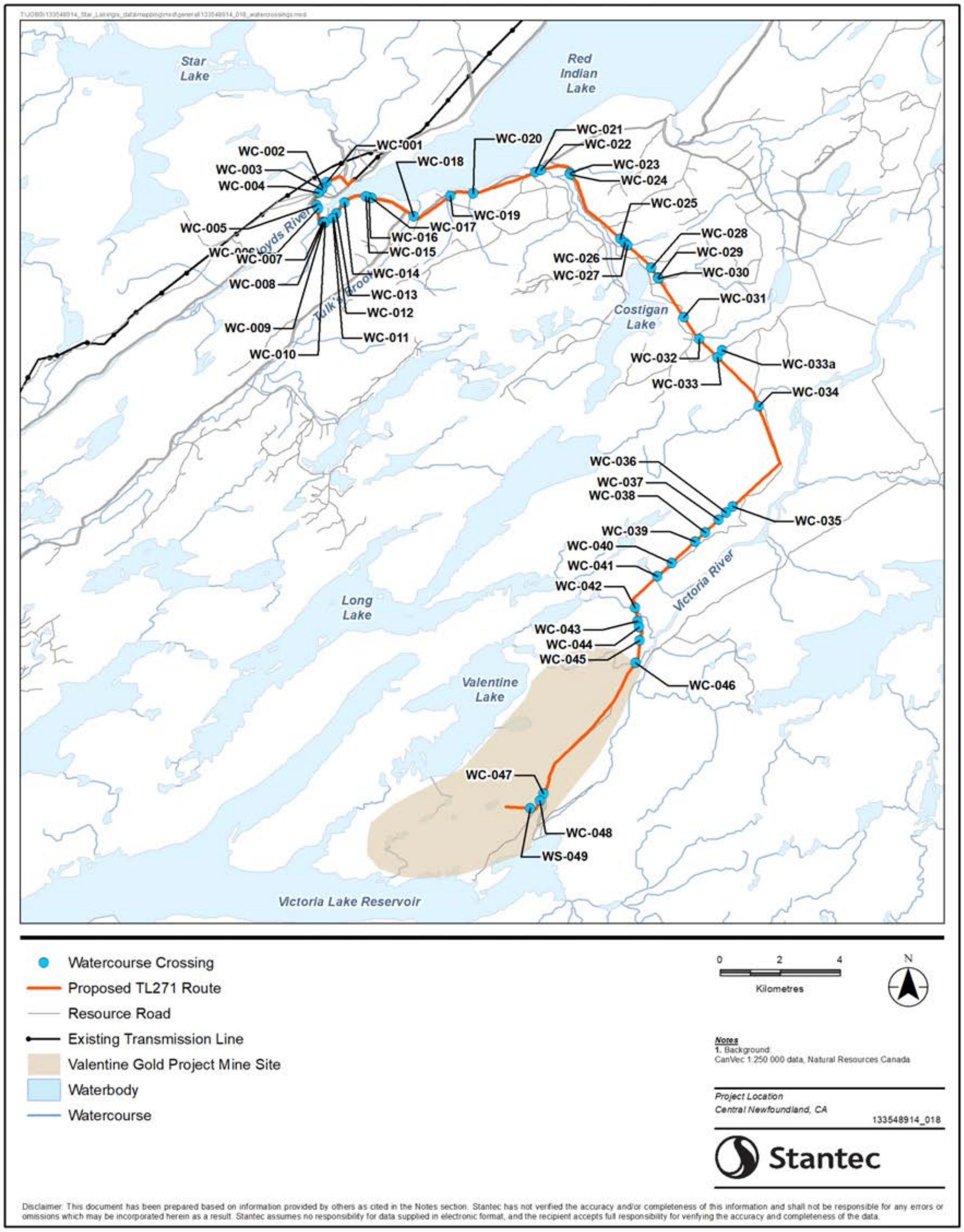

Figure 4-1 Proposed Watercourse Crossings for TL271 Star Lake to Valentine Gold Project

Table 4.1 Watercourse Crossing (includes Clear Spans) Identified by Aerial Imagery and 1:50,000 Topographic Mapping for TL271 Star Lake to Valentine Gold Project

Watercourse	Name	Source	Status	Size
WC-001	Unnamed Tributary to Red Indian Lake	1:50000 Mapping	Channel visible	Small
WC-002	Unnamed Tributary to WC-004	Aerial Imagery	Channel visible	Small
WC-003	Unnamed Tributary to WC-004	Aerial Imagery	Channel visible	Small
WC-004	Unnamed Tributary to Red Indian	Aerial Imagery	Channel visible	Small
WC-005	Lloyd’s River	1:50000 Mapping	Channel visible	Large
WC-006	Unnamed Tributary to Red Indian	Aerial Imagery	Channel visible	Small
WC-007	Unnamed Tributary to Red Indian Lake	1:50000 Mapping	Channel visible	Small
WC-008	Unnamed Tributary to WC-007	Aerial Imagery	Channel visible	Small
WC-009	Unnamed Tributary to WC-008	Aerial Imagery	Channel visible	Small
WC-010	Unnamed Tributary to WC-008	Aerial Imagery	Channel visible	Small
WC-011	Unnamed Tributary to WC-012	Aerial Imagery	Channel visible	Small
WC-012	Unnamed Tributary to Red Indian	Aerial Imagery	Channel visible	Small
WC-013	Unnamed Tributary to Red Indian	Aerial Imagery	Channel visible	Small
WC-014	Unnamed Tributary	Aerial Imagery	Channel visible	Small
WC-015	Unnamed Tribuary to WC-016	Aerial Imagery	Channel visible	Small
WC-016	Unnamed Tributary to Red Indian	Aerial Imagery	Channel visible	Small
WC-017	Unnamed Tributary to Red Indian	Aerial Imagery	Channel visible	Small
WC-018	Tuik’s Brook	1:50000 Mapping	Channel visible	Medium
WC-019	Unnamed Tributary to Red Indian Lake	1:50000 Mapping	Channel visible	Small
WC-020	Unnamed Tributary to Red Indian Lake	1:50000 Mapping	Channel visible	Small
WC-021	Unnamed Tributary to WC-022	Aerial Imagery	Small Pond	Small
WC-022	Unnamed Tributary to Red Indian Lake	1:50000 Mapping	Channel visible	Medium
WC-023	Unnamed Tributary to WC-022	1:50000 Mapping	Channel visible	Small
WC-024	Unnamed Tributary to WC-023	1:50000 Mapping	Channel visible	Small
WC-025	Unnamed Tributary to WC-027	1:50000 Mapping	Channel visible	Small
WC-026	Unnamed Tributary to WC-027	1:50000 Mapping	Channel visible	Small
WC-027	Unnamed Ttributary to WC-022	1:50000 Mapping	Channel visible	Small
WC-028	Unnamed Tribuary to Costigan Lake	1:50000 Mapping	Channel visible	Small
WC-029	Unnamed Tribuary to Costigan Lake	Aerial imagery	Channel visible	Small
WC-030	Unnamed Tribuary to Costigan Lake	1:50000 Mapping	Channel visible	Small
WC-031	Unnamed Tribuary to Costigan Lake	1:50000 Mapping	Channel visible	Small
WC-032	Unnamed Tributary to Unnamed Pond	1:50000 Mapping	Channel visible	Small
WC-033	Unnamed Tribuary to WC-032	1:50000 Mapping	No channel visible	Small

Table 4.1 Watercourse Crossing (includes Clear Spans) Identified by Aerial Imagery and 1:50,000 Topographic Mapping for TL271 Star Lake to Valentine Gold Project

Watercourse	Name	Source	Status	Size
WC-033a	Unnamed Tribuary to WC-032	Aerial Imagery	Channel visible	Small
WC-034	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Medium
WC-035	Unnamed Tribuary to Victoria River	1:50000 Mapping	No channel visible	Small
WC-036	Unnamed Tributary to WC-035	1:50000 Mapping	No channel visible	Small
WC-037	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-038	Unnamed Tribuary to Victoria River	1:50000 Mapping	No channel visible	Small
WC-039	Unnamed Tribuary to Victoria River	1:50000 Mapping	No channel visible	Small
WC-040	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-041	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-042	Outlet of Valentine Lake	1:50000 Mapping	Channel visible	Medium
WC-043	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-044	Unnamed Tribuary to WC-043	Aerial Imagery	Channel visible	Small
WC-045	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-046	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-047	Unnamed Tribuary to Victoria River	1:50000 Mapping	Channel visible	Small
WC-048	Unnamed Tribuary to Victoria River	Aerial Imagery	Channel visible	Small
WC-049	Unnamed Tribuary to Victoria River	Aerial Imagery	Channel visible	Small

4.3 FISH COMMUNITIES

Fish species including sea-run Atlantic salmon and ouananiche (*Salmo salar*), brook trout (*Salvelinus fontinalis*), Arctic char (*Salvelinus alpinus*), American eel (*Anguilla rostrata*), and threespine stickleback (*Gasterosteus aculeatus*) are known to occur within the upper Exploits River Watershed (Cunjak and Newbury 2005; Porter et al. 1974). Brook trout, ouaninache and threespine stickleback are the most common and abundant resident fish species in the vicinity of the Project (Stantec 2018, 2020; Marathon 2020) (Photos 1 to 3).

Photo 1 Representative Photo of Atlantic Salmon (Stantec 2021)

The area surrounding the Project supports established recreational fisheries for brook trout and ouananiche, and may support a limited recreational fishery for sea-run Atlantic salmon, where they reside. The Exploits watershed above Red Indian Dam is considered a Class 0 salmon river. Indigenous fishing activity in known to occur in other watercourses or waterbodies surrounding Red Indian Lake (Marathon 2020). There are no known commercial fisheries in the area.

Sea-run Atlantic salmon and American eel have the potential to occur in the Project Area and are diadromous species, meaning that a portion of their life cycle is carried out in the marine environment. Sea-run Atlantic salmon and American eel are not on Schedule 1 of SARA, and therefore have no federal prohibitions. Sea-run Atlantic salmon are part of the Northeast Newfoundland Atlantic Salmon population and are designated as Not-at-Risk by COSEWIC (COSEWIC 2010). American eel are considered a single breeding population and is classified as Threatened by COSEWIC (COSEWIC 2012) and under NL ESA as Vulnerable (Wildlife Division 2010). Given the general decline in Atlantic salmon and American eel populations in Atlantic Canada, as well as numerous hydroelectric facilities within their migratory corridors, the potential for sea-run Atlantic salmon and American eel in the Project Area is assumed to be low.

Photo 2 Representative Photo of Brook Trout (Stantec 2021)

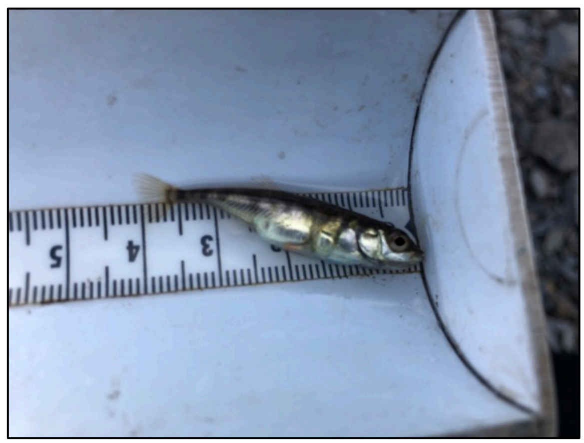

Photo 3 Representative Photo of Threespine Stickleback (Stantec 2021)

4.4 FISH HABITAT

4.4.1 Fish Habitat Characterization

Of the 50 watercourses identified in Section 4.2, 13 were field surveyed previously in 2018 and 2020 as part of the Valentine Gold Project. An analysis of aerial imagery was used to assess potential fish habitat characteristics in the remaining 37.

Small watercourses which were field surveyed as part of the Valentine Gold Project (Stantec 2019 and 2021) were generally narrow (<5 m), shallow (<0.5 m), slow flowing (<0.2 m/s) or intermittent or ephemeral in nature (Stantec 2019 and 2021). Small watercourses that flowed through bog or wetland habitats were generally characterized by shallow flats with an undefined thalweg, slow/negligible velocities, and fine grain substrates (Stantec 2018, 2021). Whereas, watercourses that flowed through forested areas were typically riffle-run, contained coarser substrates and slightly swifter velocities. It is anticipated that streams within the RoW contain similar characteristics. Representative photos of potential habitats anticipated along the proposed RoW are provided in Photos 4 to 10. Characterization of fish habitat at the proposed watercourse crossings are included in Table 4.2.

Based on the aerial imagery, no visible channel was observed at five of the 50 watercourses along the RoW (i.e., WC-033, WC-035, WC-036, WC-038 and WC-039), so these watercourses do not constitute fish habitat. A visible channel was apparent for the other 45 watercourses within the RoW, and are assumed to constitute fish habitat.

Photo 4 No Visible Channel at Proposed Crossing (Stantec 2021)

Photo 5 Wetland Drainage Visible from Aerial Imagrey at Proposed Crossing (Stantec 2021)

Photo 6 Ephemeral/Intermittent Watercourse at Proposed Crossing (Stantec 2021)

Photo 7 Watercourse With Wetland Riparian Vegetation at Proposed Crossing (Stantec 2021)

	
Photo 8 Watercourse With Shrub Riparian Vegetation at Proposed Crossing (Stantec 2021)	**Photo 9 Watercourse With Treed Riparian Vegetation at Proposed Crossing (Stantec 2021)**

Table 4.2 Summary of Habitat Characteristics for Proposed Watercourse Crossings

Watercourse	Survey Type	Status	Estimated Width (m)	Predicted Dominant Substrate	Riparian Vegetation	Relevant Features	Corresponding Valentine Gold Project Mine Access Road ID
WC-001	Desktop	Channel visible	2.3	Coarse	Trees	Adjacent to existing road	-
WC-002	Desktop	Channel visible	1	Mixed	Shrubs	-	-
WC-003	Desktop	Channel visible	1	Mixed	Shrubs	-	-
WC-004	Desktop	Channel visible	2	Mixed	Shrubs	Runs along north side of existing road	-
WC-005	Desktop	Channel visible	21.4	Coarse	Trees	Adjacent to existing road	-
WC-006	Desktop	Channel visible	1	Mixed	Shrub/Trees	-	-
WC-007	Desktop	Channel visible	2	Mixed	Shrubs/Trees	Adjacent to existing road	-
WC-008	Desktop	Channel visible	1	Mixed	Shrubs/Trees	Adjacent to existing road	-
WC-009	Desktop	Channel visible	1	Mixed	Shrubs/Trees	Adjacent to existing road	-
WC-010	Desktop	Channel visible	1	Mixed	Shrubs/Trees	Adjacent to existing road	-
WC-011	Desktop	Channel visible	1	Coarse	Trees	-	-
WC-012	Desktop	Channel visible	1	Coarse	Trees	-	-
WC-013	Desktop	Channel visible	1	Coarse	Trees	-	-
WC-014	Desktop	Channel visible	1	Coarse	Trees	Drains a bog upstream	-
WC-015	Desktop	Channel visible	1	Coarse	Trees	Travels through ditch	-
WC-016	Desktop	Channel visible	1	Coarse	Trees	-	-
WC-017	Desktop	Channel visible	1.5	Coarse	Trees	-	-
WC-018	Desktop	Channel visible	22.9	Coarse	Shrubs/Trees	Adjacent to existing road	-
WC-019	Desktop	Channel visible	2	Coarse	Forested	-	-
WC-020	Desktop	Channel visible	2	Mixed	Shrubs/Trees	Adjacent to existing road	-
WC-021	Desktop	Small Pond	5.5	Fines	Wetlands	-	-
WC-022	Desktop	Channel visible	11.4	Coarse	Trees	Adjacent to existing road	-

Table 4.2 Summary of Habitat Characteristics for Proposed Watercourse Crossings

Watercourse	Survey Type	Status	Estimated Width (m)	Predicted Dominant Substrate	Riparian Vegetation	Relevant Features	Corresponding Valentine Gold Project Mine Access Road ID
WC-023	Desktop	Channel visible	3.75	Mixed	Shrubs/Trees	-	-
WC-024	Desktop	Channel visible	1	Fines	Wetland/Shrubs	Not as mapped	-
WC-025	Desktop	Channel visible	1	Fines	Wetland/Trees	Not as mapped	-
WC-026	Desktop	Channel visible	1	Coarse	Trees	Stream	-
WC-027	Desktop	Channel visible	1	Coarse	Trees	-	-
WC-028	Desktop	Channel visible	1	Mixed	Shrub/Wetland	-	-
WC-029	Desktop	Channel visible	1	Fines	Wetland	-	-
WC-030	Desktop	Channel visible	1.5	Fines	Wetland	-	-
WC-031	Desktop	Channel visible	1	Fines	Shrub/Wetland	-	-
WC-032	Desktop	Channel visible	1	Fines	Wetland	-	-
WC-033	Desktop	No channel visible	-	-	-	No channel visible	-
WC-033a*	Desktop	Channel visible	1	Fines	Wetland	Channel difficult to discerne, lots of drainage	-
WC-034	Field	Channel visible	3	Coarse	Trees	-	C0031
WC-035	Field	No channel visible	1	Fines	Wetland	Appears not as mapped	C0023
WC-036	Field	No channel visible	1	Coarse	Trees	Appears not as mapped	C0023
WC-037	Field	Channel visible	1	Fines	Wetland	Appears not as mapped	C0022a
WC-038	Field	No channel visible	-	-	-		C009
WC-039	Field	No channel visible	-	-	-	Skidder trail in location of mapped stream	C008
WC-040	Field	Channel visible	1	Fines	Shrub/Wetland	Appears not as mapped, small channel visible but likely wetland seepage	C007

Table 4.2 Summary of Habitat Characteristics for Proposed Watercourse Crossings

Watercourse	Survey Type	Status	Estimated Width (m)	Predicted Dominant Substrate	Riparian Vegetation	Relevant Features	Corresponding Valentine Gold Project Mine Access Road ID
						channel based on Stantec (2019)	
WC-041	Field	Channel visible	1.26	Boulder	Shrub	Adjacent to existing road	C006
WC-042	Field	Channel visible	25	Boulder	Shrub	Adjacent to existing road, falls 50 m upstream of existing road crossing, not within RoW.	C005
WC-043	Field	Channel visible	1.95	Fines	Trees	-	C004
WC-044	Desktop	Channel visible	1	Fines	Shrub	-	-
WC-045	Field	Channel visible	2.07	Boulder	Shrub	Downstream of pond, adjacent to existing access road	C003
WC-046	Field	Channel visible	4	Cobble/Rubble	Trees	-	C002
WC-047	Field	Channel visible	3	Fines	Shrub	Adjacent to existing access road	C001
WC-048	Desktop	Channel visible	1	Mixed	Shrub	Adjacent to existing access road, potentially drainage from bog upstream	-
WC-049	Desktop	Channel visible	1	Mixed	Shrub/Wetland	-	C017
Note: * Watercourse crossing to require culvert installation							

4.4.2 Water Quality

Based on field surveys conducted for the Valentine Gold Project, *in situ* water quality in streams within the vicinity of the Project is generally within the acceptable ranges for supporting cold water fish communities (Stantec 2020 and 2021):

- In streams, average water temperature ranged from 12.2°C to 22.3°C
- Average dissolved oxygen concentrations in streams ranged from 7.8 mg/L to 9.4 mg/L; all stations were below the Canadian Water Quality Guidelines – Freshwater Aquatic Life (CWQG-FAL) recommended minimum value of 9.5 mg/L for early life stages of fish. However, concentrations were above the guideline of 6.5 mg/L for all life stages (CCME 2014)
- The pH ranged from 6.1 to 6.9 and was below the CWQG-FAL recommended range (6.5 to 9.0) at one of six sampling locations (CCME 2014)
- Conductivity ranged from 39.4 µS/cm to 317.0 µS/cm
- Water quality was generally soft, with low pH and alkalinity, and therefore limited acid buffering potential
- Total dissolved solids fluctuated seasonally within the region, with two peaks associated with the spring melt and fall rains
- Concentrations of total suspended solids and turbidity were generally low
- Several metals (i.e., aluminum, cadmium, copper, iron and lead) were found in naturally elevated levels in both local and regional surface water. Stream/bog waterbody types often contained higher concentrations of iron and manganese
- Total phosphorus values indicated streams and waterbodies are generally rich in nutrients

5.0 SUMMARY

In total, 50 potential watercourse crossings were identified through the review of existing information and aerial imagery. Thirty were identified through the 1:50,000 topographic mapping and the other twenty were identified through aerial imagery. Of these, 45 were considered small (first or second order headwater streams), which drained into larger tributaries or waterbodies. The remaining five were considered medium to large and flowed into Red Indian Lake or the Victoria River. A field survey will be required to verify the presence or absence of watercourses within the RoW, prior to clearing. Observations from the field will be used to identify watercourse crossing type (e.g., clear span, culvert, temporary bridge, fording site).

Based on the flowing habitat characteristics associated with the vast majority of the crossings and infield surveys in support of the Valentine Gold Project, brook trout, ouaninache, and threespine stickleback are the most common and abundant fish species to be encountered within the RoW (Stantec 2018, 2020, 2021). There is the potential for American eel and sea-run Atlantic salmon, however given the populations and field surveys (Stantec 2021), there is a low likelikehood of occurrence for the majority of the crossings.

The majority of watercourses that cross the RoW are small. Small streams flowing through bog or wetland habitats likely consist of shallow flats with an undefined thalweg, slow/negligible velocities, and fine grain substrates (Stantec 2018, 2021). Whereas, watercourses that flowed through shrubs (i.e., alders) or forested areas are typically riffle-run, contained coarser substrates and slightly swifter velocities.

In situ water quality in watercourses is generally within the acceptable ranges for supporting cold water fish communities. Water quality was generally soft, had low pH and alkalinity, and therefore limited acid buffering potential (Stantec 2020). Concentrations of total suspended solids and turbidity are considered low. Several metals (aluminum, cadmium, copper, iron and lead) are found in naturally elevated levels in both local and regional surface water.

6.0 REFERENCES

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APPENDIX A

Mapbook of Watercourse Crossings and Access Roads

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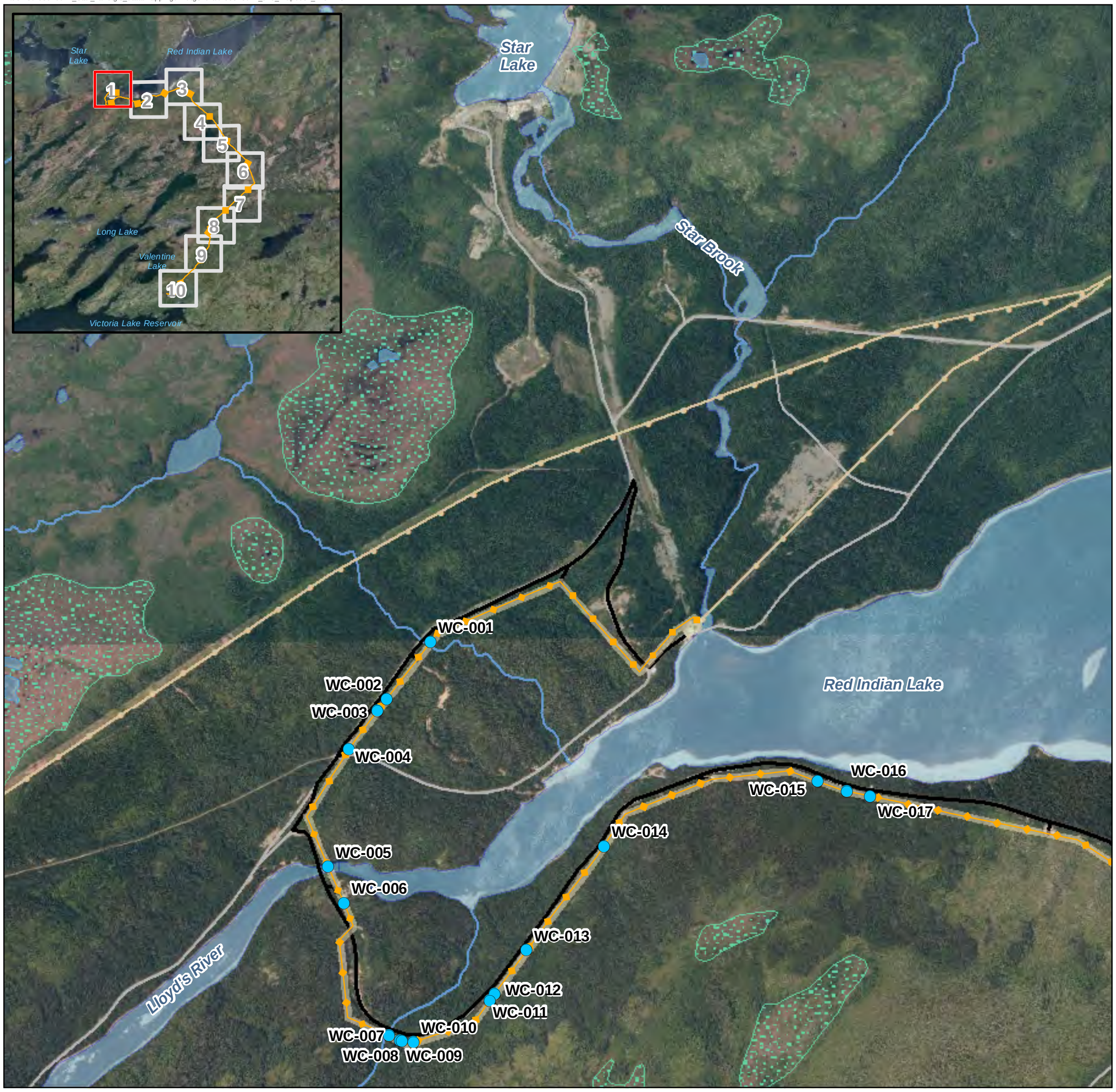

Watercourse Crossing
Proposed TL271 Route
25 m Right of Way
Proposed Access Routes
Watercourse
Existing Transmission Line
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 1
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Stantec

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Watercourse Crossing
Proposed TL271 Route
25 m Right of Way
Proposed Access Routes
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 2
133548914_001

Stantec

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- Watercourse Crossing
- Proposed TL271 Route
- 25 m Right of Way
- Proposed Access Routes
- Watercourse
- Wetland
- Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 3
133548914_001

Stantec

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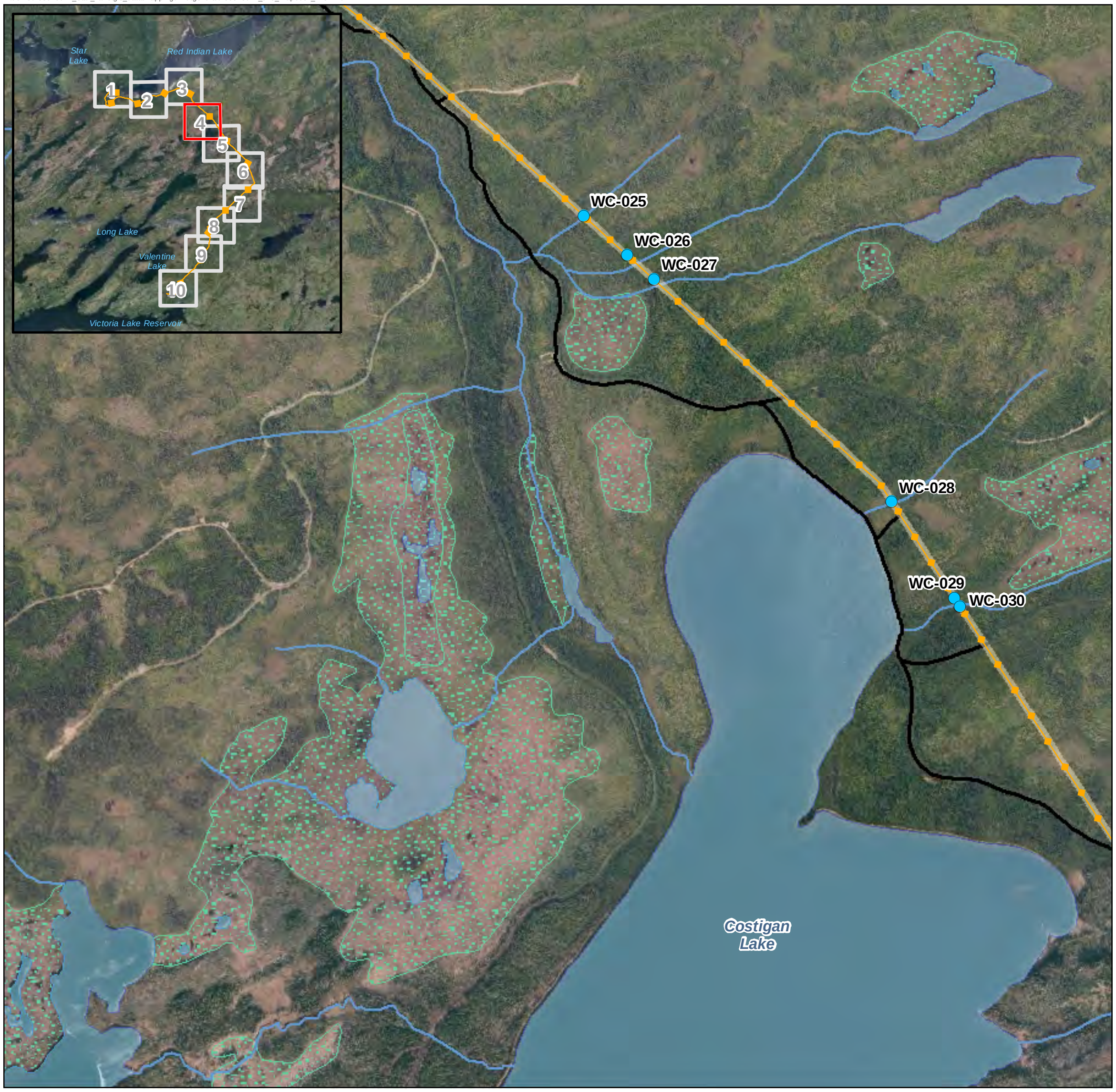

- Watercourse Crossing
- Proposed TL271 Route
- 25 m Right of Way
- Proposed Access Routes
- Watercourse
- Wetland
- Waterbody

0 250 500

Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 4
133548914_001

Stantec

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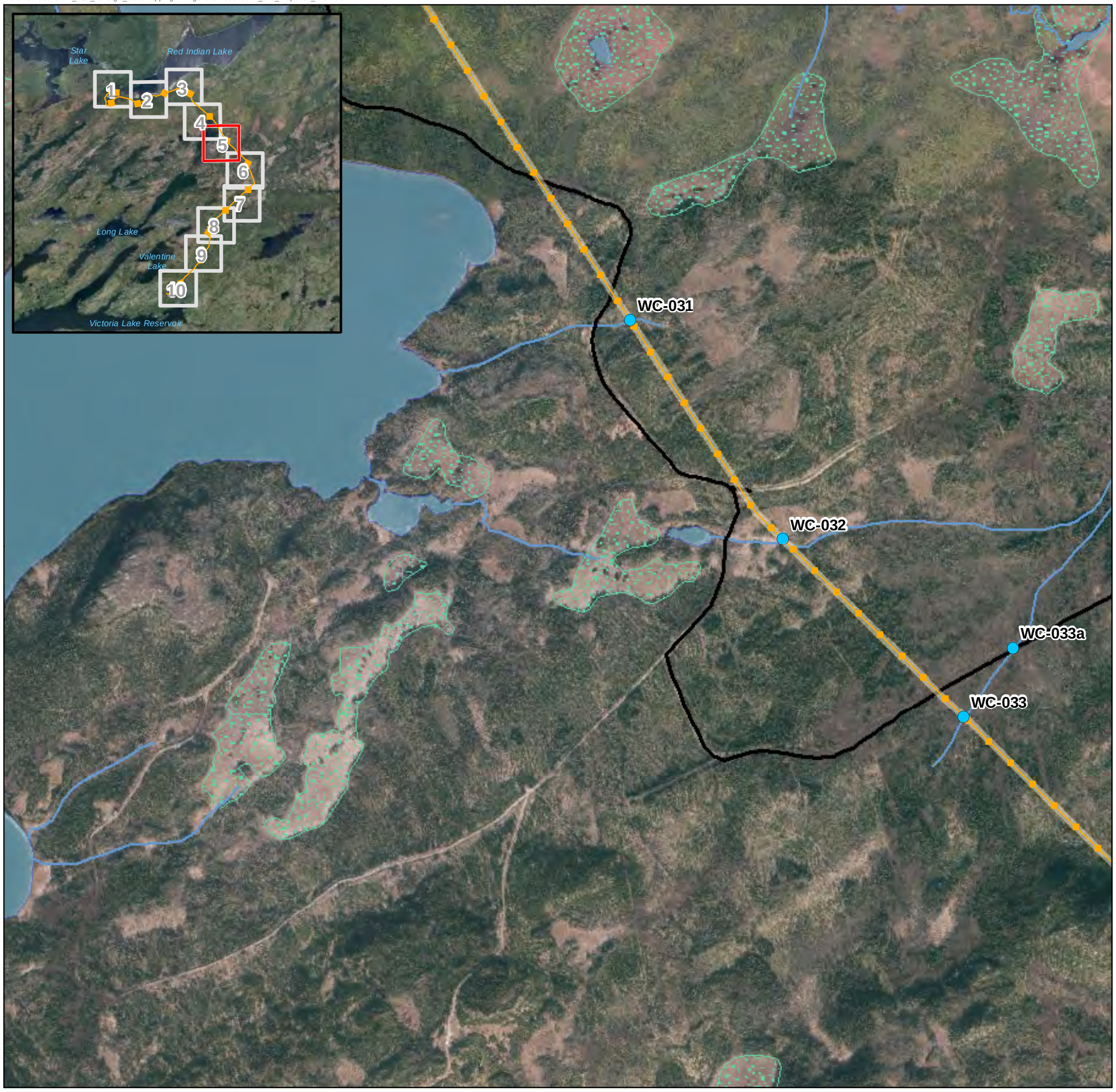

Watercourse Crossing
Proposed TL271 Route
25 m Right of Way
Proposed Access Routes
Watercourse
Wetland
Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 5
133548914_001

Stantec

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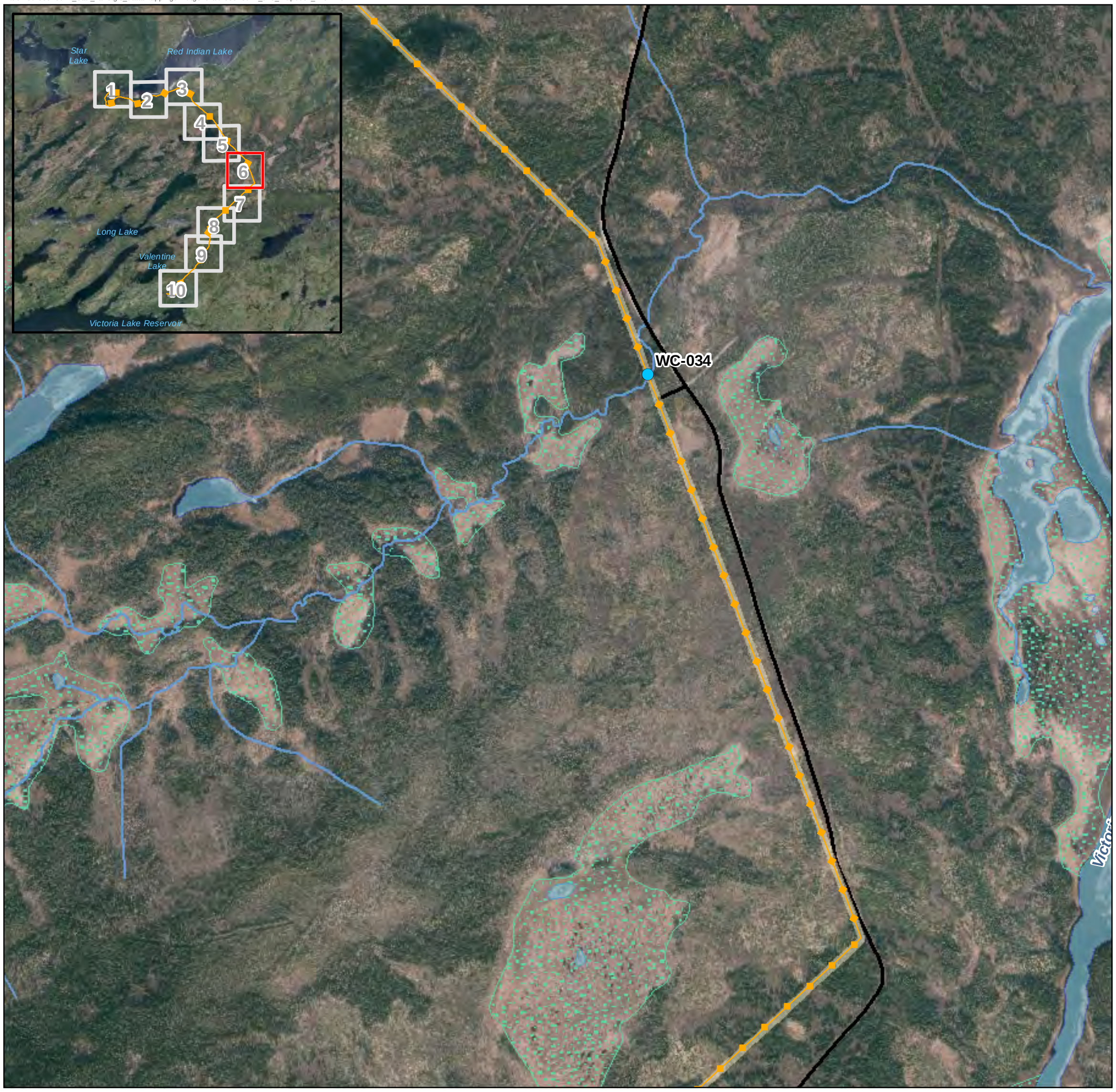

