Valentine Gold Project:

Caribou Protection and Environmental Effects Monitoring Plan (Preliminary)

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Abbreviations

dBBMM	dynamic browning bridge movement modelling
CPEEMP	Caribou Protection and Environmental Effects Mitigation and Monitoring Plan
EA	environmental assessment
EIS	Environmental Impact Statement
GPS	Global Positioning System
Julian Date	day of the year ranging from 1 to 365 or 366
km	kilometre
LAA	Local Assessment Area
LCP	least cost path
m	metre
Marathon	Marathon Gold Corporation
NL	Newfoundland and Labrador
NLDFFA-Wildlife Division	NL Department of Fisheries, Forestry and Agriculture – Wildlife Division
NSD	net squared displacement
RAA	Regional Assessment Area
TMF	tailings management facility
ZOI	zone of influence

Glossary

Cumulative Effects	The environmental effects that are likely to result from a project in combination with other projects or activities that have been or will be carried out
Environmental Effect	Refers to changes to the environment or to health, social or economic conditions and the positive and negative consequences of these changes
Effects Pathways	Effect pathways describe how a project could result in the potential environmental effect (cause-and-effect relationship; the Project-effect pathway)
Mitigation Measures	Measures or actions taken to eliminate, reduce, control or offset the adverse effects of a project
Performance Indicator	A quality of an objective to be measured and reported
Performance Target	The desired value of a performance indicator
Residual Effects	The effects of a project that remain after the application of mitigation
Risk	Risk is the possibility of something (such as environmental effect) occurring. There are many definitions of risk and for the purpose of this CPEEMP, risk involves uncertainty about the effects of an activity with respect to caribou or the chance of adverse effects to caribou.
Risk Assessment	Risk assessment aims to assess the possibility of something occurring (likelihood) and affect or influence of that occurrence on something else (impact). For the purpose of this CPEEMP, this means to assess the possibility a Project effect will occur and the potential impact of that effect on caribou.
Significance	A measure of the degree to which an environmental effect may be adverse or beneficial
Thresholds	the point at which there is an abrupt change in an ecosystem quality, property or phenomenon, or where small changes in an environmental driver produce large responses in the ecosystem. In this context, the point at which alternate actions will be taken.

1.0 INTRODUCTION

Marathon Gold Corporation (Marathon) is planning to develop an open pit gold mine south of Valentine Lake, located in the Central Region of the Island of Newfoundland, approximately 60 kilometres (km) southwest of Millertown, Newfoundland and Labrador (NL) (Figure 1-1). The Valentine Gold Project (the Project) will consist primarily of open pits, waste rock piles, crushing and stockpiling areas, conventional milling and processing facilities (the mill), a tailings management facility, personnel accommodations, and supporting infrastructure including roads, on-site power lines, buildings, and water and effluent management facilities. The mine site is accessed by an existing public access road that extends south from Millertown approximately 88 km to Marathon's existing exploration camp. Marathon will upgrade and maintain the 76 km of access road from a turnoff located approximately 8 km southwest of Millertown to the mine site.

The Project is comprised of two mining areas, the Leprechaun and Marathon deposits. Standard surface mining techniques will be used to mine gold ore from two open pits. Ore material will initially be mined and processed at a nominal rate of 6,850 tonnes per day, increasing to 10,960 tonnes per day in Year 4. Ore will be processed through the mill, where it will be crushed, milled and put through floatation and cyanidation processes to recover the gold. High-grade and low-grade ore materials will be stockpiled for mixing and for processing later in the mine life. Tailings will be treated in the process plant area to remove cyanide from the effluent and subsequently deposited in an engineered tailings management facility (TMF), where effluent will be monitored for compliance with the *Metal and Diamond Mining Effluent Regulations*. Gold will be formed into doré bars, which will be shipped from site to market in secured trucks.

The construction of the Project is expected to take place over a period of approximately 20 to 24 months, followed by an estimated mine operation life of 13 years. The Project will operate 24 hours a day, seven days a week on a 12-hour shift basis. Upon cessation of mining, the operation will be closed, and the site components will be rehabilitated and monitored in accordance with applicable regulations at the time of closure.

Other Project components and activities that are associated with the primary mining, milling and processing activities include site and haul road construction and maintenance, waste rock management, electrical power supply and distribution, process and potable water supply and distribution, site wide stormwater and effluent management including: monitoring; treatment and discharge; fuel storage and fueling stations; mine and plant workshops and services; administrative office; personnel accommodations and lunchrooms; and security (Figure 1-2). A power line connected from nearby NL Hydro's Star Lake Generating Station to the mine site will be required to supply power to the Project and will be permitted, constructed and operated by NL Hydro.

The Project Area overlaps woodland caribou range in central Newfoundland; the NL Department of Fisheries, Forestry and Agriculture (NLDFFA)-Wildlife Division identified the Buchans, Gaff Topsails, Grey River and La Poile herds as having the potential to interact with the Project Area, Local Assessment Area (LAA) and Regional Assessment Area (RAA) (Government of NL 2020). An assessment of Project effects on caribou was provided in Chapter 11 of the Environmental Impact Statement (EIS; Marathon 2020), supported by baseline studies that were appended to the EIS (i.e., Baseline Study Appendix 2: Caribou), and submitted amendments and responses to Information Requirements. The assessment considered Project effects on caribou including change in habitat, change in movement, and change in mortality (Chapter 11, EIS; Marathon 2020).

This Caribou Protection and Environmental Effects Monitoring Plan (CPEEMP) defines the mitigation measures aimed at reducing the risk of adverse effects on caribou and describes the follow-up and monitoring activities that will be undertaken to verify the environmental assessment (EA)/EIS effects predictions and mitigation effectiveness.

For the purpose of this CPEEMP, 'caribou' refers to the species (*Rangifer tarandus*), and to their daily, seasonal and annual life requisites (i.e., habitat for food, shelter, calving, and movement) necessary for caribou populations to be sustainable. Herd names are used in reference to specific caribou groups (i.e., Buchans, Grey River, Gaff Topsails, and La Poile).

The CPEEMP is considered a “live” document that will be updated regularly, based on conditions of authorization (EA release and permitting); collection of additional baseline data prior to construction; information from follow-up and monitoring activities as the Project advances; and ongoing review with regulators, scientific experts, Indigenous groups, and stakeholders. A revision log and distribution list are maintained in Appendix A.

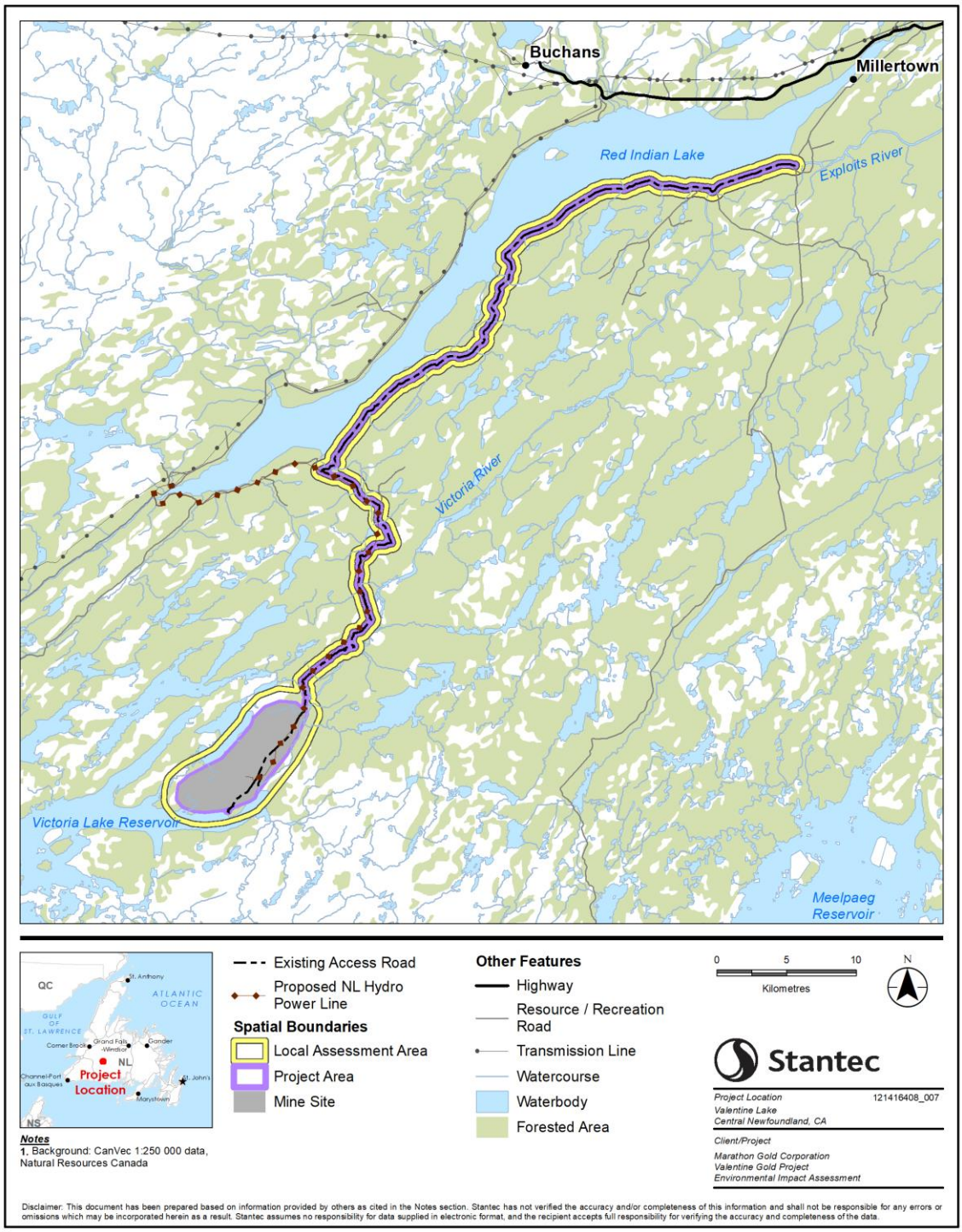


Figure 1-1 Project Area and Local Assessment Area

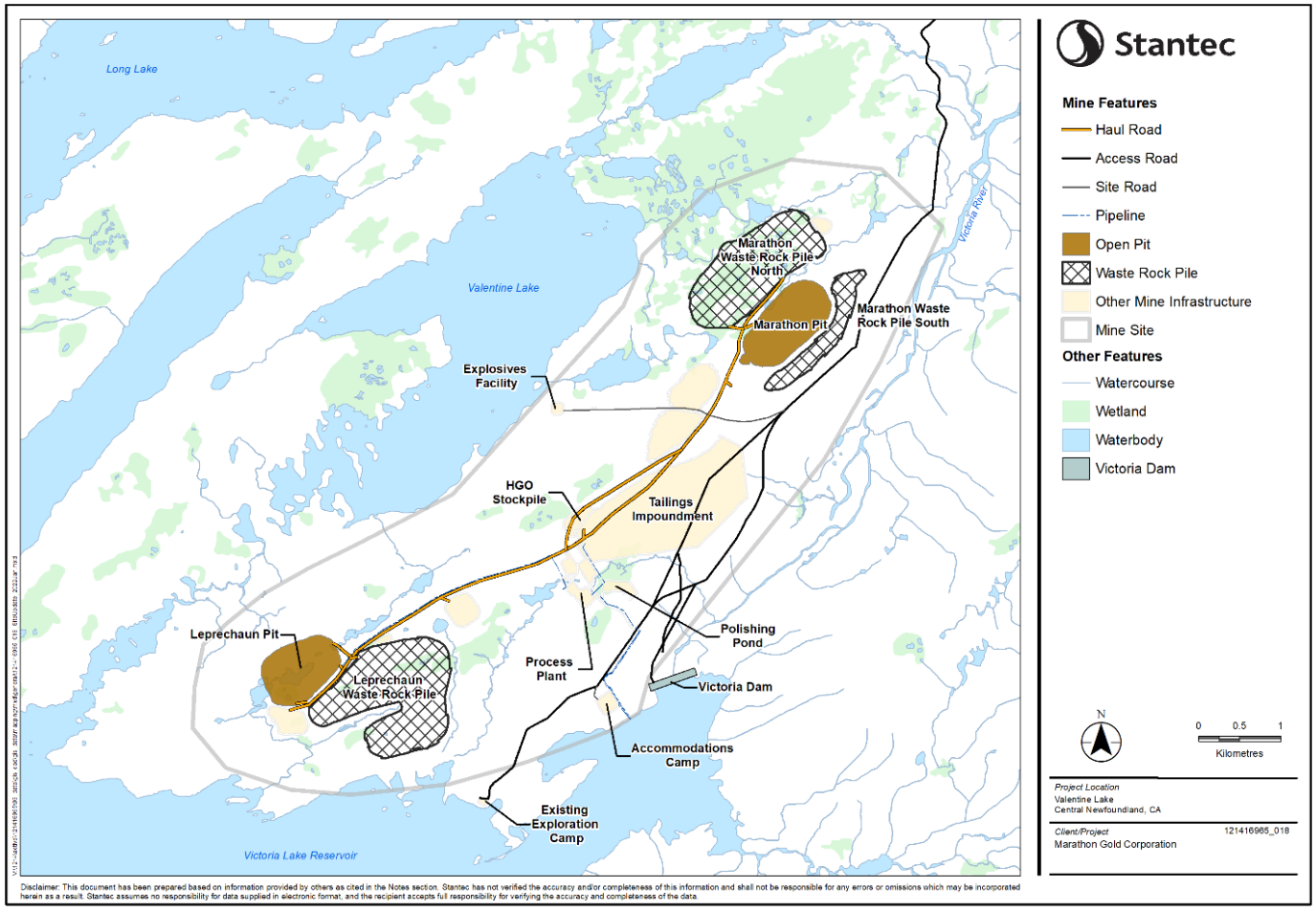


Figure 1-2 Revised Site Plan

2.0 PURPOSE

The purpose of the CPEEMP is to provide specific mitigation and monitoring protocols that will reduce the risk of Project effects on caribou directly, or through adaptive management. The goal of avoiding or reducing Project effects on caribou and their habitat will be achieved by linking the risk of the predicted Project effects directly to mitigation measures, monitoring mitigation effectiveness through performance indicators, reviewing monitoring results relative to performance targets with specific thresholds, and potentially refining mitigation or monitoring approaches through an adaptive management process. To achieve this goal, three objectives, which are linked to the primary potential Project effects on caribou, have been identified:

Objective 1: Avoid or reduce adverse effects on caribou habitat (direct and indirect)

- Reduce the area of caribou habitat affected directly (loss or alteration) and indirectly (due to sensory disturbance, dust)
- Progressively rehabilitate as much habitat each year as is practicable

Objective 2: Maintain current migration and timing by avoiding or reducing adverse effects on caribou movement

- Avoid or reduce adverse effects on caribou habitat (see Objective 1)
- Reduce Project effects related to sensory disturbance to caribou that may result in changes in timing and duration of migration
- Reduce obstacles and activities related to caribou migration to reduce potential avoidance of the mine site and access road

Objective 3: Reduce mortality risk

- Reduce risk of caribou-vehicle collisions
- Reduce risk of caribou injuries or mortalities related to site infrastructure (e.g., pits, ponds)
- Reduce the overall risk to caribou associated with Project effects, thereby reducing indirect mortality risk

This CPEEMP has been developed to comply with commitments in the EIS, the Caribou Supplemental Report, and response to Information Requirements and regulator comments, and to align with the Ministers' conditions of EA Release issued on [*dd/mm/2022*]. Specific conditions addressed in this CPEEMP include:

[*To be completed upon release from EA*]

The CPEEMP was also developed to comply with the *Canadian Environmental Assessment Act, 2012* and NL *Wild Life Act*, RSNL 1990, c W-8, and *Wild Life Regulations.*

3.0 SUPPORTING INFORMATION

Information and documents that support the development of this CPEEMP are identified in the sections below.

3.1 BACKGROUND INFORMATION

Background and supporting documents to this CPEEMP are listed below. This list will be updated as additional information becomes available through the EA process, continued baseline studies, detailed engineering, permitting, and future monitoring.

- Valentine Gold Project EIS (Marathon 2020): Chapter 11 (Caribou), Chapter 21 (Cumulative Effects) and associated, appended baseline studies
- Responses to Information Requirements and regulator comments, including the Caribou Alternate Migration Pathway Analysis and the Caribou Supplemental Information Report
- 2020 caribou survey field program as reported in *Fall 2020 Caribou Survey – Remote Cameras* (Stantec 2021a)
- 2021 post-calving aerial survey of the Buchans and resident caribou as reported in *2021 Post-Calving Aerial Survey* (Stantec 2021b)
- 2021 caribou survey field program as reported in *Spring 2021 Caribou Survey – Remote Cameras* (Stantec 2021c)

3.2 POTENTIAL PROJECT EFFECTS

This section provides a brief summary of predicted Project effects, effects pathways for caribou and caribou habitat. The spatial and temporal boundaries, and the general Project activities considered in the assessment and prediction of Project effects are also summarized for context, as the spatial and temporal boundaries are referenced in this document as they pertain to risk, mitigation measures, and monitoring.

The following spatial boundaries (Figure 3-1) were used to assess Project and cumulative effects:

- The **Project Area** encompasses the mine site, including Project infrastructure, and the access road plus a 20 metre (m) wide buffer on either side. The Project Area is the anticipated area of direct physical disturbance associated with the construction, operation and decommissioning, rehabilitation and closure of the Project.
- The **Local Assessment Area (LAA)** includes a 1 km buffer surrounding the mine site and a 500 m buffer surrounding the access road.
- The **Regional Assessment Area (RAA**) includes the combined population ranges of the Buchans, Gaff Topsails, Grey River and La Poile Herds (determined by caribou telemetry data obtained from the NLDFFA-Wildlife Division).

The following temporal boundaries were used to assess Project and cumulative effects:

- Construction Phase – 20 to 24 months, currently planned to commence in Q3 2022
- Operation Phase – Estimated 13-year operation life, with commissioning / start-up and mine / mill operation slated to start Q2 2024
- Decommissioning, Rehabilitation and Closure Phase – Closure rehabilitation will commence upon the cessation of mining and milling activities and is anticipated to take approximately 2 years to complete.
- Post-closure monitoring – Requirements for post-closure monitoring for the Project will vary as some components of the Project (e.g., the TMF and waste rock piles) will be available for closure rehabilitation 3 to 4 years prior to the completion of the operations phase. Closure rehabilitation for some components will not be completed until the end of the closure period. Post-closure monitoring is typically conducted for 6 to 8 years after closure is completed and the monitoring component associated with the CPEEMP will be determined through discussions with NLDFFA-Wildlife Division.

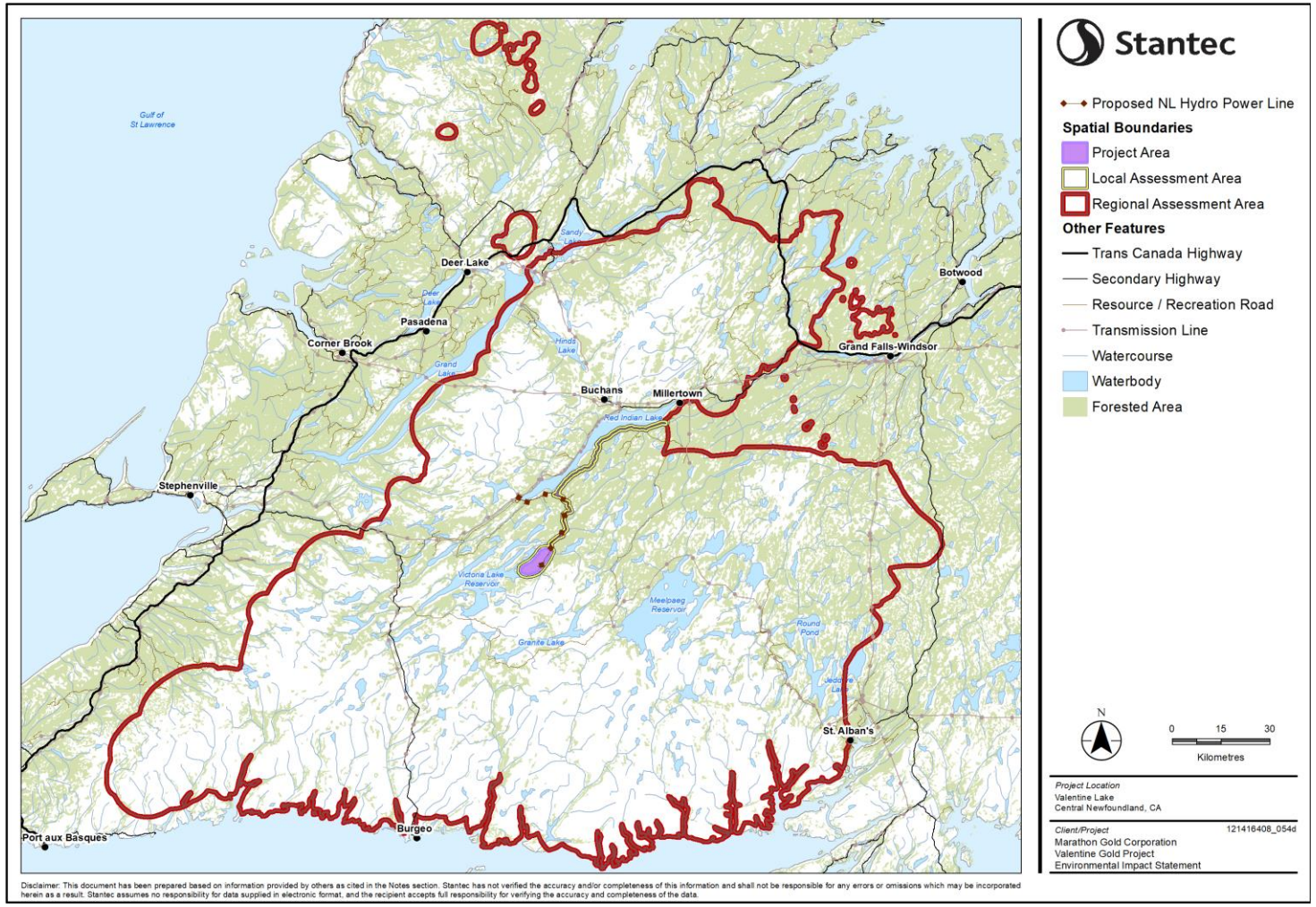


Figure 3-1 Caribou Regional Assessment Area

The general Project components and activities that may interact with caribou and caribou habitat during construction, operation, and decommissioning, rehabilitation and closure are:

- Access road upgrades
- Mine site preparation and earthworks
- Construction and installation of Project infrastructure and equipment
- Project-related transportation
- Open pit mining and associated topsoil, overburden and rock management, milling and processing, tailings management, and water management activities
- Maintenance activities (e.g., vehicles, snow clearing, road maintenance)
- Emissions, discharges and wastes (e.g., noise and air emissions, hazardous and non-hazardous wastes)

A summary of potential effects on caribou is presented in Table 3.1. These potential Project effects, and the potential consequences of these effects provide the basis for the risk assessment presented in Section 4.0.

Table 3.1 Potential Project Effects, Effect Pathways and Measurable Parameters

Potential Project Effect	Effect Pathway	Measurable Parameter(s)	Additional Context, Potential Consequences and Linkages Between Effects
Change in habitat	Direct and/or indirect loss or alteration of habitat arising from vegetation clearing and mine construction, and/or sensory disturbance (e.g., avoidance)	• Amount caribou habitat directly or indirectly lost or altered	Change in habitat, either directly (e.g., vegetation clearing) or indirectly (e.g., sensory disturbance), may also affect movement and mortality risk of caribou. Sensory disturbance in the vicinity of the mine site can result in altered migration paths for Buchans herd caribou with potential implications on energetic demand, body condition, pregnancy rates, and predation risk. Sensory disturbance can also result in reduced use or avoidance by Grey River herd caribou during calving.

Table 3.1 Potential Project Effects, Effect Pathways and Measurable Parameters

Potential Project Effect	Effect Pathway	Measurable Parameter(s)	Additional Context, Potential Consequences and Linkages Between Effects
Change in movement	Change in migration paths or patterns arising from habitat loss and/or sensory disturbance (e.g., avoidance)	• Amount of direct (Project component development) and indirect (sensory disturbance) alteration to the current migration paths/corridor • Proportion or relative amount of use of the preferred migration path within the Project Area	'Migration corridor' refers to a broader area used for migration at the population-level. The migration corridor is comprised of 'migration paths', which are used by caribou. A migration path may be used by one or more caribou. Project effects assessment includes potential changes in the functionality of the migratory pathway, with potential implications on the timing, movement rate, or use of stopover sites during caribou migration, and potential increased energetic demands, decreased body condition, decreased pregnancy rates, and increased predation risk. The risk of changes in movement and potential changes in calving success and recruitment includes potential adverse effects on the population (size and trend) of Buchans herd caribou.
Change in mortality risk	Direct change in mortality risk due to vegetation clearing and site preparation activities, vehicular collisions, and indirect change in mortality risk (e.g., increased predation)	• Changes in traffic volumes during the life of the Project • Interactions with Project infrastructure, vehicles and equipment	Direct sources of mortality include those attributable to vegetation clearing and site preparation activities, and vehicular collisions. Indirect sources of mortality are assessed qualitatively and include mortality risk factors such as displacement (due to habitat changes) to areas where predation risk is higher, and/or change in energetic demands and resulting effects on body condition (related to changes in habitat or movement).

4.0 RISK TO CARIBOU

The development of the Project will create risks to the Buchans herd which migrate through the Project Area twice annually, and to the Grey River herd whose calving grounds are located to the south of Victoria Lake Reservoir and approximately 2.5 km south of the Project Area. Risk to caribou include: migrating caribou (Buchans herd) and 'resident' caribou, which are identified as caribou that spend their time within approximately 17 km (based on the potential zone of influence [ZOI] of the Project); caribou from both the Buchans and Grey River herds; and, a portion of the Grey River herd calving grounds.

Maintaining the functionality of migration paths by preserving connectivity between seasonal ranges is vital to sustaining viable populations of migratory ungulates (Monteith et al. 2018). The Marathon open pit and waste rock pile will be developed within the primary migration corridor for the Buchans herd. This development will create a permanent obstacle which migrating caribou will be forced to avoid. In addition to the physical obstacle, site activities and associated sensory disturbance will also affect caribou within proximity to the mine site, and direct interaction with Project features and activities such as access road or haul road traffic could result in injury or mortality.

Development and operation of the Project presents two 'levels' of risk to migrating caribou. The higher-level risk is the uncertainty associated with the reaction of caribou to Project effects (combination of physical obstacle and sensory disturbance). There are three potential responses for migrating Buchans caribou:

- Caribou may continue to migrate through the existing, preferred corridor, navigating around but close to the Marathon open pit and waste rock pile
- As a result of physical obstacles and sensory disturbance, caribou may avoid the Project and migrate along alternate paths that will be longer and result in greater energetic consumption
- As a result of physical obstacles and sensory disturbance, caribou may fail to migrate, subsequently remaining either north or south of the Project year-round

These potential responses by migrating caribou may occur at the individual, group, or population level. A mixed response by caribou to the Project is also possible, whereby individuals or groups may react differently to the Project (e.g., some caribou migrate through the site and other caribou migrate via alternate, longer pathways).

Assessing the likelihood that caribou will respond to the Project in one or multiple ways, and at what level of response (individuals, groups, population) is very difficult. While the literature suggests that caribou migration patterns are frequently affected by disturbance, a herd-wide failure to migrate has not been reported as a response to disturbance (e.g., Murphy and Curatolo 1987; Dyer et al. 2002; Vistnes et al. 2004; Mahoney and Schaefer 2002; Wilson et al. 2016). There is also evidence related to the creation of Star Lake reservoir, also in the primary migration corridor, that caribou did alter their path of travel during

construction and returned post construction. The creation of the reservoir altered the migratory route temporarily but did not stop the migratory behaviours of the herd (Mahoney and Schaefer 2002).

The risk assessment presented for migrating caribou in Tables 4.1 through 4.3 evaluates the specific risks to caribou assuming that each potential migration response may occur and assesses the corresponding risks related to that response. As a result, the risk assessment, which is subsequently used to inform and evaluate the mitigation requirements in Section 5.0, considers all risks to caribou regardless of their response to the Project during migration.

Tables 4.1 through 4.4 provide a description and assessment of risk for each migration scenario as well as for resident caribou. Whether caribou migration response occurs at the population level (e.g., all migrating caribou choose to migrate through the site) or there is a mixed response (e.g., some caribou migrate through the site while others fail to migrate), the overall risk to caribou is high likelihood and the potential impact is high. The mitigation measures and monitoring program presented in Sections 5.0 and 6.0, below, have been developed to reduce these risks to the extent possible and adaptive management will be used to further reduce risk associated with the uncertainty in how caribou will respond.

Figure 4-1 provides a visual representation of the Project effects pathways and potential consequences associated with each of the three migration responses/scenarios described above. Figure 4-2 is a graphical characterization of risk levels to caribou migrating through the site over a year, corresponding the risks described in Table 4.1.

Table 4.1 Description and Assessment of Risk for Migration Through the Sites

Migration Through the Site	There will be increased risk to caribou that continue to migrate via the existing primary migration corridor as a result of direct interaction with Project activities and components. The direct risks to caribou are temporal in nature in that migrating caribou will interact with the Project during the migration period only (see risks to resident caribou in Table 4.4), however, indirect risks associated with the increased stress resulting from caribou interacting with the Project may persist beyond the migration potentially impacting caribou health. Risk to caribou migrating through the site will increase as the Project moves through construction and into operation, peaking in Year 3/4 of operations as the Project component footprints are fully developed and site activities peak. Subsequently, the risk to caribou migrating through the site will begin to reduce as mining slows and ceases in Year 9/10 of operations and tailings are directed to the Leprechaun pit and will reduce further with full closure and rehabilitation of the Project commencing in Year 13. The closure phase activity levels (lower than construction) will result in reduced sensory disturbance leading into post-closure where Project-related sensory disturbance will be eliminated except for long-term post-closure monitoring, and only residual physical Project components will remain. Once fully developed during operations, the TMF, waste rock piles, and open pits will remain as permanent landscape changes. The tailings surface will be revegetated, as will the waste rock pile. The open pit will be flooded and incorporate ingress/egress areas in the event animals enter the water. Caribou migrating through the Project site post-closure will need to continue to circumnavigate these features. The risk assessment below applies to caribou that migrate through the site only, whether at the individual, group, or population level, and is not an assessment of the likelihood that caribou will migrate through the site.

			Construction		Operations		Closure		Post-Closure	
Project Effect Pathway	**Description**	**Potential Consequence**	**Likelihood**	**Potential Impact**	**Likelihood**	**Potential Impact**	**Likelihood**	**Potential Impact**	**Likelihood**	**Potential Impact**
Direct interaction with Project activities or infrastructure	If caribou migrate through the site, they will encounter Project activities and infrastructure that could result in direct interactions (e.g., vehicle collisions, traversing steep and/or rocky slopes) which in turn result in stress, injury or mortality.	Increased stress Increased risk of direct mortality	Moderate	Moderate to High	Moderate	Moderate to High	Low	Moderate to High	Low	Low
Direct habitat loss related to site clearing, indirect habitat loss due to sensory disturbance and dust	Migrating caribou spend limited time feeding; however, loss of forage and cover within the Project Area due to clearing and sensory disturbance may increase stress, thereby affecting overall health, particularly for pregnant females during spring migration.	Increased stress Increased risk of indirect mortality Increased risk of calf mortality	Low	Moderate	Low	Moderate	Low	Low	Low	Low
Migratory path altered by site infrastructure and activity (reduced permeability)	If caribou migrate through the site, they will encounter Project component development (primarily the open pit, waste rock pile, TMF) within their existing migration corridor which will require some degree of alteration to their path, which will continue to increase as the footprints of these components increase during construction and early operations phases. Alterations to their paths, even within the primary corridor will most likely increase energetic output and stress.	Increased stress Increased risk of indirect mortality Increased risk of calf mortality Increased risk of adult mortality	High	Moderate to High	High	Moderate to High	High	Moderate to High	High	Moderate to High
Sensory disturbance related to on-site activity	If caribou migrate through the site, they will be affected by sensory disturbances such as noise, olfactory, light and human activity which can increase levels of stress, potentially affecting overall health.	Increased stress Increased risk of indirect mortality	Moderate to High	Moderate to High	High	Moderate to High	Moderate	Moderate	Low	Low
Changes in seasonal migratory patterns	The potential effects (risks) described above may combine to influence the timing and speed of the migration and overall behaviours (e.g., stopovers) of the herd.	Increased stress Increased risk of indirect mortality Increased risk of calf mortality Increased risk of adult mortality	Moderate	Moderate	Moderate	Moderate	Low	Low to Moderate	Low	Low
Overall risk to caribou migrating through the site for each Project phase:			Moderate to High	High	Moderate to High	High	Moderate	Moderate	Low	Low

Notes:

Risk assessment (likelihood or potential impact) is non-cumulative over Project Phases

These risk assessments were considered and inform the mitigation measures presented in Section 5.0 of the CPEEMP

Table 4.2 Description and Assessment of Risk for Migration via Alternate Routes

Migrate via Alternate Routes	If caribou migrate via alternate routes, there will be an increase in migration route length and duration. It is unclear how far the alternate paths may deviate from the current corridor. As the distances increase, so do energetic requirements and the potential to interact with other risks more directly, such as predators or development activities associated with other projects. These alternate paths may also change intra-group dynamics and the timing of movements. If caribou migrate via alternate routes that remain in close proximity to the Project, it is expected they will choose to move to the northeast to avoid Project activities and features immediately southwest of the existing migratory corridor. In this case, the caribou are not expected to interact directly with Project components or activities, with the exception of crossing the existing access road and power line corridor. Caribou migrating in close proximity to the northeast of the Project may be influenced by sensory disturbances such as noise and light, however, noise and light levels reduce with distance from the Project. As described for the migration through the site scenario, sensory disturbance from Project activities will increase until they peak around Year 3/4 and then drop off later in Project operations, through closure and become nil post-closure. If caribou migrate via alternate routes that move further away from the Project, it is expected they may choose to travel to the northeast or southwest of the existing migratory corridor. In this case, the caribou are still not expected to interact directly with Project components or activities, except for crossing the access road and power line corridor northeast, or possibly approaching the Leprechaun pit area from the southwest. Caribou migrating at greater distance from the Project are not likely to be directly influenced by sensory disturbances such as noise and light, however, will be affected by increased energetic requirements, as described above. As Project activities begin to taper off towards the end of operations and into closure the reduction in activity may result in caribou that selected alternate migration routes returning to the initial migratory corridor. The risk assessment below applies to caribou that select alternate migration paths only, whether at the individual, group, or population level, and is not an assessment of the likelihood that caribou will select alternate paths.

Project Effect Pathway	Description	Potential Consequence	Construction		Operations		Closure		Post-Closure	
			Likelihood	Potential Impact	Likelihood	Potential Impact	Likelihood	Potential Impact	Likelihood	Potential Impact
Direct interaction with Project activities or infrastructure	If caribou use alternate paths they will likely avoid the mine site entirely, however, if their alternate path move northeast they will cross the access road and power line, where interaction with Project-related traffic is possible which could result in stress, injury or mortality.	Increased stress Increased risk of direct mortality	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
Habitat loss (function of corridor) related to using less optimal paths	The use of alternate paths may cause animals to travel less direct paths, potentially through more difficult terrain (i.e., thicker forests, steeper terrain, less cover, larger waterbodies). Caribou spend little to no time foraging while migrating. These longer more circuitous routes may result in more energetic output and with less cover and potentially more exposure to predators.	Increased stress Increased risk of indirect mortality (energetic output) Increased risk of calf mortality Increased risk of adult mortality Increased risk of predation	Moderate	High	Moderate to High	High	Moderate	Moderate	Low	Moderate
Sensory disturbances related to Project activity	The ZOI, the distance over which the combined sensory disturbances created by the Project may influence caribou behaviour, is unknown. As a result, the degree of avoidance, and thus the incremental travel distance, energetic effort and exposure to predators that caribou will experience using these alternate routes is difficult to estimate. These factors can increase levels of stress and energetic output potentially affecting overall health, and calf survival.	Increased stress Increased risk of indirect mortality Potential decrease in calf recruitment / survival	Moderate	High	High	High	Moderate	Moderate	Low	Low
Changes in seasonal migratory patterns	The use of alternate paths may influence the timing and overall behaviours of the migratory herd. These new paths may require a change in timing due to exposure to snow, available cover, ice-free waterbodies. These variables may result in new staging areas that may not have suitable forage for the herd.	Increased stress Increased risk of indirect mortality (energetic output) Increased risk of calf mortality Increased risk of adult mortality Increased risk of predation	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate	Low	Low
Overall risk to caribou migrating via alternate routes for each Project phase, noting that the overall risk is variable relative to distance from the Project Area:			Moderate	High	Moderate to High	High	Moderate	Moderate	Low	Low

Note:
Risk assessment (likelihood or potential impact) is non-cumulative over Project Phases; These risk assessments were considered and inform the mitigation measures presented in Section 5.0 of the CPEEMP

Table 4.3 Description and Assessment of Risk for Failure to Migrate

Failure to Migrate	The failure to migrate is considered an unlikely scenario and there is no published literature indicating that a migratory herd has stopped migrating due to a new Project occurring within or near it's migratory route[1]. Failure to migrate may occur at the individual or group level, however, it is unlikely to be detected unless it occurs at the herd level. If failure to migrate at the herd level were to occur, the caribou could remain north of the site or to the south eliminating the use of their other range (winter or summer/calving). The effects of a failure to migrate would be realized by the Buchans herd, as well as the herds that utilize the same range in which the Buchans herd remains. In the event of a failure to migrate, if the Buchans herd stays to the north on their calving/summer grounds, the Gaff Topsails herd will also be affected. If the Buchans herd stays to the south, the Grey River herd will also be affected. The ZOI, the distance over which the combined sensory disturbances created by the Project may influence caribou behaviour, is unknown. If caribou fail to migrate due to Project-related effects, it is anticipated that it will happen earlier in the life of the Project as the ZOI develops during construction and increases as sensory disturbance from Project activities increase until they peak around Year 3/4 of operations. The ZOI will begin to drop off later in Project operations, through closure and sensory disturbances become nil post-closure. It is expected that the likelihood of a failure to migrate occurring due to Project-related factors will diminish with reduced activity and sensory disturbance levels. The risk assessment below applies to caribou that fail to migrate, whether at the individual, group, or population level, only and is not an assessment of the likelihood that caribou will fail to migrate. As noted above, detection of individuals or groups that fail to migrate is not likely to be possible and may be happening naturally as Buchans herd caribou mix with other herds within the overlap of their existing ranges. As such, the risk assessment below also assumes the failure to migrate occurs at the population level.