- Watercourse Crossing
- Proposed TL271 Route
- 25 m Right of Way
- Proposed Access Routes
- Watercourse
- Wetland
- Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 6
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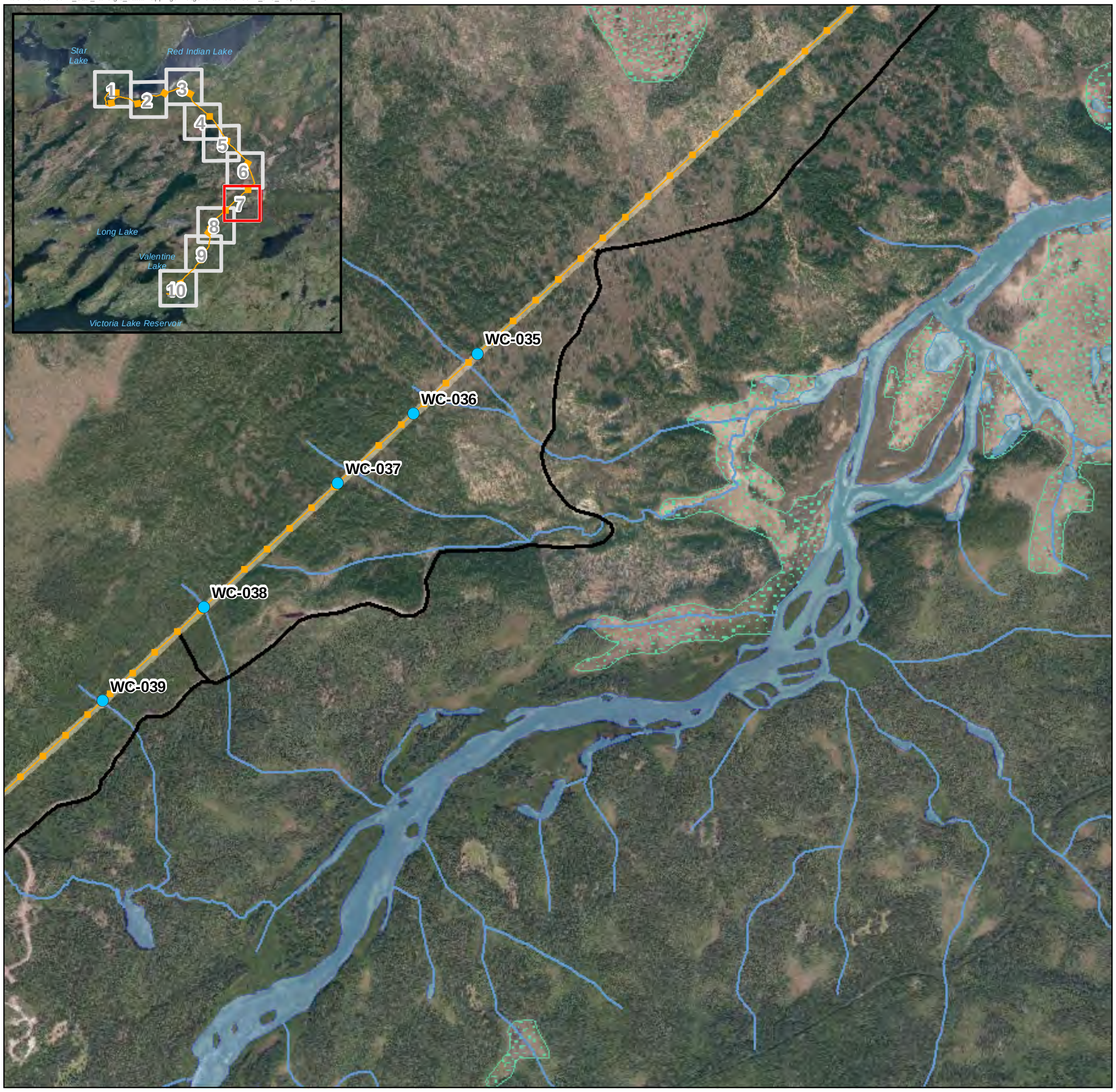

- Watercourse Crossing
- Proposed TL271 Route
- 25 m Right of Way
- Proposed Access Routes
- Watercourse
- Wetland
- Waterbody

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 7
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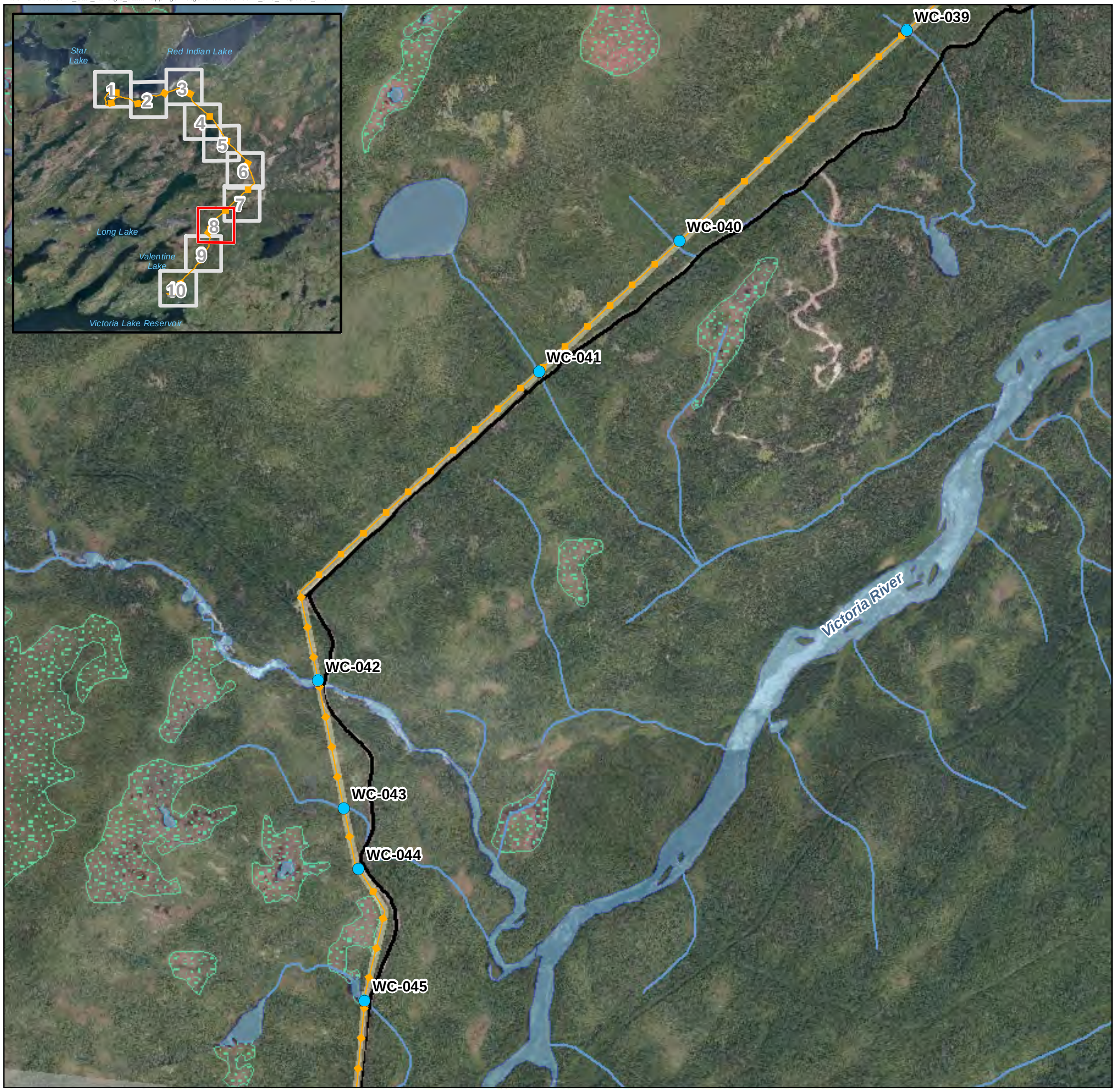

Watercourse Crossing
Proposed TL271 Route
25 m Right of Way
Proposed Access Routes
Watercourse
Wetland
Waterbody
Valentine Gold Project Mine Site

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 8
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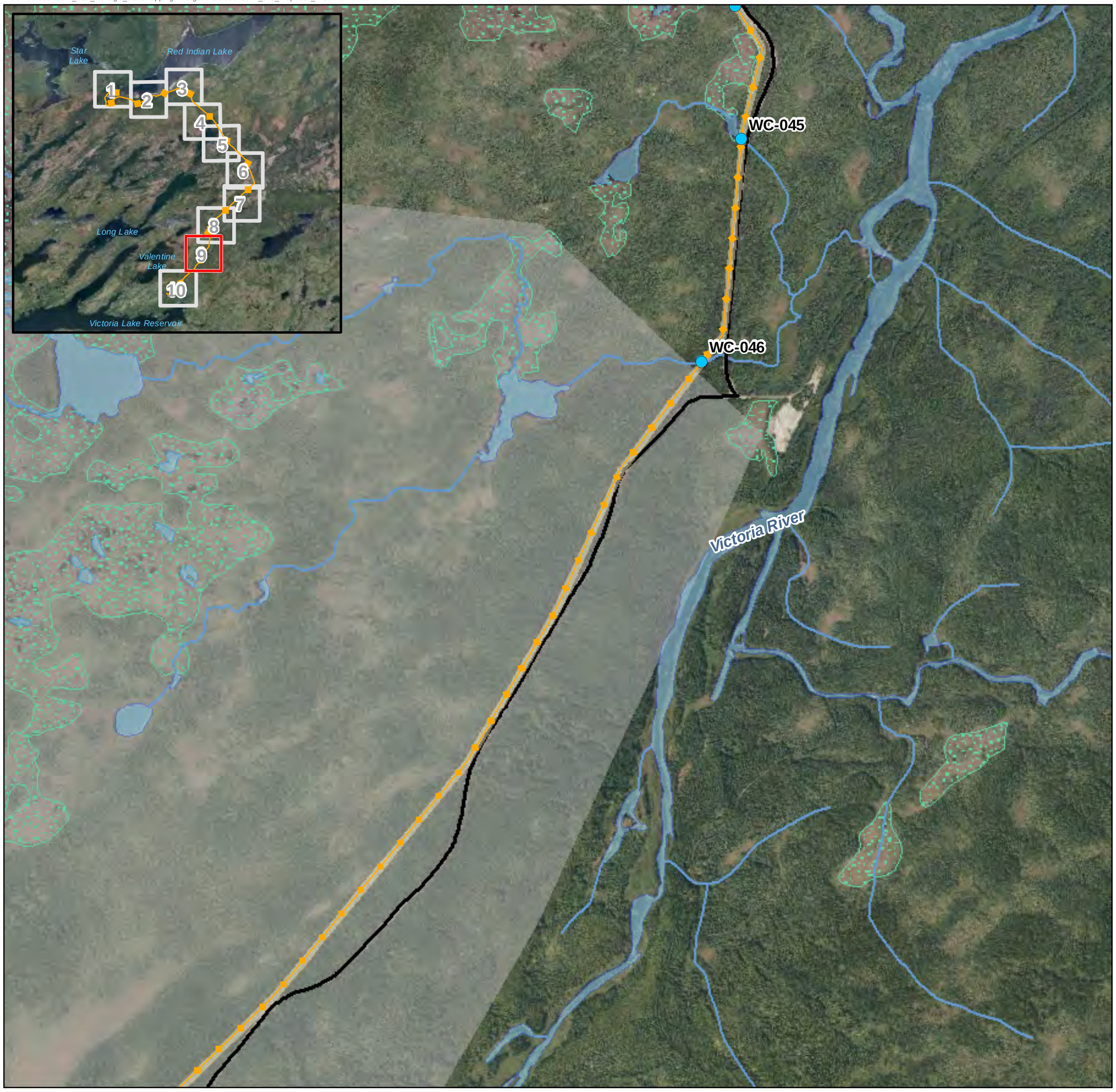

- Watercourse Crossing
- Proposed TL271 Route
- 25 m Right of Way
- Proposed Access Routes
- Watercourse
- Wetland
- Waterbody
- Valentine Gold Project Mine Site

0 250 500

Metres

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Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 9
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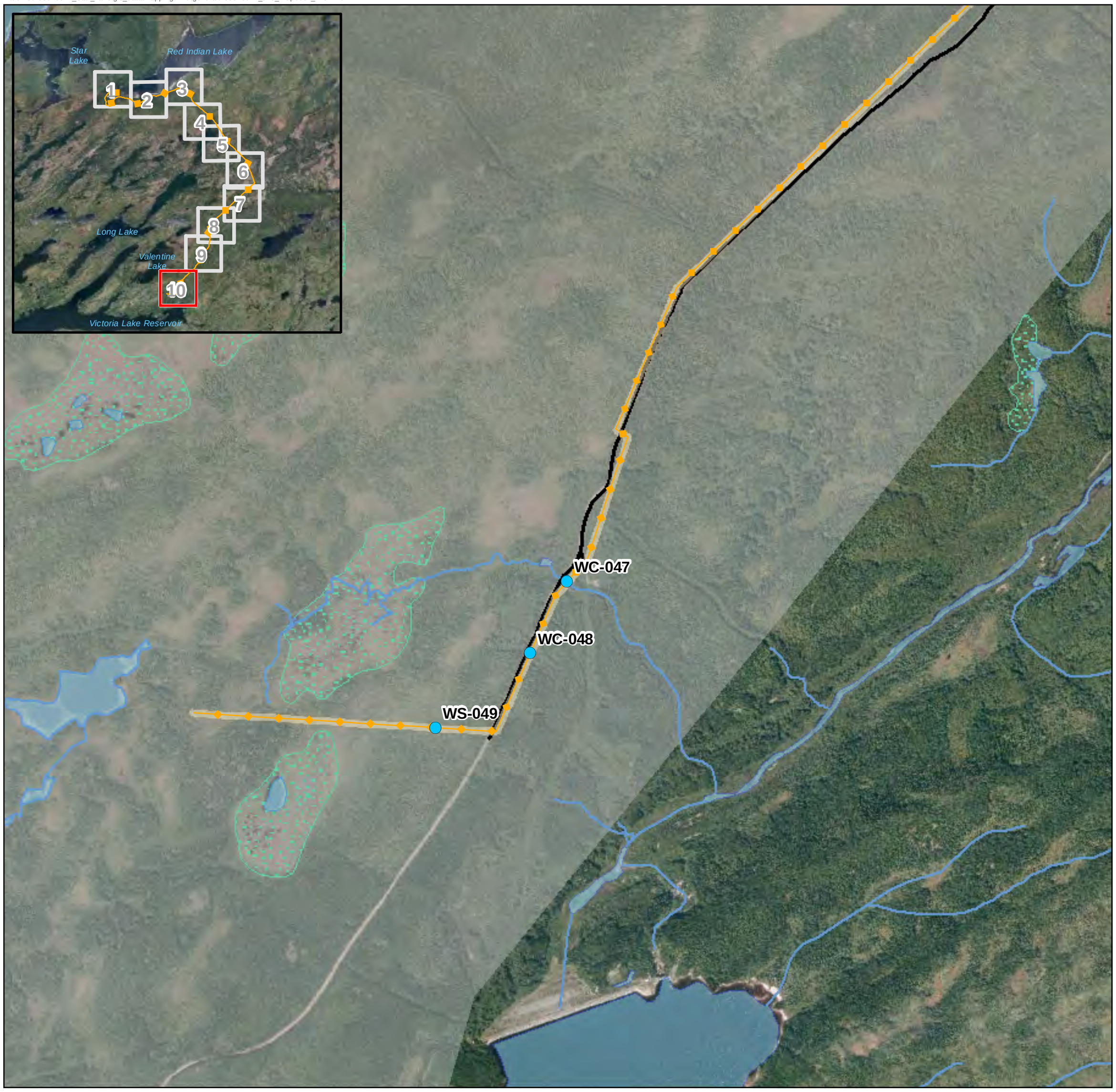

- Watercourse Crossing
- Proposed TL271 Route
- 25 m Right of Way
- Proposed Access Routes
- Watercourse
- Wetland
- Waterbody
- Valentine Gold Project Mine Site

0 250 500
Metres

N

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 10
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APPENDIX C

Caribou Baseline Study

Transmission Line 271 Star Lake to Valentine Gold Project Caribou Baseline Study

April 9, 2021

Prepared for:

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TRANSMISSION LINE 271 STAR LAKE TO VALENTINE GOLD PROJECT CARIBOU BASELINE STUDY

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Abbreviations

CEAA	*Canadian Environmental Assessment Act*
CMA	Caribou Management Area
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
dBBMM	Dynamic Brownian Bridge Movement Models
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELC	Ecological Land Classification
ELCA	Ecological Land Classification Area
EPA	*Environmental Protection Act*
ESRI	Environmental Systems Research Institute
GIS	Geographic Information System
GPS	Global Positioning System
km	kilometre
km^2	square kilometre
kV	kiloVolt
LAA	Local Assessment Area
m	metre
NL	Newfoundland and Labrador
NLDFFA	Newfoundland and Labrador Department of Fisheries, Forestry and Agriculture
NLDFLR	Newfoundland and Labrador Department of Fisheries and Land Resources
RAA	Regional Assessment Area
RoW	right of way
SARA	*Species at Risk Act*
UD	Utilization Distribution

1.0 INTRODUCTION

Newfoundland and Labrador (NL) Hydro is proposing to construct and operate a new 69 kiloVolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a proposed new terminal station (Valentine Terminal Station) being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site in the west-central region of the Island of Newfoundland (Figure 1-1) (the Project). Construction activities will include upgrades to the Star Lake Terminal Station, which will occur within the existing station property, and installation of a new 69 kV wood pole transmission line, approximately 40 km in length, with a right of way (RoW) approximately 25 m wide. Operational activities over the life of the Project will include asset inspection and repair as required, and vegetation control. Pending approvals, construction (clearing) may begin before the end of 2021, with TL271 being operational within the first quarter of 2023. TL271 is planned for decommissioning and removal once all power requirements for the Valentine Gold Project have been met.

The Caribou Baseline Study has been prepared to support ongoing Project planning and design and to support the environmental assessment of the Project, which is being initiated through submission of a Registration document to the Government of NL. This report is a baseline study on caribou in the vicinity of the Project and was prepared based on a desktop analysis of publicly available data, supported by information from field studies previously conducted for the Valentine Gold Project, the study area of which overlaps the proposed RoW for the Project. The Caribou Baseline Study considers both the proposed RoW, as well as an alternate route that was considered by NL Hydro.

Caribou is often considered an indicator species (Environment and Climate Change Canada 2018) of the health of the environment, and caribou has the potential to be affected by the Project. This Caribou Baseline Study was completed for the Project because the species provides ecological, cultural, aesthetic, recreational and economic value to Indigenous groups, government agencies, local businesses and public stakeholders. As caribou is valued by resource users, it is important to maintain a stable or increasing caribou population. This Caribou Baseline Study considers the species and its habitat, which includes elements required for feeding, movement, reproduction, calving and refuge.

The objectives of the Caribou Baseline Study are to:

- Reconcile relevant data from the Valentine Gold Project for the TL271 Star Lake to Valentine Lake Project
- Develop associated mapping to illustrate caribou migration areas
- Describe caribou migration in the Project Area

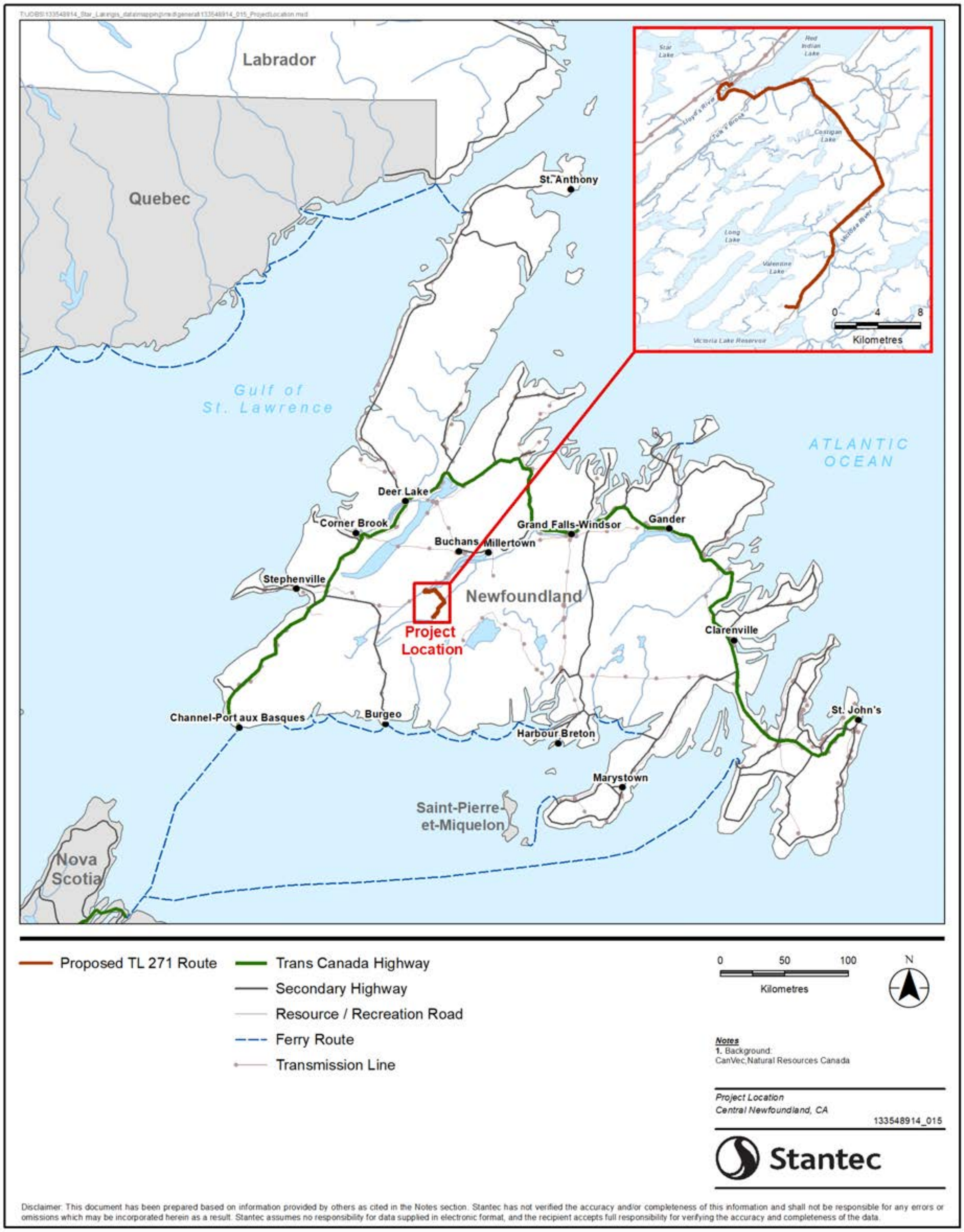

Figure 1-1 Project Location

2.0 REGULATORY CONTEXT

The Newfoundland population of caribou is not currently listed under the federal *Species at Risk Act* (SARA) or the NL *Endangered Species Act*, however various other legislation, regulations, strategies and management plans pertain to the protection of caribou or their habitat and are indicated below. In addition, because of their cultural and ecological importance, the NL Department of Fisheries, Forestry and Agriculture – Wildlife Division (NLDFFA-Wildlife Division) requires that caribou be considered in environmental effects assessments.

2.1 FEDERAL LEGISLATION

The Newfoundland population of caribou has been assessed and designated as Special Concern by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (COSEWIC 2014), an independent body of experts that assesses wildlife according to a broad range of scientific data. The committee reviews status reports on species suspected of being at risk and provides status assessments to government and the public. Following review and engagement with affected stakeholders and other groups, the federal Cabinet decides whether those species should receive legal protection under the federal SARA. In previous assessments (e.g., the Valentine Gold Project), EIS guidelines have included the provision for an assessment of the potential adverse effects of the project on species, including caribou, that are listed by COSEWIC as Extirpated, Endangered, Threatened or of Special Concern (flora and fauna) and their critical habitat.

2.2 PROVINCIAL LEGISLATION

Various provincial legislation, regulations, strategies and management plans pertain to the protection of caribou or their habitat. The following documents either relate directly to the management of wildlife in the province, or provide regulation or legislation regarding land use and development (e.g., forestry activities), which could affect caribou habitat:

- *Wilderness and Ecological Reserves Act*
- *Forestry Act*
- *Wild Life Act* and *Wild Life Regulations*
- *Wilderness Reserve Regulations*
- *Botanical Ecological Reserve Regulations*
- *Provincial Parks Regulations*
- *Sustainable Forest Management Planning Regulations*, NLR 61/13
- *Glover Island Public Reserve Regulations*
- Provincial Sustainable Forest Management Strategy 2014-2024
- 2015-2020 *Newfoundland and Labrador Moose Management Plan*
- *King George IV Ecological Reserve Order*
- King George IV Ecological Reserve Management Plan
- *Little Grand Lake Provisional Ecological Reserve Regulations*

- *Little Grand Lake Wild Life Reserve Regulations*
- *Main River Special Management Area Regulations*
- *West Brook Ecological Reserve Order*

Provincial Caribou Management Areas (CMAs) 61-64, 66, 67, 69 and 79 are pertinent to this baseline caribou study. Other provincial management areas that pertain to wildlife management or land use within caribou habitat include: Black Bear Management Areas (3, 4, 7-8,10-13, 15-21, 25, 37 and 41), Moose Management Areas (3, 4, 7-8,10-13, 15-21, 25, 37 and 41), Fur Zones (4 and 7-11), Lynx Zone (A), Forestry Management Divisions (6, 7, 9-16 and 50) and the Main River Waterway Provincial Park.

3.0 METHODS

3.1 BOUNDARIES

The following spatial boundaries were used to describe caribou distribution in relation to the Project (Figure 3-1):

- The **Project Area** includes the proposed 25 m RoW for TL271, access points and the portion of the Star Lake Terminal Station where upgrades will occur.
- The Project Area plus a 500 m buffer (referred to as the **Local Assessment Area** (LAA)).
- The combined population ranges (approximately 28,809 km^2) of the Buchans, Gaff Topsails, Grey River and La Poile Herds (referred to as the **Regional Assessment Area**, or RAA) as defined by caribou telemetry data and presented in the Valentine Gold Project EIS (Marathon 2020a). The method used to determine the RAA from telemetry data resulted in a large ‘core’ area of use centered around the Project, and several small, spatially discrete areas of use.

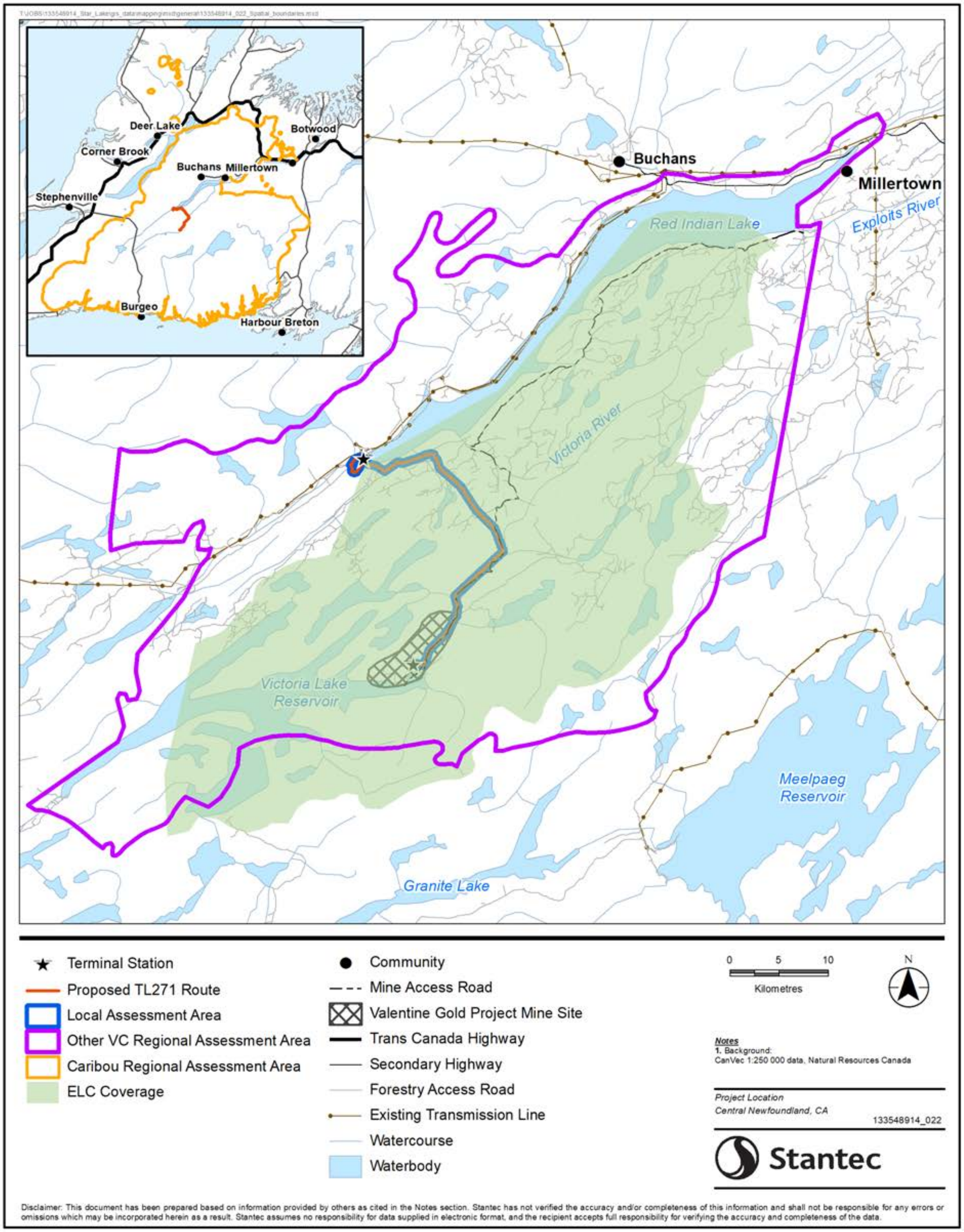

Figure 3-1 Study Boundaries and Ecological Land Classification Study Coverage

3.2 DATA SOURCES

Information on the existing environment for caribou and their habitat was compiled from various sources, including a review of available information from literature and provincial databases, including environmental assessments. The following key public resources were used during background reviews to assist with describing existing conditions for caribou in the spatial boundaries:

- Valentine Gold Project Environmental Impact Statement (EIS) (Marathon 2020a)
- Caribou collar data provided by NLDFFA-Wildlife Division
- Provincial Report on The Newfoundland Caribou (Government of NL 2015)
- Provincial 2020-2021 Hunting and Trapping Guide (Government of NL 2020a)
- Caribou Data Synthesis, Government of NL (Mahoney 2000; Mahoney and Weir 2009; Weir et al. 2014)
- COSEWIC Assessment and Status Report on the Caribou *Rangifer tarandus*, Newfoundland population, Atlantic-Gaspésie population and Boreal population (COSEWIC 2014)
- Labrador-Island Transmission Link EIS (Nalcor Energy 2012)
- Labrador-Island Transmission Link Caribou and Their Predators (Labrador and Newfoundland) Component Study (Stantec 2012)
- Ecosystem Classification and Mapping of the Marathon Gold Corporation Valentine Lake Project, Central Newfoundland (Marathon 2020b)
- Ecological Land Classification (ELC) and Wildlife Species Habitat Analysis, Alderon Iron Ore Corp (Alderon 2012)

3.3 ANALYSIS

The information presented on caribou habitat, distribution, and migration in this baseline study is based on seasonal range analyses completed for the Valentine Gold Project (Marathon 2020a), including the identification of caribou herds in the Valentine Gold Project area and the migration corridor for the Buchans herd.

3.3.1 Habitat Assessment

Habitat types were based on those identified in the ELC completed for the Valentine Gold Project (Marathon 2020b). A desktop analysis of satellite imagery, which was supported by soils and vegetation field surveys, was completed. Ecotypes in the ELC Area (ELCA) (1,830.6 km^2) were classified based on various physical characteristics including terrain, soils, moisture and nutrient regime and plant species richness. Discussion of habitat availability in this baseline study refers to the ELCA, which covers approximately 89% of the Project Area (Figure 3-1).

Habitat suitability for caribou assessed for the Valentine Gold Project (Marathon 2020a) was based on field surveys, telemetry locations during migration (i.e., for the Buchans herd), discussions with experts and a literature review of caribou-habitat associations with approaches ranging from Chi-square analysis and Bonferroni z-statistics (Chubbs et al. 1993), mechanistic modelling (Bastille-Rousseau et al. 2015; Bastille-Rousseau et al. 2018) to resource selection function models (Fortin et al. 2008; Mahoney and Virgl 2003; Rettie and Messier 2000; Stewart 2016). In this baseline study, available habitats in the

Project Area and LAA are described based on this information, with each habitat type evaluated based on its ability to provide elements necessary for caribou life requisites (e.g., structural and compositional elements and forage availability), including seasonal events such as breeding, calving and migration.

Habitat types were ranked for their suitability for caribou (as high, moderate or low) based on the availability of three critical elements – forage, refuge and habitat used during migration – and used to determine the potential for caribou to occur in vicinity of the Project (Project Area and LAA):

- **High value habitat** provides an abundance of the three critical elements (forage, refuge and habitat)
- **Moderate value habitat** provides an abundance of one or two of the critical elements
- **Low value habitat** provides marginal forage or refuge, or is rarely used during migration

3.3.2 Seasonal Analysis

Seasonal range use of collared caribou was described using kernel or range density estimates (Marathon 2020a). The seasonal dates used for this analysis (Table 3.1) were provided by NLDFFA-Wildlife Division and are specific to caribou on the Island of Newfoundland (Emera 2013).

Table 3.1 General Seasons for Island Caribou in Newfoundland

Season	Seasonal Dates
Winter	December 16 – March 31
Spring Migration / Pre-calving	April 1 – May 19
Calving	May 20 – June 10
Post-Calving Migration / Dispersal	June 11 – June 30
Post-Calving Rearing	July 1 – August 31
Fall Rut	September 1 – October 31
Fall Migration / Dispersal	November 1 – December 15
Source: Emera (2013)	

Caribou distribution was analyzed by season (Table 3.1), and ranges (or kernels) were estimated from telemetry data using a geographic information system in ArcGIS™ v.10.7.1 (Environmental Systems Research Institute [ESRI] 2019). Seasonal ranges were determined using telemetry locations from ARGOS and Global Positioning System (GPS) collars. Telemetry data from ARGOS collars had a fix-rate of four days, and data from GPS collars had a fix-rate of one to two hours. The data were quality reviewed to remove locations that were either low quality or faulty. Caribou locations with higher accuracy locations were included in the analysis (i.e., ARGOS: Location Quality ≥ 2; GPS: Fix Status = 2D, 3D and 3D-V). The seasonal range calculations included collared animals with at least 50 locations in the season of interest based on recommendations for wildlife kernel analyses (Seaman et al. 1999; Barg et al. 2005; Tri et al. 2014).

Two kernel sizes, or contour intervals (isopleths), were determined for each season using the kernel density estimation method in ArcGIS™ v.10.7.1 (ESRI 2019) using Kernel Density in the Spatial Analyst Tools in ArcGIS™. A 50% contour was calculated to represent the core area, and a 95% contour was calculated to represent the home range. Smoothed cross-validation was used as the smoothing parameter for the calculation.

More information on the telemetry data and process for seasonal analysis is available in the Valentine Gold Project EIS (Marathon 2020a).

3.3.3 Migration Path Analysis

3.3.3.1 Data Preparation

The migration analysis included data only from GPS collars as only those collars record locations at intervals suitable for identifying fine-scale movements of caribou relative to the Project (i.e., every 1 to 2 hours). The temporal windows used to define the seasonal migration periods were April 1 to May 19 for spring migration / pre-calving, and November 1 to December 15 for fall migration / dispersal (Table 3.1; Emera 2013).

There were 74 spring, and 93 fall migration paths identified from 30 GPS-collared caribou used in the migration analysis. Criteria for the inclusion of GPS-collared caribou in the analysis are explained further in Section 11.2.1.3 of the Valentine Gold Project EIS (Marathon 2020a).

3.3.3.2 Migration Analysis

Dynamic Brownian bridge movement models (dBBMMs) (Kranstauber et al. 2012) were used to estimate a utilization distribution (UD) for individual GPS-collared caribou during the spring and fall migration periods. The dBBMM provides a probabilistic estimate of animal occurrence at each grid cell within the migration path by considering the distance and time between successive locations as well as location error and uncertainty of the movement path between locations (Horne et al. 2007; Kranstauber et al. 2012). The model determines whether there is a behavioral change in movement (speed) by comparing model fit using estimates of Brownian motion variance within a sliding window of locations. A window size of 31 locations and margin of 11 locations were used in the analysis based on Kranstauber et al. (2012).

The fix success rate and 3D fix success rate were high (>99%) for both spring and fall migration periods. As such, a 20 m location error was used in the analysis because 3D fixes typically have an estimated error that is less than 20 m (Di Orio et al. 2003). A 100-m x 100-m grid cell was used to generate the dBBMM, which provided a reasonable level of spatial resolution and computer processing time. For each pixel within the migration path a UD was calculated, representing the probability that an individual GPS-collared caribou was located within that grid cell during their spring or fall migration periods relative to other grid cells within the migration path. Because most caribou had more than one spring or fall migration recorded, probability cell values were summed and then rescaled to sum to 1 to represent one UD for each collared caribou within each season (Sawyer et al. 2009). A dBBMM was fit to each GPS-collared caribou for each season using the ‘move’ package (Kranstauber et al. 2020) in program R (R Core Team 2019).

For this baseline study, 'migration corridor' refers to an area used for migration at the population-level. The migration corridor may contain various smaller 'migration paths', which are used by individual caribou. A path may be used by one or more caribou. Although the GPS telemetry data included individuals from two different sampling periods (2006 to 2012 and 2015 to 2017), the UDs from each collared caribou were combined to identify a population-level migration corridor for each season because there was relatively strong fidelity to migration paths across years. A population-level migration corridor was estimated by summing the UD for each collared caribou and rescaling cell values to sum to 1 (Sawyer et al. 2009). The UD values for each population-level spring and fall migration corridor was classified into quartiles where the upper 25% quartile of the UD for each seasonal migration period was considered to be areas of high use and assumed to represent 'migratory stopovers' (e.g., resting, foraging) similar to Sawyer et al. (2009) and Sawyer and Kauffman (2011). The remaining quartiles (25-50% and 50-75%) were considered connecting movement pathways between stopover sites, and the last quartile (75-99%) represented relatively low use areas. This collection of migration paths identified by the dBBMM is referred to as a migration corridor.

The possibility of GPS-collared caribou in the Buchans herd using priority or proposed travel paths during spring and fall migration was explored. The number of individual migration paths that occurred in each 100-m x 100-m grid cell was calculated as a proportion of the total number of GPS-collared caribou (n=30) following Sawyer et al. (2009). A preferred path was defined as one used by > 15% of the GPS-collared caribou. For the portion of a preferred path that overlapped the Project Area, the proportion of caribou using the path was determined.

The length of the migration corridor was defined using the results of the analysis. Based on the distribution of the areas of use identified by the dBBMM, boundaries were delineated between the seasonal ranges at both ends of the distinct population-level migration corridor. In the north, the migration corridor was separated from the calving range by the boundary between the elevated Buchans Plateau and the lower, forested area. In the south, the migration corridor was separated from the winter range by the Grey River. The dates of spring and fall migration through the Project Area were determined from the ARGOS and GPS telemetry data and remote camera data from field studies for the Marathon Project (Marathon 2020c).

4.0 RESULTS AND DISCUSSION

4.1 HABITAT AVAILABILITY

Caribou select habitat based on several attributes, including low risk of predation, access to preferred forage, and preferred physical features such as snow depth (see Appendix H in Environment Canada 2019). Caribou are generally associated with mature, lichen-rich boreal forest and with barrens, bogs and fens (see Appendix H in Environment Canada 2019).

High value ELC habitat types for caribou within the LAA are Balsam Fir Forest, Black Spruce Forest, Kalmia-Black Spruce Woodland and Open Wetlands (Table 4.1). Caribou select open habitats (e.g., barrens and wetlands) (Bastille-Rousseau et al. 2015; Mahoney and Virgl 2003; Rettie and Messier 2000; Schaefer et al. 2016) and forested areas (Chubbs et al. 1993; Courtois et al. 2004; Mahoney and Virgl 2003; Rettie and Messier 2000) as these habitats provide the greatest amount of lichen and other vegetation for forage while reducing predation risk. Moderate-value habitats include Open Water, Wet Coniferous Forest and Mixedwood Forest (Table 4.1). Open Water was considered as a moderate value habitat (Ferguson and Elkie 2005; Rettie and Messier 2000) (Table 4.1) because lakes provide aquatic forage (Bergerud 1972) and can be used as escape from predators, and shorelines have been selected as calving sites (Metsaranta and Mallory 2007). Caribou also travel across frozen lakes (Leblond et al. 2016; Miller 2000) and may select habitat with frozen lakes as escape from predators (Ferguson and Elkie 2005). While mixedwood areas are selected by caribou infrequently (Fortin et al. 2008), mixedwood was ranked as a moderate value habitat, as the migration corridor of the Buchans herd overlaps Mixedwood Forest west of the Project. The Alder Thicket, Riparian Thicket, Regenerating Forest, Exposed Sand / Gravel and Anthropogenic habitats were ranked as low value (Table 4.1) as they offer marginal amounts of forage or refuge or are rarely used.