Project Effect Pathway	Description	Potential Consequence	Construction		Operations		Closure		Post-Closure	
			Likelihood	Impact	Likelihood	Impact	Likelihood	Impact	Likelihood	Impact
Consolidated home ranges, contraction of home ranges	Combining home ranges (Buchans with Gaff Topsails or Grey River) could result in the contraction of range and competition for forage. Higher densities could not only prove detrimental to forage availability but could change predator success and abundance.	Increased stress Increased risk of direct and indirect mortality Potential decrease in calf recruitment / survival Potential changes in population metrics such as adult males: adults Increased risk of predation	High	High	High	High	High	High	High	High
Increased competition for seasonal food sources	Should a failure to migrate occur, the home ranges of the Buchans herd and the adjacent herd will likely change, potentially increasing competition for available forage and cover.	Increased stress Increased risk of direct and indirect mortality Potential decrease in calf recruitment / survival	High	High	High	High	High	High	High	High
Overall risk to caribou as assessed for individuals, groups, or population failing to migrate for each Project phase:			High	High	High	High	High	High	High	High

[1.] There is evidence related to the creation of Star Lake reservoir, also in the primary corridor, that caribou did alter their path of travel during construction and returned post construction. The creation of the reservoir altered the migratory route temporarily but did not stop the migratory behaviours of the herd (Mahoney and Schaefer 2002). Hydroelectric development and the disruption of migration in caribou. Biological Conservation. 107. 147-153.

Notes::
Risk assessment (likelihood or potential impact) is non-cumulative over Project Phases
These risk assessments were considered and inform the mitigation measures presented in Section 5.0 of the CPEEMP

Table 4.4 Description and Assessment of Risk for Resident Caribou

Resident caribou	Resident caribou, which are caribou that spend a portion of the year within proximity to the Project Area whether part of the Grey River or Buchans herds, may be affected by sensory disturbances within the ZOI, the distance over which the combined sensory disturbances created by the Project may influence caribou behaviour. The ZOI of the Project is unknown (based on available literature ranges from approximately 4 km to 15 km or more and is variable annually, seasonally, and due to other factors), and the response or degree of avoidance that resident caribou may exhibit is also unknown. Resident caribou will move around and may approach or move through the site at times and therefore may have direct interaction with the access road and/or the mine site. Risk to resident caribou due to sensory disturbance or direct interaction with the site will increase as the Project moves through construction and into operation, peaking in Year 3/4 of operations as the Project component footprints are fully developed and site activities peak. Subsequently, the risk to resident caribou will begin to reduce as mining slows and ceases in Year 9/10 of operations and tailings are directed to the Leprechaun pit, and will reduce further with full closure and rehabilitation of the Project commencing in Year 13. The closure phase activity levels (lower than construction) will result in reduced sensory disturbance leading into post-closure where Project-related sensory disturbance will be eliminated with the exception of long-term post-closure monitoring, and only residual physical Project components will remain. The risk assessment below applies to resident caribou, whether at the individual, group, or population level, and is not an assessment of the likelihood that caribou will continue to reside for portions of the year within proximity to the Project Area, or if they will interact directly with the Project Area.									
Project Effect Pathway	**Description**	**Potential Consequence**	**Construction**		**Operations**		**Closure**		**Post-Closure**	
			Likelihood	**Impact**	**Likelihood**	**Impact**	**Likelihood**	**Impact**	**Likelihood**	**Impact**
Direct interaction with Project activities or infrastructure	If resident caribou move close to or through the site, they may encounter Project activities and infrastructure that could result in direct interactions (e.g., vehicle collisions, traversing steep and/or rocky slopes) which in turn result in stress, injury or mortality.	Increased stress Increased risk of direct mortality	Moderate	Moderate to High	Moderate	Moderate to High	Low	Moderate to High	Low	Low
Direct habitat loss related to site clearing, indirect habitat loss due to sensory disturbance and dust	If resident caribou spend time in proximity to, or move through, the Project Area, loss of forage and cover within the Project Area due to clearing and sensory disturbance may increase stress, thereby affecting overall health.	Increased stress Increased risk of indirect mortality Increased risk of calf mortality	Moderate	Moderate	Moderate	Moderate	Low to Moderate	Low	Low	Low
Altered ranges	If resident caribou are influenced by the Project ZOI, it may cause an alteration of their seasonal range, resulting in higher caribou densities, increasing competition for forage and changes to predator success and abundance. This could increase levels of stress and competition potentially affecting overall health, and calf survival.	Increase risk of indirect mortality Decrease in calf recruitment / survival Increased predation risk	Moderate	Moderate	Moderate	Moderate to High	Low	Moderate	Low	Low
Overall risk to resident caribou as assessed for individuals, groups, or population for each Project phase, noting that the overall risk is variable relative to distance from the Project Area:			Moderate	Moderate to High	Moderate	Moderate to High	Low	Moderate	Low	Low
Notes: Risk assessment (likelihood or potential impact) is non-cumulative over Project Phases These risk assessments were considered and inform the mitigation measures presented in Section 5.0 of the CPEEMP										

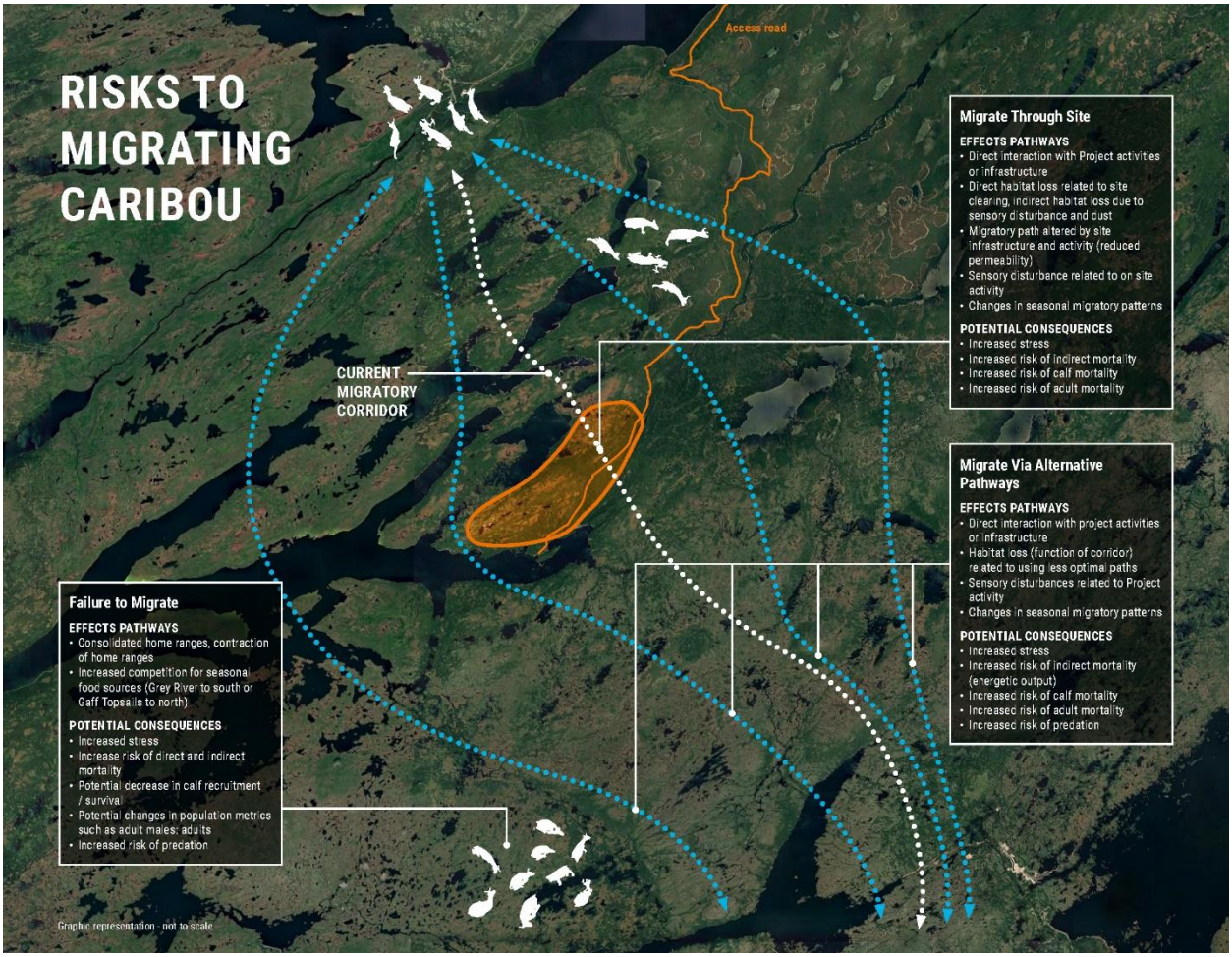


Figure 4-1 Risks to Caribou Associated with Changes to Migration

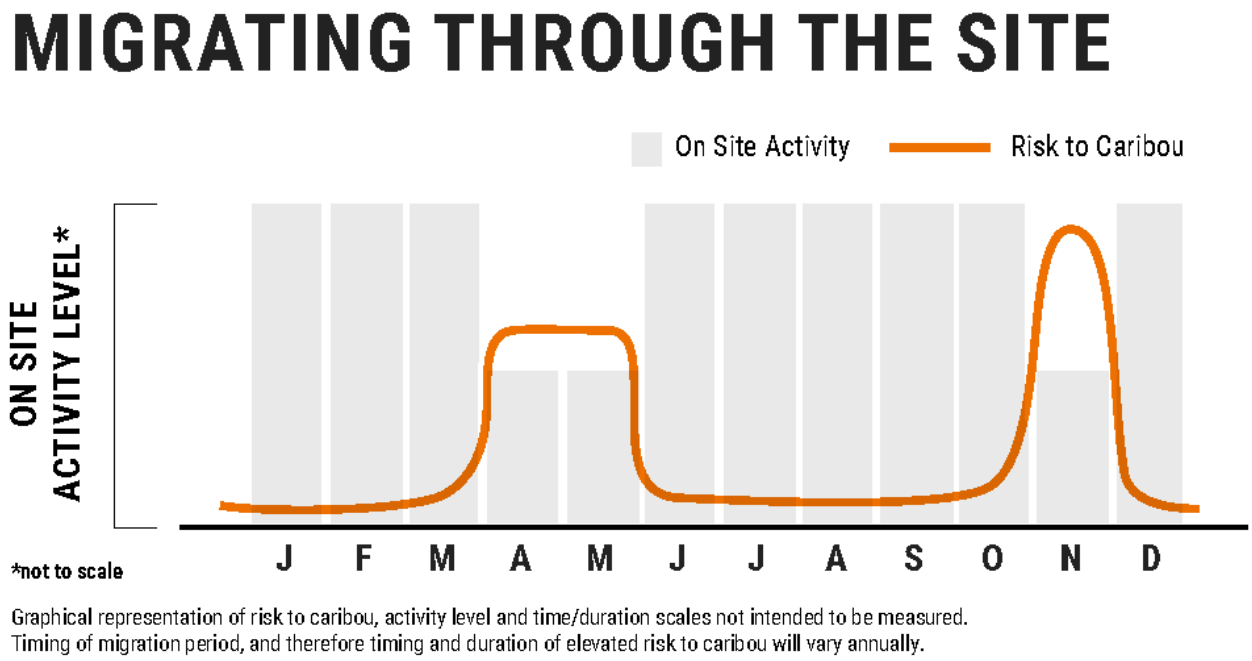


Figure 4-2 Time-Based Risk Levels for Caribou Migrating through Site

5.0 CARIBOU PROTECTION AND MITIGATION MEASURES

To avoid or reduce potential adverse Project effects on caribou, and to reduce the associated risks to caribou as described in Section 4.0, caribou protection and mitigation measures are proposed in correlation with general and specific monitoring programs.

5.1 CARIBOU PROTECTION LEVELS

To effectively address changes in caribou proximity to the Project and behavioural patterns throughout the year, four levels of caribou protection have been established. The protection levels are summarized in Table 5.1 and are shown graphically on a time scale in Figure 5-1.

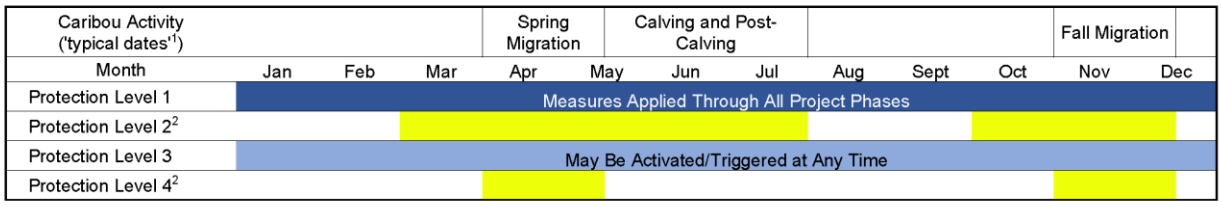
Table 5.1 Levels of Caribou Protection

Caribou Protection Levels[1]	
Protection Level	**Description**
Level 1: Normal Operation	• Always activated • Mitigation in Table 5.3 corresponding to Protection Level 1 always apply • Routine caribou monitoring (see Section 6.0)
Level 2: Site Notification	• Activated during sensitive seasons for caribou (i.e., approaching migration period, calving, post-calving periods) – Triggered three weeks prior to migration period typical[2] dates, minimum; or – If earlier, triggered when collared caribou are detected in the fall having left the Buchans Plateau and are congregating near Star Lake, and in spring when they have crossed between Granite Lake and the Meelpaeg Reservoir – In spring, will continue from spring migration through calving and post-calving period, to July 31 – In fall, will continue until two weeks post-migration (100% of collars southeast of Project Area) • Mitigation and monitoring: – Mitigation in Table 5.3 for Protection Level 2 apply, including but not limited to the following: o Informing/reminding personnel regarding their roles and responsibilities relating to caribou (Section 5.1) o Preparing for Marathon pit area activity suspension, reduced access road traffic, pre-migration inspection of site conditions – Increased level of caribou monitoring (see Section 6.0)

Table 5.1 Levels of Caribou Protection

Caribou Protection Levels[1]	
Protection Level	**Description**
Level 3: Site Alert	• Activated any time of year – Triggered when caribou are detected within 1 km of Project activities any time of year – Will continue until caribou have moved greater than 1 km from Project activities, based on monitoring and review by Environmental Team – May be triggered during the migration periods for individuals or very small groups of animals (<5) using a 3 km zone (see notes below for Protection Level 4) • Mitigation and monitoring: – Mitigation in Table 5.3 corresponding to Protection Level 3 apply – Specifically, Environmental Team will determine if specific Project activities will be reduced or suspended[3]. NLDFFA-Wildlife Division will be immediately contacted notify/consult – Increased level of caribou monitoring (see Section 6.0), specific to caribou within specified zone
Level 4: Reduction or Suspension of Project Activities	• Activated during the spring migration, based on Protection Level 2, migration-specific monitoring: – Triggered when one or more collared caribou cross a 'virtual fence' 10 km southeast of the mine site; or – If earlier, triggered when migrating groups of caribou (> 5 caribou) approach within 3 km (visual, drone, or remote camera observation) – Down-grade to Level 2 when all collared caribou are greater than 3 km north of the site – If individuals or very small groups of migrating caribou (<5 caribou) are observed within 3 km of Project activities, Protection Level 3 will apply using a 3 km zone • Activated during the fall migration, based on Protection Level 2, migration-specific monitoring: – Triggered when one or more collared caribou cross the Lloyds River (roughly 15 km north of the site); or if earlier – Triggered when migrating groups of caribou (>5 caribou) approach within 3 km (visual, drone, or remote camera observation) – Down-grade to Level 2 when all collared caribou are greater than 3 km north of the site – If individuals or very small groups of migrating caribou (<5 caribou) are observed within 3 km of Project activities, Protection Level 3 will apply using a 3 km zone • Mitigation and monitoring: – Level 4 mitigation from Table 5.3 apply, including suspended activity in TMF and Marathon pit areas, reduced access road traffic and possibility of additional Project activity reduction or suspension may be implemented where migrating caribou are observed in close proximity to site features and activity (beyond the Marathon pit and TMF areas) – Continued increased level of caribou monitoring (see Section 6.0)

Notes:
[1] Applies to the construction, operation, and decommissioning phases of the Project.
[2] Current 'normal' windows are April 1 through May 19 (spring migration) and November 1 through December 15 (fall migration) (Emera Newfoundland and Labrador 2013).
[3] Where resident caribou persist to remain near the mine site or Project activities, further measures may be required to deter the animal(s) or protect the animal(s). NLDFFA-Wildlife Division will be consulted if this situation occurs.



Notes: [1] General dates for caribou migration (Emera Newfoundland and Labrador 2013), and may vary annually based on weather and other factors that will be addressed through monitoring

[2] Activation/triggers and duration for Protection Levels 2, 3, and 4 are shown approximately only, actual activation dates and durations will vary based on information gained from the caribou monitoring program.

Figure 5-1 Caribou Activity Timescale

Protection Level 1 mitigation measures and monitoring, which are in place at all times, are focused on reducing risk to resident caribou, with increased mitigation and monitoring activated (Protection Level 3) when caribou move within 1 km of Project activities.

Protection Level 2 increases mitigation measures and monitoring ahead of the Buchans herd's migration periods and during the calving and post-calving period for both the Buchans and Grey River herds. Protection Level 4, which reduces Project activities prior to caribou approaching the site, is activated when the Buchans herd triggers specified thresholds associated with each of the migration periods. Geographical and timing triggers for Protection Levels 2 through 4 are shown graphically on Figure 5-2.

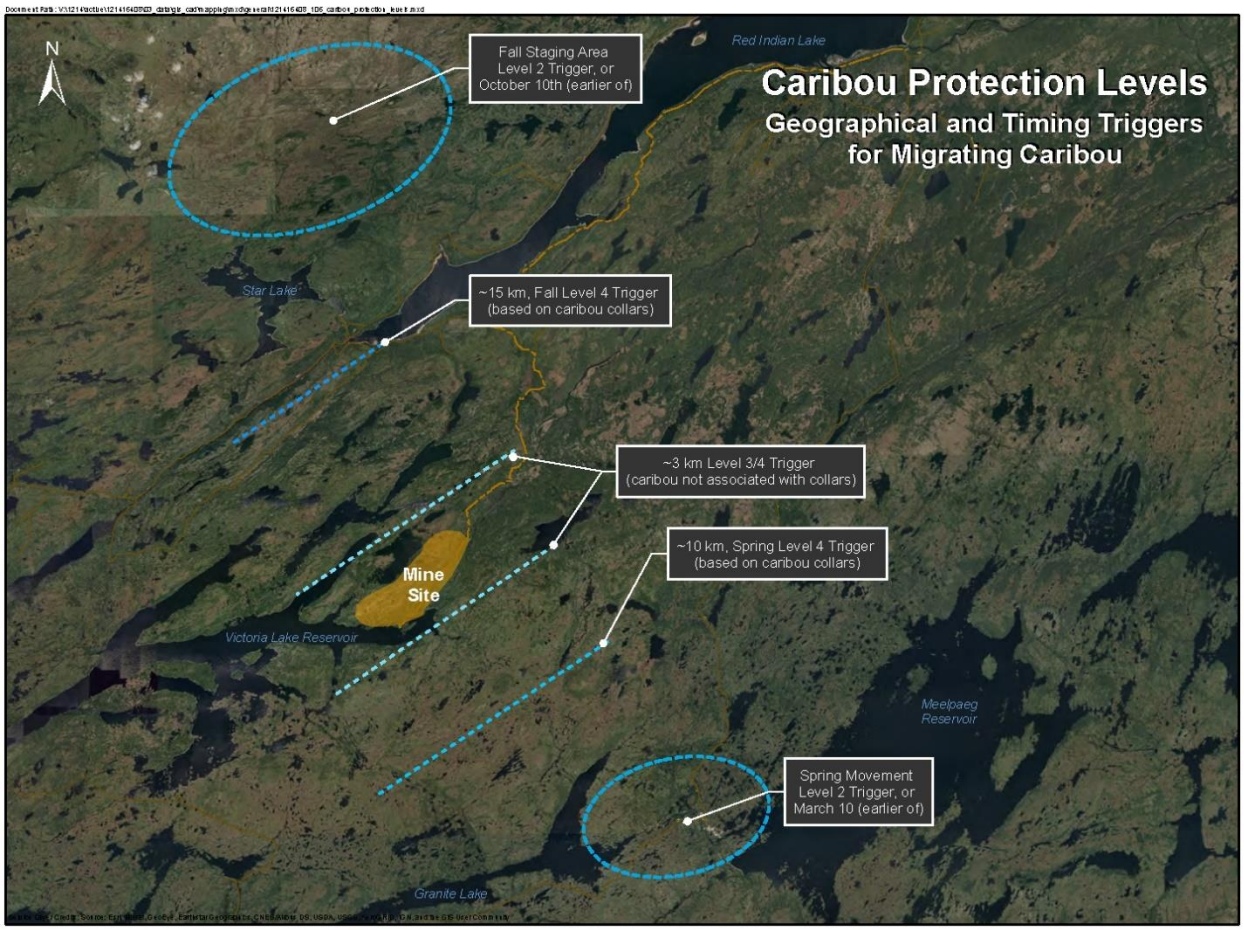


Figure 5-2 Caribou Protection Levels

Protection Level 2 is activated by one of two conditions for each migration period. In the spring, Level 2 will be activated by the earlier of:

1. March 10 (3 weeks prior to published migration period); or
2. Collar monitoring shows caribou moving north of Granite and Meelpaeg Lakes.

In the fall, Protection Level 2 will be activated by the earlier of:

1. October 10 (3 weeks prior to published migration period; or
2. Collar monitoring shows caribou congregating northeast of Star Lake.

Protection Level 3 for migrating caribou is intended to apply to individuals or small groups (<5) of caribou that may migrate ahead of, or behind the primary migration. In this case, mitigation measures and monitoring would already be at Protection Level 2, and identification of individual or very small groups of

migrating caribou within a 3 km threshold of the site would result in the quick reduction or suspension of activities based on the location and movement of the caribou and would likely be of short duration unless there are multiple individuals or small groups migrating separately.

Protection Level 4 requires different activation triggers for each migration period due to the differences in the behaviour of caribou in spring and fall. Data used in the interpretation of migration timing, duration, and group size is presented in Appendix B.

During the spring migration, caribou move slowly relative to the fall migration, in smaller groups (average less than five caribou) and are more spread-out geographically as they approach the site. The existing data for the spring migration also indicates less certainty in the timing and location of caribou movements during migration. In the fall, caribou move very quickly, in larger groups (average approximately ten caribou), within a well-defined corridor, and most of the herd pass through the migration corridor thresholds outlined below in less than a week

Establishing triggers and thresholds to activate the protection levels for the fall migration is relatively straight forward based on their behaviours:

- Pre-migration staging in the area north/northeast of Star Lake requires activation of Protection Level 2 if not already activated based on timing (October 10).
- Collared animals crossing the Lloyd's River provide an approximate 15 km trigger to activate Protection Level 4 as these caribou will travel to the site in two to three days. Smaller groups of caribou may migrate ahead of the primary migration, noting that in the fall of 2021, two collars passed through the migration corridor approximately three weeks ahead of the primary migration.
- The narrow crossing area at the northeast end of Valentine Lake approximately 3 km northwest of the site is a relatively open area where caribou that may not be moving in proximity to a collared caribou can be observed visually, using drones, and/or remote cameras.

Establishing triggers and thresholds to activate protection levels for the spring migration is more challenging due to the slower and more geographically spread-out movement, and even increased vegetation and generally visibility southeast of the Project Area:

- Caribou have crossed between Granite Lake and the Meelpaeg Reservoir requires activation of Protection Level 2 if not already activated based on timing (March 10).
- Collared animals crossing a 'virtual fence' 10 km southeast of the Project Area will activate Protection Level 4.
- The ridgeline south of the Victoria River valley, and approximately 3 km southeast of the site includes bogs and partially open areas where caribou can generally be observed visually, using drones, and/or remote cameras.

Marathon will employ additional monitoring resources for the spring 2022 migration (prior to construction) to collect additional data and to determine the best monitoring approach and location specific to the spring migration in consultation with NLDFFA-Wildlife Division.

Monitoring levels associated with each caribou protection level are described as follows, with additional information on specific monitoring equipment and approach provided in Section 6.0:

- Routine monitoring under Protection Level 1 will include review of caribou sightings by employees and contractors, environmental personnel monitoring for caribou during other site-wide environmental data collection, regular checks of remote camera images and collar data.
- When Protection Level 2 is activated, employees and contractors will be notified and asked to actively look for caribou. Environmental personnel will visit look-out locations daily (or more frequently if required) to monitor for caribou activity. If Protection Level 2 is activated based on the date trigger, collar data monitoring will be completed throughout each day, and once caribou are staging near the Protection Level 4 activation thresholds, a caribou monitoring team will commence monitoring at and within the 3 km thresholds using visual vantage points, drones, and remote cameras. The frequency and duration of caribou monitoring will depend on the proximity of caribou per collaring data and/or visual observation, increasing as the primary migration approaches (and decreasing once the migration has passed)
- When Protection Level 3 is activated, monitoring by Environmental personnel and/or the caribou monitoring team will be specific to the caribou within proximity to the mine site (1 km or 3 km depending on the timing).
- When Protection Level 4 is activated all monitoring activities (visual, cameras, collars). Specific environmental and/or caribou monitoring team members will collect demographic data where possible, and monitor caribou behaviour associated with Project components and activities.

As detail around visual monitoring locations, camera locations, assigned monitoring personnel, and specific methodology for monitoring is developed, this CPEEMP will be updated to include that information.

5.2 MITIGATION

The mitigation hierarchy, which has been applied elsewhere for caribou (e.g., Alberta; British Columbia) is: 1) Avoid; 2) Reduce; 3) Restore; and 4) Offset. Consistent with standard practice, Marathon is focused on avoiding and reducing the risk of potential Project effects on caribou to the extent feasible. Restoration and offsetting are generally not considered feasible in relation to impacts on caribou for this Project.

Based on the assessment of risks to caribou presented in Section 4.0, Marathon has employed a similarly systematic approach to the assessment of potential mitigation measures to reduce the risks associated with all Project phases, potential Project effect pathways, and the range of caribou responses and levels of response to the Project. The Mitigation Evaluation Matrix presented in Table 5.2 has been used with the results of the risk assessment to develop the mitigation measures presented in Tables 5.3 through 5.5.

Additional mitigation may be determined or established through ongoing consultation with regulators, Indigenous groups and stakeholders, through additional baseline studies, detailed engineering, or

monitoring. Additional mitigation identified could be new or an adaptation of an existing mitigation, and would subsequently be added to the appropriate table. Where a Tier 1 mitigation is adapted to a Tier 2 mitigation based on monitoring results (adaptive management process), the Tier 1 mitigation table will be updated to show the Tier 1 mitigation is no longer being used, and direct the reader to the appropriate mitigation in the Tier 2 table.

Mitigation and associated monitoring actions will be regularly reviewed (annually at a minimum) and updated or revised as required in consultation with NLDFFA-Wildlife Division.

Table 5.2 Mitigation Evaluation Matrix - Migration

Mitigation Evaluation Matrix - Migration										
Response		Migration Through Site			Migration Route Offset (1 to 5 km)		Migration Route Offset (5 to 15 km)		Failure to Migrate	
Level of Response		Individuals	Groups	Population	Groups	Population	Groups	Population	Groups	Population
Mitigation Level	Tier 1	?	?	?	?	?	?	?	?	?
	Tier 2 (Adaptive Management Level 1)	?	?	?	?	?	?	?	?	?
	Tier 3 (Adaptive Management Level 2)	?	?	?	?	?	?	?	?	?

Use of Matrix:

- Used to systematically assess potential mitigation based on caribou response and level of response to the Project
- Each response and level of response is evaluated and appropriate mitigation considered based on a tiered approach as follows:
  - Tier 1 - Mitigation to be implemented initially, not tied to monitoring and/or adaptive management
  - Tier 2 - Refinement of Tier 1 mitigations or additional mitigation to be implemented based on monitoring (adaptive management Level 1), if applicable
  - Tier 3 - Refinement of Tier 2 mitigation or additional mitigation to be implemented based on monitoring (adaptive management Level 2), if applicable

  Note: Example of a refinement of a lower tier mitigation could be a change in the applicable threshold applied (e.g., distance)
- Mitigation associated with each response and level of response are considered for all potential effects pathways for each primary Project effect (change in habitat, movement, or mortality)
- In the event of a mixed response by caribou to the Project (e.g., some caribou migrate through the site, while others migrate at an offset distance), mitigation developed for each response and level of response (that aren't already implemented) can be implemented or adapted as required
- Matrix is used to evaluate all of the above variables for each phase of the Project - Construction, Operations, Closure, and Post-Closure

The ongoing planning and design phases of the Project have focused on avoiding and reducing the risk of Project effects to caribou since the EA for the Project commenced. The following site design changes have occurred (since filing the EIS), as shown in corresponding Figures 5-3, 5-4, and 5-5:

- As shown by the changes between the EA Registration/Project Description (Marathon 2019) site plan (Figure 5-3) and the site plan subsequently submitted with the Valentine Gold Project EIS (Marathon 2020) (Figure 5-4), the following scope and design changes were implemented:
  - The Victory deposit (pit) and waste rock pile was removed from the Project scope, avoiding additional Project activities and infrastructure that could further affect migrating caribou.
  - The heap leach pad and process were removed from the Project scope, reducing Project footprint.
  - Due to the interaction of a potential TMF dam failure with the Victoria Dam, the TMF required relocation. The siting study considered 14 new potential sites, a number of which were not carried forward due to their impacts on caribou migration. While the updated TMF location created a higher potential effect on caribou than previous, the siting considered key factors (including caribou, potential impacts on the Victoria Dam and fish habitat) and the revised location was selected.
  - The process plant was moved to the west of the revised TMF location, reducing potential sensory disturbance along the primary migration corridor/paths.
  - Based on consultation with NL Hydro and NLDFFA-Wildlife Division, the proposed transmission line route was aligned with the existing access road through the migration corridor and to the northeast, which avoids creating a new linear feature and reduces direct effects on habitat.

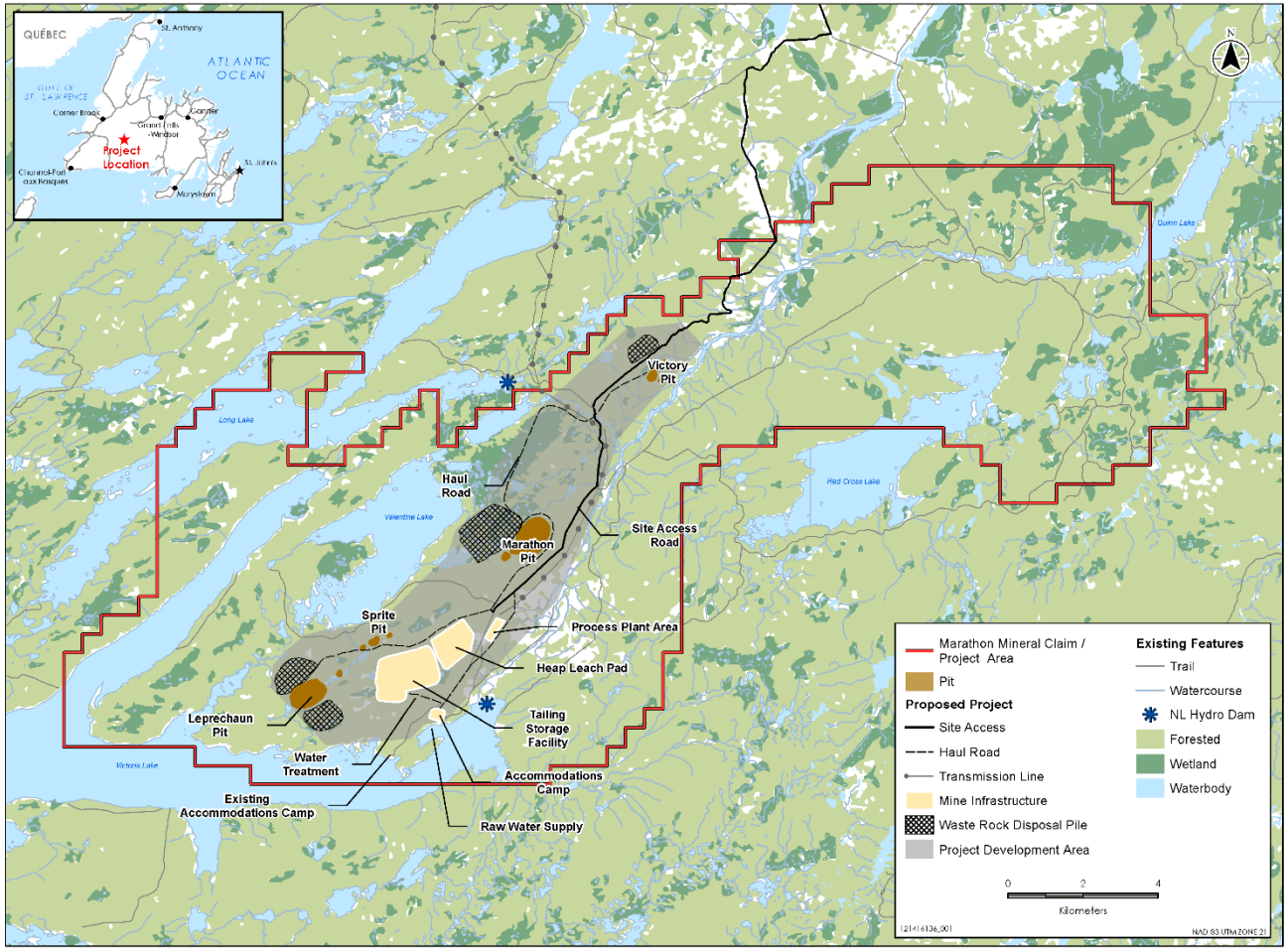


Figure 5-3 Site Plan from the EA Registration

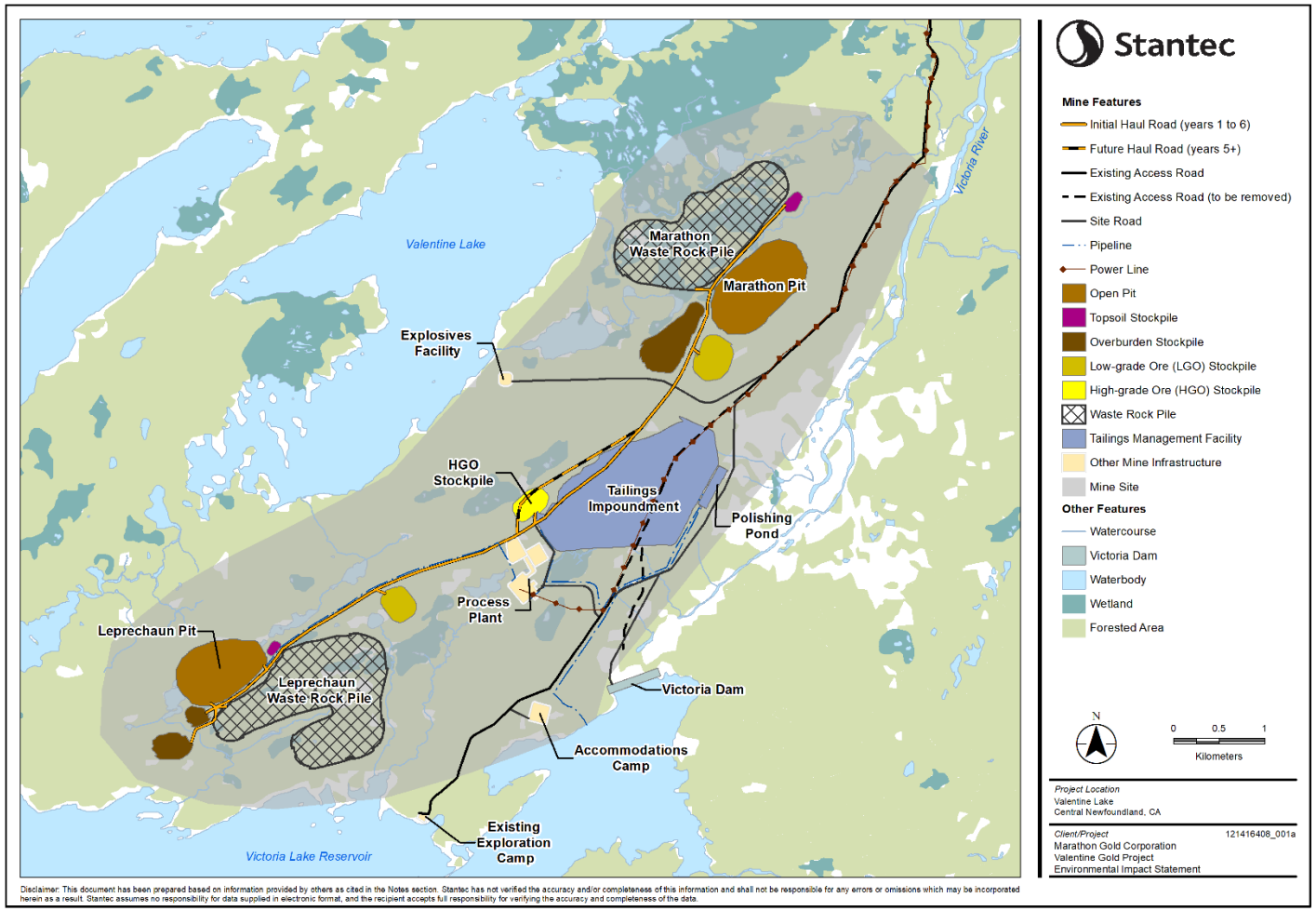


Figure 5-4 Site Plan from the EIS issued September 30, 2020

- As shown by the changes between the EIS site plan (Marathon 2020) (Figure 5-4) and the latest site plan (Figure 5-5), the following design changes have been implemented:
  - The water treatment plant and polishing pond have been relocated closer to the plant. The activities and sensory disturbance associated with these features are now further to the west of the primary migration corridor.
  - Ongoing consultation with the NLDFFA-Wildlife Division regarding the options to accommodate caribou that may choose to migrate through the Project Area to the west of the Marathon open pit and waste rock pile, thereby improving permeability of the migratory corridor during all phases of the Project, has resulted in proposed changes to the Marathon waste rock pile and overburden and low-grade ore stockpiles. The layout of the waste rock pile has been revised to narrow the dimension of the pile perpendicular to the migration corridor and to provide a barrier to caribou on approach to each side of the pit. To further improve permeability, the low-grade ore stockpile has been relocated to the west, and the overburden stockpile has been shifted west to open a corridor between the stockpiles and the open pit and waste rock pile through which caribou can travel. Marathon will continue to review this design through detailed engineering to maximize the width of this corridor. The haul road and ditching design in this corridor will also consider caribou movement. As the overburden and low-grade ore stockpiles will be removed and the areas rehabilitated during closure, the post-closure corridor will be further widened.
  - Through further engineering analysis, the transmission line has been reduced from a double pole design to a single pole design, which reduces the overall clearing requirements (width of the right of way).
  - Based on further consultation with NL Hydro and NLDFFA-Wildlife Division, the proposed transmission line route was aligned with the existing access road all the way to Star Lake Terminal which avoids creating a new linear feature and further reduces direct effects on habitat, and is further away from potential alternate caribou migration routes that caribou may use following commencement of construction and subsequent operation of the Valentine Gold Project.