Table 4.1 Habitat Value Ranking for Caribou

Habitat Type	Habitat Value Rank
Alder Thicket	Low
Anthropogenic	Low
Balsam Fir Forest	High
Black Spruce Forest	High
Exposed Sand / Gravel Shoreline	Low
Kalmia-Black Spruce Woodland	High
Mixedwood Forest	Moderate
Open Wetlands	High
Open Water	Moderate
Regenerating Forest	Low
Riparian Thicket	Low
Wet Coniferous Forest	Moderate

Notes:

1. Habitat types are described in Marathon (2020b). Kalmia-Black Spruce Woodland includes Kalmia-Black Spruce Forest and Kalmia Heath Ecotypes; Open Wetlands includes Shrub / Graminoid Fen and Shrub Bog Ecotypes.
2. Sources: Schaefer and Pruitt 1991; Chubbs et al. 1993; Rettie and Messier 2000; Mahoney and Virgl 2003; Courtois et al. 2004; Ferguson and Elkie 2005; Brown et al. 2007; Fortin et al. 2008; Leblond et al. 2011; Alderon 2012; Nalcor Energy 2012; MacNearney 2013; Bastille-Rousseau et al. 2015; Stewart 2016; Bastille-Rousseau et al. 2018; Marathon 2020a

The amount of available habitat for caribou within the proposed RoW, LAA and ELCA by habitat value rank is provided in Table 4.2. High and moderate ranked habitat for caribou is abundant in the LAA, accounting for 26.5 km^2 or 72.0% of the LAA of the proposed route. Low-ranked habitat covers 10.3 km^2 or 28.0% of the LAA of the proposed route.

Table 4.2 Amount of Habitat in the Project Area, LAA and ELCA by Value Ranking

Habitat Value Ranking	Proposed RoW (km^2 / %)	LAA (km^2 / %)	ELCA (km^2 / %)
High	0.4 / 38.6	15.0 / 40.6	849.1 / 46.4
Moderate	0.2 / 26.3	11.6 / 31.4	718.5 / 39.2
Low	0.3 / 35.1	10.3 / 28.0	263.0 / 14.4
Total	0.9 / 100.0	36.9 / 100.0	1,830.6 / 100.0

Note:
1. Numbers rounded to one decimal place. Areas and percentages may not add up to total amounts due to rounding.

4.2 LIFE HISTORY AND DISTRIBUTION

Caribou are distributed across northern North America from Alaska to the Island of Newfoundland and are generally associated with mature, lichen-rich, boreal forest, barrens, bogs and fens. While there is one species of caribou (*Rangifer tarandus*), caribou in Canada can vary in terms of ecology, behavior, morphology, and genetics (COSEWIC 2011). COSEWIC (2011) identified twelve ‘designatable units’ for caribou in Canada based on characteristics such as distribution, morphology, movement patterns, and calving strategies. Caribou on the Island of Newfoundland are recognized as a distinct population (COSEWIC 2014) and are distributed over much of the island, occurring on the Northern Peninsula, Central and Eastern Newfoundland and on the Avalon Peninsula (Government of NL 2015). The caribou population on the Island of Newfoundland has decreased by approximately 60% since the late 1990s (COSEWIC 2014; Government of NL 2015). While not listed under the federal SARA or the provincial *Endangered Species Act*, caribou on the Island of Newfoundland are considered Special Concern by COSEWIC (COSEWIC 2014). The Newfoundland population of caribou is considered sedentary (Government of NL 2009), though some herds undergo seasonal migrations (Government of NL 2015).

4.2.1 Diet

Woodland caribou require large mature, interconnected, lichen-rich coniferous forests mixed with barrens and wetlands (Environment Canada 2012; Government of NL 2020b; Weir et al. 2014). Lichens are the most important forage for woodland caribou (Government of NL 2020b) and are consumed year-round (Boertje 1984; Thomas et al. 1994; Thompson et al. 2015). Mosses and shrubs are also consumed, as well as some herbs and grasses (Government of NL 2015). Forage consumed by caribou varies seasonally as follows:

- Winter: primarily terrestrial lichens with some use of arboreal lichens, shrubs (e.g., sheep-laurel [*Kalmia angustifolia*], leatherleaf [*Chamaedaphne calyculata*], Labrador tea [*Rhododendron groenlandicum*]), graminoids, forbs, and bryophytes (Bergerud 1972; Bergerud and Russell 1964 Boertje 1984; Shaefer et al. 2016; Thomas et al. 1994; Thompson et al. 2015).

- Spring: primarily leafy-green vegetation such as shrubs (e.g., alder species [*Alnus sp*.], Rhodora [*Rhododendron canadense*], lowbush blueberry [*Vaccinium angustifolium*], sweet gale [*Myrica gale*], birch species [*Betula sp.*], leatherleaf, sheep-laurel, bog laurel [*Kalmia polifolia*], Labrador tea), with forbs (e.g., cloudberry [*Rubus chamaemorus*], bunchberry [*Cornus canadensis*]), graminoids, lichens, and bryophytes (Bergerud 1972; Bergerud and Russell 1964 Boertje 1984; Shaefer et al. 2016; Thomas et al. 1994; Thompson et al. 2015).
- Summer: mostly shrubs (e.g., Rhodora, blueberry, sweet gale, chuckley pear [*Amelanchier bartramiana*], birch species, Labrador tea, sheep-laurel, bog laurel, leatherleaf) and forbs (e.g., bunchberry, bottlebrush [*Sanguisorba canadensis*]), with some graminoids and lichens (Bergerud 1972; Bergerud and Russell 1964 Boertje 1984; Shaefer et al. 2016; Thomas et al. 1994; Thompson et al. 2015).
- Fall: primarily lichens with shrubs (e.g., Labrador tea, sheep-laurel, bog laurel, leatherleaf, blueberry), forbs, graminoids, mosses, and occasionally fungi (Bergerud 1972; Bergerud and Russell 1964 Boertje 1984; Shaefer et al. 2016; Thomas et al. 1994; Thompson et al. 2015).

During the period of population decline in the 2000s, caribou on the Island of Newfoundland consumed a higher proportion of mosses and a lower proportion of shrubs, graminoids and lichens (Schaefer et al. 2016). Schaefer et al. (2016) suggested that this shift in diet to low-quality forage indicated that the availability of preferred forage was limited by high caribou density.

4.2.2 Distribution on the Island of Newfoundland and Movement Patterns

The Newfoundland caribou population includes several sub-populations differentiated by annual movement patterns, spatial affiliations, and genetic structure (Government of NL 2015; Wilkerson 2010). The Project is within the range of the South Coast sub-population (Government of NL 2019a; Schaefer and Mahoney 2013; Wilkerson 2010), which is comprised of several herds with shared winter range near the south coast between Burgeo and the Connaigre Peninsula (Weir et al. 2014) but separate calving and summer ranges. The RAA is based on the ranges of the Buchans, Grey River, Gaff Topsails, and La Poile herds (South Coast sub-population) as caribou in those ranges could potentially interact with the Project.

4.2.3 Population Size and Demographics

The caribou population on the Island of Newfoundland was considered abundant during the early 1900s, with estimates of 100,000 individuals (COSEWIC 2014). However, a rapid decline occurred between 1915 and 1920 (Government of NL 2015), possibly because of the introduction of a parasite associated with reindeer (Ball et al. 2001). Following this decline, the caribou population remained relatively low until the 1980s (Government of NL 2015). The population returned to near-historical levels by the mid-1990s and peaked in 1996 at 94,000 caribou (Government of NL 2015). As the caribou population decreased rapidly after 1996, largely attributed to unsustainable high numbers (Government of NL 2015), some CMAs were closed to hunting (e.g., Avalon Peninsula in 2002 [Government of NL 2002], Grey River in 2008 [Government of NL 2008], and Northern Peninsula in 2019 [Government of NL 2019b]). The population of caribou on the Island of Newfoundland was recently estimated at 30,000 (NL Department of

Fisheries and Land Resources [NLDFLR] in Randell 2019). The recent population estimate indicates that the assessed herds have decreased by 60-80% compared to peaks in the 1980s and 1990s (Table 4.3), although the current trends appears to be stabilizing (Table 4.3) (Government of NL 2019a).

Table 4.3 Population Estimates for Assessed Caribou Herds

Herd	Buchans	Gaff Topsails	Grey River	La Poile
Period of Population Increase				
1960	450+		1,200	500
1962	1,000		1,300	650
1963	643		1,800	692
1964	1,341		1,772	
1965	892		2,400	800
Period of Peak Population				
1986				8,569 (8,105-9,089)
1987			9,973 (8,089-13,001)	
1988				11,176 (10,478-12,001)
1989		4,664 (3,984-5,813)		
1992				8,861 (7,817-10,342)
1994				
1997				10,565 (±1,908)
Period of Population Decrease				
2007	4,474	2,183	1,223	5,612
2011	4,651	1,890	2,133	4,197
2016	4,149	1,688	1,945	3,304
2019	4,112	1,824	2,022	3,154
Percent of Caribou Population on Island of Newfoundland (%)	13.7%	6.1%	6.7%	10.5%
Year of Peak Population	1994	1996	1991	1988

Notes:

1. Empty cells = no information available
2. Population estimates are from Bergerud (1971), Mahoney et al. (1998), Mahoney and Schaefer (2002a), Mahoney et al. (2011), Government of NL (2020c)
3. Bracketed range values are the 95% Confidence Interval (90% Confidence Interval where single numbers are indicated)
4. Percent of caribou population is based on an estimate of 30,000 caribou on Island of Newfoundland in 2019 (NLDFLR in Randell 2019). Percentages are rounded to one decimal place.
5. Year of peak population is based on Mahoney and Schaefer (2002a) and Bastille-Rousseau et al. (2016)

Population estimates of some herds in the South Coast sub-population may be stabilizing (Government of NL 2019a). However, caribou populations on the Island of Newfoundland continue to be limited by poor calf survival (Government of NL 2015) and, subsequently, poor recruitment rates. Between 1979 and 1997, the calf survival rate (i.e., proportion of calves surviving to six months) was approximately 67% but had decreased to less than 8% by 2003 (Mahoney et al. 2015). In 2019 the calf survival rate was estimated to be less than 15%, which is below the minimum needed for a stable population (NLDFLR in Randell 2019). Since 2018, the proportion of calves (i.e., percent calves out of total caribou classified) in the assessed caribou herds (observed during spring and winter surveys) has ranged between 6% and 12%, and up to 31% in the calving range for the Buchans herd (Table 4.4). The average age of the caribou population on the Island of Newfoundland had increased between the 1980s and the early 2000s (Weir et al. 2014), however adult survival remained high (i.e., 2004-2011 rates are similar to 1979-1997) (Government of NL 2015). The sex ratio for caribou population is generally more females to males, with a decreasing trend in males observed between the 1970s and 2006 (Weir et al. 2014). However, the decline in sex ratio may have slowed, as greater numbers of males have been observed since 2006 (Weir et al. 2014).

Table 4.4 Classification Results for the Assessed Caribou Herds

Year	Buchans		Gaff Topsails		Grey River		La Poile	
	% Calves	% Bulls	% Calves	% Bulls	% Calves	% Bulls	% Calves	% Bulls
2007	11.3	16.2	10.8	15.8	5.7	23.6	7.1	23.3
2011	15.8	19.2	10.3	22.8	6.6	13.9	8.7	17.1
2016	9.4	21.6	14.5	24.3	15.3	29.0	11.3	23.8
2018	10.5	26.1	11.4	21.2	5.6	26.7	9.9	32.9
2019	8.3	28.2	10.7	25.4	11.9	37.3	5.9	22.5
2020	30.6	10.5			11.3	31.6		

Notes:
1. Numbers rounded to one decimal place.
2. Sources: Government of NL (2020c, 2020d) and Marathon (2020c)
3. 2020 values for Grey River does not include their calving range.

4.2.4 Herd Distribution

The assessed caribou herds move between seasonal ranges and intermix on winter ranges with other herds in the South Coast sub-population. The overall range size, and seasonal range sizes, were calculated for each herd (Table 4.5).

Table 4.5 Areas of Seasonal Use by Collared Caribou from the Assessed Caribou Herds

Season[1]	Buchans		Gaff Topsails		Grey River		La Poile	
	Area (km²) (n = no. of collared caribou)							
	50% kernel	95% kernel	50% kernel	95% kernel	50% kernel	95% kernel	50% kernel	95% kernel
Winter	2,589 (n=47)	9,493 (n=47)	1,087 (n=32)	3,403 (n=32)	1,958 (n=23)	7,138 (n=23)	1,480 (n=29)	5,018 (n=29)
Spring Migration / Pre-Calving	4,481 (n=36)	14,382 (n=36)	953 (n=28)	3,443 (n=28)	1,857 (n=16)	10,389 (n=16)	3,566 (n=18)	9,218 (n=18)
Calving	270 (n=35)	1,351 (n=35)	424 (n=28)	1,887 (n=28)	777 (n=16)	4,579 (n=16)	530 (n=18)	2,363 (n=18)
Post-Calving Migration / Dispersal	399 (n=33)	1,128 (n=33)	481 (n=28)	1,858 (n=28)	605 (n=16)	3,611 (n=16)	513 (n=18)	2,243 (n=18)
Post-Calving Rearing	1,517 (n=37)	4,834 (n=37)	890 (n=28)	3,261 (n=28)	454 (n=16)	2,990 (n=16)	1,003 (n=18)	2,900 (n=18)
Fall Rut	617 (n=39)	2,526 (n=39)	461 (n=27)	2,030 (n=27)	271 (n=16)	2,238 (n=16)	575 (n=18)	2,873 (n=18)
Fall Migration / Dispersal	2,730 (n=41)	7,640 (n=41)	614 (n=27)	2,117 (n=27)	950 (n=16)	4,823 (n=16)	1,718 (n=18)	5,682 (n=18)

Notes:
1. Seasonal areas are calculated from collared caribou having at least 50 locations per caribou for that season.
2. Based on telemetry data from 2005-2018 (Buchans Herd), 2006-2013 (Gaff Topsails, Grey River and La Poile Herds).
3. Areas are rounded to the nearest integer.

The Buchans herd range (approximately 15,650 km²) was located between Sandy Lake to the north and the south coast of the Island of Newfoundland, and between Highways 480 and 360 (Figure 4-1). The calving and post-calving ranges occurred primarily north of the Project, while the other seasons included range near the south coast (Figure 4-2). In spring, the Buchans herd moves from central Newfoundland to winter range near the south coast.

The Gaff Topsails herd also had range between Sandy Lake and the Twin Lakes, but unlike the Buchans herd, the range only extended as far south as Star Lake (Figure 4-3). Overall range size for the Gaff Topsails herd was approximately 5,685 km². Based on available telemetry data, the Gaff Topsails herd may have smaller seasonal movements within the range (Figure 4-4) and did not overlap with the Project Area.

The Grey River herd moved between calving and summer ranges in south-west Newfoundland and winter range on the south coast. The Grey River herd range was approximately 15,500 km^2 and was generally located between Meelpaeg Lake in the north and the south coast, and between Highway 360 in the east and the Channel-Port Aux Basques area in the west (Figure 4-5). The fall and winter ranges were southeast of the Project towards St. Alban’s, and the spring and summer ranges occurred further west (Figure 4-6).

The range of the La Poile herd range was approximately 11,200 km^2 and occurred south of the Project Area between Channel-Port Aux Basques in the west and St. Alban’s in the east (Figure 4-7). La Poile herd range was furthest east in fall and winter and shifted west toward Channel-Port Aux Basques for calving (Figure 4-8).