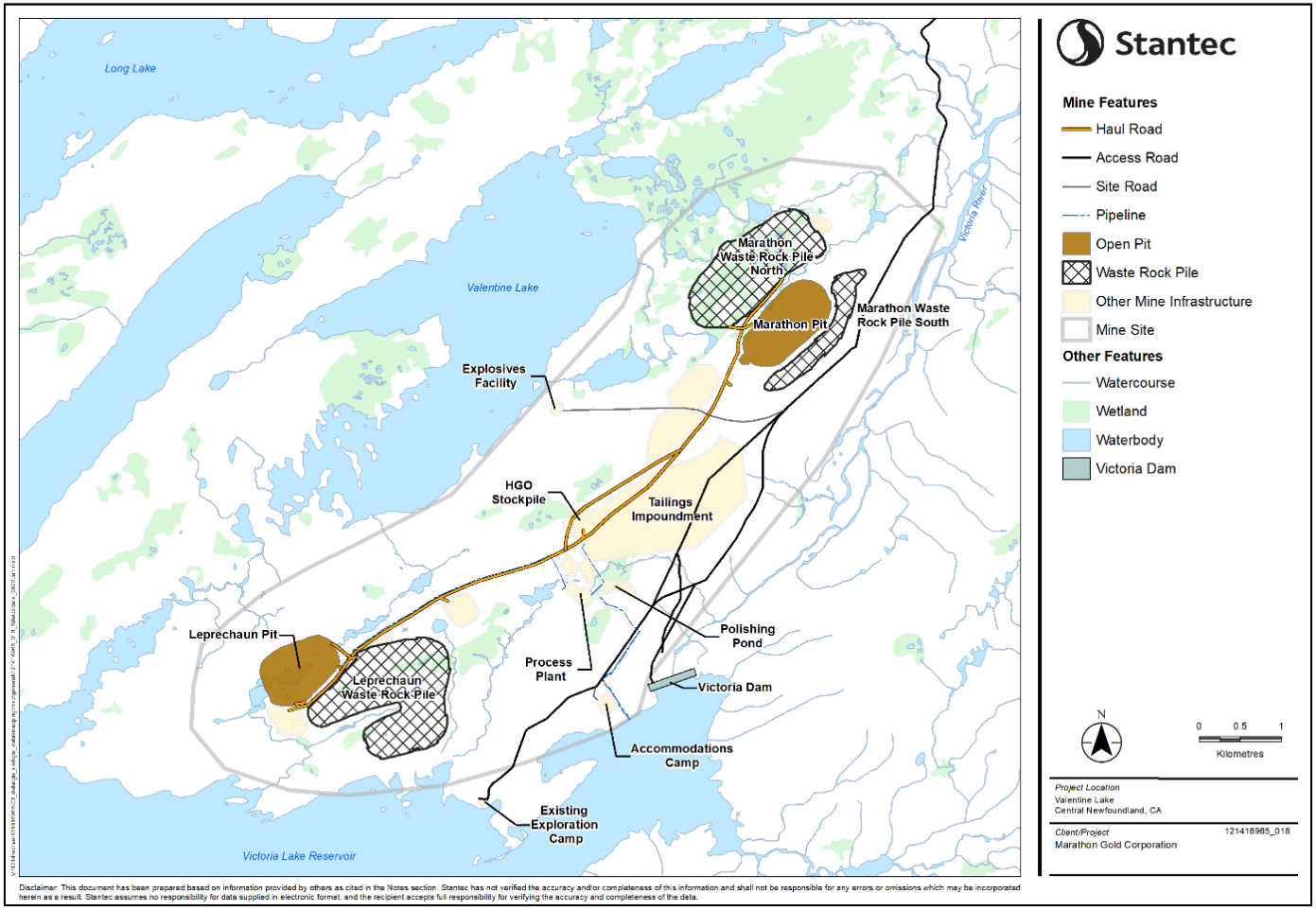


Figure 5-5 Revised Site Plan

While design and scope changes have considered risks to caribou, and have predominantly been positive in this respect, risks associated with Project components and activities remain and the mitigation measures presented in the following tables are designed to reduce risks to caribou.

Table 5.3 presents the Tier 1 mitigation list, which are mitigation measures that will be implemented for the Project. These mitigation have been previously presented in the Valentine Gold Project EIS submitted, with several revised or updated mitigation measures presented.

Table 5.4 presents the Tier 2 mitigation list, which presents potential mitigation refinements or adaptations that may be implemented if monitoring determines this requirement. Tier 2 mitigation measures are considered the first adaptive management level of mitigation.

Table 5.5 presents the Tier 3 mitigation list, which presents potential mitigation refinements or adaptations that may be implemented if monitoring determines this requirement. Tier 3 mitigation measures are considered the second adaptive management level of mitigation.

Tables 5.3 to 5.5 also present the direct monitoring approach or action used to evaluate the effectiveness of each mitigation, the potential monitoring outcomes, and response or next steps associated with each outcome.

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM001	✓	✓	✓	-	Change in Habitat	Maintain forage and cover, reduce sensory disturbance	Project footprint and disturbed areas will be limited to the extent practicable.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Monitor clearing and land disturbance during construction and operations for compliance with design features and planned clearing limits	Clearing or disturbance is consistent with design features and planned clearing limits	None
																				Clearing or disturbance occurring beyond design or planned clearing limits	Correct in consultation with Engineering and Construction teams
																				Requirement for clearing or disturbance beyond design identified during construction	Tier 2 Mitigation - see table
CM002	✓	✓	-	-	Change in Habitat	Maintain forage and cover, reduce sensory disturbance	Vegetation will be maintained around high activity areas to the extent practicable, to serve as a buffer to reduce sensory disturbance.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Monitor clearing during construction and operations for compliance with design features and planned clearing limits	Clearing is consistent with design features and planned clearing limits	None
																				Clearing occurring beyond design or planned clearing limits	Correct in consultation with Engineering and Construction teams
CM003	✓	✓	✓	✓	Change in Habitat	Maintain forage and cover	Where crossing of wetlands (with equipment and/or vehicles) is unavoidable, protective layers such as matting or biodegradable geotextile or other approved materials will be used between wetland root / seed bed and construction equipment if ground conditions are encountered that create potential for rutting, admixing, or compaction.	✓	-	1	✓	✓	✓	✓	✓	-	-	-	Environmental personnel will monitor/inspect activities that may require travel over wetlands during all Project phases	Crossing of wetlands completed using appropriate protective measures	None
																				Crossing of wetlands not completed using appropriate protection measures	Take corrective action in terms of completing the work, rehabilitate disturbed areas

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed									
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM004	✓	✓	-	-	Change in Habitat	Maintain forage and cover, reduce sensory disturbance	Transplant/plant larger trees where appropriate/advantageous to improve vegetation cover and reduce sensory disturbance	✓		1	✓	✓	✓	✓	✓	✓	-	-	Monitoring approach not applicable. Noise monitoring may result in this mitigation being implemented for adaptive management	n/a	n/a
CM005	✓	✓	✓	✓	Change in Habitat	Reduction of sensory disturbance	Engines and exhaust systems of construction and mining equipment will be subject to a comprehensive equipment preventative maintenance program to maintain fuel efficiency and performance. Vehicles and heavy equipment will be regularly inspected and maintained in good working order and will be equipped with appropriate mufflers to reduce noise	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Noise monitoring of equipment directly or indirectly (general noise monitoring), audit of equipment/vehicle inspection records	Equipment noise levels within operating range specified by the manufacturer for each equipment unit; inspections/maintenance program being followed; general noise levels within acceptable level	None
																				Equipment noise levels above operating range specified by the manufacturer for each equipment unit, or inspections/maintenance program not being followed; general noise levels within acceptable level	Implement corrective actions - inspections, maintenance
																				Equipment noise levels above operating range specified by the manufacturer for each equipment unit, or inspections/maintenance program not being followed; general noise levels above acceptable level	Tier 2 Mitigation - see table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed							Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate			
CM006	✓	✓	✓	-	Change in Habitat	Reduction of sensory disturbance; reduction of direct mortality risk; maintain migratory corridor permeability	The transportation of workers and materials to and from the site via the access road will be managed through a Traffic Management Plan to reduce traffic frequency (reducing noise, dust, mortality risk)	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Monitor traffic volumes, efficacy (loaded both directions), timing (daylight driving)	Traffic monitoring determines that Project traffic is efficient (e.g., no half-loads) and operating in accordance with protocols within the Traffic Management Plan	None
																				Traffic monitoring determines that Project traffic is not efficient and/or not operating in accordance with protocols within the Traffic Management Plan	Implement corrective actions - trucks loaded both directions, daytime driving only, other
CM007	✓	✓	✓	-	Change in Habitat	Maintain forage and cover; reduce sensory disturbance; maintain migratory corridor permeability	Vehicles (including off-highway vehicles) used by Marathon personnel will be restricted to roads, trails, and corridors to the extent practicable	✓	-	1	✓	✓	✓	✓	✓	-	-	-	Monitoring via inspection by environmental personnel	Vehicles using roads, trails and corridors only	None
																				Vehicles traveling in areas other than road, trails and corridors (e.g., across wetlands)	Implement corrective actions - additional signage, employee/contractor education, rehabilitation of impacts
CM008	✓	✓	✓	✓	Change in Mortality	Reduction of direct mortality risk; reduction of sensory disturbance	Caribou will have the right-of-way except where deemed unsafe to Project personnel. If wildlife is observed on a road, speed will be reduced and vehicle stopped, if necessary, to allow wildlife to pass and leave road. Specific protocols are provided in Section 5.2.2 of this document.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Visual monitoring on site and along access road for conformance with protocols, review of employee caribou observation reports	Conformance with protocols	None
																				Conformance with protocols	Implement corrective actions - employee/contractor discipline, further employee/contractor education, utilize data from observation reports and/or near-miss incidents to refine protocols

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM009	✓	✓	✓	✓	Change in Mortality	Reduction of direct mortality risk; reduction of sensory disturbance	Project vehicles will be required to comply with posted (or specified) speed limits and all traffic signage along the access road, site roads and haul roads	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Visual and radar monitoring along roadways for compliance with rules. Haul trucks are equipped with telemetry equipment that is recorded and can be monitored remotely	Compliance with speed limits, signage and other traffic rules/protocols	None
																					Non-compliance with speed limits, signage and other traffic rules/protocols	Implement corrective actions - employee/contractor discipline, further employee/contractor education, utilize data from observation reports and/or near-miss incidents to refine protocols
CM010	✓	✓	✓	✓	Change in Mortality	Reduce direct mortality risk; reduce sensory disturbance	Project vehicles along the access road, site roads and haul roads may be required to comply with reduced speed limits and additional traffic control measures when specific management level are implemented. May include speed restrictions and/or additional traffic controls for specific areas of the site (site and haul roads), or along the access road.	-	-	2 and 3	✓	✓	✓	✓	✓	✓	✓	✓	Visual and radar monitoring along roadways for compliance with rules. Haul trucks are equipped with telemetry equipment that is recorded and can be monitored remotely	Compliance with speed limits, signage and other traffic rules/protocols	None
																					Non-compliance with speed limits, signage and other traffic rules/protocols	Implement corrective actions - employee/contractor discipline, further employee/contractor education, utilize data from observation reports and/or near-miss incidents to refine protocols

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed									
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM011	✓	✓	✓	✓	Change in Mortality; Change in Movement	Reduce direct mortality risk; reduce sensory disturbance; maintain migratory corridor permeability	Project vehicles along the access road, site roads and haul roads will be required to comply with reduced speed limits and additional traffic control measures during the fall and spring migration periods. This is in addition to the suspension of activities in the Marathon pit area.Includes speed limit reductions for site roads, section(s) of the access road within the migration corridor with appropriate buffers, night driving will be prohibited along the access road except for emergencies, convoys will be utilized to the extent possible, increased traffic control signage within the migration corridor and at known crossing locations	-	✓	4	✓	✓	✓	✓	✓	✓	✓	✓	Visual and radar monitoring along roadways for compliance with rules. Haul trucks are equipped with telemetry equipment that is recorded and can be monitored remotely	Compliance with speed limits, signage and other traffic rules/protocols Non-compliance with speed limits, signage and other traffic rules/protocols	None Implement corrective actions - employee/contractor discipline, further employee/contractor education, utilize data from observation reports and/or near-miss incidents to refine protocols

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM012	✓	✓	✓	-	Change in Mortality; Change in Movement	Reduce direct mortality risk; reduce sensory disturbance; maintain migratory corridor permeability	Project-related traffic on the access road will be further reduced during migration periods – via the Traffic Management Plan and logistics/warehouse management systems, protocols will be developed to maximize supply and warehousing levels prior to the migration periods, as well as manage contractor-related work and rotation changes to the degree practicable (also considering worker health and safety) to reduce traffic levels during the migration period. Logistics prior to, during, and post-migration periods will be integrated with the migration-period caribou monitoring and the associated thresholds for increased caribou protection levels.	-	✓	4	✓	✓	✓	-	✓	✓	✓	✓	Monitoring of traffic volumes (counts) and for conformance with associated traffic protocols. Reduction target will be 60% traffic volume relative to average traffic levels, noting that accurate estimates of traffic volumes may be difficult to determine due to contracting schedules. Marathon will continuously review logistics during construction, operations, and closure, and target the maximum reduction in traffic levels practicable during migration periods.	Reduction of traffic volumes to 60% or less than average traffic levels; traffic protocols being followed	None
																					Reduction of traffic volumes to 60% or less than average traffic levels not achieved; traffic protocols not being followed	Implement review of traffic reduction measures, taking additional actions where possible; further employee/contractor education
																					Reduction of traffic volumes to 60% or less than average traffic levels not achievable due to length of migration period (e.g., spring period longer) or inability to store sufficient supplies	Tier 2 Mitigation - see table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed									
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM013	✓	✓	✓	✓	Change in Habitat	Reduce sensory disturbance	Project-related air traffic (helicopters) will maintain a minimum altitude of 500 m to the extent feasible at all times of the year. Where caribou are observed along the flight path, the path will be altered by 1 km to avoid passing directly overhead of caribou where safe or possible to do so. Air traffic is expected to be limited and low altitude flying is only expected to be required adjacent to a site landing area. Protocols will be reviewed with the helicopter contractor prior to flights.	✓	-	1	✓	✓	✓	✓	-	-	-	-	Monitor air traffic protocols via Project-related pilot and/or passenger reports	Air traffic protocols followed	None
																					Air traffic protocols not followed	Implement corrective actions with helicopter contractor - pilot training, change contractors if repeated issues
CM014	✓	✓	✓	✓	Change in Habitat	Reduce sensory disturbance	Air traffic (helicopters) will be limited or suspended during caribou migration and calving periods except when used for caribou studies. If air travel is required during the migration period, air traffic will avoid traveling within 5 km of the primary migratory corridor, except on approach/departure from the site. Protocols will be reviewed with the helicopter contractor prior to flights.	-	✓	4	✓	✓	✓	✓	✓	✓	✓	✓	Monitor air traffic protocols via Project-related pilot and/or passenger reports	Air traffic protocols followed	None
																					Air traffic protocols not followed	Implement corrective actions with helicopter contractor - pilot training, change contractors if repeated issues

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed									
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM015	✓	✓	✓	✓	Change in Mortality	Reduce direct mortality, reduce sensory disturbance, reduce direct and indirect effect on resource users	Hunting will be strictly prohibited on the mine site. Workers will not be permitted to hunt while staying at the accommodations camp and will not be permitted to bring firearms to site.	✓	-	1	✓	✓	✓	-	✓	✓	✓	-	Site security, environmental and transportation personnel will observe and report infractions.	Workers complying with rules	None
																				Workers not complying with rules	Workers caught breaking rules will be subject to discipline, up to and including dismissal in accordance with Marathon's policies.
CM016	✓	✓	✓	✓	Change in Habitat, Change in Movement, Change in Mortality	Reduce direct mortality, reduce sensory disturbance, maintain forage and cover, maintain migration corridor permeability, reduce direct and indirect effects on resource users	Educate employees and contractors regarding caribou protection and monitoring. A specific component of the employee and contractor induction and ongoing training programs will be focused on the CPEEMP and the roles and responsibilities under the Plan as further described in Section 5.2.1 of this document. Contract documentation for applicable contracts will include the CPEEMP. Notices and 'reminder' documentation will be issued prior to migration periods and if management levels are increased.	✓	-	All	✓	✓	✓	-	✓	✓	✓	✓	Tracking and auditing employee and contractor records regarding induction and update training (also a requirement under the Project Environmental and Social Management System). Audits of contract documentation.	Tracking and audits show compliance with induction, training, and documentation requirements for employees and contractors	None
																				Tracking and audits show non-compliance with induction, training, and documentation requirements for employees and contractors	Implement corrective actions (also per the ESMS) to ensure compliance with induction, training, and documentation requirements

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed							Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate			
CM017	✓	✓	✓	✓	Change in Movement	Maintain migratory corridor permeability	Breaks in snowbanks associated with snow clearing along roadways will be created at ~200 m intervals, to the extent practicable, through the migratory corridor to provide caribou with crossing opportunities. Where feasible, breaks will be aligned on opposite sides of the road and with existing wildlife trails (where these occur). Snowbanks will typically be < 1 m tall to facilitate caribou crossing roadways during spring and fall migration. To be applied for all roads east of the plant site, and on the access road from site to the Roebucks turn-off.	✓	-	1	✓	✓	✓	-	✓	✓	✓	-	Observation of caribou use of breaks and reaction to road crossing (visual - caribou or tracks, collar, camera). Inspection of snow clearing along identified roadway sections	Snow clearing protocols followed	None
																				Snow clearing protocols not being followed	Implement corrective actions with snow clearing contractor - operator education, replace operator or contractor if repeated non-compliance
																				No indication/evidence of road crossing issues (redirection, avoidance, etc.)	None
																				Indication/evidence of issues for caribou crossing road due to snowbanks	Increase frequency of breaks and/or lower bank height
CM018	✓	✓	✓	✓	Change in Movement	Maintain migratory corridor permeability	Water management ditches will be designed, constructed and maintained to allow wildlife crossing opportunities	✓	-	1	✓	✓	✓	-	✓		-	-	Monitor via on-site monitoring and collar data to determine if caribou hesitant or encounter issues crossing water management ditches	Caribou observed (directly and/or through hoof print/trail evidence) crossing water management ditches without issue	None
																				Caribou avoiding crossing water management ditches	Tier 2 Mitigation - see table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
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Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate			
CM019	✓	✓	-	-	Change in Habitat	Reduce sensory disturbance	Visual and/or drone surveys for caribou will be undertaken prior to blasting for construction and operations. For construction blasting (civil works) and during pit development, which includes near-surface blasting, the search zone will be 1 km from the blast. After the pit perimeter is developed and blasting is more than 50 m below the pit crest (whereby noise and vibrations will be reduced for receptors) the clearance zone will be a 500 m buffer from the final pit perimeter. Blasting will be delayed if caribou are observed within these zones.	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Regular reviews of collar data, visual and/or drone surveys will be utilized to determine if caribou are within the specified zone prior to blasting. Noise and ground vibration will be monitored via stations established at the site. If caribou are detected outside the specified zone but within a 3 km radius of the blast, visual monitoring of the caribou will be conducted to determine if they animal(s) have an adverse reaction to the blast event.	Caribou identified within the specified zone	Blasting operations suspended until caribou clear the zone
																				No caribou identified within the specified blast zone and no caribou within a 3 km radius	None, blasting operations permitted
																				No caribou identified within the specified blast zone; caribou within a 3 km radius but no adverse reaction to blast event	None, blasting operations permitted
																				No caribou identified within the specified blast zone; caribou within a 3 km radius show adverse reaction to blast event	Tier 2 Mitigation - see table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM020	✓	✓	-	-	Change in Habitat; Change in Movement	Maintain migratory corridor permeability, reduce sensory disturbance	Construction and production blasting in the Marathon pit area and TMF area will be suspended during the spring and fall migration periods.	-	✓	4	✓	✓	✓	✓	✓	✓	-	-	Monitoring associated with triggering this mitigation is conducted as part of the collar monitoring program - assessing caribou movements as the migration period approaches to trigger the suspension of blasting activities in the Marathon pit and TMF area. See Table 5.1 regarding caribou Protection Levels and triggers, and Section 6.0 regarding monitoring. Monitoring the outcome of this mitigation is tied to the overall monitoring of caribou response to the Project during migration. See Section 6.0 for further details.	See Section 6.0 of this document regarding potential monitoring outcomes (caribou response)	See Section 6.0 of this document regarding potential monitoring outcomes (caribou response) - as this mitigation relates to the suspension of activities during the migration, the response or next steps will likely be associated with other Project activities and not this specific mitigation.

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Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
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Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM021	✓	-	-	-	Change in Habitat; Change in Movement	Maintain migratory corridor permeability, reduce sensory disturbance	Construction blasting in the Plant and Leprechaun pit area is expected to be limited. During the construction phase of the Project, scheduling of construction-related (civil) blasting will be scheduled outside of the migratory periods to the extent practical. If necessary during the construction period, blast design will be reduced to minimize noise and vibration, noting that current predictive modeling indicates noise levels will be less than 40 dBA and vibration levels (peak particle velocity) less and 5 mm/s, within the primary caribou migration corridor approximately 2 to 8 km from the potential blast areas.	-	✓	4	✓	✓	✓	✓	✓	✓	-	-	Visual and/or drone monitoring will be conducted to determine if there is an adverse reaction from caribou migrating through Project Area.	No adverse reaction of caribou to blasting event	None
																					Startle or other adverse reaction of migrating caribou to blasting event	Suspend construction blasting operations until migratory period complete, corresponding in reduction of caribou Protection Level from 4 to 2.

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Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM022	✓	✓	-	-	Change in Habitat	Reduce sensory disturbance	Production blasting in Leprechaun pit during construction and operations phases is planned to continue during the migration period as current predictive modeling indicates noise levels will be less than 40 dBA and vibration levels (peak particle velocity) less and 5 mm/s, within the primary caribou migration corridor, located approximately 5 to 8 km from the pit. Visual and/or drone surveys for caribou will be undertaken prior to blasting and during the migration period, the search zone will be 2 km from the pit. Blasting will be delayed if caribou are observed within 1 km, and if groups of 10 caribou or more are observed within 2 km.	-	✓	4	✓	✓	✓	✓	✓	✓	✓	-	Visual and/or drone surveys will be utilized to determine if caribou are within the specified zone prior to blasting. Noise and ground vibration will be monitored via stations established at the site. If caribou are detected outside the specified zone but within a 3 km radius of the blast (corresponding to Protection Level 2), visual monitoring of the caribou will be conducted to determine if they animal(s) have an adverse reaction to the blast event.	Caribou identified within the specified zone	Blasting operations suspended until caribou clear the zone
																					No caribou identified within the specified blast zone and no caribou within a 3 km radius	None, blasting operations permitted
																					No caribou identified within the specified blast zone; caribou within a 3 km radius	Blasting operations permitted, visual monitoring of caribou reaction to blast event
																					No caribou identified within the specified blast zone; caribou within a 3 km radius show adverse reaction to blast event	Tier 2 Mitigation - see table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																				
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Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM023	✓	✓	✓	-	Change in Habitat	Reduce indirect habitat loss, reduce sensory disturbance, maintain migratory corridor permeability	Activities in the Marathon pit area, including the Marathon waste rock pile, overburden and topsoil stockpiles, and low grade ore stockpile, that result in sensory disturbance to caribou (e.g., blasting, loading, hauling) will be suspended while caribou are migrating.	-	✓	4	✓	✓	✓	-	✓	✓	-	-	Monitoring of caribou response to the Project during migration via collars, cameras, visual monitoring.	Caribou continue to migrate through the primary corridor and around the Marathon pit and associated components	None
																				Caribou exhibit avoidance of the Project and associated components and choose alternate migration routes	Tier 2 Mitigation - see table
CM024	✓	✓	✓	-	Change in Habitat	Maintain forage and cover	The TMF will be designed and managed to reduce the area of exposed dry surfaces, where possible, to reduce the potential for windblown dust emissions.	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Inspection of the TMF with respect to exposed, dry surfaces; overall dust monitoring via dust monitoring stations erected at the site.	Exposed, dry surfaces not evident, no visual dusting during wind events, no dust monitoring exceedances	None
																				Larger areas of exposed, dry tailings and/or visual dusting during wind events, no dust monitoring exceedances	Review and revise the tailings deposition plan to further minimize exposed, dry surfaces
																				Larger areas of exposed, dry tailings and/or visual dusting during wind events; dust monitoring exceedances	Tier 2 Mitigation - see table
CM025	✓	✓	-	-	Change in Habitat	Reduce indirect habitat loss	Emission control technologies (stacks, filters, scrubbers) will be designed/installed to reduce air contaminant emissions (dust) from process equipment and buildings	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Project dust monitoring - see Section 5.2.3 regarding monitoring thresholds	Dust within defined thresholds	None
																				Dust above defined thresholds	Tier 2 Mitigation - see table

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Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
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Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate			
CM026	-	✓	-	-	Change in Habitat	Reduce indirect habitat loss, reduce disturbed habitat	Waste rock piles will be progressively rehabilitated (including revegetation) to reduce dust emissions. Progressive rehabilitation is a regulatory requirement under the *Mines Act*.	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Monitor progressive rehabilitation effectiveness	Progressive rehabilitation is successful and therefore dust suppression is achieved	None
																				Progressive rehabilitation is not successful and therefore adequate dust suppression is not achieved	Implement corrective actions regarding progressive rehabilitation of the waste rock pile per Project Rehabilitation and Closure Plan
CM027	✓	✓	-	-	Change in Habitat	Reduce indirect habitat loss	Surfaces of topsoil and overburden stockpiles that will not be disturbed for extended periods will be stabilized by means of vegetating, covering, or utilizing surface binders.	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Project dust monitoring - see Section 5.2.3 regarding dust monitoring thresholds	Dust levels within defined thresholds	None
																				Dust levels above defined thresholds	Tier 2 Mitigation - see table
CM028	✓	✓	✓	-	Change in Habitat	Reduce indirect habitat loss	Dust suppression will be applied to roads and open-ground areas on an as-needed basis during dry and/or high wind conditions. Dust suppression will normally be water (contact water) but may also include surface binders for high traffic areas based on regulatory approval.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	-	Project dust monitoring - see Section 5.2.3 regarding dust monitoring thresholds	Dust levels within defined thresholds	None
																				Dust levels above defined thresholds	Tier 2 Mitigation - see table

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Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM029	-	✓	-	-	Change in Habitat	Reduce indirect habitat loss, reduce sensory disturbance	Conveyor belts at the mill will be enclosed to reduce dust generation and noise	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Project dust and noise monitoring - see Section 5.2.3 regarding dust and noise monitoring thresholds	Dust and noise within defined thresholds	None
																				Dust and/or noise above defined thresholds	Tier 2 Mitigation - see table
CM030	✓	✓	-	-	Change in Habitat	Reduce indirect habitat loss	When loading stockpiles, drop heights will be reduced to be as close to the pile as possible.	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Visual inspection of stockpiling activities; Project dust monitoring	Drop heights are within best and safe operating practice for the equipment type	None
																				Drop heights are above best and safe operating practice for the equipment type and creating excessive dust	Implement corrective actions with equipment operators

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Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																					
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed							Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate			
CM031	✓	✓	✓	-	Change in Habitat	Reduce indirect habitat loss, reduce sensory disturbance	Temporary and permanent lighting will be minimized to that required for safe construction and operation activities, and incorporate the following mitigation: - exterior lights will be shielded from above where possible - mobile and permanent lighting will be located such that unavoidable light spill from the working area is not directed to receptors outside the Project Area, to the extent practical - use of mobile flood lighting units will be minimized and will be turned off when not required - full cut off luminaires will be used where practical to reduce glare, light trespass, and sky glow from Project lighting	✓	-	1	✓	✓	✓	✓	✓	✓	-	-	Project light monitoring - see Section 5.2.3 regarding light monitoring thresholds	Light levels within defined thresholds	None
																				Light levels above defined thresholds	Tier 2 Mitigation - see table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM032	✓	✓	-	-	Change in Habitat, Change in Movement	Reduce direct and indirect habitat loss, maintain migration corridor permeability	Planning for closure during Project design and Project development stages – Project features are designed and developed such that progressive and final rehabilitation activities do not require major re-work or significant alteration of the adjacent land and environment. With respect to caribou, this includes the design of the Marathon waste rock pile as it relates to minimizing footprint relative to the baseline migration corridor and providing a diversion around the open pit. The diversion around the pit also largely addresses the *Mines Act* requirements to install barricades around the high wall(s) of an open pit for safety.	✓	-	1	✓	✓	✓	✓	✓	-	-	-	Mitigation implemented - monitoring will included in the assessment (visual, collaring, drone, cameras) of caribou movement through the site. As the waste rock pile footprint will not be fully developed until approximately Year 2 of operations (4 years from start of construction), opportunities to monitor caribou movement through this area and make further adjustment to the design are possible.	Caribou movement in proximity to the Marathon open pit and adjacent waste rock pile area will be monitored and the results of the change in movement to adjust to the open pit may indicate further changes to the waste rock pile design could further reduce effects to caribou migrating through the Marathon pit area.	No further action may be required, however further adjustment to the waste rock pile design may be required.

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM033	✓	✓	-	-	Change in Habitat	Reduce direct and indirect habitat loss	Planning for closure during Project development and operations - revegetation design and testing is required to determine suitable and sustainable vegetation growth in the post-closure phase. As the closure design of the Project will relate to the post-closure use of the Project Area by caribou, Marathon will consult with NLDFFA - Wildlife Division as well as Indigenous groups and stakeholders with respect to revegetation planning and design and trials that will be conducted during the operations phase of the Project.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	✓	n/a - implementation and monitoring via the Rehabilitation and Closure Plan requirement under the *Mines Act*.	n/a	n/a
CM034	-	-	✓	-	Change in Habitat, Change in Mortality	Reduce direct mortality risk	During closure, the open pits will be flooded. Ingress/egress area(s) will be created for people/animals at pit lake surface interfaces for mine closure (requirement of NLDIET-Mines Branch).	✓	-	1	✓	✓	✓	✓	✓	-	-	-	n/a - implementation and monitoring via the Rehabilitation and Closure Plan requirement under the *Mines Act*.	n/a	n/a

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM035	-	-	✓	-	Change in Habitat, Change in Movement	Reduce direct and indirect habitat loss, maintain migration corridor permeability	Project rehabilitation and closure will be planned to return the Project Area to as close to natural conditions as possible, including:- Removal and rehabilitation of the low grade ore stockpiles, overburden and topsoil stockpiles, haul roads, and water management features.- Removal of all site equipment and buildings (crusher, plant, accommodations, etc.) and rehabilitation of the associated disturbed areas.- Removal of all associated infrastructure (power lines, culverts, roads, etc.) and rehabilitation of the associated disturbed areas.- Reinstatement of pre-development topography and drainage courses to the extent possible.- Revegetation of all disturbed areas.Note that Marathon is required under the *Mines Act* to post Financial Assurance for the costs associated with the Rehabilitation and Closure Plan to ensure funds are available to complete this work in the event of a default by Marathon at any point over the life of the Project.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	✓	n/a - implementation and monitoring via the Rehabilitation and Closure Plan requirement under the *Mines Act*.	n/a	n/a

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM036	-	-	✓	✓	Change in Habitat, Change in Movement	Reduce direct and indirect habitat loss, maintain migration corridor permeability	Decommissioning and rehabilitation of site roads during closure will be conducted to the extent possible, noting that some site roads will need to be maintained for post-closure site inspections and monitoring purposes. It is expected the roads left in place will be reduced in width and may be gated to reduce public access for the post-closure monitoring period.	✓	-	1	✓	✓	✓	✓	✓	✓	✓	✓	n/a - implementation and monitoring via the Rehabilitation and Closure Plan requirement under the *Mines Act*.	n/a	n/a
CM037	✓	✓	-	-	Change in Movement, Change in Mortality	Maintain migration corridor permeability, reduce direct mortality risk	Site inspection prior to the spring and fall migration periods to assess specific hazards that might present specific risk to caribou movement (as the site is changing over time, more rapidly during construction and closure phases). Project features (e.g., open pits, TMF, water management features) and areas/features under development or closure will be monitored during migratory periods and temporary fencing/barricades may be installed as needed to reduce risks to caribou.	-	✓	2	✓	✓	✓	✓	✓	-	-	-	n/a - mitigation is an inspection and monitoring activity itself	No specific risks or hazards are identified	None
																				Specific risks or hazards are identified prior to the migration period	Implement corrective or protective measures where possible.
																				Risks or hazards are identified based on monitoring of migrating caribou	Potential risks or hazards currently considered are addressed in Tier 1 and Tier 2 mitigation and these mitigation may be used to address identified issues, or additional mitigation may need to be developed for specific hazards or caribou responses - see Tier 2 Mitigation table

Table 5.2 Tier 1 Mitigation Measures

Tier 1 Mitigation - To Be Implemented at Corresponding Project Phase																						
	Project Phase				Potential Project Effects	Mitigation Objective	Mitigation Measure	Implementation Period and Protection Level				Response and Level Addressed										
Mitigation ID	Construction	Operation	Decommissioning	Post-closure				Immediate Implement-action and/or Ongoing Measure	Migration Period Specific	Protection Level	Individuals	Groups	Population	Resident caribou	Migration Through Site	Alternate Migration Route (1 to 5 km)	Alternate Migration Route (5 km or greater)	Failure to Migrate	Monitoring Approach or Action (Specific to Mitigation)	Monitoring Outcomes and Thresholds	Response or Next Steps
CM038	✓	✓	✓	-	Change in Mortality	Reduce direct mortality risk	Outside of the migration periods, the on-site environmental team will be immediately notified when caribou are observed within 1 km of Project activities. The on-site environmental team will investigate and assess to determine if specific Project activities may be reduced or suspended, or if additional measures are required to minimize interaction and/or risk to caribou.	✓	-	3	✓	✓	✓	✓	-	-	-	-	The need for employees and contractors to monitor for and report caribou sightings will be highlighted as part of the induction and ongoing environmental training programs. Environmental inspections and audits of employee reports will be conducted. Monitoring of measures specific to protection of caribou in this case will require monitoring specific to the measures selected, most of which are expected to be addressed in the Tier 1 or Tier 2 mitigation tables.	Caribou sightings reported immediately, and report form completed	None
																				Caribou sightings not reported immediately and/or report forms not completed	Implement corrective actions - further employee/contractor training

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM001	✓	✓	✓	-	Change in Habitat	Project footprint and disturbed areas will be limited to the extent practicable.	Rehabilitate and revegetate areas where cleared or disturbed areas are required short-term (also known as progressive rehabilitation)	-	-	✓	Area Identified	Monitor area of rehabilitation/revegetation	Rehabilitation/ revegetation successful, area restored	None
													Rehabilitation/ revegetation unsuccessful	Assess reason why unsuccessful and repeat or adapt rehabilitation/ revegetation actions
CM005	✓	✓	-	-	Change in Habitat	Engines and exhaust systems of construction and mining equipment will be subject to a comprehensive equipment preventative maintenance program to maintain fuel efficiency and performance. Vehicles and heavy equipment will be regularly inspected and maintained in good working order and will be equipped with appropriate mufflers to reduce noise	If noise level monitoring indicates that noise levels are above the levels predicted in the EIS or the thresholds described in Section 5.2.3 of the CPEEMP, a detailed noise assessment will be conducted to assess the key noise sources and determine options to reduce noise levels	-	-	✓	Based on Monitoring	Project-level monitoring of noise levels	Noise levels are within EIS prediction levels and appropriate thresholds	None
													Noise levels are above EIS prediction levels and appropriate thresholds	Implement further measures associated with the detailed noise assessment

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM0012	✓	✓	✓	-	Change in Mortality; Change in Movement	Project-related traffic on the access road will be further reduced during migration periods – via the Traffic Management Plan and logistics/warehouse management systems, protocols will be developed to maximize supply and warehousing levels prior to the migration periods, as well as manage contractor-related work and rotation changes to the degree practicable (also considering worker health and safety) to reduce traffic levels during the migration period. Logistics prior to, during, and post-migration periods will be integrated with the migration-period caribou monitoring and the associated thresholds for increased caribou protection levels.	Review and implement additional strategies to reduce traffic volumes. Examples may include but not limited to additional warehouse and supplies storage on site, increase fuel storage capacity, directly manage traffic flow on the access road during migration periods (large convoys permitted when caribou are not close to the road).	-	✓	✓	Traffic Reduction Targets not met	Monitoring of traffic volumes (counts) and for conformance with associated traffic protocols.	Reduction of traffic volumes to 60% or less than average traffic levels	None
													Reduction of traffic volumes to 60% or less than average traffic levels not achieved	Implement further review of traffic reduction measures, taking additional actions where possible
CM0018	✓	✓	-	-	Change in Movement	Water management ditches will be designed, constructed and maintained to allow wildlife crossing opportunities	Install culverts and ground cover along water management ditches every 50 to 100 m to facilitate caribou crossings	-	-	✓	Based on Monitoring	Monitor via on-site monitoring and collar data to determine if caribou crossing over culverted ditches	Caribou observed (directly and/or through tracks/trail evidence) crossing culvert and non-culvert crossings without issue	None
													Caribou only crossing culvert locations (avoiding ditch crossing entirely)	Increase culvert crossings (frequency/length) in moderate to high use areas

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM0019, CM0022	✓	✓	-	-	Change in Habitat	Visual and/or drone surveys for caribou will be undertaken prior to blasting for construction and operations. For construction blasting (civil works) and during pit development, which includes near-surface blasting, the search zone will be 1 km from the blast. After the pit perimeter is developed and blasting is more than 50 m below the pit crest (whereby noise and vibrations will be reduced for receptors) the clearance zone will be a 500 m buffer from the final pit perimeter. Blasting will be delayed if caribou are observed within these zones.	If caribou are detected outside the specified zone but within a 3 km radius of the blast, and visual monitoring of the caribou determines they have an adverse reaction to the blast event, further on-site monitoring and associated studies will be completed to assess a potential change in the thresholds for caribou proximity to a blast.	-	-	✓	Based on Monitoring	Regular reviews of collar data, visual and/or drone surveys will be utilized to determine if caribou are within the specified zone (increased based on Tier 2 - limit not determined) prior to blasting. Noise and ground vibration will be monitored via stations established at the site. If caribou are detected outside the specified zone but within a 3 km radius of the blast, visual monitoring of the caribou will be conducted to determine if they animal(s) have an adverse reaction to the blast event.	Caribou identified within the specified zone	Blasting operations suspended until caribou clear the zone
													No caribou identified within the specified blast zone and no caribou within a 3 km radius	None, blasting operations permitted
													No caribou identified within the specified blast zone; caribou within a 3 km radius but no adverse reaction to blast event	None, blasting operations permitted
													No caribou identified within the specified blast zone; caribou within a 3 km radius show adverse reaction to blast event	Increase blast clearance zone and continue monitoring

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM0023	✓	✓	✓	-	Change in Movement	Activities in the Marathon pit area, including the Marathon waste rock pile, overburden and topsoil stockpiles, and low grade ore stockpile, that result in sensory disturbance to caribou (e.g., blasting, loading, hauling) will be suspended while caribou are migrating.	If caribou exhibit avoidance of the Project and associated components and choose alternate migration routes, further Project activity suspension will be implemented based on consultation with NLDFFA-Wildlife Division. As Project activities and the build-up of components (TMF, pit, waste rock pile) will increase over the first 4 to 5 years (2 years of construction plus early operations phase), the potential degree of disturbance to caribou or avoidance of the Project by caribou may be gradual over time. The monitoring program outlined in Section 6 of the CPEEMP will be critical to understanding the potential changes in caribou migration and behaviour and will be used to determine the degree of further Project activity suspension during the migration period, if required.	-	-	✓	Based on Monitoring	The full monitoring program described in Section 6 of the CPEEMP will be used to inform and monitor changes implemented to the Project activity suspension mitigation	Caribou return to migrating through or close to the baseline primary migration corridor	None
													Caribou exhibit continued or further avoidance of the Project and associated components and choose alternate migration routes	Tier 3 Mitigation - see table