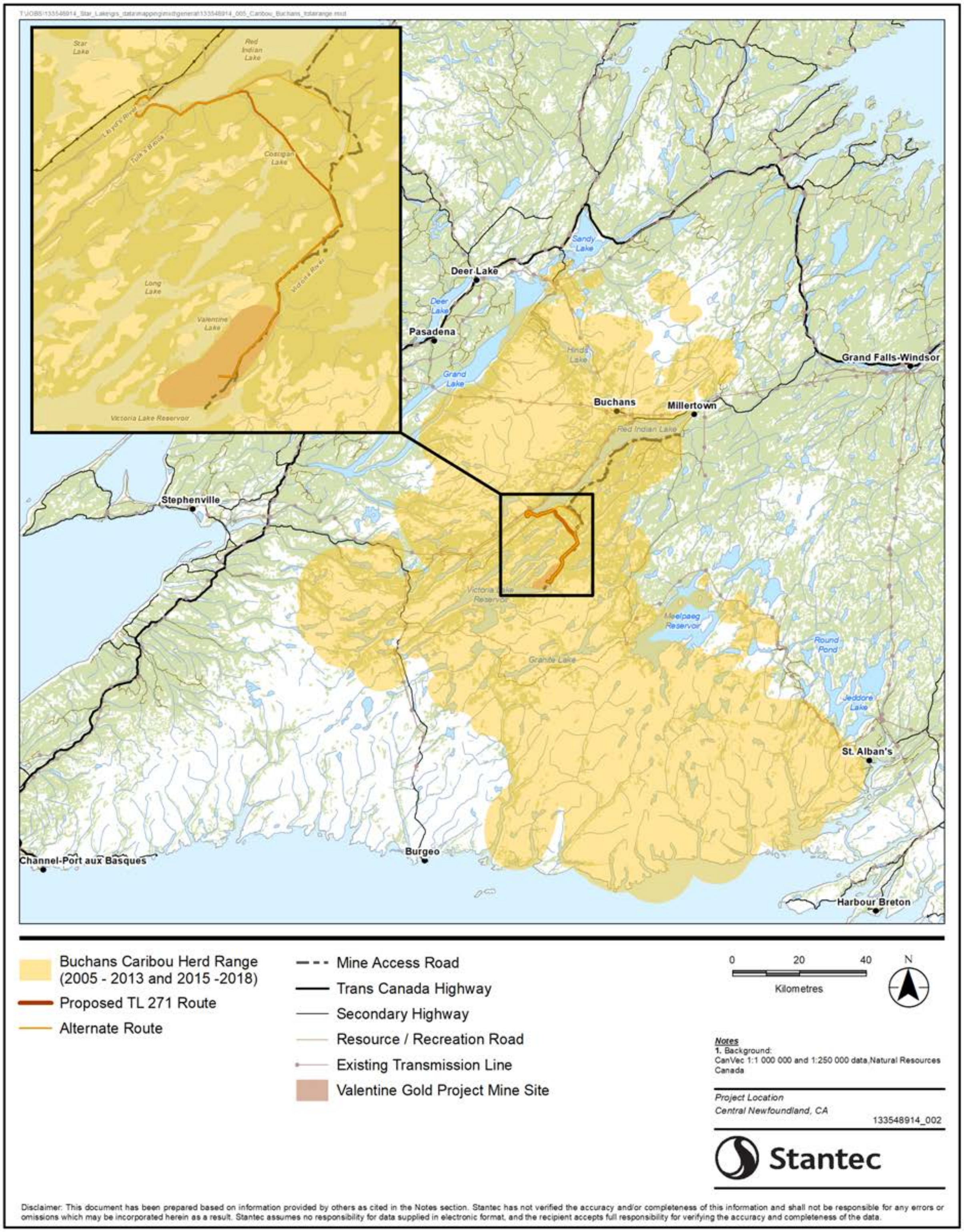

Figure 4-1 Distribution of the Buchans Caribou Herd

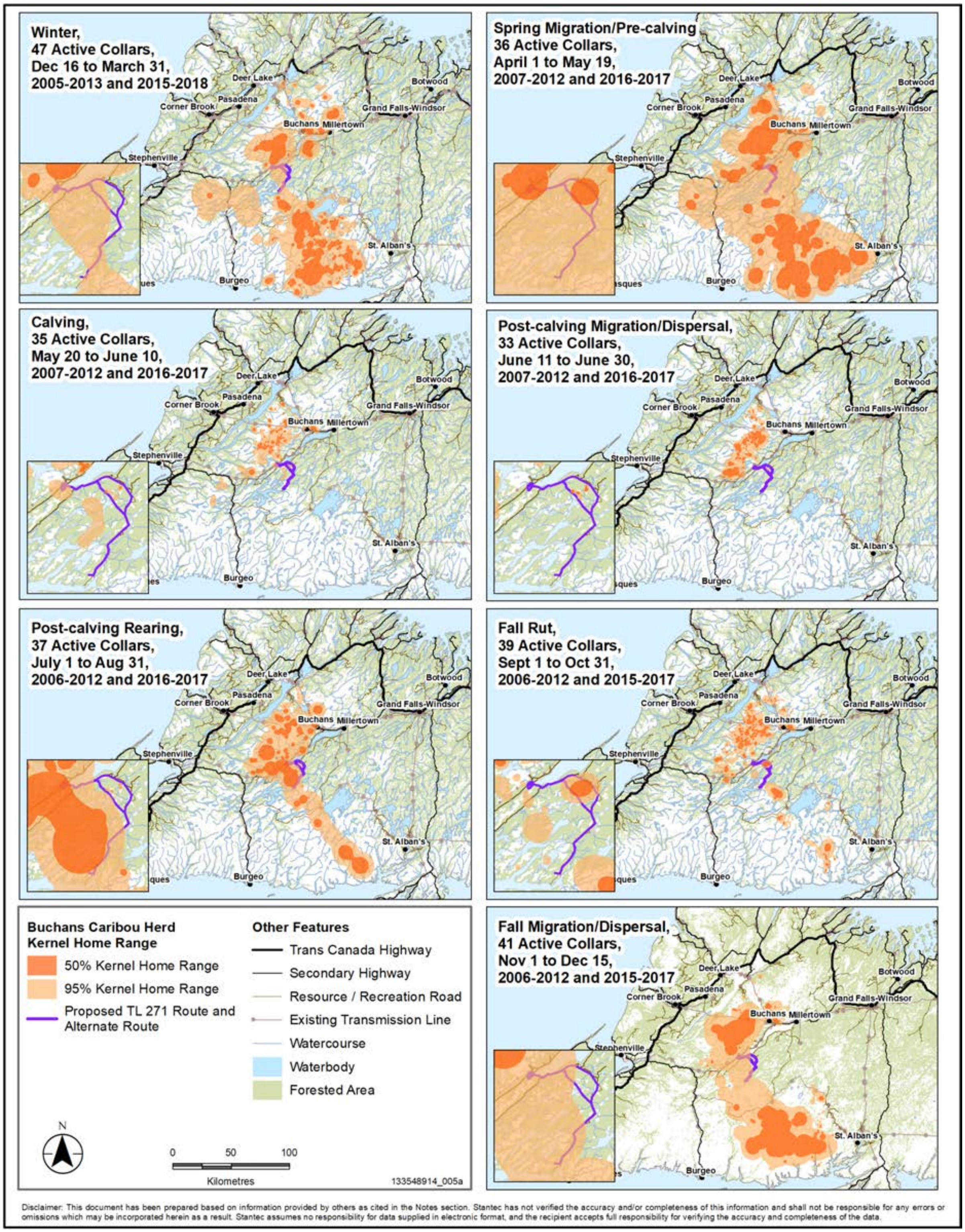

Figure 4-2 Seasonal Ranges of the Buchans Caribou Herd

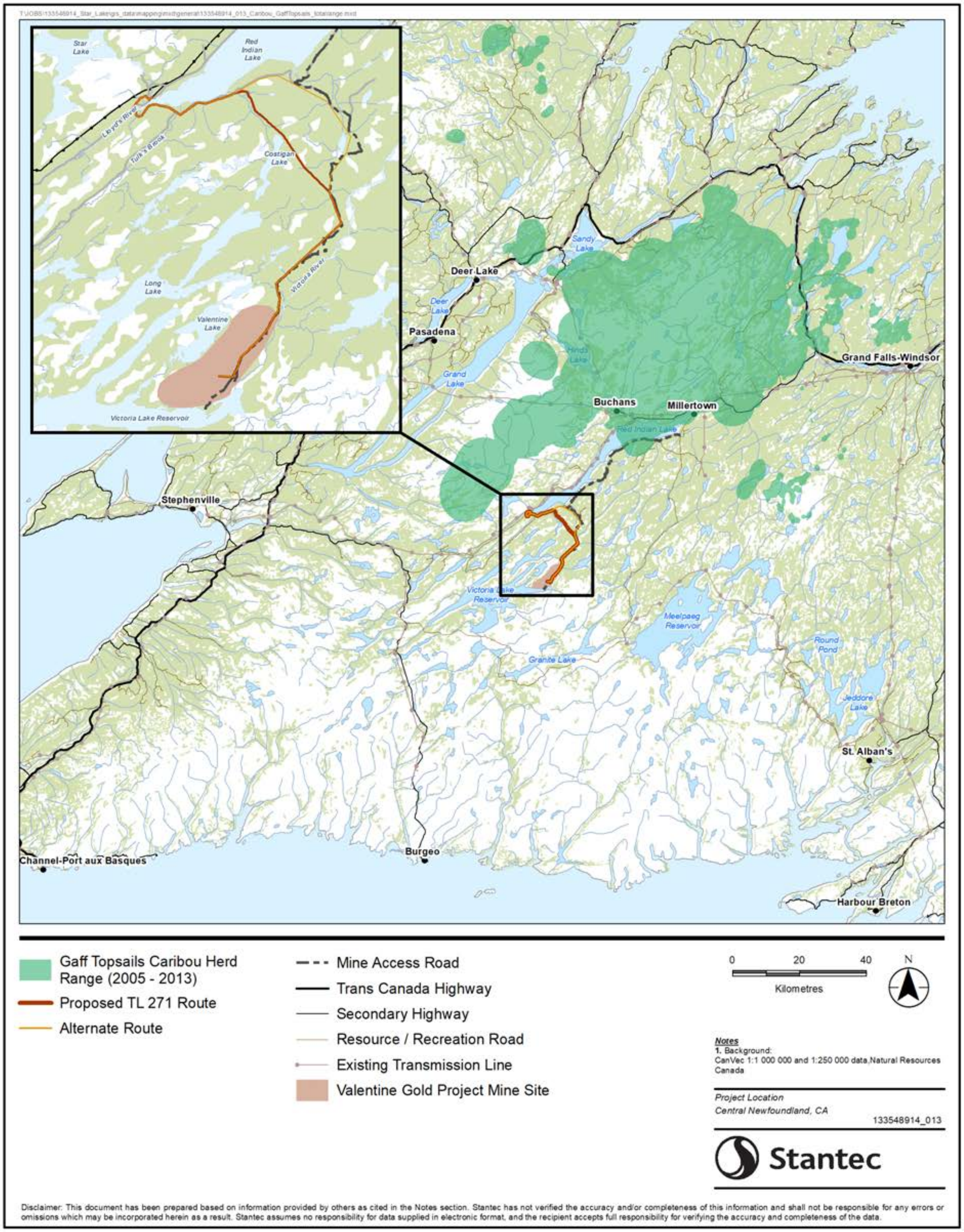

Figure 4-3 Distribution of the Gaff Topsails Caribou Herd

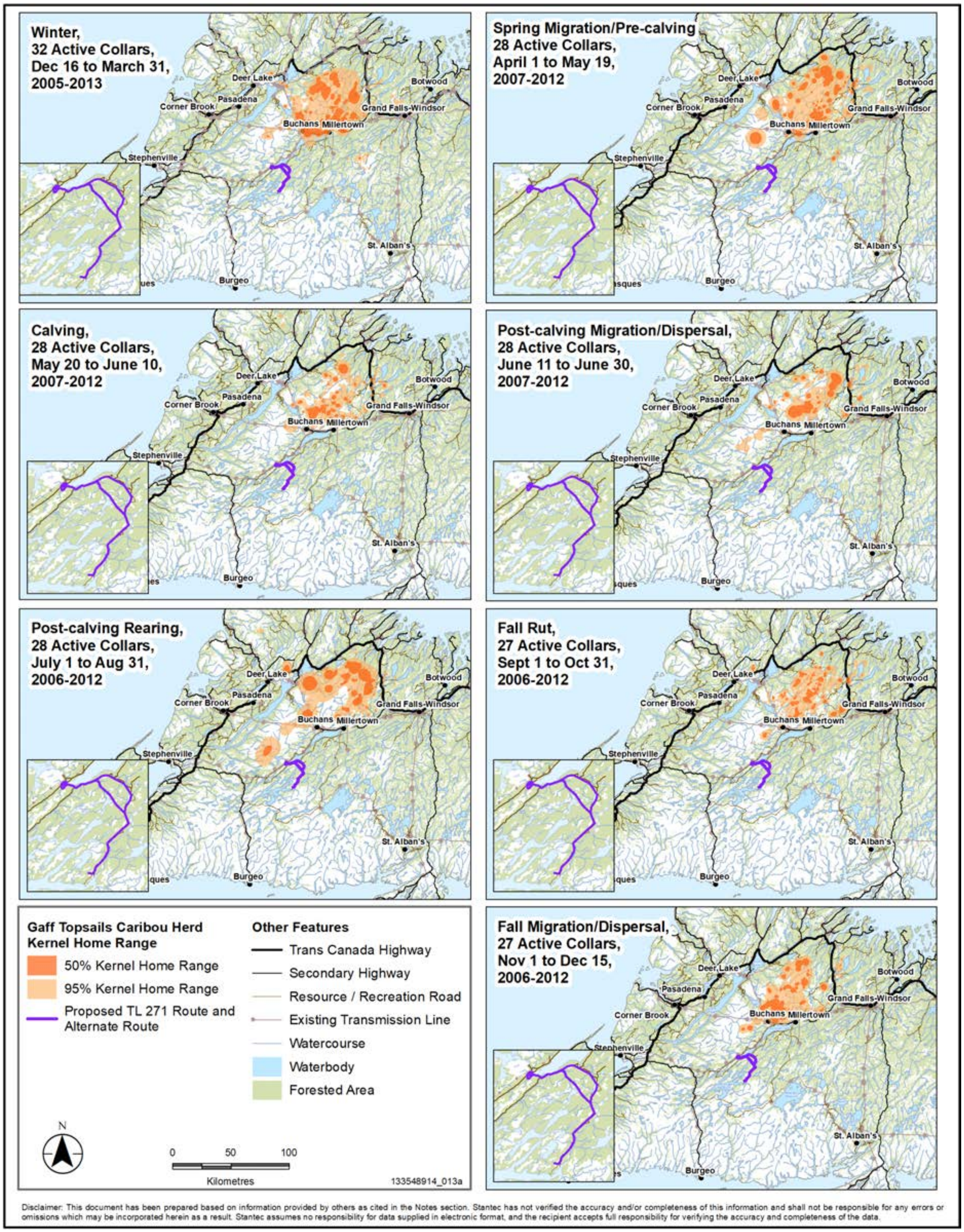

Figure 4-4 Seasonal Ranges of the Gaff Topsails Caribou Herd

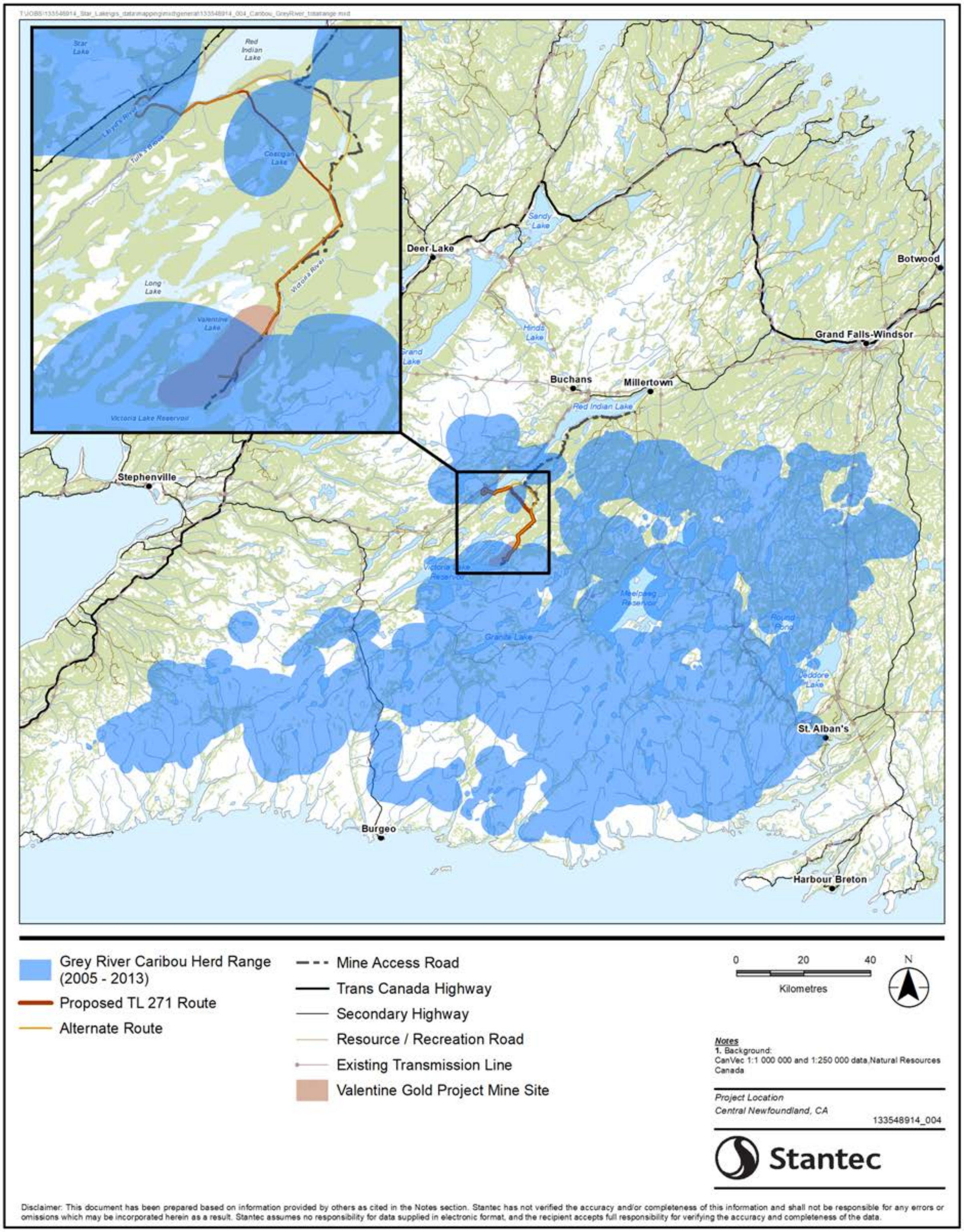

Figure 4-5 Distribution of the Grey River Caribou Herd

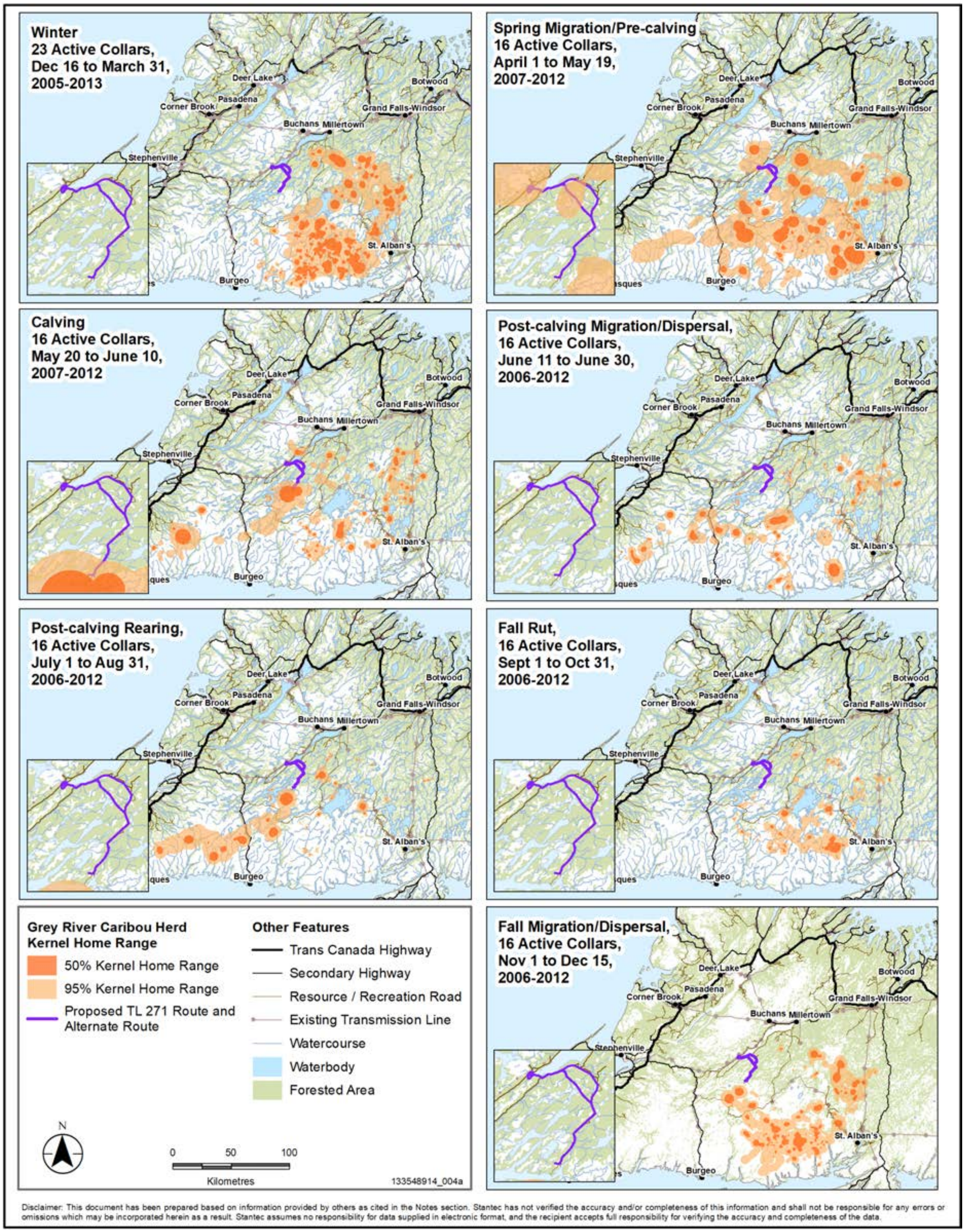

Figure 4-6 Seasonal Ranges of the Grey River Caribou Herd

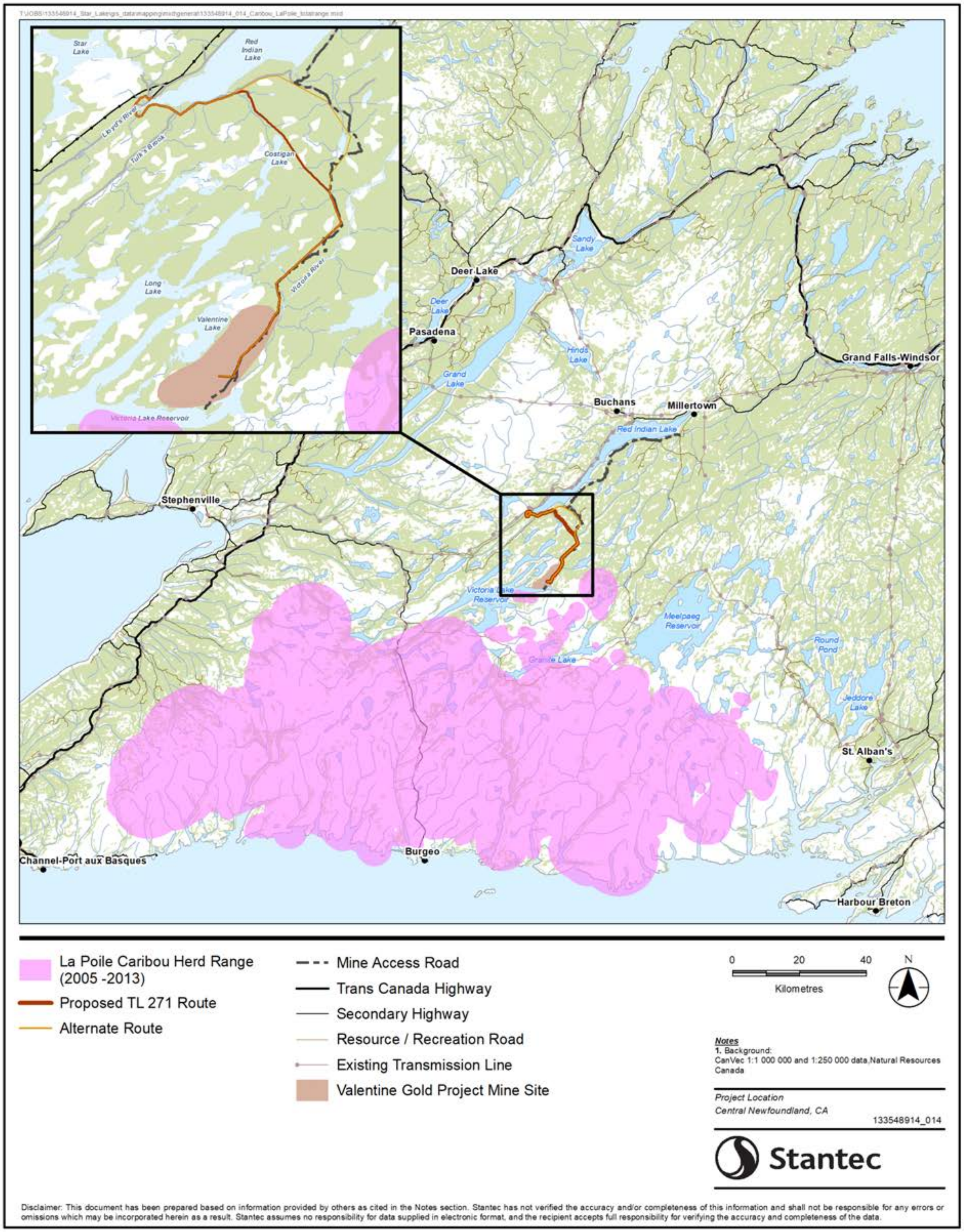

Figure 4-7 Distribution of the La Poile Caribou Herd

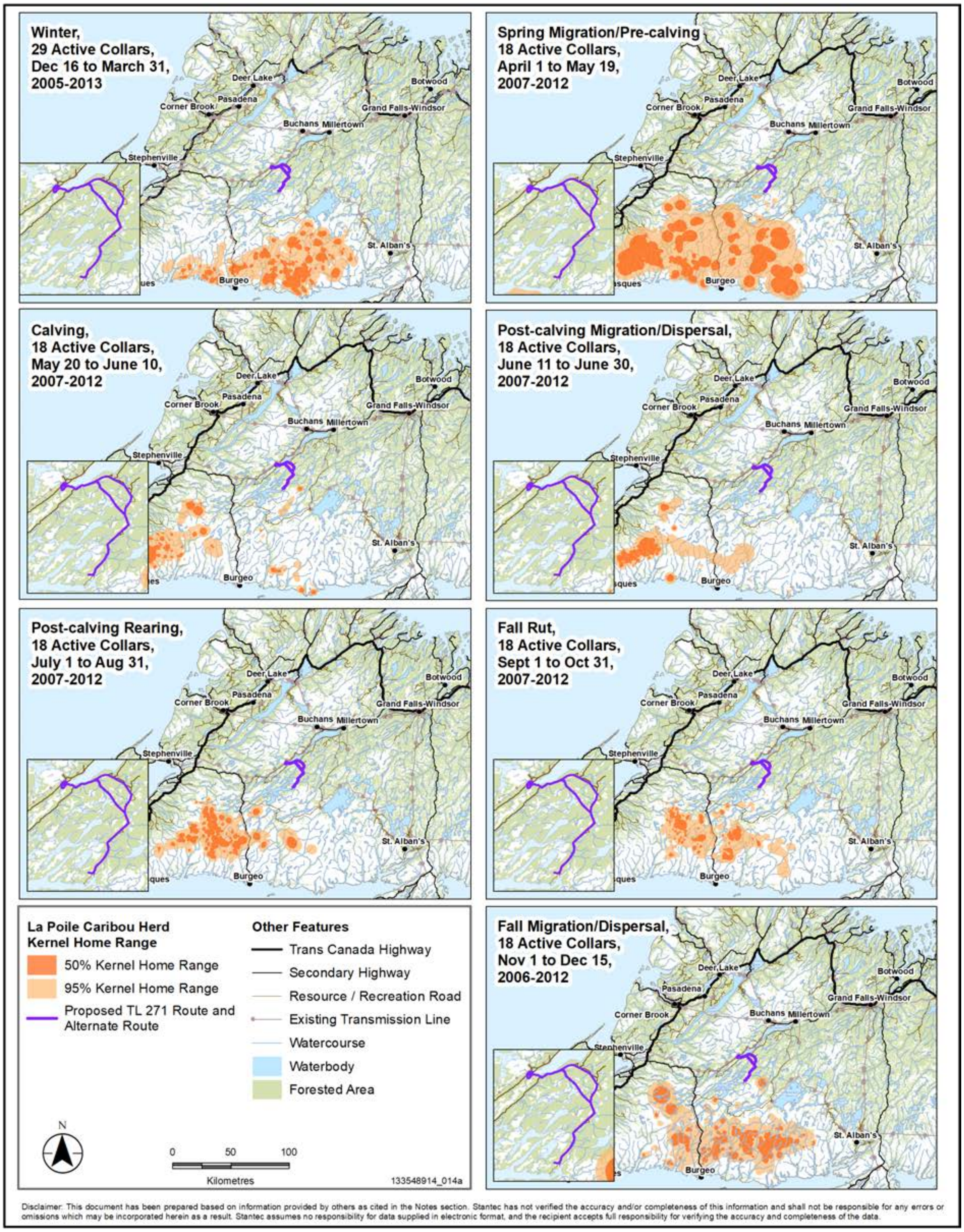

Figure 4-8 Seasonal Ranges of the La Poile Caribou Herd

4.2.5 Migration

An analysis of the migration patterns was completed for the Buchans herd as part of the Valentine Gold Project (Marathon 2020a). The dBBMM models identified areas where collared caribou occurred during seasonal migration periods. A network of travel paths approximately 30 to 86 km wide was identified by the modelling. These paths comprised a distinct population-level corridor that included high use areas (stopover sites) connected by a migration route during both spring (Figure 4-9) and fall migration periods (Figure 4-10). The spring migration corridor crossed the northern section of Victoria Lake Reservoir and Long Lake and overlapped with the proposed transmission line within the Marathon mine site (Figure 4-9). The corridor included several stopover (high use) areas, including the largest stopover area on the south side of Star Lake, west of the hydroelectric development (Figure 4-9). The spring migration corridor included four other stopover areas: two located east of Victoria Lake Reservoir, and two located just south of Granite Lake (Figure 4-9). The high use area was west of the Project Area and did not overlap with the Project. The spring migration corridor also included some low use paths that intersected with the Project Area.

The fall migration corridor was located similarly as in spring but included a narrower network of low use migration paths by comparison (Figure 4-10). The fall migration corridor had four stopover sites, including the same high use area south of Star Lake that was used during spring migration (Figure 4-10). Additional stopover areas were located near Victoria Lake Reservoir (one area east of the reservoir, and a second area south east of the reservoir) and near the south arm of Granite Lake (Figure 4-10). The Project route transmission line intersects the fall migration corridor within the Marathon mine site, where it overlaps moderate use migration areas (Figure 4-10). The north end of the transmission line also intersects with a low use area near Red Indian Lake (Figure 4-10).

The dBBMM model identified a single population-level migration path during both spring and fall migration. As such, the preferred path analysis did not identify other preferred paths based on a proportion of the sampled population. Up to 55.1% of collared caribou used the preferred migration path during spring, and up to 58.4% of caribou used it in fall. While this result is based on collared caribou, the assumption is that the movement patterns are representative of the herd generally. This implies that over half of the Buchans herd migrates through the higher use areas of the migration path.

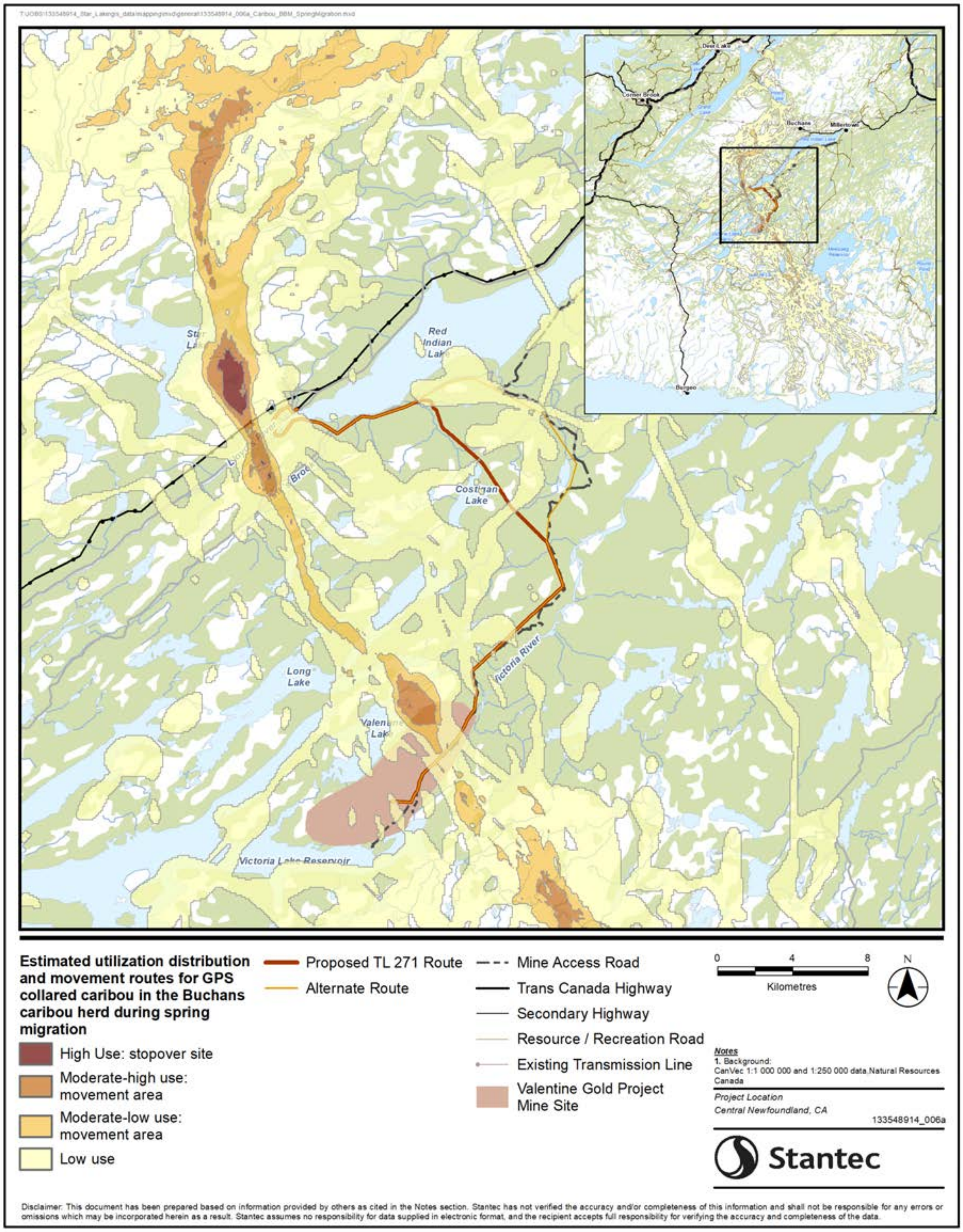

Figure 4-9 Estimated Utilization Distribution and Migration Corridors of GPS Collared Caribou in the Buchans Herd - Spring Migration

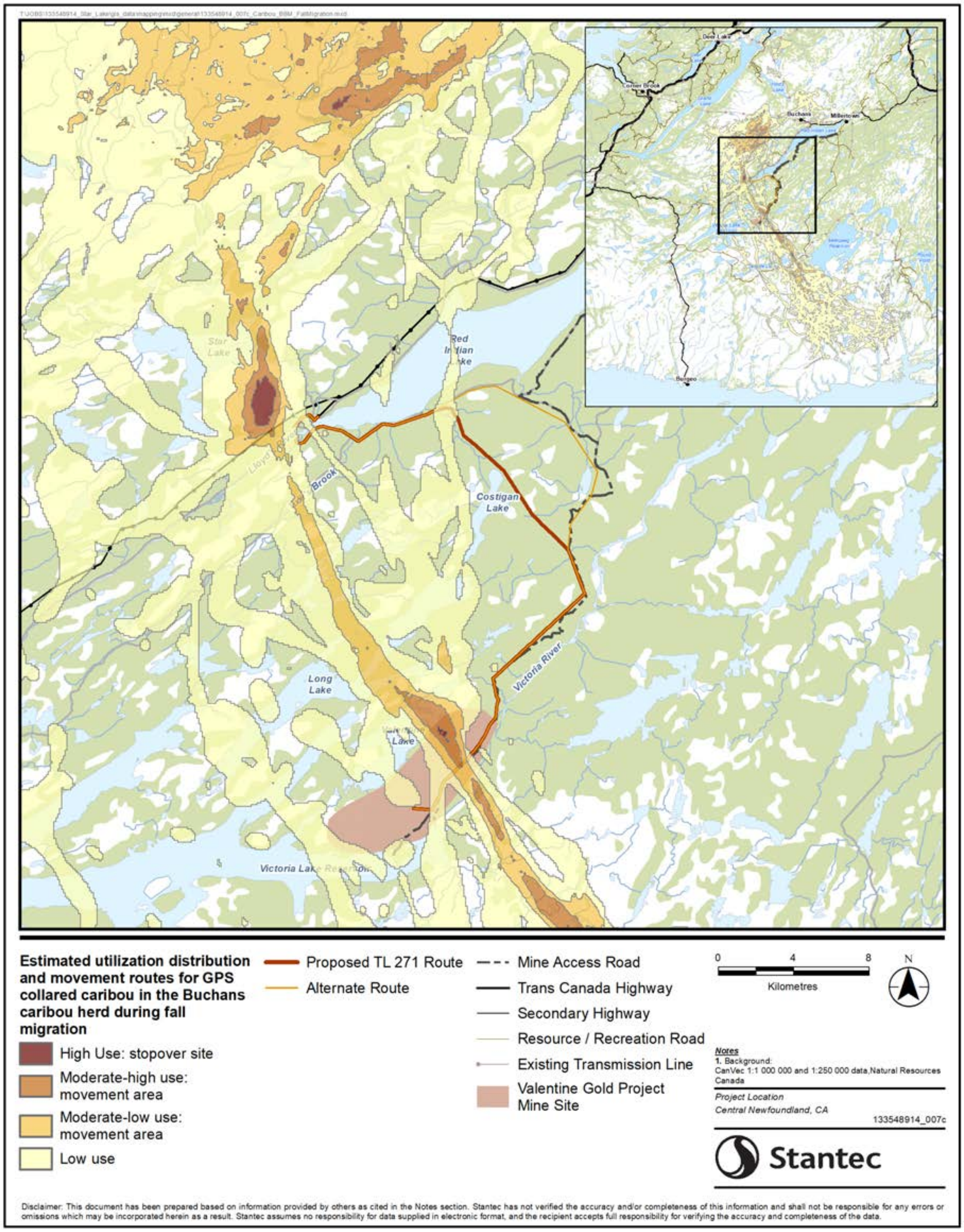

Figure 4-10 Estimated Utilization Distribution and Migration Corridors of GPS Collared Caribou in the Buchans Herd - Fall Migration

The migration path analysis completed for the Valentine Gold Project determined that the length of the migration corridor between the Buchans Plateau and Grey River was 145 km (Marathon 2020a). Between 1995 to 2000, telemetry data from Buchans caribou indicated that the median dates of movement across “Lloyd’s Line” (a line along Lloyd’s River and the north shore of Red Indian Lake, i.e., north of the Project Area) were between April 17 and May 25 during spring migration, and between October 8 to November 7 during fall migration (Mahoney and Schaefer 2002b).Telemetry data (2005 to 2013 and 2015 to 2017) and remote camera studies (fall 2019 and spring 2020) for the Valentine Gold Project indicated when caribou migrated through the Valentine Gold Project Area (Marathon 2020a, 2020c). Telemetry data indicated that dates of caribou movement through the Valentine Gold Project Area in spring ranged from April 22 to May 6 (Marathon 2020a). Data from remote cameras indicated that the dates of peak movement through the Valentine Gold Project Area during spring was between April 25 to May 7, 2020 for female caribou, and between May 15 and May 27, 2020 for males (Marathon 2020c). During the fall migration, dates of caribou movement through the Valentine Gold Project Area in fall ranged from October 30 to December 13. Remote cameras deployed during fall 2019 detected caribou moving north through the Valentine Gold Project Area from November 9 to November 12 (Marathon 2020c).

4.3 LIMITING FACTORS

Primary caribou predators on the Island of Newfoundland are black bear (*Ursus americanus*) and coyote (*Canis latrans*), for both adults and calves (Bastille-Rousseau et al. 2016; Mumma et al. 2016, 2019). While bears generally prey less often on adult ungulates (Zager and Beecham 2006), bears can be an important predator of adult caribou (Seip 1992; Wittmer 2004). The NLDFFA-Wildlife Division provided notation that black bear caused mortality of three adult caribou in July and August 2018 in the Buchans CMA.

Coyote arrived on the Island of Newfoundland in 1985 but did not become established until the 1990s (Blake 2006). Coyote in Newfoundland consume mostly moose carrion (*Alces alces*) (Bastille-Rousseau et al. 2016; Blake 2006), but also consume caribou and snowshoe hare (*Lepus americanus*) (Bridger 2006; Mumma et al. 2016).

Predation rates for calves are considerably higher than for adults (Ballard 1994; Lewis and Mahoney 2014; Mahoney and Weir 2009) with approximately 90% of calf deaths attributed to predation (Lewis and Mahoney 2014). The predation rate on calves increased from approximately 60% between 1979 and 1997, to 83% between 2003 and 2007 (Mahoney and Weir 2009), resulting in decreased calf survival (Government of NL 2015). A study on caribou calf survival on the Island of Newfoundland found black bear accounted for 34% of collared caribou calf mortality and coyote for approximately 28%, while approximately 14% of calves were killed by an unidentified predator, 15% died of non-predation causes (e.g., accident, starvation), and the cause of 14% of mortalities could not be determined (Lewis and Mahoney 2014). Other know predators of caribou calves include Canada lynx (*Lynx canadensis*), bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) (Mahoney and Virgil 2003; Mahoney et al. 1990; Snow and Mahoney 1995, Mahoney and Weir 2009, Lewis and Mahoney 2014; Mumma et al. 2016, Lewis et al. 2017).

Gray wolf (*Canis lupus*) is not a major predator of caribou on the Island of Newfoundland as wolf became extirpated on the island in the 1930s (Maunder 1991). There has been documented occurrences of wolf and wolf-coyote hybrids on the Island of Newfoundland since 2009, but there is no evidence of a breeding population (Government of NL 2012). A natural recolonization of gray wolf on the Island of Newfoundland could increase predation rates on caribou.

Wildlife populations on the Island of Newfoundland, including caribou, are sustained through management techniques that include hunting (Government of NL 2020e). Hunter success was 80 to 85% in the 1980s (prior to the caribou population peak), decreasing to approximately 60% during the decline (Weir et al. 2014). There was also a decrease in the proportion of male caribou relative to females between the 1970s and the early 2000s which may have been a result of a high male harvest rate at the beginning of the population decline (Government of NL 2015; Wier et al 2014). In response to the population decline, caribou quotas have been reduced and CMAs were closed to hunting (Government of NL 2002, 2008, 2019b). Hunter success in 2018 in the Buchans and Gaff Topsails CMAs (CMAs 62 and 66) was approximately 64% and 80%, respectively (Government of NL 2020a). The Grey River CMA was closed to hunting in 2008 (Government of NL 2008).

Habitat loss has been associated with the decline of caribou populations in North America (Environment Canada 2019; Hins et al. 2009; Sorenson et al. 2008). Caribou require mature, lichen-rich boreal forest mixed with open areas such as barrens, bogs and fens, which together provide sufficient forage and cover to evade predators. Caribou habitat can be directly lost or altered through natural disturbance such as forest fire, or through anthropogenic disturbance (e.g., agriculture, forestry, and industrial and residential development). Fragmentation (i.e., the division of a large area of habitat into smaller, disconnected areas) can also reduce habitat suitability. Although habitat may remain intact, it could be indirectly affected through mechanisms such as sensory disturbance, which may reduce its suitability for caribou.

Several species of parasites are present in the caribou population on the Island of Newfoundland including nematodes [*Paraelaphostrongylus andersoni* and *Elaphostrongylus rangiferi* (Lankester and Fong 1998)], tapeworms [*Taenia hydatigena* and *Taenia krabbei* (Government of NL 2010a)] and oestrid flies [*Hypoderma tarandii* and *Cephenemyia trompe* (Government of NL 2010b)]. Parasites have been linked to reduced caribou health (Hughes et al. 2009) and change in behavior (Government of NL 2010c). *E. rangiferi*), which occurs across the Island of Newfoundland (Ball et al. 2001), can cause a debilitating neurologic disease in caribou, and is seen primarily in young animals in late winter (Nalcor Energy 2012). Although a moderate tapeworm infection may not reduce caribou condition (Thomas 1996), harassment and infestation by oestrids can affect habitat selection (Skarin et al. 2004) and overall caribou health (Weladji et al. 2003).

Climate change (i.e., global warming) has the potential to affect northern caribou populations, including those on the Island of Newfoundland. Warmer temperatures are predicted to alter the assemblage of plant species in boreal regions (Boulanger et al. 2017), which could affect the abundance and distribution of preferred forage species in caribou habitat. The timing of annual events (i.e., calving) aligns with the peak forage and nutrient availability (Klein 1990). Warmer temperatures could induce earlier spring green-up, which could lead to misalignment of forage biomass availability and seasonal energetic needs of caribou, although earlier warm temperatures and earlier green-up recorded to date do not appear have affected the timing of calving (Mallory et al. 2020; Post and Forchhammer 2008). However, an increase in length of time between green-up and calving has been linked to both an increase in calf mortality and a decrease in calf production (Post and Forchhammer 2008).

Caribou populations are affected by insect harassment, which affects behavior and movement patterns (Hagemoen and Reimers 2002) and body condition (Weladji et al. 2003). Changes in climate could affect the timing of insect emergence, as well as insect winter survival and development rates (Robinet and Roques 2010). Caribou harassed by insects spend less time foraging than those without harassment, which could lead to decreased body condition (Vors and Boyce 2009). Changes in the abundance or diversity of parasites resulting from climate change could also have negative effects on caribou populations (Mallory and Boyce 2018).

Climate change is predicted to affect the frequency, intensity, duration and timing of weather and climate extremes (Seneviratne et al. 2012), including increased risk and magnitude of forest fires and winter icing events. Increases in the size of forest fires can reduce the amount of old forest available to caribou and alter forest and plant communities (Racey 2005). A warming climate is predicted to increase the size of area affected by forest fires, which could reduce the amount of high value caribou habitat and potentially affect caribou abundance (Joly et al. 2012). An icing event, where an ice layer is formed by rain on snow or freeze-thaw cycles, limits or prevents caribou from accessing underlying forage. Extreme weather such as an increase in the frequency of icing events could limit the amount of forage available to caribou during the winter period (Mallory and Boyce 2018). Recent research in Labrador found caribou survival decreased with a reduction in snowfall and an increase in freezing rain in the fall (Schmelzer et al. 2020).

Cumulative effects (i.e., the combined effect of past, present and reasonably foreseeable future activities) on the landscape may also affect caribou. There is an existing road system within the range of the assessed herds, which has likely contributed to direct and indirect habitat loss (e.g., habitat fragmentation, sensory disturbance). Predation rates on caribou are higher near linear features (Mumma et al. 2017). Coyote (Boisjoly et al. 2010) and black bear (Hinton et al. 2015; Mosnier et al. 2008; Tomchuk 2019) have also been shown to select for disturbed habitats, which could increase the amount of predation on caribou. Selection of disturbed habitat by predators could increase predation of caribou (DeMars and Boutin 2017; Dickie et al. 2017; McKenzie et al. 2012; Mumma et al. 2018) through higher encounter rates due to ease of movement on linear features, or increased access to caribou range. Future developments (e.g., mining, forestry) may cause habitat loss and sensory disturbance, and affect mortality rate. On the Island of Newfoundland, Buchans caribou showed avoidance of Star Lake hydroelectric facility and a delay in the timing of migration following construction of the facility in 1997 to 1998 (Mahoney and Schaefer 2002b), and La Poile caribou showed avoidance of the Hope Brook Gold Mine (Weir et al. 2007).

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APPENDIX D

Flora and Fauna Baseline Study

Transmission Line 271 Star Lake to Valentine Gold Project Flora and Fauna Baseline Study

April 9, 2021

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TRANSMISSION LINE 271 STAR LAKE TO VALENTINE GOLD PROJECT FLORA AND FAUNA BASELINE STUDY

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Abbreviations

ºC	degrees Celsius
AC CDC	Atlantic Canada Conservation Data Centre
BBS	North American Breeding Bird Survey
CBC	Christmas Bird Count
cm	centimetre
CNF	Central Newfoundland Forest
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DNA	deoxyribonucleic acid
ECCC	Environment and Climate Change Canada
EIS	Environmental Impact Statement
ELC	Ecological Land Classification (in this case, specifically Ecosystem Classification and Mapping of the Marathon Gold Corporation Valentine Gold Project, Central Newfoundland)
GIS	Geographic Information System
ha	hectares
km	kilometre
km^2	square kilometre
kV	kiloVolt
m	metre
MBCA	*Migratory Birds Convention Act, 1994*, SC 1994, c 22
mm	millimetre
NL	Newfoundland and Labrador
NL ESA	Newfoundland and Labrador *Endangered Species Act*
RoW	right of way
SAR	Species at Risk
SARA	*Species at Risk Act*
SOCC	Species of Conservation Concern
SSAC	Species Status Advisory Committee
USDA	United States Department of Agriculture

1.0 INTRODUCTION

Newfoundland and Labrador (NL) Hydro is proposing to construct and operate a new 69 kilovolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a proposed new terminal station (Valentine Terminal Station) being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site in the west-central region of the Island of Newfoundland (the Project; see Figure 1.1). Project construction activities will include upgrades to the Star Lake Terminal Station, which will occur within the existing station property, and installation of a new 69 kV wood pole transmission line, approximately 40 km in length, with a right of way (RoW) approximately 25 m wide. Operational activities over the life of the Project will include asset inspection and repair as required, and vegetation control. Pending approvals, construction (clearing) may begin before the end of 2021, with TL271 being operational by early 2023. TL271 will be decommissioned once the power requirements for the Valentine Gold Project have been met.

The Flora and Fauna Baseline Study has been prepared to support ongoing Project planning and design and to support the environmental assessment of the Project, which is being initiated through submission of a Registration document to the Government of NL. This report is a baseline study on flora and fauna in the vicinity of the Project and was prepared based on a desktop analysis of publicly available data, supported by information from field studies previously conducted for the Valentine Gold Project, the study area of which overlaps the proposed RoW for the Project. The Baseline Study considers both the proposed RoW, as well as an alternate route that was considered by NL Hydro.

The flora component of the Flora and Fauna Baseline Study identifies and maps known or likely occurrences of listed (legally protected) and regionally uncommon plant species within or near the RoW. The fauna component provides information on the presence, abundance and distribution of fauna (including raptors, migratory birds and furbearers) in insular Newfoundland, in and near the RoW. Caribou are considered in a separate Caribou Baseline Study.

The objectives of the Flora and Fauna Baseline Study are to:

1. Compile information on flora (rare/protected species) and fauna (avifauna and other wildlife) in the vicinity of the Project that have the potential to interact with the Project, based on their occurrence (or likely occurrence) in the RoW.
2. Develop GIS mapping to illustrate sensitive areas for flora and fauna (note: exact locations of sensitive species are not provided by conservation agencies due to conservation concerns).
3. Prepare a standalone report describing the flora and fauna in the Project area to support the Registration of the Project, as well as the development of mitigation measures.

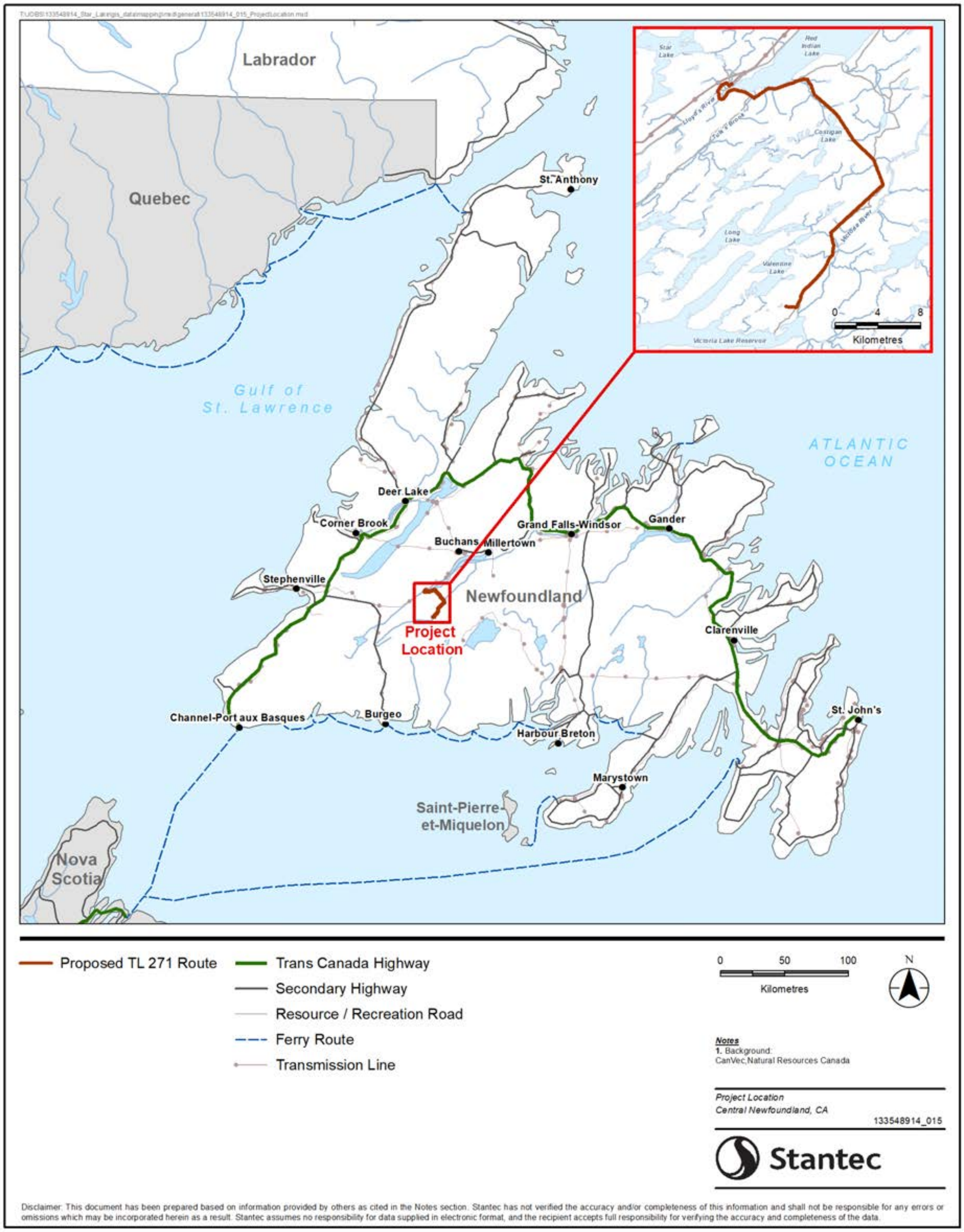

Figure 1.1 Project Location

2.0 RARE SPECIES AND REGULATORY CONTEXT

2.1 OVERVIEW OF RARE SPECIES

A species can be considered rare for a variety of reasons. It can be rare because it has relatively few individuals, it is uncommon or scarce, and/or it occurs within a limited geographical range. The rarity of a species may also be a matter of scale, meaning that a species may not be rare in Canada, but may be considered "regionally rare" in a respective province or territory. The rarest species are those with small geographic ranges, few occurrences, and few individuals in each occurrence.

The terms Species at Risk (SAR) and Species of Conservation Concern (SOCC) are used in this report when discussing rare species and are defined in the following sections.

2.1.1 Species at Risk

In NL, SAR include those species listed as Extirpated, Endangered, Threatened, Vulnerable, or Special Concern under the NL *Endangered Species Act* (NL ESA), the federal *Species at Risk Act* (SARA), or by the Committee on the Status of Endangered Wildlife Species in Canada (COSEWIC).

2.1.2 Species of Conservation Concern

For this purpose of this baseline study, SOCC include those species:

- recommended for listing by the Species Status Advisory Committee (SSAC) as Endangered, Threatened, Vulnerable, or Special Concern but not yet listed under NL ESA or SARA
- considered provincially rare, i.e., those species with provincial status ranks (S-ranks) of S1 (critically imperiled), S2 (imperiled), or combinations thereof (e.g., S1S2) upon review by the Atlantic Canada Conservation Data Centre (AC CDC 2021)

Unlike some SAR, SOCC are not protected by federal or provincial legislation. Rather, they are included as a precautionary measure, reflecting observations and trends in their provincial population status. SOCC may be important indicators of ecosystem health and regional biodiversity, thus their presence in an area may warrant mitigation, given their rarity or importance. They are also often indicators of the presence of unusual and / or sensitive habitat, and their protection as umbrella species could possibly result in protection of their associated unusual habitats and co-existing species.

A summary of the ranking systems outlined by SARA, COSEWIC, NL ESA, and AC CDC are provided in Appendix A.

2.2 RELEVANT LEGISLATION

The protection of rare species is a legal requirement for those species listed under Schedule 1 of SARA and the NL ESA. Fauna species are afforded further protection under the federal *Migratory Birds Convention Act, 1994* (MBCA) and the NL *Wild Life Act*.

2.2.1 Federal

2.2.1.1 Species at Risk Act

The status of species in Canada is assessed and designated by COSEWIC, which then recommends a designation for legal protection by being officially listed under Schedule 1 of SARA. One of the key considerations under SARA for protection of listed SAR is protection of the species' habitat.

SARA is one part of a three-part Government of Canada strategy for the protection of SAR, and applies to Extirpated, Endangered, or Threatened species listed as being at risk and their critical habitat. SARA-listed species designated as Special Concern are not protected by the prohibitions of Sections 32-36 of SARA; however, it is required that provincial or regional management plans be developed to protect these species. The other two parts of this strategy include commitments under the Accord for the Protection of Species at Risk and activities under the Habitat Stewardship Program for SAR, which protect SAR on federal land.

There are three main prohibitions in SARA relevant to Extirpated, Endangered, or Threatened SAR and their critical habitat:

- Section 32, which prohibits killing, harming, or taking SAR
- Section 33, which prohibits damage or destruction of residences of SAR
- Subsection 58(1), which prohibits destruction of critical habitat of SAR

Definitions of COSEWIC and SARA species status categories are summarized in Appendix A.

2.2.1.2 Migratory Birds Convention Act, 1994

The MBCA provides protection for migratory birds along with their nests and eggs. This Act affords protection to most native bird species expected to occur in or near the Project, except some non-migratory groups, and some species, such as raptors, kingfishers and cormorants. Those species not protected under the MBCA are afforded protection under provincial legislation described below.

2.2.2 Provincial

2.2.2.1 NL Endangered Species Act

In addition to SARA, each province and territory has a regulatory body that determines what species are rare in each of their respective jurisdictions. Designation under the NL ESA follows the recommendations of the SSAC on the appropriate assessment of a species and referring concerns about the status of species to COSEWIC, where the species is of national importance.

The purpose of NL ESA is to:

- Prevent listed species from being extirpated from NL
- Provide for the recovery of species listed as Extirpated, Endangered, or Threatened due to human activity
- Conserve species listed as Special Concern to prevent them from becoming Endangered or Threatened

Prohibitions of NL ESA include Section 16, which states “a person shall not disturb, harass, injure, or kill an individual of a species designated as threatened, endangered or extirpated”. Species are listed under the *Endangered Species List Regulations.*

2.2.2.2 NL Wild Life Act

The NL *Wild Life Act* affords protection of wildlife (including avifauna species) and prohibits the hunting, taking or killing of wildlife or classes of wildlife, whether in particular places or at particular times or by particular methods, except under license or permit. The Act, in combination with other provincial regulations and Acts including the *Wilderness and Ecological Reserves Act* and the NL ESA, protects the biodiversity and wildlife resources of NL from being compromised.

2.2.2.3 Other Acts, Strategies and Management Plans

Other provincial Acts, strategies and management plans related to the protection of wildlife and their habitat in the vicinity of the Project include (but are not limited to) the following:

- *Little Grand Lake Provisional Ecological Reserve Regulations*
- *Little Grand Lake Wild Life Reserve Regulations*
- *Forestry Act*
- *Recovery Plan for the Threatened Newfoundland population of American marten (Martes americana atrata*) (Newfoundland Marten Recovery Team 2010)
- *Provincial Sustainable Forest Management Strategy* 2014-2024 (Government of NL 2014)
- *Sustainable Forest Management Planning Regulations*, NLR 61/13

3.0 METHODS

The RoW for TL271 (25 m in width) was evaluated for the potential presence of rare flora. For fauna, records of their presence in the vicinity of the RoW were considered in addition to their potential to occur in the RoW.

3.1 INFORMATION SOURCES

No field data has been collected specifically in support of the Project. AC CDC data was obtained for the area within 5 km of a 100 m buffer of the proposed and alternate transmission line routes for the Project (AC CDC 2020a). This data included information on both flora and fauna SAR and SOCC.

A number of baseline studies were completed between 2013 and 2020 for the Valentine Gold Project (Marathon 2020), in habitats overlapping or near the Project. Results from these programs were used to support the development of the rare flora and fauna component for the Project (Table 3.1). These include an Ecological Land Classification (ELC), waterfowl and waterfowl habitat surveys, forest songbird surveys, winter wildlife study, rare plant surveys, and a Newfoundland Marten study. Other sources of information used were readily available (public) primary and secondary literature and federal and provincial databases such as:

- COSEWIC Assessment and Status Update Reports (COSEWIC 2019a)
- AC CDC – observation data on SAR / SOCC in Atlantic Canada (AC CDC 2020a)
- North American Breeding Bird Survey (BBS) (United States Geological Survey 2018)
- Christmas Bird Counts (CBC) (Audubon 2020)

Table 3.1 Field Surveys Conducted During Baseline Programs for the Valentine Gold Project

Study	Date of Field Surveys	Summary
2011 Baseline Waterfowl and Waterfowl Habitat Study (Stantec 2014a)	May 16 and July 7, 2011	Aerial waterfowl breeding pair and brood surveys, and wetland habitat characterization.
2011 Forest Songbird Surveys (Stantec 2014b)	June 14 – 18, 2011	Point count surveys and transects targeting forest breeding songbirds.
Winter Wildlife Survey (Stantec 2014c)	February 28 – March 29, 2013	Aerial and ground-based track surveys.
Ecosystem Classification and Mapping (Stantec 2015)	2013 – 2014	Ecosystem classification using remote sensing and field-based habitat descriptions.
Vegetation Baseline Study (Stantec 2017a)	July 17 – 21, 2017	Rare plant survey conducted in key habitats within the Valentine Gold Project footprint.