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM0024	✓	✓	✓	-	Change in Habitat	The TMF will be designed and managed to reduce the area of exposed dry surfaces, where possible, to reduce the potential for windblown dust emissions.	Where standard mitigation for dust control at the TMF are determined to be insufficient through monitoring, additional measures will be applied to control dust based on an assessment of the source (area of the TMF) and cause (drying, mounding, insufficient deposition changes). Additional measures may include, but not be limited to, surface binders or temporary covers (synthetic, rock materials, or vegetation).	-	-	✓	Based on Monitoring	Inspection of the TMF with respect to exposed, dry surfaces; overall dust monitoring via dust monitoring stations erected at the site.	Exposed, dry surfaces not evident, no visual dusting during wind events, no dust monitoring exceedances	None
													Visual dusting during wind events, dust monitoring exceedances	Implement further measures associated with binders or covers
CM0025, CM0027, CM0028, CM0029	✓	✓	✓	-	Change in Habitat	Mitigation associated with dust control for: - process equipment and buildings - waste rock piles - topsoil and overburden stockpiles - roads and open-ground areas	If dust level monitoring indicates that dust levels are above the levels predicted in the EIS or the thresholds described in Section 5.2.3 of the CPEEMP, a detailed dust assessment will be conducted to assess the key source(s) and determine options to reduce levels	-	-	✓	Based on Monitoring	Project dust monitoring - see Section 5.2.3 regarding monitoring thresholds	Dust within defined thresholds	None
													Dust above defined thresholds	Implement further measures associated with dust control

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM0031	✓	✓	✓	-	Change in Habitat	Temporary and permanent lighting will be minimized to that required for safe construction and operation activities, and incorporate the following mitigation: - exterior lights will be shielded from above where possible - mobile and permanent lighting will be located such that unavoidable light spill from the working area is not directed to receptors outside the Project Area, to the extent practical - use of mobile flood lighting units will be minimized and will be turned off when not required - full cut off luminaires will be used where practical to reduce glare, light trespass, and sky glow from Project lighting	If light level monitoring indicates that light levels are above the levels predicted in the EIS or the thresholds described in Section 5.2.3 of the CPEEMP, a detailed light assessment will be conducted to assess the key sources and determine options to reduce light levels	-	-	✓	Based on Monitoring	Project light monitoring - see Section 5.2.3 regarding light monitoring thresholds	Light levels within defined thresholds	None
													Light levels above defined thresholds	Implement further measures associated with light control

Table 5.3 Tier 2 Mitigation Measures

Tier 2 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 1 Mitigation)

	Project Phase							Tier 2 Implementation Period or Threshold				Tier 2 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
										Applies	Threshold			
CM0037	✓	✓	✓	-	Change in Mortality	Site inspection prior to the spring and fall migration periods to assess specific hazards that might present specific risk to caribou movement (as the site is changing over time, more rapidly during construction and closure phases). Project features (e.g., open pits, TMF, water management features) and areas/features under development or closure will be monitored during migratory periods and temporary fencing/barricades may be installed as needed to reduce risks to caribou.	Potential risks or hazards currently considered are addressed in Tier 1 and Tier 2 mitigation and these mitigation may be used to address identified issues, or additional mitigation may need to be developed for specific hazards or caribou responses. Additional mitigation may include temporary or permanent fencing, barriers or berms for exclusion from specific areas, or possibly to direct caribou away or towards a particular area of the Project, or aversive conditioning. Any options considered will be reviewed with NLDFFA-Wildlife Division prior to implementation	-	-	✓	Based on Monitoring	Camera and visual monitoring of the implemented options	Specific risks or hazards are addressed and no longer pose a risk to caribou	None
													Risks or hazards are not addressed based on monitoring of migrating caribou	Implement additional corrective or protective measures, if possible.

Table 5.4 Tier 3 Mitigation Measures

Tier 3 Mitigation - To Be Implemented based on Monitoring (Adaptive Management to Tier 2 Mitigation)

	Project Phase								Tier 3 Implementation Period or Threshold				Tier 3 Monitoring		
Mitigation ID	Construction	Operation	Decommissioning	Post-closure	Potential Project Effects	Tier 1 Mitigation Measure	Tier 2 Mitigation Measure	Tier 3 Mitigation Measure	Ongoing Measure	Migration period	Defined Threshold		Monitoring Approach or Action	Monitoring Outcomes	Response or Next Steps
											Applies	Threshold			
CM0023	✓	✓	✓	-	Change in Movement	Activities in the Marathon pit area, including the Marathon waste rock pile, overburden and topsoil stockpiles, and low grade ore stockpile, that result in sensory disturbance to caribou (e.g., blasting, loading, hauling) will be suspended while caribou are migrating.	If caribou continue to exhibit avoidance of the Project and associated components and choose alternate migration routes, another level Project activity suspension may be implemented based on consultation with NLDFFA-Wildlife Division. As Project activities and the build-up of components (TMF, pit, waste rock pile) will increase over the first 4 to 5 years (2 years of construction plus early operations phase), the potential degree of disturbance to caribou or avoidance of the Project by caribou may be gradual over time. The monitoring program outlined in Section 8.0 of the CPEEMP will be critical to understanding the potential changes in caribou migration and behaviour and will be used to determine the degree of further Project activity suspension during the migration period, if required.	If caribou continue to exhibit avoidance of the Project and associated components and choose alternate migration routes, additional levels Project activity suspension may be implemented based on consultation with NLDFFA-Wildlife Division. The monitoring program outlined in Section 6.0 of the CPEEMP will continue to be critical to understanding the potential changes in caribou migration and behaviour and will be used to determine the degree of further Project activity suspension during the migration period, if required.	-	-	✓	Based on Monitoring	The full monitoring program described in Section 6.0 of the CPEEMP will be used to inform and monitor changes implemented to the Project activity suspension mitigation	Caribou return to migrating through or very close to the baseline primary migration corridor	None
														Caribou exhibit continued or further avoidance of the Project and associated components and choose alternate migration routes	Implement further activity suspension and/or reduce sensory disturbance further
n/a	✓	✓	✓	✓	Change in Movement, Change in Mortality	n/a	n/a	Where effects monitoring (see Section 6.0) indicates potential or realized trends or changes in caribou movement or mortality, additional mitigation that would be under the control of the NLDFFA-Wildlife Division may be considered (e.g., a predator control program).	-	-	✓	Based on Monitoring	The monitoring approach for the specific mitigation (e.g., predator control) would be developed for that specific mitigation.	Monitoring outcomes would be determined based on the specific mitigation and monitoring program.	The response or next steps associated with the monitoring outcomes would be determined based on the specific mitigation and monitoring program.

5.2.1 Employee and Contractor Training and Orientation

Marathon will confirm that all Project personnel understand the potential environmental effects of the Project on caribou related to their specific work activities, as well as their roles and responsibilities in reducing potential effects, including protocols for on-site observations, mitigation measures, and legal requirements. Environmental orientation and ongoing awareness training orientation for Marathon employees and contractors will include a review of:

- Environmental management requirements, including the procedures outlined in this CPEEMP and the Construction Environmental Protection Plan and any revisions to these documents
- Environmental considerations
- Non-compliance and corrective actions
- Environmental contingency measures
- Incident reporting requirements
- Work subject to regulatory permit requirements
- Construction site rules and regulations
- Wildlife awareness training

Employees and contractors will receive orientation during the on-boarding process. Employees and contractors will be required to sign a form indicating they have reviewed and understand their role and responsibilities regarding this CPEEMP and the Construction Environmental Protection Plan.

Observations of wildlife sightings, including caribou, will be reported by all staff and contractors on-site and monitored by the on-site environmental manager. All observations of caribou (e.g., location, date, number of animals, caribou behaviour) will be recorded in a log book developed for the Project and will be included in semi-annual and annual monitoring reports (Section 8.1).

5.2.2 Caribou Encounters on Roads

The following protocols are to be followed by all drivers in any type of vehicle travelling on the access road, at any time of the year. Note that during the migration periods in spring and fall, speed limits will be reduced within the migration corridor – notifications will be provided to all employees and contractors and signage will be posted along the road indicating reduced speed limits and known crossing locations.

- Respect speed limits and watch the road for wildlife and other vehicles at all times

- Caribou (as well as other wildlife) will always be given the right of way on all Project roads.
- If a caribou is encountered on the road STOP as far back as possible, greater than 50 m is preferred:
  - Turn off the engine
  - Turn on the emergency flashers to warn other vehicles approaching from either direction
  - Radio or call site security to notify and request a notification be sent to other drivers, noting the location of the caribou

- Wait until the caribou have crossed and moved away from the road before proceeding – proceed at a reduced speed (20 km/hr) until at least 100 m past the last location the caribou were visible on the road

While not a lot of open areas exist along the access road, the following protocols are to be followed where such conditions are encountered, and on mine site roads where open areas are more frequent:

- If a caribou is observed within 100 m of the road (250 m for haul trucks), slow down to 20 km/hr:
  - If the caribou are resting, feeding, or moving away from the road, proceed with caution and at reduced speed until at least 100 m past the location
  - If the caribou are moving towards the road STOP as far back as possible and turn off the engine
    - Turn on the emergency flashers to warn other vehicles approaching from either direction
    - Radio or call site security to notify and request a notification be sent to other drivers, noting the location of the caribou
    - Wait until the caribou have crossed and moved away from the road by 50 m (where visible) before proceeding – proceed at a reduced speed (20 km/hr) until at least 100 m past the last location the caribou were visible on the road
- If a caribou is observed greater than 100 m from the road (greater than 250 m for haul trucks):
  - If the caribou are resting, feeding, or moving away from the road, proceed as usual
  - If the caribou are moving towards the road:
    - Proceed with caution at reduced speed (20 km/hr)
    - Turn on the emergency flashers to warn other vehicles approaching from either direction
    - Radio or call site security to notify and request a notification be sent to other drivers, noting the location of the caribou

5.2.3 Sensory and Air Quality Thresholds

Noise emissions from the Project will be monitored regularly using sound recording equipment set up at distance intervals from Project activities selected based on topography and vegetation cover to confirm the noise level predictions in the EIS. Monitoring will specifically target noise levels relative to the primary caribou migration corridor and noise levels at greater distances from Project activities (5 to 10 km or greater) to measure noise levels that may affect both migrating and resident caribou. There are no provincial or federal noise thresholds for caribou, however, 40 dBA is typically used as a threshold for disturbance of caribou.

There are no provincial or federal light emission thresholds for caribou, and while there is literature on the effects of light on wildlife there is little or nothing on targets or thresholds. The International Commission on Illumination guidelines for sparsely populated rural areas could be considered as a possible target/threshold for light emissions for caribou at 0.1 lux, which is roughly equivalent to light levels during a full moon and can be measured by most light meters. Marathon will develop a light monitoring program that considers potential effects on caribou in consultation with NLDFFA-Wildlife Division.

Provincial and federal air quality standards (including dust) are provided in the EIS, Table 5.1. There are no wildlife-specific dust thresholds. Marathon will be required to complete an ambient air quality monitoring program, including the installation of real time air quality monitors as required by the Newfoundland and Labrador Department of Environment and Climate Change. Passive dustfall collectors, and monitoring of dust on vegetation can be used to monitor dust levels and associated contaminant levels for comparison with the Canadian Council of Ministers of the Environment guidelines where they exist (limited).

6.0 FOLLOW-UP MONITORING

Marathon is committed to long-term follow-up monitoring of mitigation effectiveness and Project effects on caribou. The follow-up monitoring described in this section complements the mitigation measures described above in Section 5.0. The follow-up monitoring plan presented herein includes monitoring approaches and actions which are expected to require refinement based on the collection of additional baseline data prior to construction, collection of follow-up and monitoring results as the Project advances, and ongoing review with the NLDFFA-Wildlife Division, scientific experts, Indigenous groups and stakeholders.

The CPEEMP has been developed in accordance with the "follow-up and compliance monitoring" requirements under Canadian Environmental Assessment Agency's Operational Policy Statement (Follow-up Programs under the *Canadian Environment Assessment Act*, 2012) and includes two types of monitoring:

- Effects (condition) monitoring will monitor the effects of the Project on caribou and will build on information gathered during baseline studies. Changes in performance indicators will be monitored at an appropriate scale (e.g., within the Project Area, LAA, and RAA, hereafter the study area) to measure Project-related effects on caribou (e.g., their distribution) and contribute to ongoing evaluation of the overall condition of caribou within the study area. Effects monitoring will also evaluate the effectiveness of mitigation designed to reduce predicted changes in caribou habitat, movement, and mortality risk and will include documenting the presence of caribou on-site, and other incidents (e.g., injury, mortality) that require a management response (e.g., incident investigation) or and adaptive management action (e.g., Tier 2 mitigation measure). Collectively this information will be used to monitor the accuracy of EIS predictions.
- Conformance monitoring will determine compliance with regulatory requirements and other environmental commitments made in the EIS, Information Requirement responses, and conditions of EA release and reported in the Environmental and Social Management System.

Evaluating the outcomes of the effects monitoring and compliance monitoring will identify the potential need for adaptive management measures to further mitigate Project effects.

6.1 KEY MONITORING QUESTIONS

Responses by caribou to disturbance are variable and can include a shift in individual home ranges to avoid overlap with the disturbed area (e.g., MacNearney et al. 2016), selection of previously unused habitat (Sawyer et al. 2006), seasonal avoidance (e.g., Boulanger et al. 2012), alteration of behaviors and group sizes in the vicinity of the disturbance (e.g., Weir et al. 2007), and a change in the timing and direction of migration (e.g., Mahoney and Schaefer 2002). As the viability of caribou populations across the country decreases with increasing habitat disturbance, the Amended Recovery Strategy for the

Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada (ECCC 2020) suggests limiting the quantity of disturbed habitat within their ranges. Additionally, maintaining the functionality of migration paths by preserving connectivity between seasonal ranges is vital to sustaining viable populations of migratory ungulates (Monteith et al. 2018). Due to the overlap with a primary migration corridor, the Project is likely to cause changes to caribou habitat, movement, and mortality risk, which ultimately could affect caribou recruitment and/or survival. A summary of environmental effects on caribou and the associated risks are presented in Sections 3.0 and 4.0 of this document. The mitigation presented in Section 5.0, above, are intended to avoid or reduce potential adverse effects on caribou.

The follow-up effects monitoring program presented below is designed in consideration of predicted Project effects and associated risks to caribou. The following questions provide the foundation for the effects-based monitoring program.

Question 1: Has the Project affected movement patterns of the Buchans herd?

- Q1a. Has the Project caused a change in the timing and / or duration of migration of the Buchans herd occur through the Project Area?
- Q1b. Has the Project caused a change in the number or ratio (e.g., calf: cow) of Buchans herd caribou moving through the Project Area?
- Q1c. Have migrating Buchans caribou used alternate migration routes as a result of the Project development and operation?

Question 2: Have the seasonal distributions of the Buchans and Grey River herds changed?

- Q2a. Have the seasonal ranges changed compared to baseline (e.g., size, location)?
- Q2b. Have the calving ranges changed compared to baseline (e.g., size, area)?

Question 3: Have the Buchans and Grey River populations changed?

- Q3a. Were there changes in demographic (e.g., calf:female ratio; adult male:adult female ratio;group composition on the calving grounds)?
- Q3b. Were there changes in the population estimate for the Buchans herd on the calving grounds?

Question 4: How have caribou directly interacted with the Project over time?

- Q4a. Are there changes in the observations of caribou at the mine site (e.g., number, timing, frequency, locations)?
- Q4b. Are there changes in the observations of caribou on the Project access road (e.g., number, timing, frequency, locations)?
- Q4c. Are there changes in the Project-related caribou injuries or mortalities in the Project (e.g., number, timing, locations)?

6.2 EFFECTS MONITORING

The goal of the effects monitoring is to determine whether the proposed mitigation measures are effective and the EIS predictions are correct. The monitoring plan establishes means to track changes in performance indicators to quantify Project effects on caribou and caribou habitat over space and time relative to the Project. Table 6.1 presents the performance indicators that will be used to measure caribou response level to predicted targets. Conservative targets are proposed to initiate action prior to exceedance of biologically meaningful thresholds.

Table 6.1 Performance Indicators that will be used to Measure Caribou Response Level to Predicted Targets

Residual Effect	Performance Indicator	Target	Threshold
Change in caribou movement (Buchans herd)	• Timing and duration of migration	• Change in timing and duration of migration within natural variations	• Trending towards considerable change in timing and duration of migration
	• Amount of time spent at stop-overs	• Change in amount of time spent at stop-overs is within natural variations	• Trending towards considerable change in amount of time spent at stop-overs
	• Number of caribou or composition of caribou groups moving through Project Area	• No change in number of caribou or composition of caribou groups moving through Project Area	• Trending towards a decreasing number of migrating caribou or group composition as compared to baseline • Evidence that animals attempting to migrate do not migrate
Change in caribou movement (Buchans herd)	• Use of alternate pathways	• Alternate pathways are used	• Animals using alternate pathways show evidence of “stress” that may have population consequence
Change in caribou mortality risk (interactions with mine-infrastructure)	• Number of caribou-vehicle collisions in the Project Area	• Zero caribou-vehicle collisions in the Project Area	• Any caribou mortality related to vehicle traffic or, equipment in the Project Area
Change in caribou mortality risk (interactions with mine-infrastructure)	• Number of caribou injuries or mortalities in and around site infrastructure (e.g., pits, ponds)	• Zero caribou injuries or mortalities in and around site infrastructure	• Any caribou injury or mortality related to infrastructure in the Project Area

Table 6.1 Performance Indicators that will be used to Measure Caribou Response Level to Predicted Targets

Residual Effect	Performance Indicator	Target	Threshold
Change in caribou mortality risk (landscape scale Project effects)	• Population demographics trends are not negatively influenced by the Project	• Calf:cow ratios remain at sustainable levels consistent with baseline conditions	• Trending towards a reduced calf:cow ratio
		• Adult males / 100 caribou remain at sustainable levels consistent with baseline conditions	• Trending towards a changing adult males / 100 caribou ratio
		• Calf survival rate remain at sustainable levels consistent with baseline conditions	• Trending towards a decline in calf survival rate
		• Population size remain at sustainable levels consistent with baseline conditions	• Trending towards a reduced overall population size

6.2.1 Spatial and Temporal Scales

The spatial scale of the CPEEMP will be the baseline distribution of the Buchans and Grey River herds based on 95% kernel density estimates from collared caribou. The kernels for the Buchans and Grey River herds will be based on ARGOS and GPS telemetry locations from available baseline until immediately before Project construction beings (2005-2022 for the Buchans herd and 2004-2022 for the Grey River herd). For each herd, seasonal ranges will be estimated using the dates in Table 6.2. The separate seasonal ranges will be used to determine changes and will be combined to estimate the overall baseline distribution. The temporal scale of the monitoring program is the construction phase (approximately 2 years), operation phase (approximately 13 years), closure and rehabilitation (approximately 2 years) and post-closure (2-6 years pending monitoring results).