Table 3.1 Field Surveys Conducted During Baseline Programs for the Valentine Gold Project

Study	Date of Field Surveys	Summary
Waterfowl Baseline Study: Aerial Waterfowl Spring Breeding and Fall Staging Surveys (Stantec 2017b)	June 6 and September 7, 2017	Aerial waterfowl surveys conducted in spring and fall.
Newfoundland Marten Study (Stantec 2018)	Winter 2018	Hair snag trapping.
2019 Vegetation Baseline Study (Stantec 2019a)	June 25 – 29, 2019	Rare plant survey conducted in key habitats within the Valentine Gold Project footprint.
2019 Avifauna Baseline Study: Results of the 2019 Songbird and Common Nighthawk Surveys (Stantec 2019b)	June 26 – 28, 2019	Point count surveys targeting breeding songbirds, and crepuscular surveys for (common nighthawk [*Chordeiles minor*]).

3.2 ANALYSIS

The following criteria were used to determine the occurrence or likelihood of occurrence of a species in or near the Project RoW:

- Rare Flora: Habitat preferences of species known to be present in the area surrounding the RoW were evaluated with respect to the abundance of various habitats within the RoW, as determined through the ELC, to estimate the potential of a species being present within the RoW.
- Fauna SAR: Confirmation of their occurrence in the vicinity of the RoW through AC CDC data (2020a) and/or field programs (Marathon 2020) combined with a review of existing status reports or other publicly available information, was used to infer their potential to occur in the RoW.
- Avifauna: Confirmation of their occurrence in the vicinity of the RoW during field programs (Marathon 2020) was used to infer their presence in suitable habitats in the RoW during the breeding season.
- Other Wildlife: Evidence of their occurrence in the RoW was based primarily on publicly available literature and incidental observations during field programs for the Valentine Gold Project (Marathon 2020).

4.0 RESULTS AND DISCUSSION

4.1 HABITAT

The Project is in the Red Indian Lake Subregion of the Central Newfoundland Forest (CNF) Ecoregion, one of nine ecoregions on the Island of Newfoundland (Government of NL n.d.a). The CNF Ecoregion is primarily inland and has a more continental climate than other surrounding ecoregions. This ecoregion also has the warmest summers and coldest winters on the island, with the potential for night frost year-round. These conditions exclude some hardwood tree species from the area (Government of NL n.d.a).

The Red Indian Lake Subregion is slightly cooler than other subregions of the CNF. Balsam fir (*Abies balsamea*), paper birch (*Betula papyrifera*), and black spruce (*Picea mariana*) are dominant tree species, and areas of rich, productive soils are present, particularly along the southern slopes of Red Indian Lake (Government of NL n.d.a). Disturbances such as logging or fire often lead to the succession of alder (*Alnus* spp.) thickets, which has become an issue for silviculture within the subregion (Government of NL n.d.a).

The ELC conducted by Stantec for the Valentine Gold Project (Stantec 2015; Marathon 2020) covers approximately 89% of the 25 m wide RoW, ending at Red Indian Lake near Lloyd's River, and includes 12 habitat types that occur in the area (Table 4.1). Complete descriptions of the habitat types are available in the ELC report (Stantec 2015). Forest habitat types account for approximately 36% of the ELC area and 54% of the RoW. Approximately 41% of habitats in the ELC area and 38% of the RoW are characterized by wetland habitat types. Approximately 22% of the ELC area and 1% of the RoW are covered with open water, and the remaining habitat types (anthropogenic and exposed sand / gravel shoreline) cover less than 1% of the ELC area and 7% of the RoW. The major differences between the percentages of various habitats within the ELC area and the RoW are open water, which is lower within the RoW relative to the ELC area as the RoW does not cross any major waterbodies, and anthropogenic, which is higher in the RoW relative to the ELC area as the RoW follows and crosses many roads.

Table 4.1 Habitat Types in the Project RoW

Habitat Type	Description	Area in RoW (ha)	% in RoW	% in ELC Study Area
Forested Habitat Types				
Balsam Fir Forest	Dry to moist and sometimes wet conifer-dominated forests	1,213.1	13.5	6.9
Black Spruce Forest	Dry to moist and sometimes wet conifer-dominated forests	1,649.2	18.4	12.7
Kalmia-Black Spruce Woodland	Dry to moist and sometimes wet stunted tree and shrub / heath dominated communities	360.9	4.0	11.4

Table 4.1 Habitat Types in the Project RoW

Habitat Type	Description	Area in RoW (ha)	% in RoW	% in ELC Study Area
Mixedwood Forest	Mesic to moist forests with high deciduous component	1,899.2	21.2	9.8
Regenerating Forest	Forests regenerating as a result of influences such as harvesting, fire and windthrow	1,356.7	15.2	7.6
Alder Thicket	Alder-dominated communities on moist seepage slopes and riparian areas	1,129.6	12.6	5.3
Wetland Habitats				
Open Wetlands	Very moist to wet shrub / herb dominated peatlands (includes shrub bogs and shrub / graminoid fens)	231.9	2.6	15.3
Wet Coniferous Forest	Very moist to wet conifer forests	374.1	4.2	7.1
Riparian Habitats				
Riparian Thicket	Shrub thickets located in transitional areas and subject to periodic flooding	0	0	0.8
Sparsely Vegetated, Naturally Non-vegetated, and Anthropogenically Altered / Disturbed Habitats				
Open Water	Waterbodies (lakes, ponds, rivers, and streams)	81.8	0.9	22.3
Exposed Sand / Gravel Shoreline	Sparsely vegetated and/or un-vegetated shorelines	0	0	0.2
Anthropogenic	Areas currently or historically subject to intense levels of human disturbance and use (does not include areas regenerating from forest management)	659.5	7.4	0.5
Source: Stantec 2015, Marathon (2020)				

4.2 RARE FLORA

Rare plant species include all plant SAR and SOCC as defined in Section 2.1, and are generally defined as native species that, because of their biological characteristics, or because they occur at the periphery of their range, or for some other reason, exist in low or declining numbers or in very restricted areas, in Canada and/or NL.

4.2.1 Vascular Plants

Several vascular plant SOCC have been identified in the vicinity of the Project from various sources (Table 4.2).

Table 4.2 Vascular Plant Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
perennial bentgrass	*Agrostis perennans*	S2	ELC	SOCC
short-scale sedge	*Carex deweyana*	S2	ELC	SOCC
nodding water nymph	*Najas flexilis*	S2	2017 Rare Plant Survey	SOCC
red pine	*Pinus resinosa*	S2	AC CDC	SOCC
fragrant cliff wood-fern	*Dryopteris fragrans*	S2S3	AC CDC	SOCC
common water primrose	*Ludwigia palustris*	SNR	2019 Rare Plant Survey	Presumed SOCC

Notes:

1 Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S2 = imperiled, due to a very restricted range, ≤ 20 populations, steep declines, or other factors; S3 = vulnerable, due to a restricted range, ≤ 80 populations, widespread declines, or other factors. S#S# = indicates a range of uncertainty of the status of a species (AC CDC 2021)

2 Data sources described in Section 3.2.

3 SAR = Species at Risk; SOCC = Species of Conservation Concern

Perennial bent grass (*Agrostis perennans*) is ranked S2 on the Island of Newfoundland (AC CDC 2020b). This grass species grows in tufts and can reach between 50 and 100 cm in height and has flat leaves that range from 2 to 6 mm in width (Gleason and Cronquist 1991). Its pale inflorescence can grow from 10 to 25 cm in length. Within Canada, this species is found from Ontario to the Island of Newfoundland (United States Department of Agriculture [USDA] n.d.a), where it is found in northern and western-central Newfoundland (Meades et al. 2000). Perennial bent grass was observed in two locations, both within the Alder Thicket Ecotype, during ELC surveys conducted in support of the Valentine Gold Project, and were approximately 200 m and 380 m from the edge of the RoW (Stantec 2015, Figure 4.1). It has been reported in a wide range of habitats, from moist woods, flooded shores, and dry habitats (Gleason and Cronquist 1991; Hinds 2000), all of which are within the RoW; therefore, perennial bent grass may exist within the RoW.

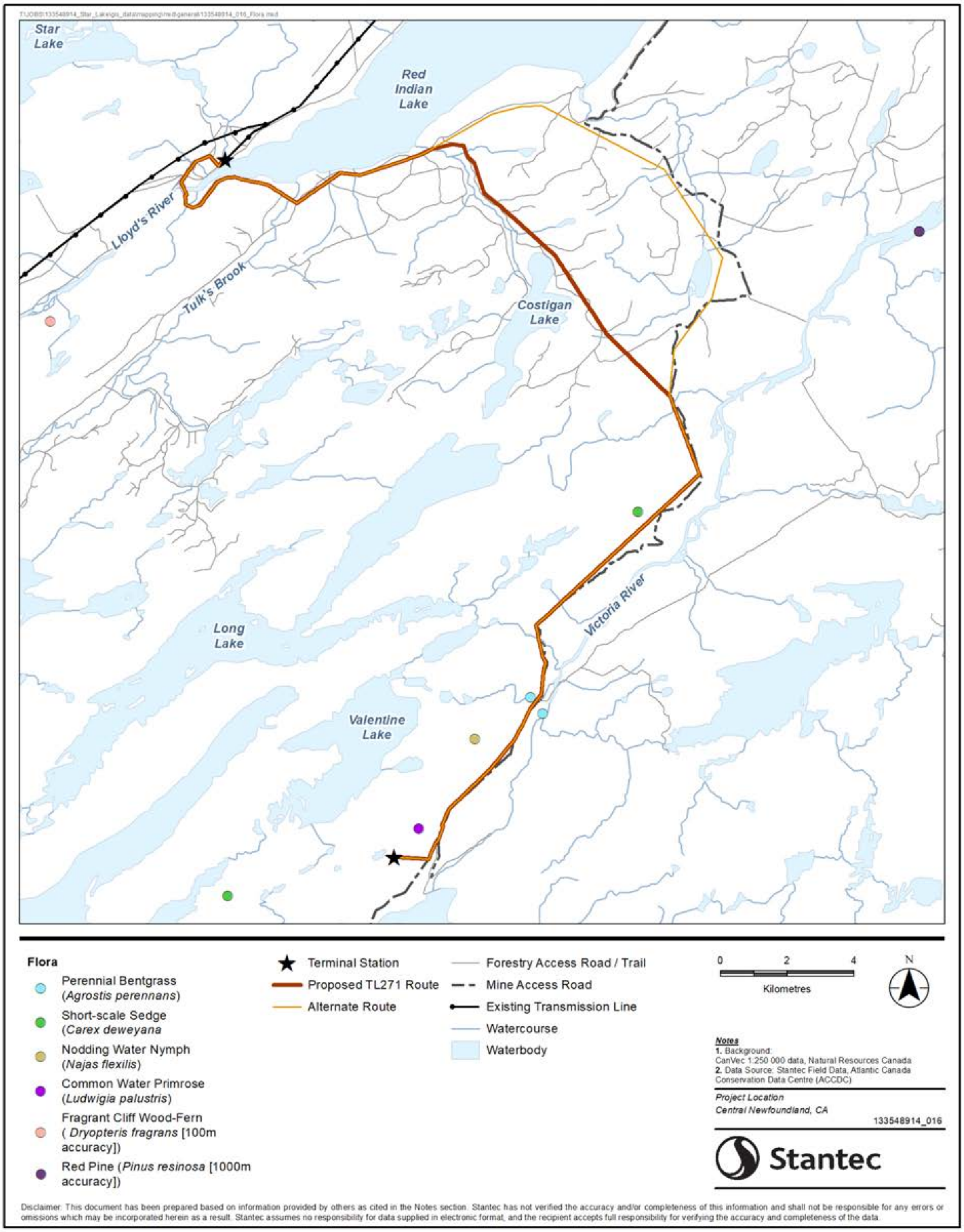

Figure 4.1 Rare Flora in the Vicinity of the Project

Short-scale sedge (*Carex deweyana*) is ranked S2 on the Island of Newfoundland (AC CDC 2020b). This species is a relatively short perennial sedge that can occasionally grow to a height of 120 cm. It has a relatively small inflorescence with translucent pistillate scales which result in a silvery appearance (Gleason and Cronquist 1991). On the Island of Newfoundland, the range of short-scale sedge includes western, southwestern, northwestern, and eastern areas (Stantec 2017a). It has been reported from all regions of Canada except Nunavut (USDA n.d.b). Short-scale sedge were observed during the ELC field surveys conducted in support of the Valentine Gold Project. Small numbers of this species were recorded at two locations in the Alder Thicket Ecotype, approximately 380 m and more than 5 km from the RoW (Figure 4.1; Stantec 2015). Short-scale sedge is reported to be associated with open hardwood or hardwood and mixedwood forest habitats (Hinds 2000; Haines 2011). These habitat types are present within the RoW; thus, it is possible this species may exist within the RoW.

Nodding water nymph (*Najas flexilis*) is ranked S2 on the Island of Newfoundland (AC CDC 2020b). This aquatic species is a rooted annual plant that grows submerged in shallow water (Hinds 2000). It has long, slender, many-branched stems ranging from 5 to 50 cm long and 0.2 to 0.6 mm wide, which support minutely serrated leaves, ranging in size from 1 to 4 cm long and 0.2 to 0.6 mm wide (Gleason and Cronquist 1991). Nodding water nymph is known throughout Canada apart from Yukon and Nunavut Territories, and Labrador (USDA n.d.c), and within western, northern and central Newfoundland (Meades et al. 2000). This species was observed in an open water pool in the Open Wetland Ecosystem Unit during a rare plant survey conducted in support of the Valentine Gold Project, approximately 940 m from the RoW (Figure 4.1; Stantec 2017a). It is associated with various aquatic habitats, including lake and river margins, and pools in bogs (Gleason and Cronquist 1991; Reznicek et al. 2011). Many of these habitats are present within the RoW and therefore, this species may occur within the RoW.

Red pine (*Pinus resinosa*) is ranked S2 on the Island of Newfoundland (AC CDC 2020b). This coniferous tree has 10 to 16 cm long needles in bundles of two and can grow to heights of 25 m (Farrar 1995). Red pine is an eastern species, known in Canada from Manitoba to the Island of Newfoundland (USDA n.d.d), and within Newfoundland, from the central and northeast coast areas (Meades et al. 2000). This species was recorded twice in 1962 and once in 1985 in locations that are not well documented. The provided coordinates for these records are near Victoria River and have an accuracy of 1,000 m (Figure 4.1). However, each record has a location description, which are Overflow Pond and near Noel Paul's Brook. These two locations are approximately 50 km and over 18 km, respectively, from the Victoria River location, which itself is approximately 10 km east of the Project. Red pine typically grows in sandy soils and other areas of relatively low soil fertility in association with other coniferous tree species (Farrar 1995; Hinds 2000). These types of stands are not precisely described in the ELC but align most closely with and may have been included in the Kalmia-Black Spruce Forest Ecotype. This is an open forest habitat found in shallow, stony soils (Stantec 2015). Red pine could exist within the RoW, but potential habitats cannot be determined from the ELC data.

Fragrant cliff wood-fern (*Dryopteris fragrans*) is ranked S2S3 on the Island of Newfoundland (AC CDC 2020b). This narrow fern grows to 35 cm in length and 5.5 cm in width and produces many overlapping spore-producing structures on its underside (Gleason and Cronquist 1991). Fragrant cliff wood-fern is a northern species, known through much of Canada but only some of the northcentral and northeastern

United States (Kartesz BONAP 2015). On the Island of Newfoundland, it is known from western, central, and northeastern regions (Meades et al. 2000). AC CDC data identified records of fragrant cliff wood-fern near the Project. It was observed within a rocky black spruce stand south of Lloyd's River, approximately 5.4 km southwest of the Project (Figure 4.1). Fragrant cliff wood-fern grows on shaded cliffs and rock outcrops, typically on alkaline rocks (Gleason and Cronquist 1991; Haines 2011). This habitat may be present within the RoW along Lloyd's River, but is unlikely to be found elsewhere.

Common water-primrose or marsh seedbox (*Ludwigia palustris*) is a robust aquatic or semi-aquatic plant commonly grown in aquariums (Native Plant Trust 2021). This species has 5 to 30 mm long simple, opposite leaves, and produces sessile flowers in the axils of its leaves (Gleason and Cronquist 1991). Common water-primrose is known from British Columbia and most of eastern Canada, as well as most of the United States outside of the Midwest (USDA n.d.e). Although the province of NL is not considered part of this species' distribution in many official records (USDA n.d.e; Brouillet et al. 2020), it has recently been added to the AC CDC species list, with a rank of SNR (species not ranked, AC CDC 2020b). It was also identified on the Island of Newfoundland in 2012, a record which was subsequently verified by Sean Blaney of the AC CDC (iNaturalist n.d.). Common water-primrose is common throughout most of its range and is expected to become more common as it becomes established on the Island of Newfoundland. This species was observed within a pool in the Black Spruce Forest Ecotype during surveys conducted in support of the Marathon EIS in late June 2019, approximately 565 m from the RoW (Figure 4.1; Stantec 2019a). It is known from wet silt, mud, and shallow water along shorelines, in swamps, and in wet ditches (Gleason and Cronquist 1991; Haines 2011). This habitat exists within the RoW; therefore, common water-primrose may be found within appropriate habitat within the RoW.

4.2.2 Bryophytes and Lichens

No rare bryophytes or lichens were recorded within the AC CDC data within a 5 km radius of the Project, nor were rare bryophytes or lichens recorded during field surveys conducted in support of the Valentine Gold Project. However, targeted bryophyte and lichen surveys were not conducted for the Valentine Gold Project; rather, these taxa were recorded incidentally to other surveys, and often to genus level as only field identifications were completed.

4.3 FAUNA

The fauna component of the Flora and Fauna Baseline Study provides information on avifauna and other wildlife, including SAR and SOCC, that have the potential to occur in and near the RoW, based on their confirmed presence in habitats proximate to the Project and/or publicly available literature and historic records.

While many wildlife species would be expected to use a variety of habitat types at different times of the year, with respect to biologically important time periods for avifauna, the breeding season (April to August) is the most sensitive for birds and their occurrence in the vicinity of the RoW is largely based on this period unless otherwise indicated.

For the purpose of this Baseline Study, avifauna species (Section 4.3.1) are categorized into three broad groups: Raptors (including owls), Migratory Birds (species covered under the MBCA), and Other Avifauna Species (e.g., Upland Gamebirds, Crows, Ravens, Jays, Kingfishers, and Starlings). Migratory birds are further broken into groups based largely on categories identified under the MBCA and include: Game and Non-Game Birds (e.g., waterfowl, shorebirds, gulls, loons, pigeons and bitterns) and Insectivorous Birds (e.g., chickadees, flycatchers, nighthawks, swallows, warblers, and woodpeckers). Other Wildlife (Section 4.3.2) includes Furbearers, Small Mammals, and Large Mammals (excepting caribou that are addressed in a separate report).

Avifauna and other wildlife SAR / SOCC are noted in relevant sections and presented in more detail in Section 4.3.3.

4.3.1 Avifauna

A combination of data sources, including baseline studies completed for the Valentine Gold Project, breeding bird surveys, and data provided by the AC CDC, indicate that (at least) 98 species of avifauna have the potential to occur in or near the RoW.

4.3.1.1 Raptors

Raptors are birds of prey that include species which primarily hunt and feed on other vertebrates (including mammals, fish and other birds). Two species of raptor were confirmed during Valentine Gold Project baseline point count surveys in 2011 (Stantec 2014b): northern goshawk (*Accipiter gentilis*) and merlin (*Falco columbarius*). Other raptors identified in the vicinity of the RoW, either incidentally during other baseline studies for the Valentine Gold Project (Stantec 2014a, 2014c, 2015, 2017, 2018, 2019b) and/or through additional data sources (i.e., BBS, CBC) include osprey (*Pandion haliaetus*), northern harrier (*Circus hudsonius*), bald eagle (*Haliaeetus leucocephalus*), great horned owl (*Bubo virginianus*), and boreal owl (*Aegolius funereus*) (Table 4.3; Marathon 2020). None of the raptor species identified in the vicinity of the RoW, either during baseline studies in support of the Valentine Gold Project and/or through additional data sources, are identified as a SAR or SOCC.

Table 4.3 Raptor Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
Osprey	*Pandion haliaetus*	S4S5B, SUM	Baseline Studies	No
Norther Harrier	*Circus hudsonius*	S3B, SUM	Baseline Studies	No
Northern Goshawk	*Accipiter gentilis*	S3	Baseline Studies	No
Bald Eagle	*Haliaeetus leucocephalus*	S4	Baseline Studies	No
Great Horned Owl	*Bubo virginianus*	S4	CBC, Baseline Studies	No
Boreal Owl	*Aegolius funereus*	S4	Baseline Studies	No
Merlin	*Falco columbarius*	S4S5B, SUM	BBS, Baseline Studies	No

Notes:

1 Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S3 = vulnerable, due to a restricted range, < 80 populations, widespread declines, or other factors; S4 = apparently secure, uncommon but not rare; S5 = secure, common, widespread and abundant; S#S# = indicates a range of uncertainty of the status of a species; SU = unrankable, more information needed; B = Breeding; M = Migrant (AC CDC 2021).

2 Baseline Studies include field programs conducted for the Valentine Gold Project between 2013 and 2020 (Table 3.1).

3 SAR = Species at Risk; SOCC = Species of Conservation Concern

Source: Adapted from Marathon Gold (2020)

4.3.1.2 Migratory Birds

For this baseline study, migratory birds include the following groups (as described under the MBCA):

- **Game and Non-Game Birds**: Anatidae or waterfowl, including brant, wild ducks, geese, and swans; Gruidae or cranes, including little brown, sandhill, and whooping cranes; Rallidae or rails, including coots, gallinules and sora and other rails; Limicolae or shorebirds, including avocets, curlew, dowitchers, godwits, knots, oyster catchers, phalaropes, plovers, sandpipers, snipe, stilts, surf birds, turnstones, willet, woodcock, and yellowlegs; and Columbidae or pigeons, including doves and wild pigeons; and Auks, auklets, bitterns, fulmars, gannets, grebes, guillemots, gulls, herons, jaegers, loons, murres, petrels, puffins, shearwaters, and terns.
- **Insectivorous Birds**: Bobolinks, catbirds, chickadees, cuckoos, flickers, flycatchers, grosbeaks, hummingbirds, kinglets, martins, meadowlarks, nighthawks or bull bats, nuthatches, orioles, robins, shrikes, swallows, swifts, tanagers, titmice, thrushes, vireos, warblers, waxwings, whip-poor-wills, woodpeckers, and wrens, and all other perching birds which feed entirely or chiefly on insects.

Migratory Game and Non-Game Birds

Eighteen species of game and non-game migratory birds (Table 4.4) were documented in the vicinity of the Project during baseline waterfowl surveys (Stantec 2014a, 2017) or incidentally during other surveys in support of the Valentine Gold Project (Stantec 2014b, 2014c, 2015, 2018, 2019; Marathon 2020). One additional species, rock pigeon (*Columba livia*), was documented only during CBC surveys; this species is listed as SNA under AC CDC, indicating that a conservation status rank is not applicable because the species is not a suitable target for conservation activities. Of the 18 species of game and non-game migratory birds identified, one species observed during field surveys (Marathon 2020), Caspian tern

(*Hydroprogne caspia*) (Figure 4.2), is considered a SOCC. This species is discussed further in Section 4.3.3.

Table 4.4 Migratory Game and Non-Game Bird Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
American Black Duck	*Anas rubripes*	S4	Baseline Studies, CBC	No
Canada Goose	*Branta canadensis*	S4	Baseline Studies	No
Common Goldeneye	*Bucephala clangula*	S4	Baseline Studies	No
Common Loon	*Gavia immer*	S5B, S4N	Baseline Studies, BBS	No
Common Merganser	*Mergus merganser*	S4	Baseline Studies, BBS	No
Green-winged Teal	*Anas crecca*	S4B, SUM	Baseline Studies	No
Mallard	*Anas platyrhynchos*	S3B, SUM	Baseline Studies	No
Red-breasted Merganser	*Mergus serrator*	S4B, S4M	Baseline Studies	No
Ring-necked Duck	*Aythya collaris*	S5B, S5M	Baseline Studies	No
Killdeer	*Charadius vociferus*	S3B, SUM	Baseline Studies	No
Wilson’s Snipe	*Gallinago delicata*	S5B, S5M	Baseline Studies, BBS	No
Spotted Sandpiper	*Actitis macularius*	S4B, SUM	Baseline Studies, BBS	No
Greater Yellowlegs	*Tringa melanoleuca*	S3B, S4M	Baseline Studies, BBS	No
Herring Gull	*Larus argentatus*	S4	Baseline Studies, BBS	No
Caspian Tern	***Hydroprogne caspia***	**S2B, SUM**	**Baseline Studies**	**SOCC**
Common Tern	*Sterna hirundo*	S4B, SUM	Baseline Studies	No
American Bittern	*Botaurus lentiginosus*	S4B, SUM	Baseline Studies, BBS	No
Rock Pigeon	*Columba livia*	SNA	CBC	No

[1] Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S2 = imperiled, due to a very restricted range, < 20 populations, steep declines, or other factors; S3 = vulnerable, due to a restricted range, < 80 populations, widespread declines, or other factors; S4 = apparently secure, uncommon but not rare; S5 = secure, common, widespread and abundant; SU = unrankable, more information needed; SNA = not applicable, not suitable target for conservation; B = Breeding; N = nonbreeding; M = Migrant (AC CDC 2021).

[2]Baseline Studies include field programs conducted for the Valentine Gold Project between 2013 and 2020 (Table 3.1); BBS = Breeding Bird Surveys; CBC = Christmas Bird Counts

[3]SAR = Species at Risk; SOCC = Species of Conservation Concern

Source: Adapted from Marathon (2020)

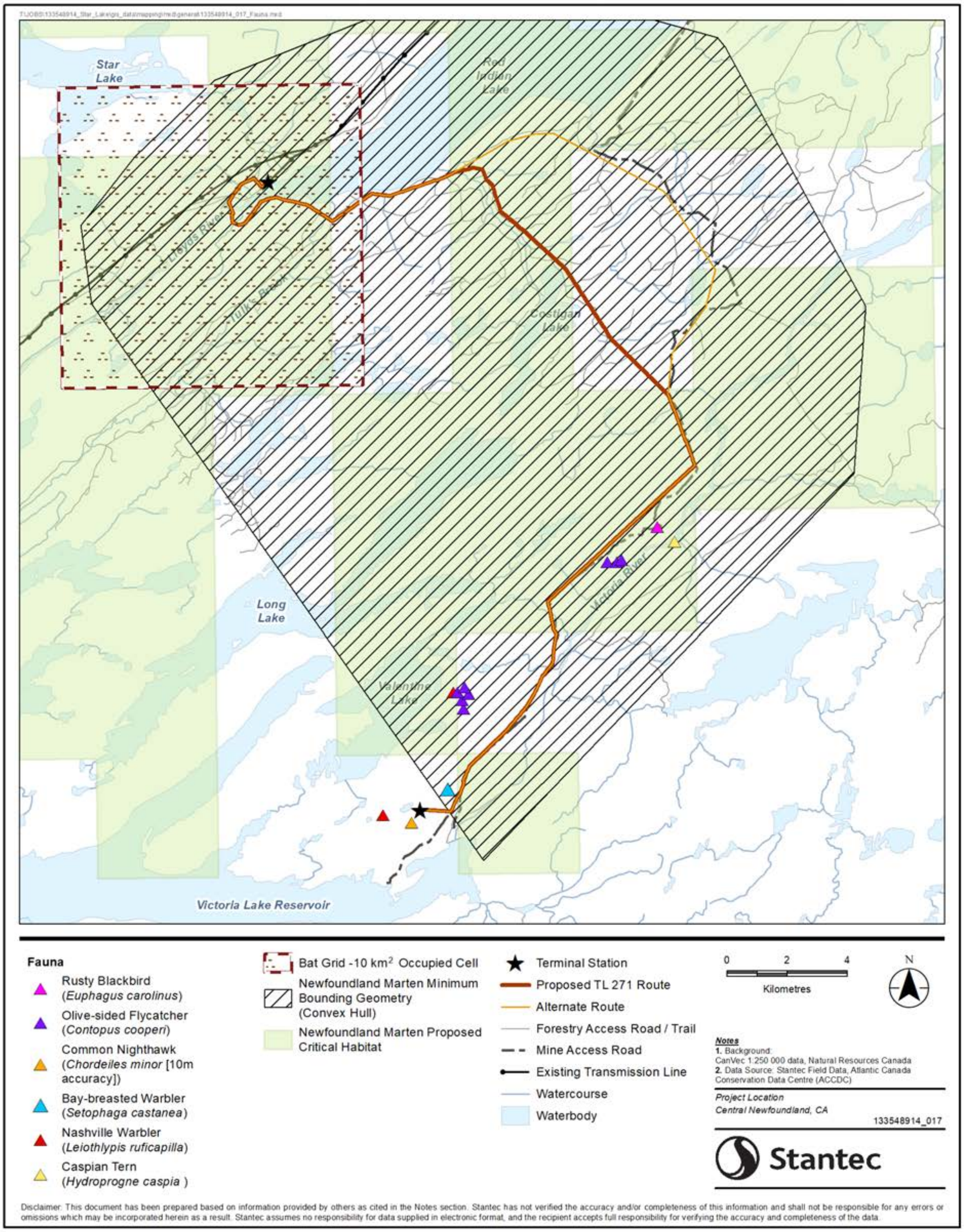

Figure 4.2 Known Locations of Fauna SAR / SOCC in the Vicinity of the Project

Migratory Insectivorous Birds

Insectivorous migratory birds encompass a broad range of species that, as the name suggests, feed entirely or chiefly on insects. Of this group, species in the order Passeriformes (commonly known as perching birds) comprise the largest and most dominant group of birds, and most species likely to occur in or near the RoW fall within this classification. Other categories of migratory insectivorous birds reported in the vicinity of the Project include Woodpeckers, Swallows and Nightjars.

A total of 63 species of migratory insectivorous birds (Table 4.5) were confirmed in the vicinity of the Project during baseline studies in support of the Valentine Gold Project (Stantec 2014a, 2014b, 2014c, 2015, 2017, 2018, 2019b) and/or through historic records (i.e., BBS, CBC) (Marathon 2020). Six of these species are a SAR under SARA: common nighthawk (*Chordeiles minor*), olive-sided flycatcher (*Contopus cooperi*), red crossbill (*Loxia curvirostra*), bank swallow (*Riparia riparia*), gray-cheeked thrush (*Catharus minimus*) and evening grosbeak (*Coccothraustes vespertinus*). Two avifauna SOCC –Nashville warbler (*Leiothlypis ruficapilla*) and bay-breasted warbler (*Setophaga castanea*) – were also detected during baseline field surveys (Figure 4.2). Most species of migratory insectivorous birds would be expected to occur in suitable habitats in the Project RoW during the breeding season, apart from SAR / SOCC that have more limited distributions or are at the edge of their breeding range in the Project area. SAR / SOCC are discussed in more detail in Section 4.3.3.

Table 4.5 Migratory Insectivorous Bird Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
Common Nighthawk	***Chordeiles minor***	**SNA**	**AC CDC, Baseline Studies**	**SARA Status: Threatened (Schedule 1); COSEWIC: Special Concern; NL ESA: Threatened**
Black-backed Woodpecker	*Picoides arcticus*	S4	BBS, Baseline Studies	No
Downy Woodpecker	*Dryobates pubescens*	S4	CBC, Baseline Studies	No
Hairy Woodpecker	*Dryobates villosus*	S4	BBS, CBC, Baseline Studies	No
Northern Flicker	*Colaptes auratus*	S4	BBS, Baseline Studies	No
Olive-sided Flycatcher	***Contopus cooperi***	**S3B, SUM**	**BBS, Baseline Studies**	**SARA Status: Threatened (Schedule 1); COSEWIC: Special Concern; NL ESA: Threatened**
Yellow-bellied Flycatcher	*Empidonax flaviventris*	S5B, S5M	BBS, Baseline Studies	No
Alder Flycatcher	*Empidonax alnorum*	S4B, SUM	BBS	No
Least Flycatcher	*Empidonax minimus*	S2S3?B, SUM	BBS, Baseline Studies	No

Table 4.5 Migratory Insectivorous Bird Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
Northern Shrike	*Lanius borealis*	S3N, SUM	CBC	No
Blue-headed Vireo	*Vireo solitarius*	S3B, SUM	BBS, Baseline Studies	No
Bank Swallow	***Riparia riparia***	**S1S2B, SUM**	**AC CDC**	**SARA Status: Threatened (Schedule 1); COSEWIC: Threatened**
Tree Swallow	*Tachycineta bicolor*	S4B, SUM	BBS, Baseline Studies	No
Black-capped Chickadee	*Poecile atricapillus*	S5	BBS, CBC, Baseline Studies	No
Boreal Chickadee	*Poecile hudsonicus*	S4	BBS, CBC, Baseline Studies	No
Red-breasted Nuthatch	*Sitta canadensis*	S5	BBS, Baseline Studies	No
Brown Creeper	*Certhia americana*	S3	Baseline Studies	No
Winter Wren	*Troglodytes hiemalis*	S3B, SUM	BBS	No
Golden-crowned Kinglet	*Regulus satrapa*	S5B, S4N, SUM	BBS, CBC, Baseline Studies	No
Ruby-crowned Kinglet	*Regulus calendula*	S5B, S5M	BBS, Baseline Studies	No
Gray-cheeked Thrush	***Catharus minimus***	**S2B, SUM**	**BBS**	**NL ESA Status: Threatened**
Swainson's Thrush	*Catharus ustulatus*	S5B, S5M	BBS, Baseline Studies	No
Hermit Thrush	*Catharus guttatus*	S5B, S5M	BBS, Baseline Studies	No
American Robin	*Turdus migratorius*	S5B, S5M	BBS, Baseline Studies	No
Bohemian Waxwing	*Bombycilla garrulus*	S4N, SUM	CBC	No
Cedar Waxwing	*Bombycilla cedrorum*	S4B, SUM	BBS	No
House Sparrow	*Passer domesticus*	SNA	BBS, CBC	No
Evening Grosbeak	***Coccothraustes vespertinus***	**S4**	**BBS, CBC**	**SARA Status: Special Concern; COSEWIC: Special Concern**
Pine Grosbeak	*Pinicola enucleator*	S5	BBS, CBC, Baseline Studies	No
Purple Finch	*Haemorhous purpureus*	S5	BBS	No
Common Redpoll	*Acanthis flammea*	S2S3B, S4N, SUM	BBS, CBC	No

Table 4.5 Migratory Insectivorous Bird Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
Red Crossbill	***Loxia curvirostra***	**S1S2**	**BBS**	**SARA Status: Threatened (Schedule 1); COSEWIC: Threatened; NL ESA: Endangered**
White-winged Crossbill	*Loxia leucoptera*	S5	BBS, Baseline Studies	No
Pine Siskin	*Spinus pinus*	S4S5	BBS, CBC, Baseline Studies	No
American Goldfinch	*Spinus tristis*	S5	BBS, CBC, Baseline Studies	No
Fox Sparrow	*Passerella iliaca*	S5B, S5M	BBS, Baseline Studies	No
American tree Sparrow	*Spizelloides arborea*	S3B, SUM	CBC	No
Dark-eyed junco	*Junco hyemalis*	S5	BBS, CBC, Baseline Studies	No
White-crowned Sparrow	*Zonotrichia leucophrys*	S4B, SUM	Baseline Studies	No
White-throated Sparrow	*Zonotrichia albicollis*	S5B, S5M	BBS, CBC, Baseline Studies	No
Vesper Sparrow	*Pooecetes gramineus*	SNA	Baseline Studies	No
Savannah Sparrow	*Passerculus sandwichensis*	S5B, S5M	BBS, Baseline Studies	No
Song Sparrow	*Melospiza melodia*	S4B, SUM	Baseline Studies	No
Lincoln's Sparrow	*Melospiza lincolnii*	S5B, S5M	BBS, Baseline Studies	No
Swamp Sparrow	*Melospiza georgiana*	S5B, S5M	BBS, Baseline Studies	No
Ovenbird	*Seiurus aurocapilla*	S3B, SUM	BBS, Baseline Studies	No
Northern Waterthrush	*Parkesia noveboracensis*	S5B, S5M	BBS, Baseline Studies	No
Black-and-white Warbler	*Mniotilta varia*	S5B, S5M	BBS, Baseline Studies	No
Tennessee Warbler	*Leiothlypis peregrina*	S4B, SUM	BBS	No
Nashville Warbler	***Leiothlypis ruficapilla***	**S2B, SUM**	**BBS, Baseline Studies**	**SOCC**
Mourning Warbler	*Geothlypis philadelphia*	S4B, SUM	BBS, Baseline Studies	No

Table 4.5 Migratory Insectivorous Bird Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
Common Yellowthroat	*Geothlypis trichas*	S5B, S5M	BBS, Baseline Studies	No
American Redstart	*Setophaga ruticilla*	S5B, S5M	BBS, Baseline Studies	No
Magnolia Warbler	*Setophaga magnolia*	S4B, SUM	BBS, Baseline Studies	No
Bay-breasted Warbler	***Setophaga castanea***	**S2B, SUM**	**BBS, Baseline Studies**	**SOCC**
Yellow Warbler	*Setophaga petechia*	S5B, S5M	BBS, Baseline Studies	No
Blackpoll Warbler	*Setophaga striata*	S5B, S5M	BBS, Baseline Studies	No
Palm Warbler	*Setophaga palmarum*	S5B, S5M	BBS, Baseline Studies	No
Pine Warbler	*Setophaga pinus*	SNA	Baseline Studies	No
Yellow-rumped Warbler	*Setophaga coronata*	S5B, S5M	BBS, Baseline Studies	No
Black-throated green Warbler	*Setophaga virens*	S5B, S5M	BBS, Baseline Studies	No
Wilson's Warbler	*Cardellina pusilla*	S5B, S5M	BBS, Baseline Studies	No
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	SNA	CBC	No

Notes:

[1] Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S1 = critically imperiled, due to extreme rarity, ≤ 5 individuals, steep declines, or other factors; S2 = imperiled, due to a very restricted range, < 20 populations, steep declines, or other factors; S3 = vulnerable, due to a restricted range, < 80 populations, widespread declines, or other factors; S4 = apparently secure, uncommon but not rare; S5 = secure, common, widespread and abundant; S#S# = indicates a range of uncertainty of the status of a species; SU = unrankable, more information needed; SNA = not applicable, not suitable target for conservation; B = Breeding; N = nonbreeding; M = Migrant (AC CDC 2021).

[2] Baseline Studies include field programs conducted for the Valentine Gold Project between 2013 and 2020 (Table 3.1).; BBS = Breeding Bird Surveys; CBC = Christmas Bird Counts

[3] SAR = Species at Risk; SOCC = Species of Conservation Concern

SAR / SOCC are reported in **bold** text

Source: Adapted from Marathon (2020)

4.3.1.3 Other Avifauna Species

Species included in the Other Avifauna category are those species (excluding raptors) that are not protected under the MBCA. While the MBCA affords protection to most native bird species expected to occur in the vicinity of the RoW, species not protected under the MBCA (and therefore included in this category) are protected under the NL ESA and/or the NL *Wild Life Act.*

Three species of Upland Gamebirds: ruffed grouse (*Bonasa umbellus*), spruce grouse (*Falcipennis canadensis*), and willow ptarmigan (*Lagopus lagopus*); four species of Corvids: Canada jay (*Perisoreus canadensis*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*) and common raven (*Corvus corax*); as well as European starling (*Sturnus vulgaris*) and rusty blackbird (*Euphagus carolinus*) are likely to occur in the vicinity of the RoW, based on confirmation of their occurrence in the area during baseline studies conducted for the Valentine Gold Project (Stantec 2014a, 2014b, 2014c, 2015, 2017b, 2018, 2019b) and BBS or CBC surveys (Table 4.6; Marathon 2020).

Table 4.6 Other Avifauna Species Reported in the Vicinity of the Project

Common Name	Scientific Name	AC CDC Rank[1]	Data Source[2]	SAR / SOCC[3]
Ruffed Grouse	*Bonasa umbellus*	SNR	BBS, Baseline Studies	No
Spruce Grouse	*Falcipennis canadensis*	SNA	CBC, Baseline Studies	No
Willow Ptarmigan	*Lagopus lagopus*	S5	CBC, Baseline Studies	No
Belted Kingfisher	*Megaceryle alcyon*	S4B, S3N, SUM	BBS, Baseline Studies	No
Canada Jay	*Perisoreus canadensis*	S5	BBS, CBC, Baseline Studies	No
Blue Jay	*Cyanocitta cristata*	S5	BBS, CBC	No
American Crow	*Corvus brachyrhynchos*	S5	BBS, CBC, Baseline Studies	No
Common Raven	*Corvus corax*	S5	BBS, CBC, Baseline Studies	No
European Starling	*Sturnus vulgaris*	SNA	BBS, CBC	No
Rusty Blackbird	***Euphagus carolinus***	**S2S3B, SUM**	**BBS, Baseline Studies**	**SARA Status: Special Concern (Schedule 1); COSEWIC: Special Concern; NL ESA: Vulnerable**

Notes:

1 Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S2 = imperiled, due to a very restricted range, < 20 populations, steep declines, or other factors; S3 = vulnerable, due to a restricted range, < 80 populations, widespread declines, or other factors; S4 = apparently secure, uncommon but not rare; S5 = secure, common, widespread and abundant; S#S# = indicates a range of uncertainty of the status of a species; SU = unrankable, more information needed; SNA = not applicable, not suitable target for conservation; SNR = unranked, not yet assessed; B = Breeding; N = nonbreeding; M = Migrant (AC CDC 2021).

2 Baseline Studies include field programs conducted for the Valentine Gold Project between 2013 and 2020 (Table 3.1); BBS = Breeding Bird Surveys; CBC = Christmas Bird Counts

3 SAR = Species at Risk; SOCC = Species of Conservation Concern

SAR / SOCC are reported in **bold** text

Source: Adapted from Marathon (2020)

One SAR – rusty blackbird – was recorded incidentally during baseline surveys for the Valentine Gold Project (Marathon 2020) and thus has the potential to occur in or the near the RoW. Rusty blackbird is discussed in greater detail in Section 4.3.3.

4.3.2 Other Wildlife

4.3.2.1 Furbearers

While the term 'furbearers' traditionally refers to species that are managed for harvesting, for the purpose of this study, the definition includes species managed as such by the Province of NL, as well as other medium-sized furbearing mammals, such as hares.

Thirteen species of furbearers occur on the Island of Newfoundland (Table 4.7), including eight native species and four species that were introduced by European settlers. A fifth non-native species, coyote (*Canis latrans*), has established on the Island of Newfoundland through range expansion.

Table 4.7 Furbearer Species Occurring on the Island of Newfoundland and their Expected Occurrence in or near the Project RoW

Common Name	Scientific Name	Origin	AC CDC Rank[1]	Occurrence in or near the Project RoW	SAR / SOCC[3]
Snowshoe Hare	*Lepus americanus*	Introduced	SNA	Confirmed during baseline studies[2]	No
Arctic Hare	*Lepus arcticus bangsii*	Native	S2S3	Unlikely (generally restricted to higher elevations – e.g., Long Range Mountains / Buchans Plateau)	No
Eastern Chipmunk	*Tamias striatus*	Introduced	SNA	Unlikely but has the potential to occur in low numbers (prefers deciduous forest habitats)	No
Red Squirrel	*Tamiasciurus hudsonicus*	Introduced	SNA	Confirmed during baseline studies	No
American Beaver	*Castor canadensis*	Native	Not ranked	Expected to occur in suitable habitat	No
Muskrat	*Ondatra zibethicus*	Native	S3S4	Confirmed during baseline studies	No
Eastern Coyote	*Canis latrans*	Naturally introduced through range expansion	S5	Confirmed during baseline studies	No

Table 4.7 Furbearer Species Occurring on the Island of Newfoundland and their Expected Occurrence in or near the Project RoW

Common Name	Scientific Name	Origin	AC CDC Rank[1]	Occurrence in or near the Project RoW	SAR / SOCC[3]
Gray Wolf	*Canis lupus*	Extirpated in 1930s; genetic testing confirmed presence of wolf and wolf-coyote hybrids (Government of NL 2012).	SNA	No evidence of breeding populations on the Island of Newfoundland	No
Red Fox	*Vulpes vulpes*	Native	S4	Confirmed during baseline studies	No
Newfoundland Marten	***Martes americana atrata***	**Native**	**S3**	**Confirmed during baseline studies**	**SARA Status: Threatened (Schedule 1); COSEWIC: Threatened; NL ESA: Threatened**
Ermine (Short-tailed Weasel)	*Mustela erminea*	Native	S4	Confirmed during baseline studies	No
American Mink	*Neovison vison*	Introduced	SNA	Expected to occur in suitable habitat	No
North American River Otter	*Lontra canadensis*	Native	S5	Confirmed during baseline studies	No
Canada Lynx	*Lynx canadensis*	Native	S3S4	Confirmed during baseline studies	No

Notes:

1 Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S2 = imperiled, due to a very restricted range, < 20 populations, steep declines, or other factors; S3 = vulnerable, due to a restricted range, < 80 populations, widespread declines, or other factors; S4 = apparently secure, uncommon but not rare; S5 = secure, common, widespread and abundant; S#S# = indicates a range of uncertainty of the status of a species; SU = unrankable, more information needed; SNA = not applicable, not suitable target for conservation; SNR = unranked, not yet assessed; B = Breeding; N = nonbreeding; M = Migrant (AC CDC 2021).

2 Baseline Studies include field programs conducted for the Valentine Gold Project between 2013 and 2020 (Table 3.1); BBS = Breeding Bird Surveys; CBC = Christmas Bird Counts

3 SAR = Species at Risk; SOCC = Species of Conservation Concern

SAR / SOCC are reported in **bold** text

Source: Adapted from Marathon (2020)

Four of the furbearer species with potential to occur in or near the Project are mustelids including Newfoundland marten (*Martes americana atrata*), ermine (*Mustela erminea*), American mink (*Neovison vison*), and North American river otter (*Lontra canadensis*). American mink were first introduced as escapees from fur farms around the 1930s (Northcott et al. 1974) and they are now found in suitable habitat (e.g., streams, lakeshores, marshy areas) throughout the province. The North American river otter is a semi-aquatic species found in lakes, rivers, marshes, and bays throughout the Island of Newfoundland. Ermine, also known as short-tailed weasel, can be found in a wide variety of habitats, although it prefers wooded areas with thick understory (NatureServe 2019). Newfoundland marten, ermine and North American river otter were confirmed in the area during baseline studies for the Valentine Gold Project (Marathon 2020). Newfoundland marten is a SAR and is discussed in more detail in Section 4.3.3. While not detected in field studies, American mink is also expected to occur in the area.

Rodent furbearers with potential to occur in or near the RoW are eastern chipmunk (*Tamias striatus*), red squirrel (*Tamiasciurus hudsonicus*), American beaver (*Castor canadensis*), and muskrat (*Ondatra zibethicus*). Eastern chipmunk and red squirrel were both introduced in the 1960s and are now found throughout much of the Island of Newfoundland in suitable forest habitats. American beaver and muskrat are larger rodents found in aquatic environments. Red squirrel and muskrat were confirmed in the area during baseline studies for the Valentine Gold Project (Marathon 2020). Eastern chipmunk, while widespread, prefer deciduous forest stands and are unlikely to occur in significant numbers. American beaver, while not documented during field studies for the Valentine Gold Project, are likely to occur in the area.

Two species of canines regularly occur on the Island of Newfoundland and were confirmed in the area during baseline studies for the Valentine Gold Project: red fox (*Vulpes vulpes*) and eastern coyote (Marathon 2020). Both species are generalist predators and are found in a variety of habitat types. Historically, a Newfoundland subspecies of gray wolf (*Canis lupus*) also occurred on the Island of Newfoundland. Genetic testing of harvested animals in 2009 and 2012 confirmed the presence of wolf and wolf-coyote hybrids on the island, although there was no evidence of an established breeding population of wolves (Government of NL 2012).

One feline species, Canada lynx (*Lynx canadensis*), was confirmed in the area during baseline studies for the Valentine Gold Project (Marathon 2020). Canada lynx were rare in Newfoundland prior to the introduction of snowshoe hare (a primary food source) but have since increased in numbers (Government of NL n.d.b). Canada lynx are expected to occur in areas occupied by snowshoe hare in or near the RoW.

Arctic hare and snowshoe hare both occur in Newfoundland. Snowshoe hare was introduced around 1860 but is now found throughout the island. Snowshoe hare were identified during baseline studies and are expected to occur in or near the RoW (Marathon 2020). Arctic hare are generally restricted to higher elevations, such as in the Long Range Mountains or the Buchans Plateau, are therefore unlikely to occur in or near the Project RoW.

4.3.2.2 Small Mammals

Four native small mammal species occur on the Island of Newfoundland (Table 4.8): meadow vole (*Microtus pennsylvanicus*) and three species of bats: little brown myotis (*Myotis lucifugus*), northern long-eared myotis (*Myotis septentrionalis*) and hoary bat (*Aeorestes cinereus*).

Table 4.8 Small Mammal Species Occurring on the Island of Newfoundland and their Expected Occurrence in or near the Project RoW

Common Name	Scientific Name	Origin	AC CDC Rank[1]	Occurrence in or near the Project RoW	SAR / SOCC[2]
Norway rat	*Rattus norvegicus*	Introduced	SNA	Unlikely, prefers domestic areas	No
Meadow vole	*Microtus pennsylvanicus*	Native	S4?	Potential to occur in suitable habitat	No
House mouse	*Mus musculus*	Introduced	SNA	Unlikely, prefers domestic areas	No
Deer mouse	*Peromyscus maniculatus*	Introduced	SNA	Expected to occur in suitable habitat	No
Southern red-backed vole	*Myodes gapperi*	Introduced	SNA	Expected to occur in suitable habitat	No
Northern bank vole	*Myodes glareolus*	Introduced	SNA	Unlikely, not widely distributed in NL	No
Masked shrew	*Sorex cinereus*	Introduced	SNA	Expected to occur in suitable habitat	No
Little brown myotis	***Myotis lucifugus***	**Native**	**S3S4**	**Hibernacula confirmed within ~10 km**	**SARA Status: Endangered (Schedule 1); COSEWIC: Endangered**
Northern long-eared myotis	***Myotis septentrionalis***	**Native**	**S2S3**	**Hibernacula confirmed within ~10 km**	**SARA Status: Endangered (Schedule 1); COSEWIC: Endangered**
Hoary bat	*Aeorestes cinereus*	Native	SNA	Uncommon in NL (occasional migrant)	No

Notes:

[1] Data ranks provided by AC CDC in December 2020 (AC CDC 2020b). S2 = imperiled, due to a very restricted range, < 20 populations, steep declines, or other factors; S3 = vulnerable, due to a restricted range, < 80 populations, widespread declines, or other factors; S4 = apparently secure, uncommon but not rare; S5 = secure, common, widespread and abundant; S#S# = indicates a range of uncertainty of the status of a species; SU = unrankable, more information needed; SNA = not applicable, not suitable target for conservation; SNR = unranked, not yet assessed; B = Breeding; N = nonbreeding; M = Migrant (AC CDC 2021).

[2] Baseline Studies include field programs conducted for the Valentine Gold Project between 2013 and 2020 (Table 3.1); BBS = Breeding Bird Surveys; CBC = Christmas Bird Counts

[3] SAR = Species at Risk; SOCC = Species of Conservation Concern

SAR / SOCC are reported in **bold** text

Source: Adapted from Marathon (2020)

The meadow vole (*Microtus pennsylvanicus*) is widely distributed throughout Newfoundland, although relatively scarce where present (Folinsbee et al. 1973). This species is most frequently associated with treeless habitats with grass or sedge cover (e.g., fens), and to a lesser extent barrens and bogs (Folinsbee et al. 1973). This species has the potential to occur in suitable habitat in or near the RoW.

Six additional species of small mammals were introduced to the Island of Newfoundland, including the northern bank vole (*Myodes glareolus*), southern red-backed vole (*Myodes gapperi*), masked shrew (*Sorex cinerius*), deer mouse (*Peromyscus maniculatus*), house mouse (*Mus musculus*), and Norway rat (*Rattus norvegicus*) (Table 4.6). These species may function as important prey species for predators on the Island of Newfoundland, including Newfoundland marten and other mustelids, red fox, eastern coyote, Canada lynx, and raptors. House mouse and Norway rat tend to prefer areas of human habituation and are therefore not likely to occur in or near the RoW. Similarly, Northern bank vole is unlikely to be present in or near the RoW because it has limited distribution in NL. Hearn et al. (2006) did not include Northern bank vole in their list of native and non-native terrestrial mammals on the island of Newfoundland but noted its introduction to offshore islands. While not confirmed during field surveys, deer mouse, southern red-backed vole and masked shrew may occur in or near the RoW.

The hoary bat is a migratory, tree-roosting species that does not commonly occur in the province. It is thought to only pass through occasionally while migrating (Maunder 1988). The little brown myotis and northern long-eared myotis are more commonly found in Newfoundland and have the potential to occur in or near the RoW, based on the presence of a hibernacula site near the Project (AC CDC 2020) and the potential for both species to overwinter together. Both species of *Myotis* are federally listed as Endangered and are discussed in Section 4.3.3.

4.3.2.3 Large Mammals

Large mammal species occurring on the Island of Newfoundland are moose (*Alces alces*), American black bear (*Ursus americanus*) and caribou (*Rangifer tarandus*), all of which are likely to occur in or near the RoW. Moose and black bear are discussed briefly below, while caribou are presented in detail in a separate baseline study.

Moose were introduced to the Island of Newfoundland in the late 1800s (Government of NL n.d.c) and due to low predation and a large amount of uncolonized suitable habitat (McLaren et al. 2004) their population rapidly increased. Moose are now common throughout the island and are generally associated with mixedwood and boreal forests (Timmermann and Rodgers 2005). Individuals and/or evidence of their presence (e.g., scat, tracks) were confirmed during baseline studies for the Valentine Gold Project, and remote wildlife cameras captured 140 moose observations (Marathon 2020).

American black bears are distributed across the Island of Newfoundland and were confirmed in the Valentine Gold Project Area by remote wildlife cameras (Marathon 2020). An opportunistic omnivore, black bears primarily forage for plants and insects (Graber and White 1980; Bull et al. 2001; Greenleaf et al. 2009; Bastille-Rousseau et al. 2011), however, they will hunt or scavenge when possible (Allen et al. 2014). On the Island of Newfoundland, over 30% of predated caribou calves are killed by black bears (Lewis and Mahoney 2014; Lewis et al. 2017) although research indicates black bears may select habitats rich in vegetation over habitats with a higher likelihood of encountering moose and caribou young (Bastille-Rousseau et al. 2011).

4.3.3 Avifauna and Other Wildlife SAR / SOCC

Avifauna SAR / SOCC identified during baseline field surveys for the Valentine Gold Project and/or other publicly available data sources are summarized in Table 4.9 and discussed below. Wildlife SAR likely to occur in or near the RoW include Newfoundland marten and both species of myotis (Marathon 2020).

Table 4.9 Summary of Avifauna SAR / SOCC and their Occurrence in the Vicinity of the Project

Common Name	Latin Name	Legal Status	Occurrence in the Vicinity of the Project	Data Sources
SAR				
Common Nighthawk	*Chordeiles minor*	Threatened (SARA & NL ESA); Special Concern (COSEWIC); SNA (AC CDC)	One record in RAA. Known to breed only in S. Labrador and considered an uncommon visitor to Newfoundland.	Marathon Gold (2020), AC CDC (2020), Government of NL n.d.
Olive-sided Flycatcher	***Contopus cooperi***	**Threatened (SARA & NL ESA); Special Concern (COSEWIC); S3B, SUM (AC CDC)**	**Twelve records in the RAA (2011 and 2019 surveys)**	**Marathon Gold (2020), BBS**
Bank Swallow	*Riparia riparia*	Threatened (SARA & COSEWIC); S1S2B, SUM (AC CDC)	One record reported near Buchans. Occasional sightings throughout the island but breeding generally restricted to SW Newfoundland.	AC CDC (2020), Warkentin and Newton (2009)
Gray-cheeked Thrush	***Catharus minimus***	**Threatened (NL ESA), S2B, SUM (AC CDC)**	**Observed along BBS NL 5704 route in Buchans, most recently in 2002. Most common in northern areas in Newfoundland, and the Avalon Peninsula.**	**Marathon Gold (2020), BBS, Warkentin and Newton (2009)**
Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern (SARA & COSEWIC); S4 (AC CDC)	Recorded during winter in Buchans, most recently in 2007. Mainly occurs during winter, and then typically occurs in SE Newfoundland.	Marathon Gold (2020), CBC, Warkentin and Newton (2009)
Red Crossbill	***Loxia curvirostra***	**Threatened (SARA & COSEWIC); Endangered (NL ESA); S1S2 (AC CDC)**	**One individual recorded on BBS NL 5704 route in Buchans in 1984. Prefers mature coniferous forests.**	**Marathon Gold (2020), BBS, Warkentin and Newton (2009)**
Rusty Blackbird	***Euphagus carolinus***	**Special Concern (SARA & COSEWIC); Vulnerable (NL ESA); S2S3B, SUM (AC CDC)**	**Incidental sightings throughout much of insular Newfoundland. Three individuals recorded in RAA.**	**Marathon Gold (2020), BBS, Wildlife Division (2020)**

Table 4.9 Summary of Avifauna SAR / SOCC and their Occurrence in the Vicinity of the Project

Common Name	Latin Name	Legal Status	Occurrence in the Vicinity of the Project	Data Sources
SOCC				
Caspian Tern	*Hydroprogne caspia*	S2B, SUM (AC CDC)	One (solitary) record in RAA. Typically breeds in colonies on islands in large lakes or on offshore islands. Unlikely that the single observation represents a breeding attempt in the area.	Marathon Gold (2020), Dunn and Alderfer (2017), Warkentin and Newton (2009)
Nashville Warbler	***Leiothlypis ruficapilla***	**S2B, SUM (AC CDC)**	**Two records in RAA. At the northern most distribution of its breeding range (irregular occurrence in NL).**	**Marathon Gold (2020), Dunn and Alderfer (2017)**
Bay-breasted Warbler	***Setophaga castanea***	**S2B, SUM (AC CDC)**	**One record in RAA. At the northern most distribution of its breeding range (irregular occurrence in NL).**	**Marathon Gold (2020), Dunn and Alderfer (2017)**

Notes:

1. ACCDC ranks: SNA = not applicable / status not assessed; SU = unrankable (more information needed); S1 = critically imperiled; S2 = imperiled; S3 = vulnerable; S4 = apparently secure; S5 = secure; B = breeding; M = migrant
2. Marathon Gold field data include baseline programs from 2013-2020; BBS = Breeding Bird Surveys; CBC = Christmas Bird Counts
3. Species indicted in bold are most likely to occur in suitable habitats in the Project Area during the migratory bird breeding season.

4.3.3.1 Common Nighthawk

Common nighthawk is ranked as Threatened under Schedule 1 of SARA and as Special Concern by COSEWIC. The NL ESA ranks this species as Threatened, and the AC CDC lists common nighthawk as SNA, indicating a conservation status rank is not applicable because the species is not a suitable target for conservation activities in NL. Populations of common nighthawk across Canada have been in decline, coinciding with a declining abundance of aerial insects linked to pesticide use and changes in precipitation, hydrological and temperature regimes (COSEWIC 2018b).

In NL, this species breeds on bare ground, including sand dunes, beaches, forest clearings, burned areas and barrens. Although they can be found throughout the province, common nighthawks are known to breed only in the southern part of Labrador and are considered an uncommon visitor on the Island of Newfoundland (Government of NL n.d.d). A single Common Nighthawk was observed incidentally during baseline surveys for the Valentine Gold Project (Figure 4.2) (Marathon 2020), however this species is not likely to breed near the Project given the absence of preferred habitat and low numbers in general on the Island.

4.3.3.2 Olive-sided Flycatcher

Olive-sided flycatcher is ranked as Threatened under Schedule 1 of SARA and as Special Concern by COSEWIC. The NL ESA ranks this species as Threatened and the AC CDC lists the olive-sided flycatcher as S3B, SUM, which indicates that the breeding population of this species is considered Vulnerable and the migrating population is considered unrankable on the Island of Newfoundland.

The population of this species is in decline in Canada, which is believed to be the result of a loss or alteration of suitable habitats (COSEWIC 2018a). Declining insect populations on breeding and wintering grounds may also be a contributing factor.

Olive-sided flycatchers are most often associated with open areas, where they perch in tall trees and forage for flying insects (COSEWIC 2018a). Most often this consists of coniferous forest stands interspersed with bogs or fens of similar size that provide a combination of suitable nesting sites (islands of coniferous forest), open foraging areas (small to medium sized bogs and fens) and perch sites (tall trees and snags). Wet coniferous forest and open wetlands were identified as being of high value to olive-sided flycatcher on the Island of Newfoundland (Marathon 2020), which, when combined, comprise approximately 6.8% of habitats in the RoW. Olive-sided flycatcher was confirmed within the Valentine Gold Project Area during baseline surveys in 2011 and 2019 (Figure 4.2) (Marathon 2020) and has the potential to occur in the suitable habitats in the RoW.

4.3.3.3 Rusty Blackbird

Rusty blackbird is ranked as Special Concern under Schedule 1 of SARA and as Special Concern by COSEWIC. The NL ESA ranks this species as Vulnerable and the AC CDC lists the rusty blackbird as S2S3B, SUM indicating that the breeding population of this species is ranked between Imperiled and Vulnerable and the migrating population is considered unrankable on the Island of Newfoundland.

This species is believed to occur irregularly in suitable habitat in Newfoundland (Wildlife Division 2020). While primarily associated with forested wetlands, particularly those with waterbodies such as slow-moving streams and beaver ponds, they are also found in peat bogs, sedge meadows and scrub edges (COSEWIC 2006; Government of NL n.d.d; Wildlife Division 2020). Incidental sightings of rusty blackbird have been reported from much of insular Newfoundland (Wildlife Division 2020) including during baseline studies for the Valentine Gold Project (Figure 4.2), where a lone male was observed singing within a tall shrub swamp and two other rusty blackbirds were noted during aerial waterfowl surveys (Marathon 2020). High-value habitat (e.g., wet coniferous forests) for rusty blackbird comprises 4.2% of the Project RoW.

4.3.3.4 Red Crossbill

Red crossbill is ranked as Threatened under Schedule 1 of SARA and as Threatened by COSEWIC. The species is ranked as Endangered by the NL ESA, and the AC CDC lists red crossbill as S1S2 indicating that the population of this species is ranked between Critically Imperiled and Imperiled on the Island of Newfoundland.

On the Island of Newfoundland, red crossbills belong to the *percna* subspecies, which is unique to the island and appears to have become rare in recent years (Government of NL n.d.d). While there have been sporadic reports of this subspecies in other Atlantic Provinces, it is likely restricted to Newfoundland. Preferred habitat for red crossbill includes older, mature conifer forests, with the highest abundance likely occurring in western Newfoundland (Government of NL n.d.d). However, this species has the potential to occur in any large stands of coniferous forest. Within the Project RoW, forested habitat types are predominantly mixedwood and regenerating forests (36.4% of the RoW), while balsam fir forests comprise approximately 13.5% of habitats.

No red crossbills were observed during any baseline surveys for the Valentine Gold Project, and only one record of a red crossbill exists from recent years (a single individual in 1984 along the BBS NL 5704 route in Buchans) (Marathon 2020).

4.3.3.5 Bank Swallow

Bank swallow is ranked as Threatened under Schedule 1 of SARA and by COSEWIC. The AC CDC lists the bank swallow as S1S2B, SUM, indicating that the breeding population of this species is ranked between Critically Imperiled and Imperiled and the migrating population is considered unrankable for Newfoundland. In 2009, the SSAC recommended a status of Not at Risk for this species, however despite populations experiencing declines in neighboring areas, there was insufficient evidence to establish that the species is at risk in NL (SSAC 2009).

Bank swallows breed colonially and while the preferred substrate for nest burrows is likely a sand-silt mixture, they will use a wide variety of sites for constructing nest burrows (including riverbanks, lake and ocean bluffs, aggregate pits, road cuts and stockpiles of soil). In Newfoundland, breeding has been reported in low-lying sand pits, in sand banks on shorelines, sand-clay banks and sandy dunes, turf atop sea cliffs and in gravel pits (SSAC 2009).

Bank swallows were not recorded during baseline surveys for the Valentine Gold Project however one record of bank swallow was reported near Buchans (Marathon 2020). Preferred habitat for this species (i.e., exposed sand/gravel shorelines) does not occur in the Project RoW.

4.3.3.6 Gray-cheeked Thrush

Grey-cheeked thrush is ranked as Threatened by the NL ESA and the AC CDC lists this species as S2B, SUM, indicating that the breeding population is considered Imperiled and the migrating population is considered unrankable for Newfoundland.

In Newfoundland, preferred breeding grounds for grey-cheeked thrush include dense low coniferous woods such as young regenerating forest, open-canopy old growth forests having a dense understory, and dense, stunted spruce stands (SSAC 2005). This species has been reported as being most common on the Great Northern Peninsula, the northeast coast and the Avalon Peninsula; it is less common on the west coast and in the interior (Government of NL n.d.d).

Grey-cheeked thrush was not recorded during any baseline surveys for the Valentine Gold Mine Project, however this species was observed along the BBS NL 5704 route in Buchans, with the most recent observation of a single individual reported in 2002 (Marathon 2020). Preferred habitats (i.e., regenerating forests) comprise 15.2% of the RoW.

4.3.3.7 Evening Grosbeak

Evening grosbeak is ranked as Special Concern under Schedule 1 of SARA and by COSEWIC, and currently has no rank under the NL ESA. The AC CDC lists this species as S4, indicating that the populations of this species are considered Apparently Secure in NL.

Evening grosbeak is distributed across all Canadian provinces and territories except for Nunavut (COSEWIC 2016), although its winter distribution is largely dependent upon seed production in the boreal forest. Optimal breeding habitat for this species includes open mature mixedwood forests, where fir or white spruce are dominant and spruce budworm is abundant (COSEWIC 2016).

This species was not noted during any baseline surveys conducted for the Valentine Gold Project but was recorded in winter during the CBC in Buchans (Marathon 2020). The most recent record of this species was from 2007, however location data is not available. Warkentin and Newton (2009) indicate that this species irregularly occurs in Newfoundland (mainly in the southeastern part of the island) and often only during winter. As such, while preferred habitat (i.e., mixedwood forests) comprises 21.2% of the RoW, Evening Grosbeak are unlikely to breed in the Project RoW.

4.3.3.8 Avifauna SOCC

Caspian Tern

Caspian terns typically breed in colonies located on islands in large lakes or on offshore islands. During the 2011 waterfowl study in support of the Valentine Gold Project, a single Caspian tern was observed incidentally (Marathon 2020). Given that the individual was alone and far from known colony sites in the marine environment, it is unlikely that this represents a breeding attempt in the area (Marathon 2020) and the species is unlikely to be present in the RoW during the breeding season.

Nashville Warbler

Nashville warblers typically inhabit open coniferous woodlands and brushy habitats. During baseline songbird surveys for the Valentine Gold Project, this species was recorded on two occasions in coniferous forest habitat (one in an open balsam fir stand and the second in a mature forest stand dominated by black spruce and tamarack) (Marathon 2020). The low numbers of individuals present on the Island of Newfoundland in general may be attributable to the fact that Newfoundland represents the northern most distribution of its breeding range. This species was not listed by Warkentin and Newton (2009) in the Birds of Newfoundland but has an indicated breeding distribution extending to the most southwestern region of Newfoundland in a more recent field guide for birds in North America (Dunn and Alderfer 2017). Suitable habitat in the RoW includes balsam fir and mixedwood forest types (34.7%) and kalmia-black spruce woodlands (4.0%), as well any brushy habitat.

Bay-breasted Warbler

Bay-breasted warblers typically nest in mature forest stands dominated by spruce and fir. Suitable habitat in the RoW largely consists of balsam fir and mixedwood forest types (34.7%). One bay-breasted warbler was recorded during baseline breeding bird surveys for the Valentine Gold Project, in a mature coniferous forest stand (Marathon 2020). As with Nashville warblers, this species was not included in the list of NL birds by Warkentin and Newton (2009) but has a breeding distribution indicated in a limited area of western NL in Dunn and Alderfer (2017). Low numbers on the Island of Newfoundland are likely because Newfoundland is at the northern most distribution of the species' breeding range. Globally, populations of this species are relatively stable.

4.3.3.9 Newfoundland Marten

The Newfoundland population of American marten is listed as Threatened under SARA and the NL ESA, and the AC CDC ranks marten as S3 (or Vulnerable).

Newfoundland marten was historically distributed throughout much of the central portion of the Island of Newfoundland in the most productive forests (Bergerud 1969), however there are currently three main core areas where breeding populations remain: Main River, Terra Nova National Park and west-central Newfoundland. The west-central Newfoundland area includes three separate core areas (or subpopulations): Little Grand Lake / Red Indian Lake, Sandy Lake and Crabbes River (Schmelzer 2008 in Nalcor 2012). Of these, the Little Grand Lake / Red Indian Lake core area overlaps the Project. The Newfoundland marten population in this core area is estimated to be between 237 and 481 individuals (Schmelzer 2008 in Nalcor 2012).

Newfoundland marten generally select mature, dense canopy forest patches within a matrix of bogs and scrub (Smith and Schaefer 2002; Payer and Harrison 2003; Poole et al. 2004; Gosse et al. 2005; Hearn et al. 2010) with a high percentage of tall spruce or fir trees and woody debris (Bowman and Robitaille 1997). A mixture of large-diameter mature trees, open shrub layer, and coarse woody debris are important to Newfoundland marten as they provide cover, protection and prey availability (Thompson and Curran 1995; Godbout and Ouellet 2010; Hearn et al. 2010; Caryl et al. 2012). Balsam fir and black spruce forests are considered high-value habitat types for Newfoundland marten in the vicinity of the Project (Marathon 2020).

Several factors may limit Newfoundland marten populations in Newfoundland including predation by Canada lynx, great horned owls, northern hawk owls (*Surnia ulula*) and red fox (Government of NL n.d.e), and other Newfoundland marten (Bull and Heater 2001), or diseases such as encephalitis (Fredrickson 1990). However, habitat loss / alteration and mortality from trapping and snaring are likely the most significant factors (Newfoundland Marten Recovery Team 2010). Habitat could be lost or made less suitable to marten through human activities (e.g., forest harvesting, mining operations, hydroelectric projects, road and powerline construction) or natural disturbances (e.g., forest fire, insect infestation).

In regards to trapping and snaring impacts, research in the Little Grand Lake / Red Indian Lake area reported that trapping and snaring accounted for nearly 50% of Newfoundland marten mortalities (Hearn 2007). Trapping of Newfoundland marten has been prohibited on the island since 1934; however, they are incidentally captured during legal trapping of other species. Best Management Practices developed by the provincial government to reduce non-targeted marten mortality include restrictions on areas where snaring and trapping are permitted, restrictions on the trapping techniques that can be employed and development of snaring techniques that reduce the likelihood of Newfoundland marten being killed in snares (Government of NL 2020a).

As part of the NL ESA, critical habitat for endangered species must be defined and protected. In the Recovery Plan for Newfoundland marten on the Island of Newfoundland, an area of critical habitat of approximately 6,200 km^2 was identified, based on Newfoundland marten occurrences and habitat suitability (Newfoundland Marten Recovery Team 2010), of which a portion overlaps segments of proposed and alternate transmission line routes of the Project. AC CDC information provided on Newfoundland marten sightings within 5 km of the Project confirm their occurrence in the area (AC CDC 2020a), with a particularly high concentration of observations around Red Indian Lake (Figure 4.2). Marten were also confirmed in the area during hair snag surveys in support of the Valentine Gold Project, as well as incidentally during other studies (Marathon 2020).

4.3.3.10 Myotis sp.

The little brown myotis and northern long-eared myotis are currently listed as Endangered under SARA, following an emergency listing in 2014. This was due to sudden and dramatic population declines across the eastern portions of their range caused by white-nose syndrome. A recovery strategy for these species was released in 2015 (Environment and Climate Change Canada [ECCC] 2015). Neither species of bat is currently listed under the NL ESA.

The little brown myotis is the most widely distributed and common bat species in Canada. The range of the northern long-eared myotis is slightly more restricted, although it still has a wide distribution in Canada. Both species have patchy distributions across the Island of Newfoundland (Park and Broders 2012), where they are year-round residents.

Little brown myotis are predominately associated with open areas, compared to northern long-eared myotis that are generally more forest dependent. Little brown myotis typically feed over open areas (e.g., open water) and form maternity colonies in human structures such as barns, attics, or sheds (although less commonly they will utilize forests for these activities). In contrast, northern long-eared myotis feed on terrestrial insects in forested areas and form maternity colonies in trees, where females give birth and raise their young. In Newfoundland, tree species used for roosting by northern long-eared myotis include balsam fir (*Abies balsamea*) and white birch (*Betula papyrifera*) and, to a lesser extent, black spruce (*Picea mariana*). The males of both species, who are less restricted in roost choice than are maternity colonies, will roost alone or in small groups and may roost in human structures or in trees.

Both little brown and northern long-eared myotis mate in the fall during an activity called swarming, after which they enter hibernacula until spring (both species will hibernate together at the same sites). Many swarming sites are also used as hibernacula; however, it is not known what percentage of bats swarming at a location will also hibernate there (Johnson et al. 2015). Appropriate hibernacula require a specific microclimate, which typically includes a temperature ranging between 2 degrees Celsius (ºC) and 10ºC, and humidity levels over 80% (Fenton 1970; Anderson and Robert 1971; ECCC 2015). Little is known regarding the location of hibernacula and swarming sites on the Island of Newfoundland, although they include underground sites such as caves and abandoned mines.

The largest threat to little brown and northern long-eared myotis in North America is white-nose syndrome, a fungal pathogen (*Pseudogymnoascus destructans*) first detected in New York state in 2006. The first Canadian confirmations of white-nose syndrome occurred in 2010 in Ontario and Quebec, and it has since spread to most other provinces. White-nose syndrome was confirmed on the Island of Newfoundland in 2016/2017 (United States Fish and Wildlife Service 2019).

P. destructans grows on the skin of bats during hibernation and thrives in the microclimates provided in hibernacula. The pathogen causes physiological changes in the bats, including chronic respiratory acidosis and hyperkalemia (Verant et al. 2014) and appears to be associated with increased evaporative water loss (and subsequent dehydration) and more frequent arousals during hibernation (Verant et al. 2014; Cryan et al. 2010; ECCC 2015). Ultimately, this combination of effects results in a depletion of fat reserves, and death by starvation and/or dehydration (Verant et al. 2014; Frank et al. 2014; Cryan et al. 2010). Populations of little brown and northern long-eared bats at known hibernacula in eastern Canada have declined by 94% since the arrival of white-nose syndrome (COSEWIC 2013).

A portion of the RoW is within a 10 km grid cell where a hibernaculum for myotis species is known to exist (AC CDC 2020a). As such, it is likely that this species will be present in habitats in the Project RoW. This site has tested positive for white-nose syndrome (Government of NL 2020b).

5.0 SUMMARY

TL271 is a planned 69 kV transmission line that would connect the existing Star Lake Terminal Station to a proposed new terminal station known as Valentine Terminal Station, which will be associated with the proposed Valentine Gold Project. This report summarizes the known and potential rare flora and fauna that may occur within or near the RoW. Data sources include AC CDC data requested for the Project, and data collected in support of the Valentine Gold Project.

The ELC completed for the Valentine Gold Project covers approximately 89% of the RoW and was used to evaluate the potential for rare plant species to be found within the RoW. Twelve habitats are described in the ELC. Six rare vascular plants, all SOCC or presumed SOCC, have been recorded near the Project and all have some potential to be found within or near the RoW. These include one tree species, two graminoid species, two aquatic or semi-aquatic forbs, and one fern.

In total, 98 avifauna species have been documented in the vicinity of the RoW, based on baseline studies completed for the Valentine Gold Project (Marathon 2020) and publicly available literature and databases, comprising seven raptor species, 81 species of migratory birds, and 10 other avifauna species (non-raptor species not protected under the MBCA, e.g., upland game birds).

Three avifauna SAR (Olive-sided Flycatcher, Rusty Blackbird and Common Nighthawk) and three avifauna SOCC (Caspian Tern, Nashville Warbler and Bay-breasted Warbler) were confirmed in the region during field studies, and an additional four SAR (Red Crossbill, Bank Swallow, Gray-cheeked Thrush and Evening Grosbeak) were documented in the region through other data sources. Of these, four SAR – olive-sided flycatcher, gray-cheeked thrush, red crossbill and rusty blackbird – and two SOCC – Nashville warbler and bay-breasted warbler – have the potential to occur in suitable habitats in the Project area during the breeding season for migratory birds on the Island of Newfoundland (April – August). Other species identified are either at the edge of their ranges in the Project area and are therefore uncommon visitors to the region in general or are expected to occur only in other areas of NL.

Thirteen species of furbearers occur on the Island of Newfoundland, including eight native species, four introduced species and eastern coyote, which established on the Island of Newfoundland through natural range expansion. Furbearer species with potential to occur in suitable habitats in the region include snowshoe hare, red squirrel, American beaver, muskrat, eastern coyote, red fox, Newfoundland marten, ermine, American mink, North American river otter and Canada lynx.

Ten small mammal species have been documented on the Island on Newfoundland, including only four native species: meadow vole, Little brown myotis, northern long-eared myotis and hoary bat. Meadow vole, deer mouse, southern red-backed vole, masked shrew, and both the little brown and northern long-eared myotis have the potential or are known to occur in suitable habitats in the Project RoW.

Large mammal species occurring on the Island of Newfoundland include moose, American black bear and caribou, all of which are likely to occur in or near the RoW.

Mammal SAR known to occur in or near the RoW include Newfoundland marten, little brown myotis and long-eared myotis. Critical habitat identified as important to the recovery of Newfoundland marten overlaps portions of the proposed RoW (approximately 0.6 km^2), and Newfoundland marten have been confirmed in the area during field surveys and in the AC CDC (2020a) dataset. AC CDC (2020a) data have also confirmed the presence of a hibernaculum for myotis species within 10 km of the proposed RoW and therefore both little brown and long-eared myotis likely roost and/or feed in suitable habitats in the RoW. This hibernaculum has tested positive for white-nosed syndrome, which is considered the single largest threat to this species.

6.0 REFERENCES

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APPENDIX A

Committee on the Status of Endangered Wildlife in Canada and Species at Risk Act Wildlife Species Status Categories

Appendix A

Table A.1 Committee on the Status of Endangered Wildlife in Canada and *Species at Risk Act* Species Status Category Descriptions

Status Category	Description
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species that no longer exists in the wild in Canada but exists elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species that is likely to become Endangered if nothing is done to reverse the factors leading to its extirpation or extinction.
Special Concern (SC)	A wildlife species that may become Threatened or Endangered because of a combination of biological characteristics and identified threats.
Data Deficient (DD)	A category that applies when the available information is insufficient (a) to resolve a wildlife species' eligibility for assessment or (b) to permit an assessment of the wildlife species' risk of extinction.
Not at Risk (NAR)	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Source: COSEWIC 2019b	

Table A.2 Newfoundland and Labrador *Endangered Species Act* Designations and Descriptions

Designation	Description
Extinct	A wildlife species that no longer exists.
Extirpated	A wildlife species that no longer exists in the wild but exists elsewhere.
Endangered	A wildlife species facing imminent Extirpation or Extinction.
Threatened	A wildlife species that is likely to become Endangered if nothing is done to reverse the factors limiting its survival.
Vulnerable	A wildlife species that has characteristics which make it particularly sensitive to human activities or natural events, or restricted habitat or food requirements that are themselves under threat.
Data Deficient (DD)	A category that applies when all sources of available information have been investigated but the information in the status report is insufficient to determine risk of extinction based on distribution and/or population status.
Not at Risk (NAR)	Generally applied to widespread and abundant taxa.
Source: Government of NL n.d.f	

Table A.3 Definitions of the Atlantic Canada Conservation Data Centre S-Ranks

Provincial Ranking (S-rank)	Definition
SX	Presumed Extirpated - Species or community is believed to be extirpated from the province. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered.
S1	Critically Imperiled - Critically imperiled in the province because of extreme rarity (often 5 or fewer occurrences) or because of some factor(s) such as very steep declines making it especially vulnerable to extirpation from the province.
S2	Imperiled - Imperiled in the province because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation from the nation or province.
S3	Vulnerable - Vulnerable in the province due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation.
S4	Apparently Secure - Uncommon but not rare; some cause for long term concern due to declines or other factors.
S5	Secure - Common, widespread, and abundant in the province.
SNR	Unranked - Provincial conservation status not yet assessed.
SU	Unrankable - Possibly in peril, but status is uncertain - more information is needed
SNA	Not Applicable - A conservation status rank is not applicable because the species is not a suitable target for conservation activities.
S#/S#	Range Rank - A numeric range rank (e.g., S2S3) is used to indicate any range of uncertainty about the status of the species or community. Ranges cannot skip more than one rank (e.g., SU is used rather than S1S4)
SH	Possibly Extirpated (Historical)—Species or community occurred historically in the province, and there is some possibility that it may be rediscovered. Its presence may not have been verified in the past 20-40 years. A species or community could become SH without such a 20 to 40-year delay if the only known occurrences in a province were destroyed or if it had been extensively and unsuccessfully looked for. The SH rank is reserved for species or communities for which some effort has been made to relocate occurrences, rather than simply using this status for all elements not known from verified extant occurrences.
Not Provided	Species is not known to occur in the province.
Source: AC CDC 2021	

APPENDIX E

Historic Resources Baseline Study

Stantec

Transmission Line 271 Star Lake to Valentine Gold Project Historic Resources Baseline Study

Final Report

April 9, 2021

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Abbreviations

BP	Before Present
ESRI	Environmental Systems Research Institute
km	kilometre
kV	kiloVolt
m	metre
NE	northeast
NL	Newfoundland and Labrador
PAO	Provincial Archaeology Office
RoW	right of way
SW	southwest

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

Newfoundland and Labrador (NL) Hydro is proposing to construct and operate a new 69 kilovolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a proposed new terminal station (Valentine Terminal Station) being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site in the west-central region of the Island of Newfoundland (the Project; see Figure 1-1). Project construction activities will include upgrades to the Star Lake Terminal Station which will occur within the existing station property, and installation of a new 69 kV wood pole transmission line, approximately 40 km in length, with a right of way (RoW) approximately 25 m wide. Operational activities over the life of the Project will include asset inspection and repair as required, and vegetation control. Pending approvals, construction (clearing) may begin before the end of 2021, with TL271 being operational by early 2023. TL271 will be decommissioned once the power requirements for the Valentine Gold Project have been met.

The Historic Resources Baseline Study has been prepared to support ongoing Project planning and design and to support the environmental assessment of the Project, which is being initiated through submission of a Registration document to the Government of NL. This report is a baseline study on historic resources and archaeological potential in the vicinity of the Project and was prepared based on a desktop analysis of publicly available data, supported by information from studies previously conducted for the Valentine Gold Project, the study area of which overlaps the proposed RoW for the Project. The Baseline Study considers both the proposed RoW, as well as an alternate route that was considered by NL Hydro.

This historic resources desktop assessment of the Project is intended to serve as a preliminary assessment of the archaeological potential along the Project route and determine possible requirements for an archaeological field assessment.

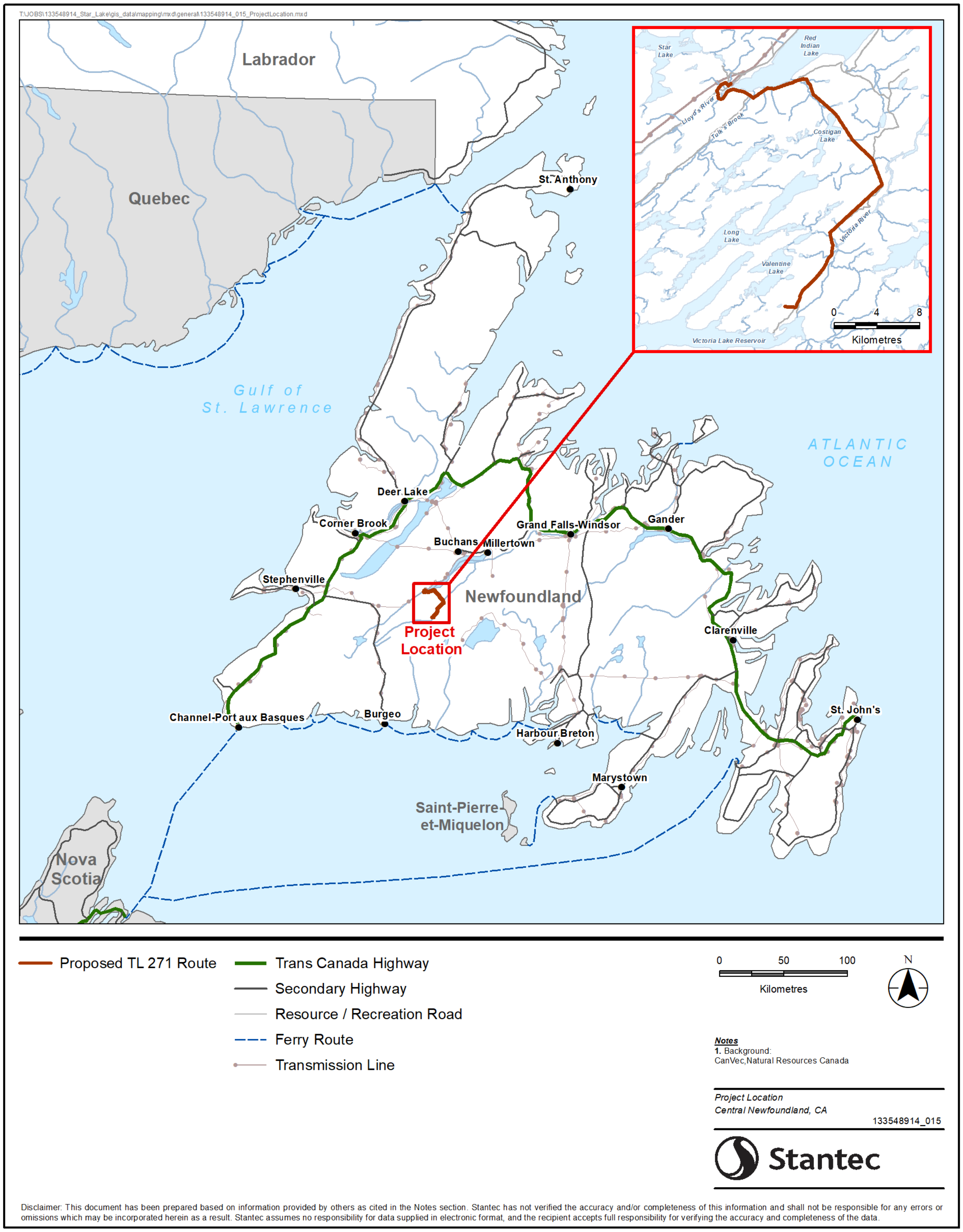

Figure 1-1 Project Location

1.2 HISTORIC RESOURCES OVERVIEW APPROACH

Figure 1-2 shows the current proposed RoW, as well as an alternate route that was considered by NL Hydro. For the purposes of historic resources assessment, the Study Area is defined to extend 25 m to each side of the proposed transmission line centreline (for the proposed and alternate routes). The purpose of this expanded buffer is to allow for possible minor changes to the transmission line routing. While this corridor width is intended to capture the high potential areas within the Project RoW, there may be other archaeological potential areas outside the corridor related to RoW access. Construction will use existing forest access roads, as much as possible, but there may be areas where existing access may need to be upgraded and/or limited new sections of access trail will need to be developed. These will need to be assessed as they are confirmed.

Previous archaeological assessment of the Study Area has been extremely limited. As a result, the desktop assessment of archaeological potential depends on a broader review of archaeological work previously conducted on the Island of Newfoundland, and specifically within a broader Regional Study Area encompassing the interior of southwestern Newfoundland, used for a similar desktop assessment of the Valentine Gold Project (Stantec 2017, 2020). The historic resources assessment consisted of review of archaeological, historic, and ethnohistoric literature, along with reports and site record forms provided by the Provincial Archaeology Office (PAO), pertaining to known archaeological sites in the vicinity of the Study Area. Resources consulted include the following:

- General archaeological, historic, and ethnohistoric literature pertaining to the broad culture-historical framework of precontact and historic-period settlement in Newfoundland, with particular reference to settlement in the interior of the Island
- Specific archaeological, historic and ethnohistoric literature bearing on the archaeology of the southwestern interior of the Island
- Literature and other information on environmental factors pertinent to archaeological potential within the Study Area, such as caribou abundance, lakeshore characteristics, and the impacts of previous developments (most notably, the diversion and flooding of waterways for logging and hydroelectric development)
- Aerial (Google Earth and Environmental Systems Research Institute [ESRI]) imagery and topographic maps reviewed for preliminary identification of specific locations of elevated archaeological potential

As noted, to a large extent, the present desktop study draws on the results of previous desktop reviews (Stantec 2017, 2020) undertaken for the Valentine Gold Project, which encompasses the same general geographic area.

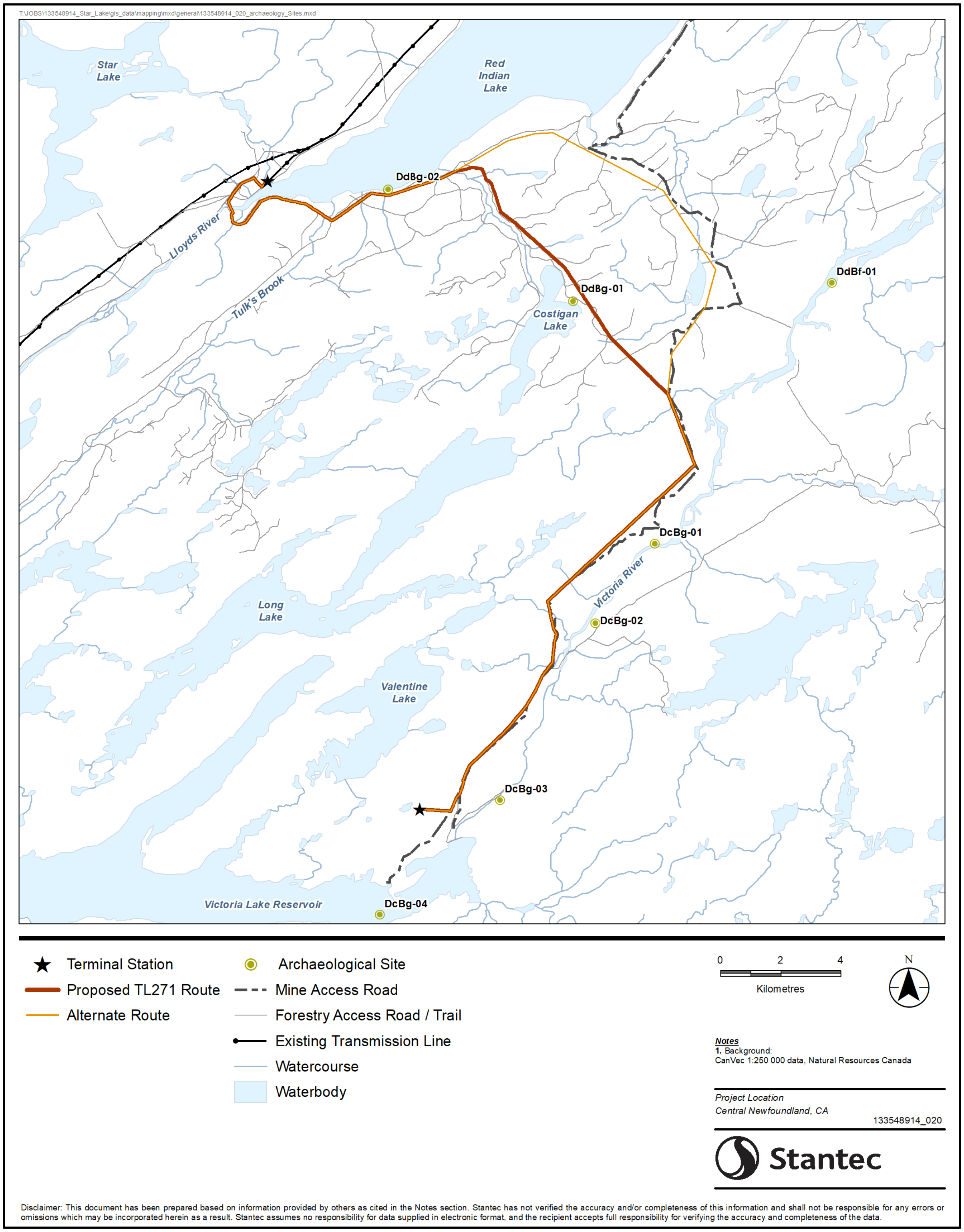

Figure 1-2 Historic Resources Along the Proposed and Alternate TL271 Routes

2.0 NEWFOUNDLAND CULTURE-HISTORICAL OVERVIEW

2.1 THE PRECONTACT PERIOD

Archaeological investigations in Newfoundland, particularly over the last forty years, have provided a clear, if incomplete, understanding of the Island's long-term culture-history. The initial occupation of the Island appears to have occurred late in the Maritime Archaic period, *ca*. 5,000-3,200 years Before Present (BP), although one site in the Deer Lake area may potentially be older (Reader 1999). Southern Labrador shows clear evidence of occupation much earlier in the Maritime Archaic period, by 7,500-8,000 BP (McGhee and Tuck 1975, Schwarz 2010), and insular Newfoundland was theoretically habitable by this time as well (Macpherson 1981). The scarcity of evidence for an early Archaic occupation of the Island, and the apparent delay in the expansion of Archaic hunters from Labrador to Newfoundland, has never been satisfactorily explained.

After a hiatus of several centuries, the Maritime Archaic occupation was followed by an Early Palaeo-Inuit (Groswater) occupation, dating to 2,800-2,000 BP. This in turn was followed by a distinct Late Palaeo-Inuit (Middle Dorset) occupation beginning *ca*. 1,900 BP. Dorset sites in Newfoundland are both larger and more numerous than those of any other period, and although absolute population estimates are not possible, the Dorset occupation appears to have been the most extensive, and its population levels the highest in the Island's prehistory. While it may have seen the most extensive occupation, the Dorset period was also the briefest, apparently ending *ca*. 1,100 BP.

The “Recent Indian” occupation began with an early “Cow Head Complex” occupation, contemporary with the Dorset, indicating shared occupation of the Island by both Amerindian and Palaeo-Inuit peoples (Hartery 2007), and ended with the historically-documented extinction of the Beothuk early in the nineteenth century. Beothuk sites of the early contact period (450-250 BP) have been identified on the Avalon Peninsula, Bonavista Bay, and Notre Dame Bay. Later historic Beothuk sites (250-120 BP) are limited to the Exploits Valley, including Red Indian Lake, among the final refuges of the Beothuk prior to their extinction in 1829 (Devereux 1965, 1970; LeBlanc 1973). It is important to note that most archaeological work on the Island has been concentrated on the coast. Archaeologists have tended to regard Newfoundland's marine resources as rich and stable, in contrast to an interior resource base which is limited, impoverished, and prone to periodic fluctuations in abundance (Tuck and Pastore 1985).

As a consequence, archaeologists have tended to concentrate their efforts on investigating coastal sites, on the assumption that the archaeological potential of the interior is generally low.

The Exploits Valley, however, has long been recognized as having high archaeological potential. The historic resources of the Exploits Valley are dominated by the remains of the Beothuk, a people forced into a deep interior caribou-hunting adaptation by spreading European settlement along the coast. Pre-Beothuk remains are relatively scarce along the Exploits River. This historic Beothuk interior adaptation ended ultimately in extinction, and the Beothuk have thus been regarded as the exception that proves the rule: successful hunter-gatherer adaptation to the deep interior is impossible over the long term, and would not have occurred without competition from expanding European settlement.

Archaeological work since the 1980s has somewhat modified the traditional view of the Newfoundland interior resource base. Investigations of the interior by a number of investigators (Schwarz 1994) have confirmed the archaeological potential of the Newfoundland interior, for precontact sites, particularly on or near-coastal interior lakes, and along the major SW-NE-oriented river systems (most notably the Exploits River), which offer travel routes into the deep interior and to strategic locations from which to intercept migrating caribou. The majority of the interior sites identified to date pertain to the Recent Indian period, although Maritime Archaic sites have also been identified, and, increasingly, evidence for Early Palaeo-Inuit occupations is being recovered, even from deep-interior locations, such as Birchy Lake and the Exploits River (Erwin and Holly 2006). Late Palaeo-Inuit (Dorset) sites in the interior remain relatively rare. In terms of micro-locational attributes, precontact interior sites appear to be particularly associated with points of land and constrictions in waterways, as well as with stream mouths and falls or rapids (Schwarz 1992, 1994).

2.2 THE HISTORIC PERIOD

Newfoundland has had a long history of European settlement, and historical archaeology in Newfoundland has tended to focus on the province's unusually early European remains, and on the archaeology of the historic Beothuk.

The earliest known historic European site on the Island is the Norse site at L'Anse aux Meadows, dated *ca*. 1,000 BP (Ingstad 1969), a period that archaeologists still generally regard as "prehistoric" in Newfoundland. The intensive European migratory fishery, which developed and expanded through the sixteenth century, is documented by the Basque remains at Red Bay (Tuck and Grenier 1989). The seventeenth century has recently become a focus of investigation; outside of the Avalon, this century is still sparsely-documented archaeologically in the province, though there are likely many sites of this period along the coast, pertaining to the English, French, and Basque migratory fisheries. The eighteenth century, a period which saw substantial growth in the European resident population of Newfoundland, is well-represented at archaeological sites across the Island.

As with precontact archaeology, and for many of the same reasons, research in historic archaeology has been strongly focused on the coast. Historic European activities in the interior, such as trapping (Pastore 1987) have not been investigated archaeologically, although archaeological research into European near-coastal interior "winterhousing" (Smith 1987) has recently begun (Venovcevs 2016).

For the Beothuk, the only indigenous group in Canada to become extinct, the period from the late 15th century to the death of Shanadithit, the last-known Beothuk, in 1829, were years when English, Portuguese, Basque, and French fishermen encroached upon not only the coast and its rich resources, but also the salmon-fishing rivers (Howley 1915; Marshall 1996). Mi'kmaq settlement from the mainland also deprived the Beothuk of hunting and fishing locations. The Beothuk rarely traded with Europeans, and their need for metal led to raiding of seasonal fishing stations during the winters and retaliation by Europeans. This hostility, coupled with Europeans excluding the Beothuk from the coastline and from favoured salmon-fishing spots, contributed to the decline of the Beothuk. By the 19th century, the remaining Beothuk were largely confined to the Exploits River and Red Indian Lake, along with the lakes in the interior hinterland of western Notre Dame Bay.

By this time, the Beothuk were not the only Indigenous people inhabiting the central Newfoundland interior. Mi'kmaq from Cape Breton had been travelling to Newfoundland to hunt by at least the early-middle 17th century. Through the 18th century, their favoured destinations on the Island included Placentia, Cape Ray, and Bay d'Espoir. Initially, Mi'kmaq in Newfoundland regularly returned to Cape Breton, but by the end of the 18th century or early 19th century, Mi'kmaq families were settling permanently in southern and southwestern Newfoundland, hunting caribou, trapping, and later, serving as guides for European explorers and sportsmen (see Pastore 1978a).

In the 18th and early 19th centuries, there was little territorial overlap between the Mi'kmaq and the Beothuk: Mi'kmaq settlement and harvesting being focused on the southern and southwestern interior from St. George's Bay to Placentia Bay, while the Beothuk ranged to the north, principally along the Exploits and Red Indian Lake (Pastore 1978a). In 1822, William Epps Cormack and his Mi'kmaq guide, Joseph Sylvester, walked across the Newfoundland interior from Trinity Bay to St. George's Bay, including the country between Meelpaeg, Granite Lake and George IV Lake south of the Study Area (see Howley 1915). The Mi'kmaq families they encountered along their route informed them that at that time, the southern border of Beothuk territory lay 15 to 25 km north of the Mi'kmaq camp on King George IV Lake (Marshall 1996). King George IV Lake marked the approximate eastern limit of Mi'kmaq canoe travel inland from St. George's Bay (Penney 1987).

Through the 19th century, following the demise of the Beothuk, the Mi'kmaq extended their range to encompass most of the central and western Newfoundland interior, as far north as the Bay of Exploits and Gander Bay. Although there was some competition with white trappers in the hinterlands of the northeast coast, through the second half of the 19th century and the beginning of the 20th century, the Mi'kmaq had the interior of the Island largely to themselves (Pastore 1978b). In 1914, the anthropologist Frank Speck mapped the hunting and trapping territories of individual Mi'kmaq families across the Newfoundland interior. For example, the large territory extending from Sandy Lake down through Red Indian Lake, Victoria River and Lake, and Lloyd's River, as far east and Meelpaeg, and as far south as the northern end of King George IV Lake was at that time the territory of Frank Joe, a hunter and trapper of mixed Mi'kmaq and Innu descent (Speck 1922).

Archaeologically, the historic Mi'kmaq occupation of the Newfoundland interior is attested by a number of recorded 20th century tilt sites (see Section 3). Two historic Mi'kmaq sites, both situated on Middle Ridge east of the Bay d'Espoir Highway, have been excavated (Penney and Nicol 1984). Burnt Knaps 1 (DbAv-01) yielded the remains of a rectangular wigwam dating to the first quarter of the 20th century, and Burnt Knaps 2 (DbAv-02), appeared to be slightly older, dating to the last half of the 19th century.

2.3 SUMMARY

In summary, previous archaeological work on the Island as a whole indicates approximately 5,000 years of precontact Indigenous occupation in four distinct periods: two Palaeo-Inuit and two of Amerindian affiliation. Indigenous occupation was demonstrably intensive along the coast. Interior occupation, primarily by Amerindian groups, but increasingly including some evidence for Palaeo-Inuit occupation, appears to have been focused on near-coastal interior lakes, and major NE-SW-oriented lakes and rivers traversing the deep interior. Along these waterways, specific site locations tend to be associated with sandy coves and points of land, prominent constrictions in major waterways, stream confluences and stream mouths, and locations above or below falls and rapids. Historic European archaeological sites are known primarily from coastal areas until the 20th century, although historic Mi'kmaq and Beothuk sites have been recorded, and may be anticipated, in deep interior settings on the Island.

Within the Study Area, ethnohistoric evidence indicates that important caribou migration corridors approach and traverse the Study Area, and that there is theoretical potential for precontact sites of all periods, particularly for sites of Maritime Archaic and late precontact Amerindian peoples, but also, to a lesser extent, potential for Palaeo-Inuit sites. Turning to the historic sites potential, the Study Area lies within the territory of the Beothuk prior to the second quarter of the 19th century, so there is potential for historic Beothuk sites, and also for historic Mi'kmaq sites dating to the second half of the 19th century into the 20th century.

3.0 ARCHAEOLOGY OF THE STUDY AREA AND SOUTHWESTERN NEWFOUNDLAND

No archaeological sites have been recorded within the Study Area. Three archaeological surveys have previously been undertaken in the vicinity of the Study Area, all with negative results: a canoe survey of Victoria Lake, George IV Lake and the Lloyd's River System in the 1970s (Madden 1975), a boat- and vehicle-based survey of Star Lake and Star Brook in the 1990s (Schwarz 1993), and most recently, a targeted survey of the northeastern corner of Costigan Lake (Schwarz 2020).

In the desktop assessment conducted for the Valentine Gold Project (Stantec 2017, 2020), assessment of regional archaeological potential was therefore based on a review of the registered archaeological sites recorded to date from a broader Regional Study Area surrounding the Study Area in west-central and south-central Newfoundland (Figure 3-1). These sites can be classified into four main groupings:

- The important cluster of historic Beothuk and precontact sites on Red Indian Lake, northeast of the Study Area
- A widely-dispersed group of sites recorded on various interior lakes south and southwest of the Study Area
- Miscellaneous sites of 20th century date recorded in locations surrounding the Study Area
- A series of thirteen sites registered by PAO based on sites indicated on an 1875 map of Victoria River and Red Indian Lake, believed to have been drawn and/or annotated by geologist J.P. Howley during his survey of the region (Murray and Howley 1881)

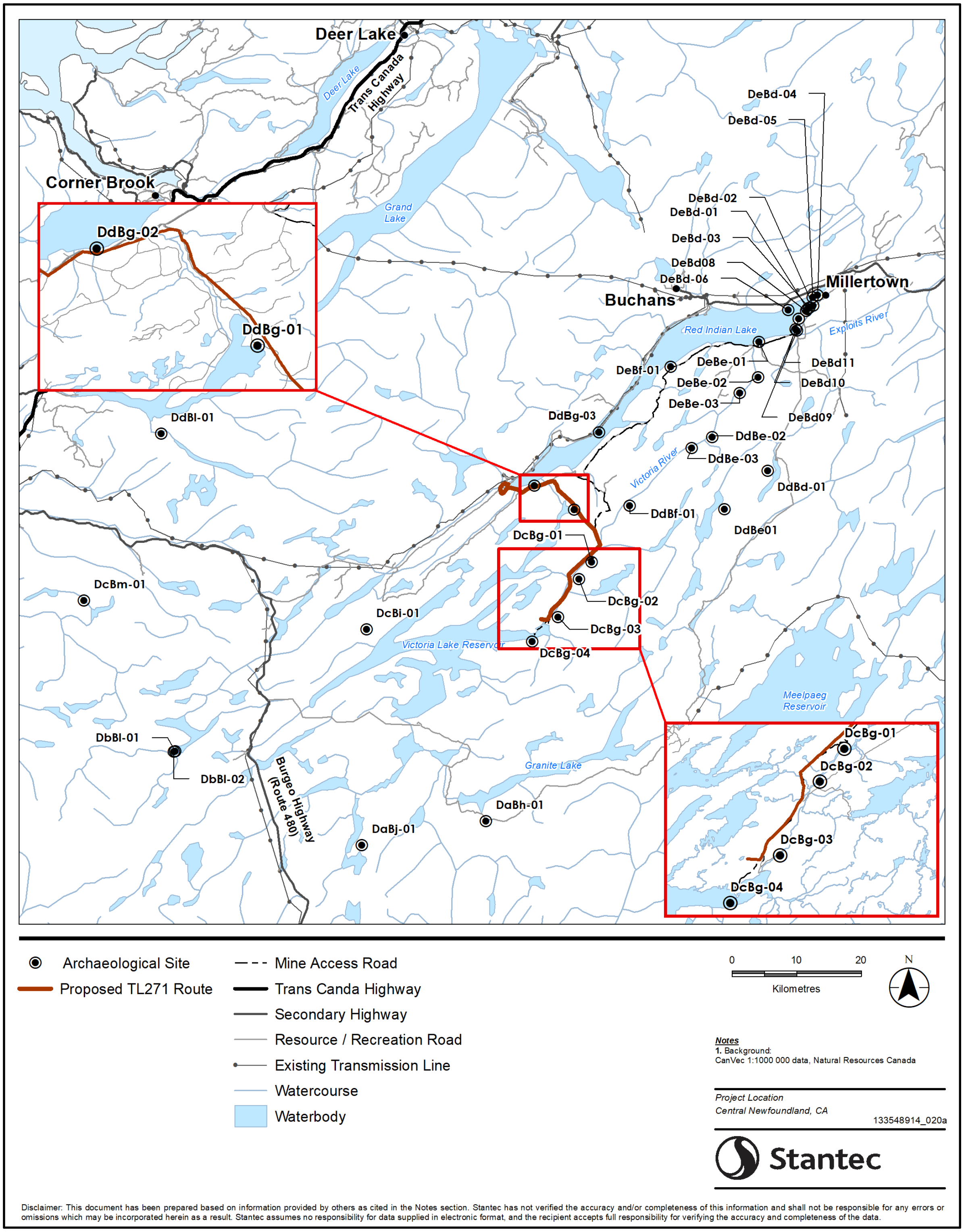

Figure 3-1 Known Archaeological Sites in the Region

3.1 HISTORIC BEOTHUK AND PRECONTACT SITES ON RED INDIAN LAKE

Ten pre-contact and/or Beothuk archaeological sites have been recorded on Red Indian Lake. The majority are situated on the south side of the northeast arm of the lake, between the Red Indian Lake dam and Buchans Junction. The largest and best-known site on the northeastern arm of Red Indian Lake is Indian Point (DeBd-01). The site was excavated in the 1960s (Devereux 1970) and found to include substantial Beothuk housepit remains, possibly including “longhouses” or communal feasting structures with linear hearths. In addition, the site yielded evidence for precontact occupation in the Dorset and late precontact Amerindian periods. Unfortunately, this highly archaeologically significant site has been subjected to a variety of destructive impacts, including the flooding of Red Indian Lake for hydroelectric power generation. Nevertheless, revisits to this site by numerous researchers since the 1960s have confirmed that despite flooding, portions of the site remain intact above the high-water mark. Indian Point is flanked by smaller outlier sites that may belong to the same site complex. These include the historic Beothuk “Three Wigwam Site” (DeBd-02), and also June's Cove 1 (DeBd-03), a multi-component precontact and historic Beothuk site which is normally inundated though occasionally re-emerges in dry years when lake levels are low. Of particular importance is the Sabbath Point site (DeBd-08), the remains of a well-preserved and undisturbed Beothuk polygonal wigwam identified initially in 2015 (McLean 2017), and subsequently investigated and partially excavated in 2017, 2018, and 2019 (Erwin et al. 2018; Schwarz and Hutchings 2018; McLean 2019; Holly et al. 2020). This site, preserved behind the present lakeshore, would originally have been situated a considerable distance inland from the water. There are also three sites on the north side of the arm and two sites further up the lake to the south and west.

The Red Indian Lake sites are relatively distant (25-65 km) from the Study Area, however the archaeological resources from Red Indian Lake do have implications for the archaeological potential of the Study Area:

- The association of archaeological sites with points of land projecting out into lakes and waterways, generally evident in the Newfoundland interior, is repeated in the Study Area around the Project
- Palaeo-Inuit components are less abundant than those of the precontact and historic Beothuk in deep interior settings, although are present nevertheless
- While previous impoundment of lakes for hydroelectric development may have impacted archaeological resources, this does not necessarily eliminate the potential for archaeological sites, or portions of sites, to survive intact

3.2 ARCHAEOLOGICAL SITES SOUTH AND SOUTHWEST OF THE STUDY AREA

Archaeological work in the southwestern interior of Newfoundland has been limited, however the limited surveys undertaken to date have yielded archaeological sites of the precontact and historic periods. Four sites have been recorded on lakes south and southwest of the Study Area.

An archaeological survey of King George IV Lake (Penney 1987) led to the discovery of two sites at the delta of Lloyd's River at the southwest end of the lake. At one site, DbBl-01, two hearths were identified. One contained lithic artifacts pertaining to the late precontact period, and the other an assemblage of historic artifacts, including clay tobacco pipes, nails, gunflints and the decayed remains of a spruce-bough floor. This latter hearth was attributed to a Mi'kmaq occupation of the site *ca*. 1920. The second site, DbBl-02, included the remains of a fallen Mi'kmaq square wigwam with artifacts indicating a date of occupation *ca*. 1940.

In 1989, Gerald Penney (Penney 1990) surveyed the lake known to Newfoundland Mi'kmaq as "Temagen Gospen," situated southwest of Burnt Pond, which had been previously surveyed with negative results. Unlike Burnt Pond, Temagen Gospen had not been flooded by the diversion of Spruce Pond, Victoria Lake, and Burnt Pond into Granite Lake. One site, DaBj-01, located at a prominent constriction midway along the lakeshore, yielded evidence for a late precontact site, along with a mid-20th century Mi'kmaq hunting camp. Two additional modern Mi'kmaq camps were also recorded at the southern end of the lake.

An unusual site has been recorded on a small lake high in the Long Range Mountains in the near-coastal interior (i.e., less than 30 km from salt water) hinterland of Flat Bay (Penney 1980). This site, Long Pond (DcBm-01), yielded surface finds of precontact (Dorset Palaeo-Inuit) lithic artifacts along the beach at a constriction between Long Pond and Cross Pond. The original site appears to have been destroyed when the pond was flooded in the early 1950s for power generation.

Finally, a fourth site was recorded during archaeological assessment of Little Grand Lake, near the southwest end of Grand Lake, in 1984 (Northland Associates 1989). This site, Little Grand Lake 1 (DdBl-01), consisted of a cluster of four low rock mounds of indeterminate function, cultural affiliation or date.

The implications for archaeological assessment of the Study Area are similar to those noted on Red Indian Lake:

- The association of archaeological sites with points of land and constrictions in lakes and waterways is repeated again, although river mouth deltas also have potential for archaeological sites
- Palaeo-Eskimo components are less abundant than those of the late precontact period in deep interior settings, although are present nevertheless
- Although the majority of the recorded sites in the Newfoundland interior are situated on major lakes or rivers, even small ponds (as at DcBm-01) have potential to yield archaeological sites

- Previous impoundment of lakes for hydroelectric development severely impacts archaeological resources, and may in fact destroy those sites, although there remains potential for identifying the eroded remains of sites which were formerly present
- Historic Mi'kmaq sites are anticipated in the southwestern interior

3.3 MISCELLANEOUS 20TH CENTURY SITES IN LOCATIONS SURROUNDING THE STUDY AREA

The PAO inventory references five sites in the vicinity of the Study Area that are known, or inferred, to be of relatively recent, 20th century date.

One site is situated in proximity to the cluster of Beothuk sites on Red Indian Lake. This site, Millers Point Wharf (DeBd-08), consists of the remains of wooden cribworks, ballast piles, and artifacts across a beach, attesting to early 20th-century industrial logging in central Newfoundland.

The Granite Lake site (DaBh-01) similarly consists of abandoned machinery and possible remains of a milling operation of 20th century date (Cultural Resource Management Group Ltd. 2011).

Another unique site situated on a small pond northeast of the Study Area, is the Rogerson Lake Site (DdBe-01). The site consists of the wreck of a tug believed to be "Alligator Annie," an Alligator Warping Tug (a paddle steamer), one of two such tugs used on Red Indian Lake in the logging industry in the 20th century. If this wreck is indeed that of "Annie," then it was originally purchased in 1900.

Site DcBi-01, located northwest of Victoria Lake Reservoir, is the site of a World War II aircraft wreck. The site contains the remains of a Lockheed Hudson A-28 BW 719, which was lost on 18 December 1943 (Deal and Hillier 2007).

Finally, site DdBd-01 ("Gerald Coomb's Shoe") is the site of a stray find of a leather shoe or boot collected between Beaver and Ambrose Lakes (see PAO site inventory record form). The exact provenience of the find is not known, nor is its precise age and cultural affiliation.

The implications of these finds for the archaeological assessment of the Study Area are difficult to specify. In some cases, the general locations of such sites may be elucidated by further archival or oral history research, however the precise locations are difficult to model or predict.

3.4 ARCHAEOLOGICAL SITES MAPPED BY HOWLEY IN 1875

The PAO inventory includes thirteen registered sites identified by PAO in 2018 on the basis of an 1875 map of Victoria River and Red Indian Lake, believed to have been drawn and/or annotated by geologist J.P. Howley during his survey between Victoria River and Red Indian Lake (Murray and Howley 1881). These sites include both observed (presumed Beothuk) wigwams dating to the 18th or 19th centuries, and the locations of Howley's own campsites. These sites have not been ground-truthed, but they have been registered in the PAO site inventory as archaeological sites, with approximate coordinates. Ten of these sites are situated on Victoria River, two on Red Indian Lake, and one on Costigan Lake. Two of these sites are located in the immediate vicinity of the Study Area.

The first, Costigan Lake 1 (DdBg-01), is a reported wigwam site situated on Costigan Lake, approximately 750 m from the proposed transmission line RoW. Field assessment in an attempt to verify and locate this wigwam site was undertaken in October 2020 (Schwarz 2020) with negative results. It is hypothesized that the wigwam observed by Howley in 1875 may have been present in this location but that it was a relatively ephemeral occupation leaving little or no material remains. Given that Howley observed the structure at least 45 to 50 years after the demise of the Beothuk, it is possible that this wigwam may have been a mid-19th-century Mi'kmaq dwelling rather than an early-19th-century Beothuk structure.

The second, DdBg-02, is a reported wigwam site, and also one of Howley's own 1875 campsites, situated on the south side of Red Indian Lake, approximately 2 km west of the mouth of Costigan Brook, and approximately 160 m from the transmission line RoW as it approaches the Red Indian Lake shoreline.

4.0 ASSESSMENT OF ARCHAEOLOGICAL POTENTIAL WITHIN THE STUDY AREA

Although no known archaeological sites have been inventoried within the Study Area, two unconfirmed sites (DdBg-01 and DdBg-02) are situated close to the Study Area (approximately 750 m away, and 160 m away, respectively) (refer to Figure 1-2). More broadly, review of regional archaeological data indicates that the Study Area does have potential for archaeological resources, particularly those pertaining to the precontact and historic Beothuk and Mi'kmaq occupations of the southwestern Newfoundland interior. While this potential may have been reduced by the impacts of flooding for commercial logging and hydroelectric development, it has not been eliminated. Potential may be particularly high on dry, level, habitable terrain, particularly on points of land and constrictions in waterways, stream mouths and confluences, falls and rapids.

For the present assessment, interactions between watercourses and the Study Area were assumed to represent zones of archaeological potential. Aerial imagery (ESRI), overlain with layers indicating the transmission line corridor and waterways, was reviewed in order to identify zones of interaction. These zones were rated as high, medium, or low potential for historic resources as follows:

- Low potential zones consist of minor waterway crossings that are identifiable as water crossings, but where aerial imagery clearly indicates that they consist of boggy, poorly-drained terrain unsuitable for historic or precontact settlement and not amenable to archaeological subsurface testing. No further assessment is warranted at these crossings.
- Medium potential zones consist of minor waterway crossings that appear in aerial imagery to be potentially habitable and amenable to subsurface testing. It is possible that such zones, or parts of them, may in fact be too-steeply-sloping or poorly drained. Further ground assessment (archaeological walkover) is required to confirm the potential of medium potential zones, and determine whether further subsurface testing is warranted.

- High potential zones are locations at which the transmission line corridor crosses or tracks major waterways (e.g., Lloyd's River, Red Indian Lake, Costigan Lake). Again, ground assessment is required to confirm the potential for historic or precontact settlement, and for subsurface testing. However, it is likely that in most cases, subsurface testing will be required in high potential zones.

Interactions with watercourses have been identified at 43 locations along the proposed and alternate transmission line RoWs, and therefore there are 43 mapped zones of archaeological potential (Table 4.1; Appendix A). Eleven zones are rated as high potential, 26 as medium potential, and 6 as low potential. In some cases, in high potential at major waterway crossings, each side of the watercourse has been listed as a distinct zone (e.g., Zones SL-arch-02 and SL-arch-03). In other cases, medium-potential stream crossings in close proximity have been combined into a single zone (e.g., SL-arch-39). The 11 identified zones of high potential for historic resources are individually described below.

Table 4.1 Archaeological Potential Zones Along the Proposed and Alternate Routes for TL271

Zone Number	Potential Rating	Location
SL-arch-01	High	North Shore Red Indian Lake
SL-arch-02	High	Lloyd's River Crossing
SL-arch-03	High	Lloyd's River Crossing
SL-arch-04	Medium	North Shore Red Indian Lake
SL-arch-05	Medium	South Shore Red Indian Lake
SL-arch-06	High	South Shore Red Indian Lake
SL-arch-07	High	South Shore Red Indian Lake
SL-arch-08	High	Tulk's Brook Crossing
SL-arch-09	High	Tulk's Brook Crossing
SL-arch-10	Medium	South Shore Red Indian Lake
SL-arch-11	Medium	South Shore Red Indian Lake
SL-arch-12	Medium	South Shore Red Indian Lake
SL-arch-13	Medium	South Shore Red Indian Lake
SL-arch-14	Medium	South Shore Red Indian Lake
SL-arch-15	Low	South Shore Red Indian Lake
SL-arch-16	Low	South Shore Red Indian Lake
SL-arch-17	Low	Valentine Lake Road
SL-arch-18	Medium	Valentine Lake Road
SL-arch-19	Medium	Valentine Lake Road
SL-arch-20	High	Valentine Lake Road
SL-arch-21	Medium	Valentine Lake Road
SL-arch-22	Medium	Valentine Lake Road
SL-arch-23	Medium	Valentine Lake Road

Table 4.1 Archaeological Potential Zones Along the Proposed and Alternate Routes for TL271

Zone Number	Potential Rating	Location
SL-arch-24	Medium	Valentine Lake Road
SL-arch-25	Medium	Valentine Lake Road
SL-arch-26	Medium	Valentine Lake Road
SL-arch-27	Medium	Valentine Lake Road
SL-arch-28	Medium	Valentine Lake Road
SL-arch-29	High	Valentine Lake Road
SL-arch-30	High	Valentine Lake Road
SL-arch-31	Medium	Valentine Lake Road
SL-arch-32	Medium	Valentine Lake Road
SL-arch-33	Medium	Valentine Lake Road
SL-arch-34	Low	Valentine Lake Road
SL-arch-35	Low	Valentine Lake Road
SL-arch-36	Medium	Costigan Brook
SL-arch-37	Medium	Costigan Brook
SL-arch-38	Medium	Costigan Brook
SL-arch-39	High	Costigan Lake
SL-arch-40	Medium	Costigan Lake
SL-arch-41	Medium	Costigan Lake
SL-arch-42	Low	East of Costigan Lake
SL-arch-43	Medium	East of Costigan Lake
Note: See Appendix A for mapbook.		

4.1 ZONE SL-ARCH-01

Zone SL-arch-01 is situated on the north shore of Red Indian Lake. This is obviously a strategic location on the Red Indian Lake shoreline at a river mouth. The northern end of this zone includes the western side of the mouth of Star Brook, and much of the Star Lake Terminal Station. Much of this area has thus been extensively disturbed. Moreover, the northern end of this zone was assessed prior to the Star Lake hydroelectric development (Schwarz 1993). The southern half of this zone includes a stretch of shoreline on Red Indian Lake. As noted above, previous archaeological work has established that despite historic flooding of Red Indian Lake, archaeological sites may remain preserved behind the present-day shoreline. This southern portion of Zone SL-arch-01 has been impacted somewhat by road construction but the shoreline appears largely undisturbed.

4.2 ZONE SL-ARCH-02

Zone SL-arch-02 is situated on the south side of the Lloyd's River crossing for the proposed transmission line. Prior to flooding, the mouth of Lloyd's River may have been half a kilometre to the east, but this must be considered a high-potential strategic river mouth location. This zone has been partly disturbed by the existing bridge crossing, and by a possible borrow area to the east of the road, but most of the riverbank appears to be forested and undisturbed.

4.3 ZONE SL-ARCH-03

Zone SL-arch-03 is situated on the north side of the Lloyd's River crossing for the proposed transmission line RoW. As with Zone SL-arch-02, this zone has been partly disturbed by the existing bridge crossing, but most of the riverbank appears to be forested and undisturbed.

4.4 ZONE SL-ARCH-06

Zone SL-arch-06 is situated where the proposed transmission line RoW tracks and closely approaches the south shore of Red Indian Lake. The zone contains no particular strategic stream mouths, nor (today) does it exhibit prominent points of land. Nevertheless, there is potential for archaeological sites along the Red Indian Lake shoreline despite historic flooding. Zone SL-arch-06 has been impacted by road construction but lacks recreational cottage development, and terrain behind the lakeshore appears to be forested and undisturbed.

4.5 ZONE SL-ARCH-07

Zone SL-arch-07 is situated where the proposed transmission line RoW tracks and approaches the south shore of Red Indian Lake. The zone contains no particular strategic stream mouths, nor (today) does it exhibit prominent points of land. Nevertheless, there is potential for preservation of archaeological sites along the Red Indian Lake shoreline despite historic flooding. Zone SL-arch-07 lies almost entirely south of the road, and terrain appears to be almost entirely forested and undisturbed.

4.6 ZONE SL-ARCH-08

Zone SL-arch-08 is situated on the west side of the Tulk's Brook crossing for the proposed transmission line RoW. The (present-day) mouth of Tulk's Brook lies approximately 800 m downstream to the north. Apart from possible logging impacts along the western margins of this zone, Zone SL-arch-08 appears to be forested and undisturbed.

4.7 ZONE SL-ARCH-09

Zone SL-arch-09 is situated on the east side of the Tulk's Brook crossing for the proposed transmission line RoW. The (present-day) mouth of Tulk's Brook lies approximately 800 m downstream to the north. Zone SL-arch-009 appears to be forested and undisturbed.

4.8 ZONE SL-ARCH-20

Zone SL-arch-20 is situated west of the Valentine Lake Road, where the proposed transmission line RoW tracks and approaches a fairly large (approximately 1.5 km long) pond. Parts of Zone SL-arch-20 may be poorly drained and unsuitable for testing, or for past settlement, but the terrain appears to be almost entirely forested and undisturbed.

4.9 ZONE SL-ARCH-29

Zone SL-arch-29 is situated west of the Valentine Lake Road, on the north side of the tributary of Victoria River which descends from Valentine Lake. Two small sets of rapids on this stream lie alongside Zone SL-arch-29, enhancing its potential strategic value. The terrain within this zone appears to be forested and undisturbed.

4.10 ZONE SL-ARCH-30

Zone SL-arch-30 is situated west of the Valentine Lake Road, on the south side of the tributary of Victoria River which descends from Valentine Lake. As with Zone SL-arch-29, two small sets of rapids lie alongside this zone, enhancing its potential strategic value since travel along this stream may require a portage and a travel stop. The terrain within this zone appears to be forested and undisturbed.

4.11 ZONE SL-ARCH-40

Zone SL-arch-40 is situated where the proposed transmission line RoW tracks and approaches the northern shoreline of Costigan Lake. The mouth of a small stream lies within this zone, enhancing its potential strategic value. The estimated location of registered site DdBg-01 lies approximately 1 km to the south of this zone. It should be noted that although this zone meets the locational criteria for a high potential zone, the lake frontage in this location has been substantially impacted by construction of an old (now bushed-in) logging road, while behind the road embankment, terrain is for the most part extremely poorly drained. Ground assessment may indicate that most or all of Zone SL-arch-40 is not, in fact, suitable for testing or for past settlement.

5.0 SUMMARY AND CONCLUSIONS

Review of regional archaeological data drew upon many of the same source materials as those that informed the historic resources baseline study for the Valentine Gold Project (Stantec 2017, 2020). The results indicate that the Study Area does have broad theoretical potential for archaeological remains, particularly those pertaining to the precontact period (especially late precontact), and the historic Beothuk and Mi'kmaq occupations of the southwestern Newfoundland interior. This potential may be reduced, but not eliminated, in some areas by the impacts of flooding for commercial logging and hydroelectric development. Potential may be particularly high on points of land and constrictions in waterways, stream mouths and confluences, falls and rapids. Although no known archaeological sites have been inventoried within the Study Area, two registered but unconfirmed sites, one on Red Indian Lake, and one on Costigan Lake, are situated less than a kilometre from the Study Area.

On the basis of this review, interactions of the Study Area with watercourses were identified as zones of archaeological potential. Review of aerial imagery identified 43 locations within the Study Area with potential to yield archaeological remains (Table 4.1; Appendix A). Six of these zones along minor waterways were rated as low potential zones which do not warrant further investigation. A further 26 zones along minor waterways were rated as medium potential, warranting ground assessment (archaeological walkover) to determine whether subsurface testing is warranted. Eleven zones associated with major waterways were rated as high potential, where ground assessment is warranted, and likely to identify locations that warrant subsurface testing prior to development. There may be additional archaeological potential areas outside the corridor related to RoW access. Construction will use existing forestry and mine access roads, as much as possible, although there may be surface disturbance associated with upgrading existing road sections or developing new sections of access that will need to be assessed as they are confirmed.

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APPENDIX A

Archaeological Potential Mapping

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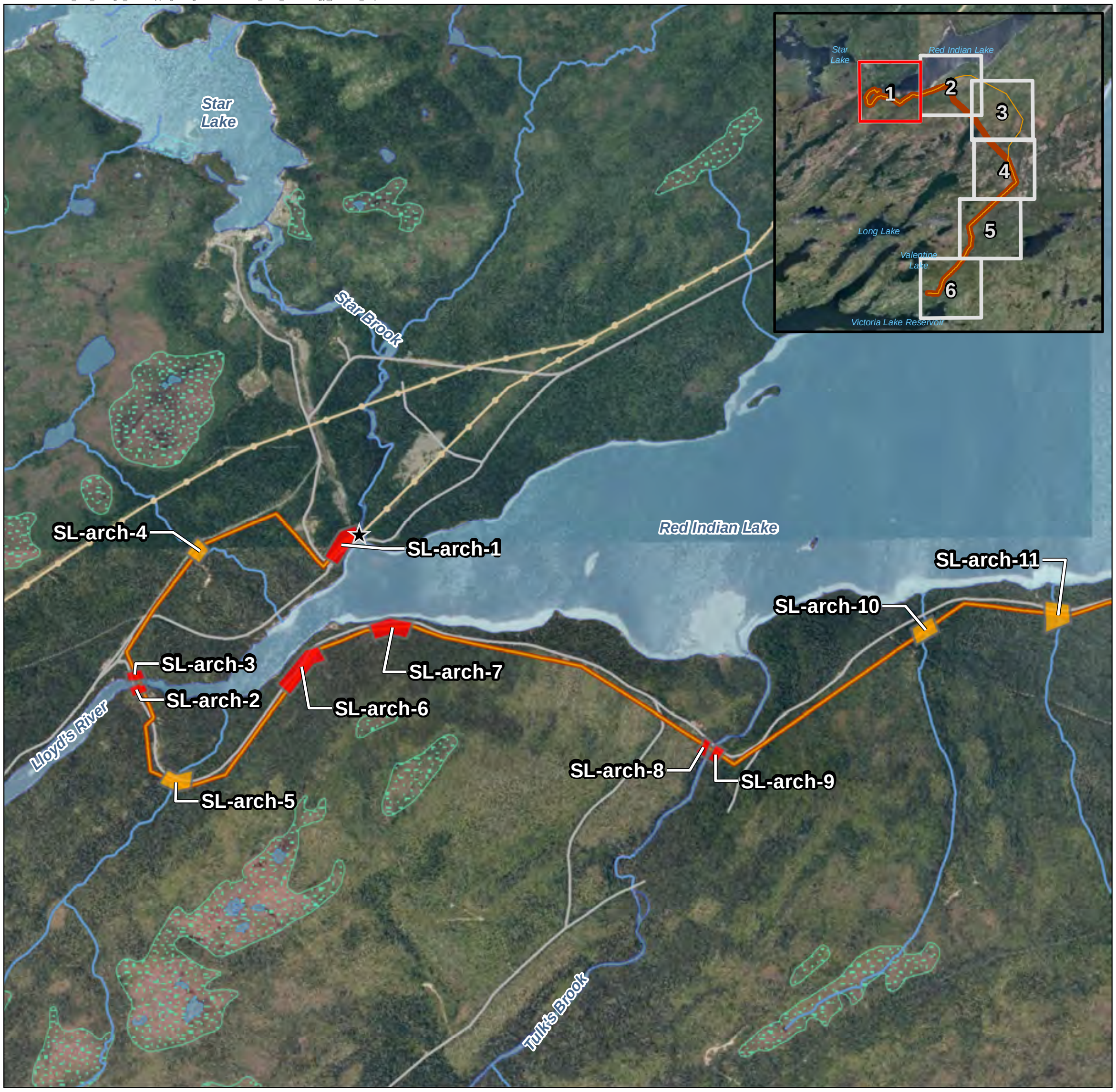

Potential Archaeological Area

- High Potential
- Medium Potential
- Low Potential

- Terminal Station
- Proposed TL271 Route
- Alternate Route

- Road
- Existing Transmission Line
- Watercourse
- Wetland
- Waterbody

N

0 300 600

Metres

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 1
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Potential Archaeological Area

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- Proposed TL271 Route
- Alternate Route

- Road
- Watercourse
- Wetland
- Waterbody

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0 300 600

Metres

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 2
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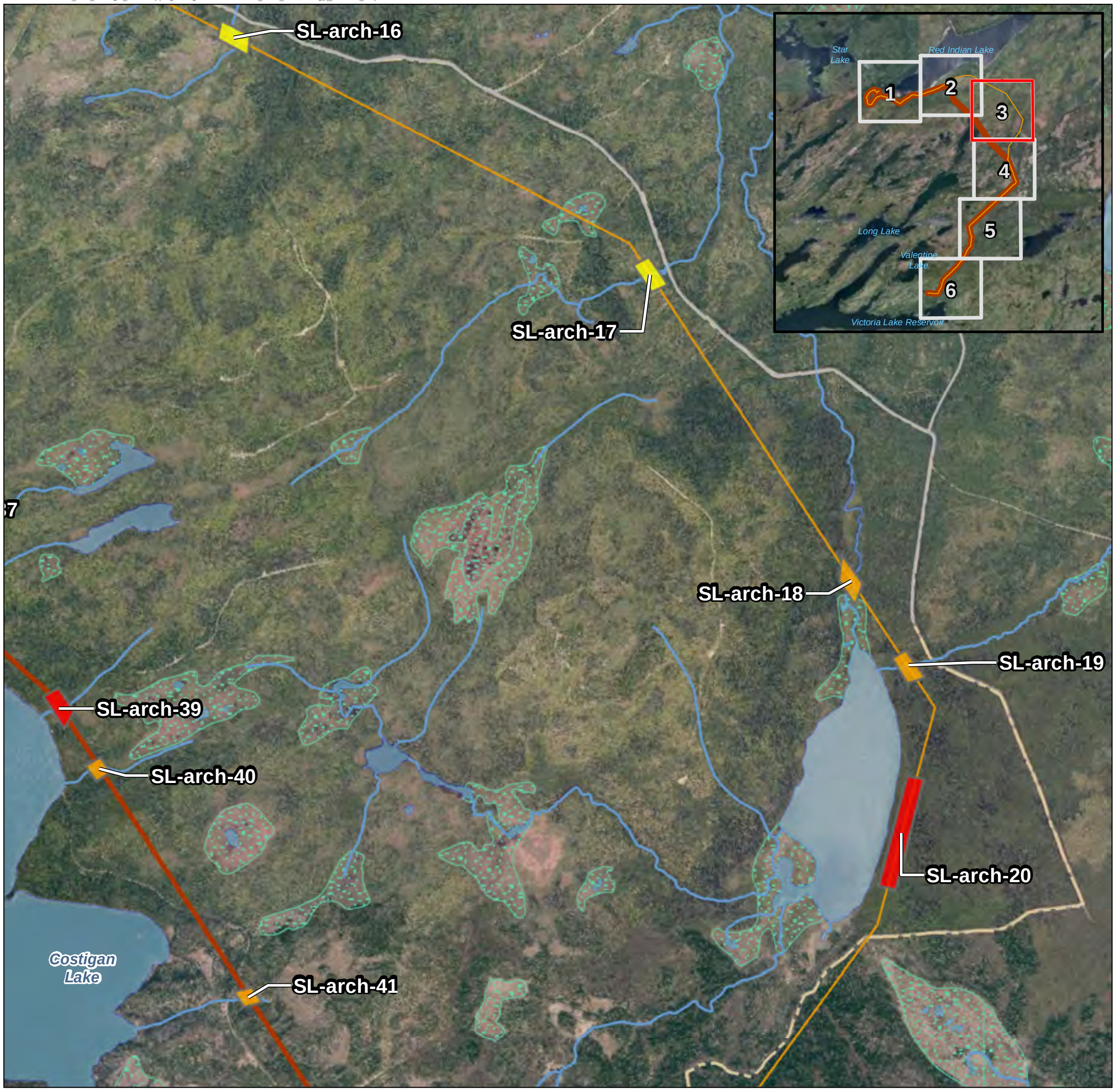

Potential Archaeological Area

- High Potential
- Medium Potential
- Low Potential

- Terminal Station
- Proposed TL271 Route
- Alternate Route

- Road
- Mine Access Road
- Watercourse
- Wetland
- Waterbody

N

0 300 600
Metres

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 3
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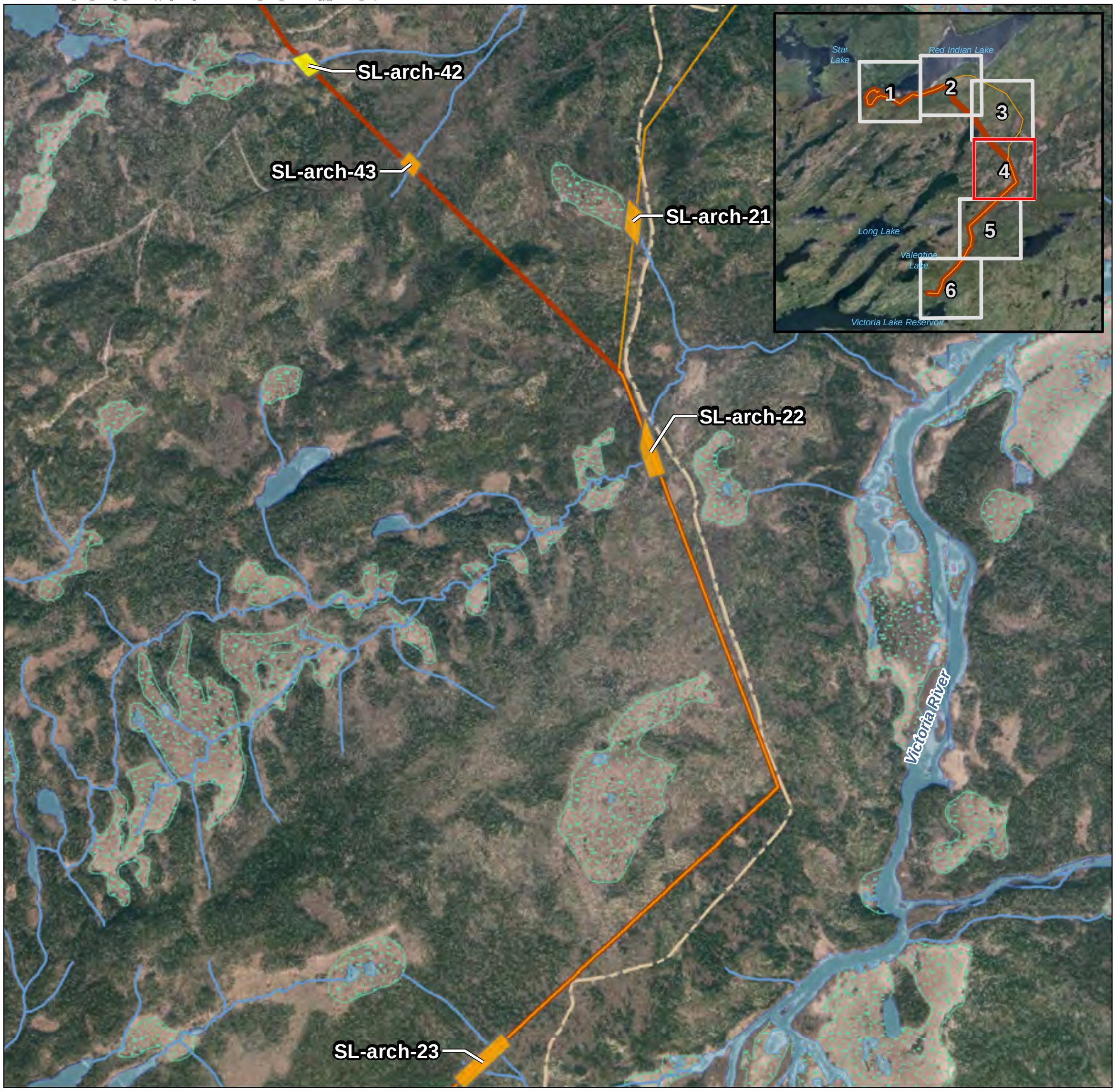

Potential Archaeological Area

- High Potential
- Medium Potential
- Low Potential
- Terminal Station
- Proposed TL271 Route
- Alternate Route
- Road
- Mine Access Road
- Watercourse
- Wetland
- Waterbody

N

0 300 600

Metres

Notes
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CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 4

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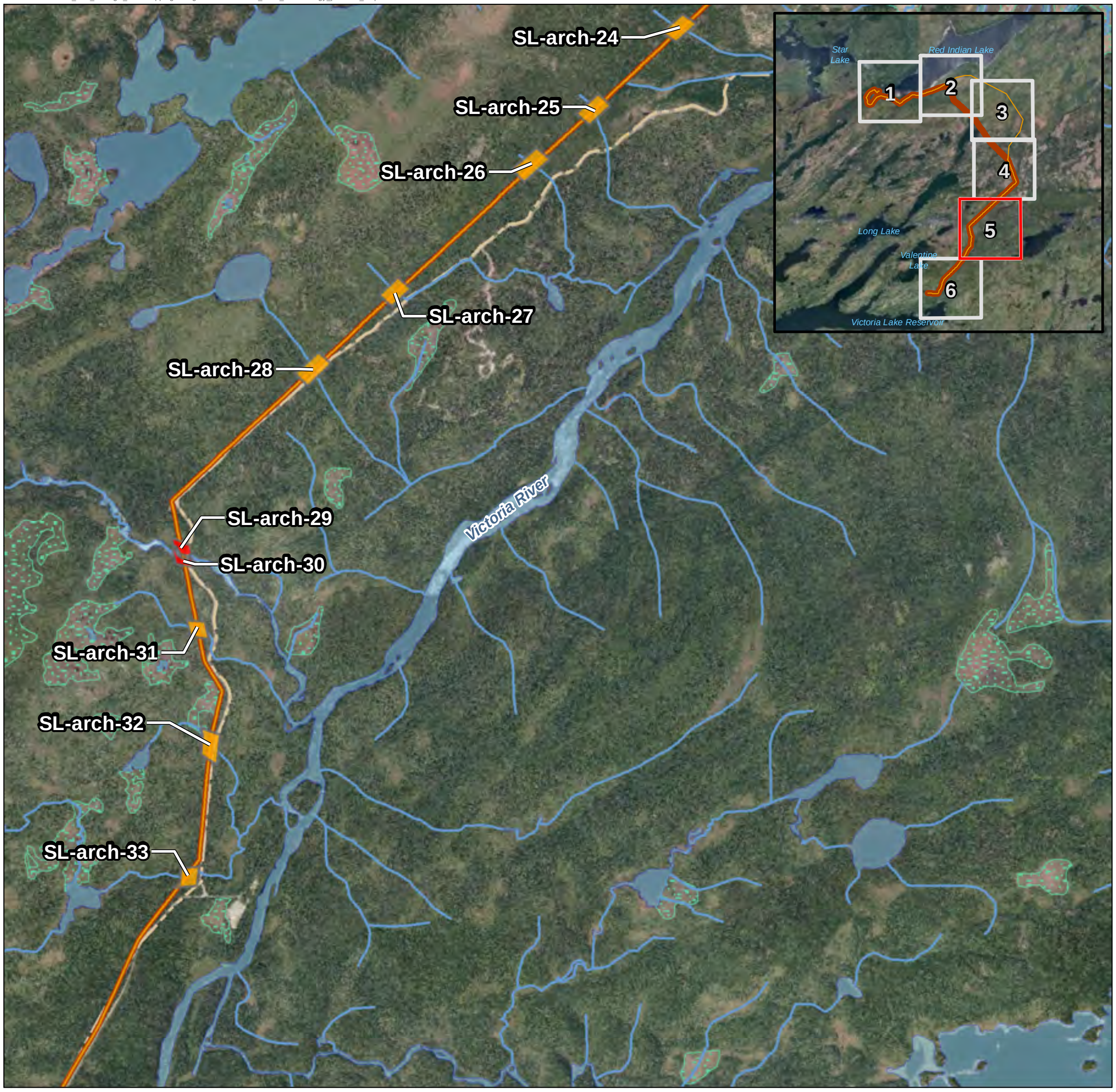

Potential Archaeological Area

- High Potential
- Medium Potential
- Low Potential

- Terminal Station
- Proposed TL271 Route
- Alternate Route

- Road
- Mine Access Road
- Watercourse
- Wetland
- Waterbody

N

0 300 600

Metres

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 5

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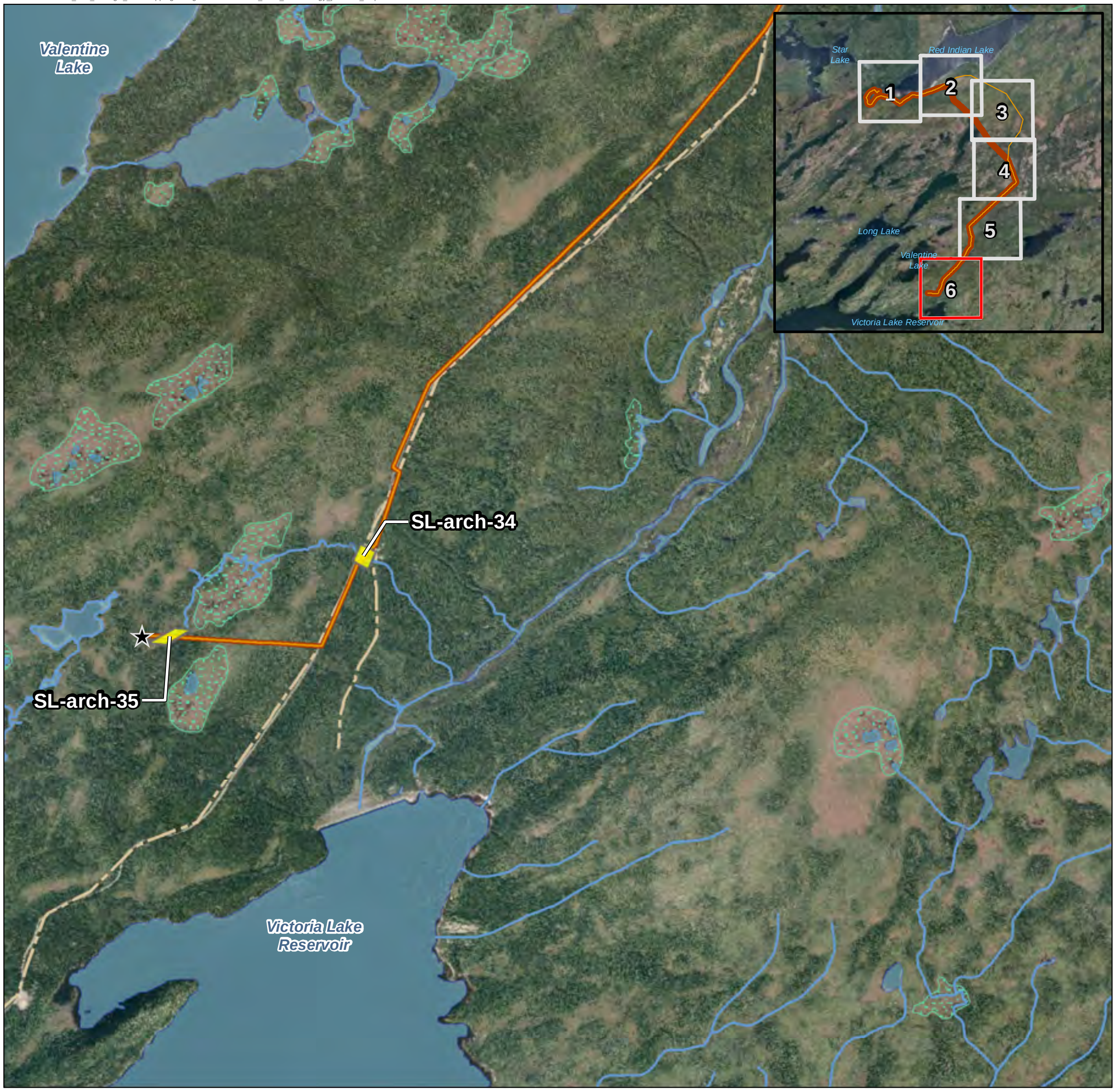

Potential Archaeological Area

- High Potential
- Medium Potential
- Low Potential

- Terminal Station
- Proposed TL271 Route
- Alternate Route

- Road
- Mine Access Road
- Watercourse
- Wetland
- Waterbody

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Metres

Notes
1. Background: GovNL
CanVec 1:50 000 data, Natural Resources Canada

Project Location
Central Newfoundland, CA

Map: 6

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Stantec

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APPENDIX F

Public Engagement Materials

Promotion and direct outreach (Feb-Mar 2021)

- Advisory inviting public comment posted on NL Hydro's website (February 12)
- Invitation for public comment shared on NL Hydro's Facebook (February 12)
- Radio ads inviting public comment – 30 spots each on 4 Stingray AM & FM stations in central Newfoundland from February 17-25, 2021 and additional 20 spots each March 2-5, 2021.
- The following were emailed a project summary (attached) and an invitation to provide comment(February 11-15):
  - Town of Millertown
  - Town of Buchans
  - Salmonid Council of NL (Leo White)
  - NL Outfitters Association (Cory Foster)
  - Miawpukek First Nation
  - Qalipu First Nation

- We were able to identify approximately 10 individuals with properties and successfully made contact with 5 of those. Of the 5 Hydro spoke to, none expressed opposition or concern about the proposed power line; one responded with an email to Hydro expressing same. (A limitation to direct outreach was being able to identify and make contact with individual seasonal property owners near the proposed TL271 route in the area at the western end of Red Indian Lake.)

Response

Group or individual	***Submission?***	***Date***	***Meeting/ call?***	***Date***
Exploits Resource Management Assoc (ERMA)			√	Feb. 23/21
Salmonid Council of NL (w/ Atlantic Salmon Fed,etc)	*		√	Mar. 1/21
NL Outfitters Association	√	Feb. 16/21		
Notch Mountain Outfitters			√	Mar. 4/21
Miawpukek First Nation	√	Mar. 12/21	√	Mar. 30/21
Qalipu First Nation	√	Mar. 5/21		
Town of Millertown				
Town of Buchans				
Private Citizen (property owner)	√	Feb. 25/21		
Private Citizen	√	Feb. 23/21		
Private Citizen	√	Feb. 24/21		
Private Citizen	√	Feb. 24/21		
Private Submission "Caribou Protection"	√	Mar. 5/21		
Canadian Parks & Wilderness Society (NL Chapter)	√	Mar. 5/21		
Mi'kmaq Matters (media business)	√	Mar. 5/21		

*Indicated they would wait until EA to submit comments

OVERVIEW: Proposed project to construct transmission line and upgrade terminal station at Star Lake to supply Valentine Gold Project

Project Overview

Newfoundland and Labrador Hydro (NL Hydro) is proposing to construct and operate a new 69 kiloVolt (kV) transmission line (TL271) from their existing Star Lake Terminal Station to a terminal station being developed by Marathon Gold Corporation (Marathon) at the proposed Valentine Gold Project mine site (see Figures 1 and 2 below). Project construction activities will include upgrades to the Star Lake Terminal Station which will occur within the existing station property and construction of a new wood pole transmission line (TL271) to the mine site. The length of TL271 will be approximately 40 km with a right of way approximately 15 m to 25 m wide.

The purpose of the project is to enable the supply of electrical power to the proposed Valentine Gold Project. An estimated peak demand of 23 megawatts (MW) is required for the operational phase of that project. The Valentine Gold Project is currently undergoing environmental assessment in accordance with the former Canadian Environmental Assessment Act, 2012 and provincial Environmental Protection Act, 2002, which is a separate undertaking than the proposed terminal station upgrades and construction of TL271.

Figure 1.

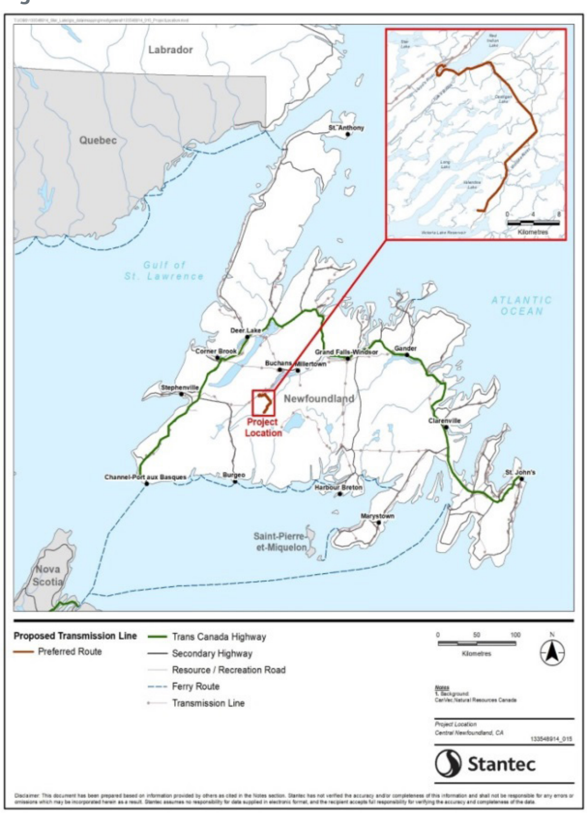
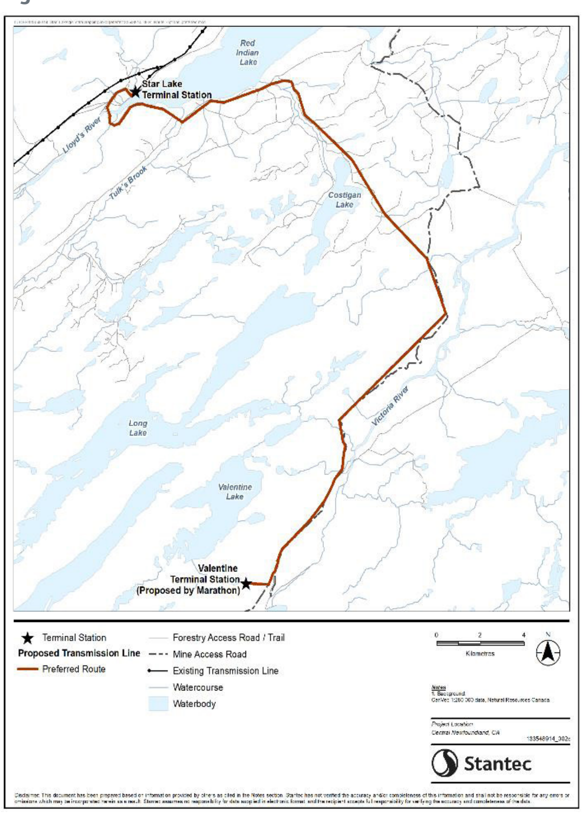


Figure 2.



February 8, 2021

Location & Route of Transmission Line (TL271)

The project is located in a remote area in rural central Newfoundland, approximately 52 km southwest from the town of Millertown and 45 km southwest from the town of Buchans. The project is located primarily on provincial Crown land. Land use in the general area is characterized by mining and other land and resource uses, including commercial forestry, outfitting, and recreational land use.

The proposed route for TL271 from the Star Lake Terminal Station to the Valentine Gold Terminal Station is shown in Figures 1 and 2.

The preferred route begins at the Star Lake Terminal Station and runs north a short distance before turning southwest along existing access roads to Lloyd's River. This routing allows the transmission line to avoid cabin properties along the north shore of Red Indian Lake between the Star Lake powerhouse and the Lloyd's River bridge. The new transmission line would span Lloyd's River (on the east side of the bridge) and then will generally follow the existing forestry road along the southern shoreline of Red Indian Lake before turning south and travelling cross-country toward Costigan Lake. TL271 will pass along the east side of Costigan Lake until it reaches the access road to the Valentine Gold Mine site. TL271 will continue to generally follow the mine access road until it reaches the proposed Valentine Terminal Station.

Construction Timing & Approach

Pending regulatory approvals, construction activities are scheduled to start in early 2022, with transmission line operations commencing in early 2023. Depending on timing of release from Environmental Assessment and sanction of the project, clearing activity for TL271 may commence in the fall of 2021 in an effort to avoid the migratory bird season. Construction activities will be undertaken, to the extent practical, to avoid sensitive time periods for fish and wildlife. Where these periods cannot be avoided, additional mitigation may be required, which would be identified in consultation with applicable regulators.

Right of Way (RoW) clearing will include a combination of hand cutting, mechanical harvesting, and mechanical mulching depending on permitted requirements for the area. All harvested timber will be processed in accordance with provincial regulations and will be either stockpiled along the RoW or in a pre-determined location. RoW access will be created primarily using existing forest access roads where possible. Given the proximity of the transmission line to existing roads along much of the preferred route, the need for access road development will be limited. Operation and maintenance activities will primarily involve asset inspection and vegetation control.

Environmental Assessment

NL Hydro has engaged Stantec Consulting Ltd to prepare the Environmental Assessment for TL271. Desktop environmental component studies are ongoing to evaluate the potential effects of the project on water resources, wildlife, vegetation, historic resources, and area users.

A desktop environmental constraints analysis to review proposed route options and identify potentially sensitive environmental features and land use restrictions with the RoW has been completed. This study has shown there are environmental attributes within, or which intersect with, the proposed TL271 project. These attributes include watercourses (including scheduled salmon rivers and/or tributaries), wetlands, pine marten critical habitat, and a known caribou migration route for the Buchans herd. TL271 RoW also overlaps with one registered cabin lot near Lloyd's River. A known archaeological site is also identified along the western shore of Costigan Lake approximately 250 metres from the RoW. Mitigation will be in place to address any identified areas of concern and will be determined in consultation with appropriate regulatory bodies.