Table 6.2 General Seasons for Island Caribou in NL

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 Newfoundland and Labrador (2013)	

6.2.2 Data Collection

Data collected during the monitoring program will be used to confirm effects predictions, which will be derived primarily from GPS telemetry collars deployed on Buchans and Grey River caribou, remote cameras around the Project Area, and aerial surveys of the Buchans calving grounds and calving grounds for resident caribou near the mine site. Prior to and during the migratory periods (caribou protection levels 2 and 4), review of caribou movement data (collars and cameras) will increase substantively, and on-site teams will be deployed to observe, record and inform when caribou approaching the site. Additionally, drones will be used to confirm animals in proximity of the Project Area during sensitive seasons and prior to blasting throughout the year. On-site personnel (Environment Manager) will gather information from any sightings, near-miss or incident reports, such as the number of caribou observed on site and potential Project interactions, for inclusion in the monitoring plan. At regular intervals during the monitoring program, new spatial information will be brought into the analysis (e.g., new imagery or vegetation layers, additional or new information on other landscape activities in the RAA).

The primary sources of data are described below.

GPS Collared Caribou

A review of other studies that have used GPS collars indicates that the reliability of results improves with the number of collared individuals (Börger et al. 2006). Peer-reviewed research programs that used the same analyses as will be used for collar data analysis as described in this CPEEMP (i.e., dynamic Browning Bridge Movement Modelling, Net Squared Displacement and kernel analysis) included from 8 to 54 telemetry collars in their analyses (Anderson et al. 2005; Sawyer et al. 2013; Byrne et al. 2014; Latham et al. 2014; Walter et al. 2015; Bastille-Rousseau et al. 2016; Hamilton et al. 2017; Monteith et al. 2018; Robb et al. 2019; Dewey and Schwabedissen 2020). Additionally, 20 to 30 collars have been shown to be effective for monitoring adult female survival rates and cow:calf ratios while also providing sufficient statistical power to detect population trends over at least a five-year period (Rettie 2017 in GNWT-INF 2020). Based on a literature review and professional judgment, at least 20 active collars on the Grey River herd, and 40 collars on the Buchans herd would be needed to provide a robust statistical analysis. As the collar program needs to consider the possibility of collar malfunction (Tomkiewicz et al. 2010) and mortality of collared caribou, additional collars for relatively rapid replacement of 'lost' collars, would be needed.

Thus far, Marathon purchased 60 GPS collars (Lotek Iridium 420w) to support the long-term monitoring program. These collar deployments, as well as future collar deployments, will be managed by NLDFFA-Wildlife Division.

Remote Cameras

Marathon deployed 12 remote cameras in fall 2019, spring 2020, and fall 2020, near the Project Area to collect information on caribou group size and composition, and to estimate the timing of spring and fall migration through the mine site. Marathon augmented this program in spring 2021 by adding fourteen additional cameras, and in fall 2021 by adding an additional five cameras. The intent of the augmented program was to further refine the timing and location of migration relative to the Project Area, while also obtaining information on other wildlife trails through or near the Project Area, including potential trails identified by least cost path (LCP) analysis (Attachment A in Caribou Supplemental Information Report [Appendix G to the EIS Amendment]). Remote camera deployment was guided by likely travel paths identified from light detection and ranging data; the migration path analysis (i.e., dynamic Brownian Bridge Movement Models (dBBMM) analysis) completed for the EIS; potential alternative paths identified by the LCP analysis; and comments from the Wildlife Division. Further information on deployment locations and the selection criteria for location selection is available in the remote camera reports (BSA.2 2-A, 2-B [Stantec 2021a]).

Much of the guidance on appropriate sample sizes for remote camera programs is based on faunal inventories, occupancy studies, and population estimates where camera placement may be random or deployed in an array (e.g., Rovero and Zimmermann 2016). Peer-reviewed studies recommended that a

sample size from 25 to 30 remote cameras is suitable for determining species richness, occupancy, and density and is considered sufficient to provide reliable estimates of changes in caribou movement through the LAA (Gillespie et al. 2015; Kays et al. 2020). The goal of the remote camera monitoring program has been primarily to gather information on caribou access points to the Project Area, refine the timing of caribou migration through the mine site, gather information on alternate paths and provide information on group size and group dynamics. Currently, there are 31 remote cameras deployed in the Project study area, which is within the range recommended in the literature.

As the thresholds that will trigger migration-specific mitigation measures have been developed (see Table 5.3), the camera deployment to monitor caribou proximity going forward will be evaluated further.

Aerial Surveys

The goal of post-calving aerial surveys is to provide an estimate of the size of the Buchans herd population on the calving grounds, and to determine caribou demographics (e.g., group size and composition) for resident Grey River caribou and for the Buchans herd on the calving grounds. A demographics survey was completed in June 2020 and June 2021, and a population estimate was completed for caribou on the Buchans herd calving grounds in June 2021. Transects were established in the post-calving survey area and surveyed by helicopter. Caribou were observed and classified from the transect lines using distance-sampling methods to estimate population size (Stantec 2021b). Future aerial surveys, which will use the same methods, will provide comparative information from the construction and operation phases.

On-Site Observations

Observations of wildlife sightings, including caribou, will be monitored by the on-site environmental manager. Programs and protocols will be developed to monitor on-site caribou observations and will include the following:

- Observations on-site (year round) – development of a log for personnel to record wildlife observations (e.g., location, date, caribou behaviour); will be compiled by the on-site Environmental Team
- Completing pre-migration surveys of all mine site areas looking for specific hazards that may exist at a given point in time as the site changes over time (construction and closure phases particularly).
- Caribou on-site observation team during migratory periods - this could include strategic vantage points of the primary corridor or select locations within the corridor proximate to primary paths
- Drones will be used to monitor caribou activity near the Project during sensitive seasons and pre-blast activities
- TMF monitoring – monitoring of TMF (with increased frequency during migratory periods) to assess caribou activity in the area and associated hazards to caribou

- Incident reporting – development of a protocol to record information about wildlife incident (e.g., nature of the incident, time, location, personnel involved) which may lead to a root cause analysis and response (e.g., corrective action)
- Education and training – Project personnel be educated and trained on the draft CPEEMP, protocols for on-site observations, mitigation measures, and legal requirements (Section 5.2 CPEEMP)

This information will be collected by the on-site environmental manager and incorporated in during the reporting cycles.

6.2.3 Methods

The key monitoring questions have been defined for the draft CPEEMP (Section 6.1). The following sections describe the approach that will used to address the key questions.

Throughout this monitoring program a series of data sources and modelling approaches will be used to better understand and predict movement patterns, seasonal patterns and overall population changes. Marathon will be approaching these models from an information theoretic framework. This will allow for the development of a candidate set of biologically defensible *a priori* models (Burnham and Anderson 2002) that consider both spatial and temporal covariates that have been reported to influence habitat selection and movement patterns of caribou (e.g., distance to roads, snow cover, ice-out date, NVDI, topography, Julian dates, proximity to disturbance and disturbance type), where appropriate. A candidate model set will be developed in consultation with NLDFFA-Wildlife Division and Akaike's information criterion will be used to evaluate competing models and find the best approximating model.

6.2.3.1 Movement Patterns (Buchans Caribou Herd)

Due to the overlap between the Project and the migration path used by the Buchans herd, the residual effect on change in movement for the Buchans herd is predicted to be high in magnitude and is considered likely to occur, as presented in section 4.0 of the CPEEMP. With implementation of mitigation measures, and given the uncertainties described in section 11.6 in the EIS, the residual adverse effect of change in movement for the Buchans herd is conservatively predicted to be significant. This determination is the key component of the first key effects monitoring question: Has the Project affected movement patterns of the Buchans herd?

Q1a - Has there been a change in the timing and / or duration of migration?

The timing and duration of seasonal migrations will be estimated using net squared displacement (NSD) (Bunnefeld et al. 2011, Sawyer et al. 2016) with adjustments to calculate mean squared displacement as described in Singh et al. (2016). Specifically, NSD measures the square of the straight-line distance between an animal's starting point and each subsequent location. NSD is a model-driven method that attempts to distinguish between migration movement and other movement types or strategies (e.g., resident, disperser) (Bunnefeld et al. 2011).

The start and end dates of annual spring and fall migrations will be identified to compare potential shifts in timing and/or duration of migration during construction and operation relative to baseline (pre-construction), while also considering natural factors like weather. Potential shifts in timing or duration or migration during construction and operations will be evaluated using the variation observed in the baseline data (e.g., start or end dates of migrations are outside 95% confidence interval or ± 2 standard deviations of baseline Julian dates).

Information about the timing and duration of seasonal migrations will also be obtained from the remote cameras. Remote camera photos will be reviewed using the program Timelapse v.2.2.3.9, which is an image analysis software program that extracts photograph metadata and facilitates the management of photo results (Greenberg 2021). Photos will be analyzed based on independent events identified from individual photo series. An event will be defined as beginning when an animal or group of animals (i.e., one or more animals) enter the frame and ending when the animal or group has exited the frame for more than two minutes (Stantec 2015; Rowcliffe et al. 2008). Collared caribou detected in the photos will be counted and group composition metrics calculated (i.e., group sizes, sex ratios, and age classes).

Using the camera data, the start of the peak movement period will be defined as the first Julian day the proportion of caribou detections exceeds 5% of the total detections for each migration and will end when the cumulative total exceeds 80% of caribou events. The mean Julian day will be calculated for each migration period (i.e., spring and fall), and the migration periods recorded during construction and operation phases will be compared.

The duration of migration will also be determined by calculating movement rates (km/day or m/h) during spring and fall migration. Movement rates will be calculated using GPS collared data to monitor potential changes in movement behaviour during construction and operation relative to baseline. Movement rates will also be compared to determine if GPS collared caribou increase or decrease their movement rate relative to the mine site and ZOI as well as approaching and crossing the access road. Because fix interval can affect movement rates, GPS collared caribou that have similar fix intervals will used in the analysis.

Q1b - Has there been a change in the number of caribou moving through the Project Area?

GPS collar data will be used to identify the number of caribou, and their paths, moving through the Project Area. The remote camera data will also provide information on the number and group composition of caribou moving through the area. Remote cameras have been deployed around the perimeter of the Project Area to collect information on caribou entry and exit locations to the mine site. The mean number of caribou events and number of caribou detected at the locations around the Project Area perimeter will be used to compare potential changes in relative abundance (e.g., number of detections/100 camera days) during construction and operations relative to baseline estimates.

Differences in relative abundance between baseline and Project phases will be compared using a repeated measures ANOVA with Project phase as a factor if statistical assumptions (e.g., normality) can be met. Otherwise, a non-parametric test for repeated measures (e.g., Freidman test) will be used. Differences will be considered statistically significant if $p < 0.05$, although a biologically meaningful change will be evaluated on the basis of effect size.

Information on the number of caribou observed in the mine site or on the access road will be collected by on-site personnel and compared between Project phases.

Q1c - Are migrating caribou using alternate pathways?

Spring and fall caribou migration paths during construction and operation will be estimated using a dBBMM (Kranstauber et al. 2012) to compare potential changes in seasonal migration paths to baseline paths. 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 seasonal migration paths during the construction and operation phases will be compared to baseline paths. The analysis will follow similar methods described by Sawyer et al. (2013) and Blum et al. (2015), focusing on the following components:

- identify potential changes in the location or size of the seasonal migration corridors.
- determine whether migration paths overlap the LCP options as previously identified.
- determine if there are new alternate or priority migration paths.
- identify potential changes in the number and /or size of seasonal stop-overs.

The utilization distributions estimated from the dBBMMs for the construction and operation phases will be compared to baseline, possibly by determining the amount of overlap in the seasonal ranges between phases (e.g., Fieberg and Kochanny 2005). Baseline will be established from available data up to the last migratory period prior to the initiation of construction.

The remote camera deployment locations were selected to overlap likely wildlife trails, areas identified by the baseline dBBMM, and LCP options identified by the Caribou Alternate Migration Pathway Analysis. The mean number of caribou events and number of caribou detected will be used to compare potential changes in relative abundance during construction and operations relative to baseline estimates. Differences in relative abundance (e.g., number of detections/100 camera days) between baseline and Project phases will be compared using a repeated measures ANOVA with Project phase as a factor if statistical assumptions (e.g., normality) are satisfied. Alternatively, a non-parametric test for repeated measures (e.g., Freidman test) will be used. For each analysis, differences will be considered statistically significant if $p < 0.05$, although a biologically meaningful change will be evaluated on the basis of magnitude of the effect.

6.2.3.2 Seasonal Distribution (Buchans and Grey River Caribou)

As described in the EIS (11.2.2.1), the assessed caribou herds undergo seasonal movements between ranges and intermix on winter ranges with other herds. The Buchans herd moves between ranges and migrates from central Newfoundland during spring to wintering areas on the south coast, where they interact primarily with the Grey River herd. Although not considered migratory, the Grey River herd have a seasonal range relatively near the Project. Changes in these seasonal ranges could indicate Project and is therefore the basis of the second primary question in the effects monitoring program: Have the seasonal distributions of the Buchans and Grey River herds changed?

Q2a - Have the seasonal ranges changed compared to baseline (e.g., size, area)?

Kernel or range density estimates will be used to describe the location, area, and seasonal range use of collared caribou (see section 11.2.1.3 of the EIS). Using the GPS collar data, caribou seasonal utilization distributions will be determined using the kernel density estimation method in ArcGIS™ v.10.7.1 (ESRI 2017) using Kernel Density in the Spatial Analyst Tools in ArcGIS™. Two contour intervals (isopleths) will be calculated for each seasonal range: a 50% contour area that represents the "core area" where caribou live, and a 95% contour area that representations the estimated seasonal home range boundary. Smoothed cross-validation will be used as the smoothing parameter for the calculation. The seasonal ranges during construction and operation will be compared to baseline, (Marathon has committed to updating the baseline conditions with all available information pr-construction), possibly by determining the amount of overlap in the seasonal ranges between phases (e.g., Fieberg and Kochanny 2005).

Q2b - Have the calving ranges changed compared to baseline (e.g., size, area)?

Kernel density estimates will be used to describe the calving range for the Buchans and Grey River caribou herd using a similar analysis as described above. The calving range during construction and operation will be compared to baseline calving ranges by comparing the degree of overlap (e.g., Fieberg and Kochanny 2005).

6.2.3.3 Population Change

As presented in the EIS section 11.2.2.1, although recent surveys indicate that population estimates of some herds in the south coast sub-population may be stabilizing (Government of NL 2019a), research also indicates that caribou populations on the Island of Newfoundland continue to be limited by poor calf survival (Government of NL 2015) and, subsequently, poor recruitment rates. For the herds that most directly interact with the Project, population studies have been on-going and will continue. These efforts are the foundation of the third key effects monitoring question: Have the Buchans and Grey River populations changed?

Q3a - Are there changes in the demographic parameters (e.g., calf:female ratio, adult male:adult female ratio) and group composition on the calving grounds?

Caribou will be counted and classified annually during the June aerial survey of the calving grounds. The demographics observed during the construction and operation phases will be compared to baseline conditions (June 2020 and 2021). Potentially meaningful changes, biologically or statistically, will be analyzed using appropriate tests (e.g., ANOVA; t-test; z-test).

Q3b - Are there changes in the population estimate for the Buchans herd on the calving grounds?

Population estimates will be completed yearly on the Buchans herd calving grounds. The population trends during the construction and operation phases will be compared to the baseline conditions (June 2020 and 2021). Potentially meaningful changes, biologically or statistically, will be analyzed using appropriate tests (e.g., ANOVA; t-test; z-test), although more complex population models may be needed to understand drivers of population change if they occur.

6.2.3.4 Caribou Interaction with the Project

Marathon has employed a systematic approach to the assessment of potential mitigation measures that consider all Project phases, the potential effect pathways, and the range of caribou responses and levels of response to the Project features and activities as presented in Section 5.0. The mitigation measures are intended to reduce potential risk to caribou. The fourth effects monitoring question is focused on the interactions of caribou with the Project: How have caribou directly interacted with the Project over time?

Q4a - Are there changes in the observations of caribou within the mine site (e.g., number, timing, frequency, locations)?

As described in Section 4.2.5.1, information about the number of caribou interacting with the mine site will be determined from observation data collected by on-site personnel, the GPS collar data, and remote camera data. The number, timing, frequency, and location of caribou interactions in the construction and operation phases will be tracked. Annual differences in the observations of caribou in the mine site between during Project phases will be evaluated using a parametric test if statistical assumptions (e.g., normality) can be met. Otherwise, a non-parametric test will be used. Differences in caribou observations may also be described qualitatively.

Q4b - Are there changes in the observations of caribou on the Project access road (e.g., number, timing, frequency, locations)?

Data collected by on-site personnel, the GPS collar data, and remote camera data pertaining to caribou use of the access road during the construction and operation phases will be summarized annually. The occurrences, trends and changes over time of observations of caribou on the access road will be recorded and evaluated using a parametric test if statistical assumptions (e.g., normality) can be met.

Otherwise, a non-parametric test will be used. Differences in caribou observations may also be described qualitatively.

Q4c - Are there changes in Project-related caribou injuries or mortalities in the Project Area (e.g., number, timing, locations)?

Observational data on Project-related caribou injuries or mortality will be recorded and investigated to determine any trends.

If there are either 'near miss' occurrences or injuries/fatalities of caribou related to Project activities (access road or site), an incident response will be triggered to determine the root cause of the occurrence. The mitigation measures in place to reduce the likelihood of this type of occurrence have associated monitoring protocols and thresholds for adaptive management actions, see Table 5.2.

7.0 ADAPTIVE MANAGEMENT

Marathon will use an adaptive management framework that allows for adjusting mitigation measures and management actions in response to monitoring results. The adaptive management framework establishes a process to evaluate monitoring outcomes relative to desired goals for specific mitigation measures as well as broader Project effects.

While construction activities related to site development will result in full footprint development in some areas of the site, the largest Project components (e.g., the open pits, waste rock piles, overburden and ore stockpiles, TMF) will be only partially developed during construction and will not be fully developed until several years into operations. It is anticipated that follow-up and monitoring activities completed during the construction and early development period will provide valuable information on potential change in caribou movement and interactions with respect to the Project and the effectiveness of proposed mitigation measures. This information will then be used to determine if adjustments to mitigation measures, or the adoption of new mitigation measures, is required.

The premise of adaptive management is to use a cycle of planning, implementation, monitoring, and analysis / learning to systematically determine whether mitigation measures are effective relative to the goals and objectives, while allowing for adjustments to mitigation when monitoring results indicate that the goals and objectives are not being achieved. Marathon is committed to working with the NLDFFA-Wildlife Division, scientific experts, Indigenous groups and stakeholders to implement mitigation measures, undertake follow-up and monitoring activities, and adapt mitigation measures as applicable to avoid or reduce Project-related effects on caribou migration and population.

Marathon's conceptual adaptive management framework is presented in the mitigation tables located in Section 5.0 where proposed mitigation measures to be implemented are presented in Table 5.3 with the associated monitoring, monitoring outcomes (assessment) and next steps. Where adaptive management

may be required to address goals or objectives that are not achieved, the refined or new mitigation are presented in Table 5.4.

The adaptive management framework includes the basic elements of Plan, Act, Monitor, Assess, and Revise, which function together under a feedback system. This framework is inherently linked to each mitigation measure, and broadly to each monitoring objective and question. The basic elements are illustrated in Figure 6-1 and summarized as follows:

- Plan: states the goal and is supported by targets and performance indicators
- Act: the 'doing' of specific actions, such as implementing one or more mitigation measure
- Monitor: seeks to collect data/information on the performance indicators and to report on those measures in respect of the targets
- Assess: allows for evaluation of the effectiveness of a mitigation measure in terms of meeting the target. Typically, measures that meet or exceed the target will result in no change to the Plan, whereas measures that do not meet the target will be reviewed in detail to identify the root cause of the deficiency and to identify adjustments or corrective measures to meet the target. The Assess element can include consultation and engagement regarding monitoring results and proposed corrective actions
- Revise: the process of implementing changes, as necessary, that were identified in the Assess element. The Revise element circles back to the Monitor and Assess elements as part of understanding whether the corrective actions are effective at achieving the stated goal.

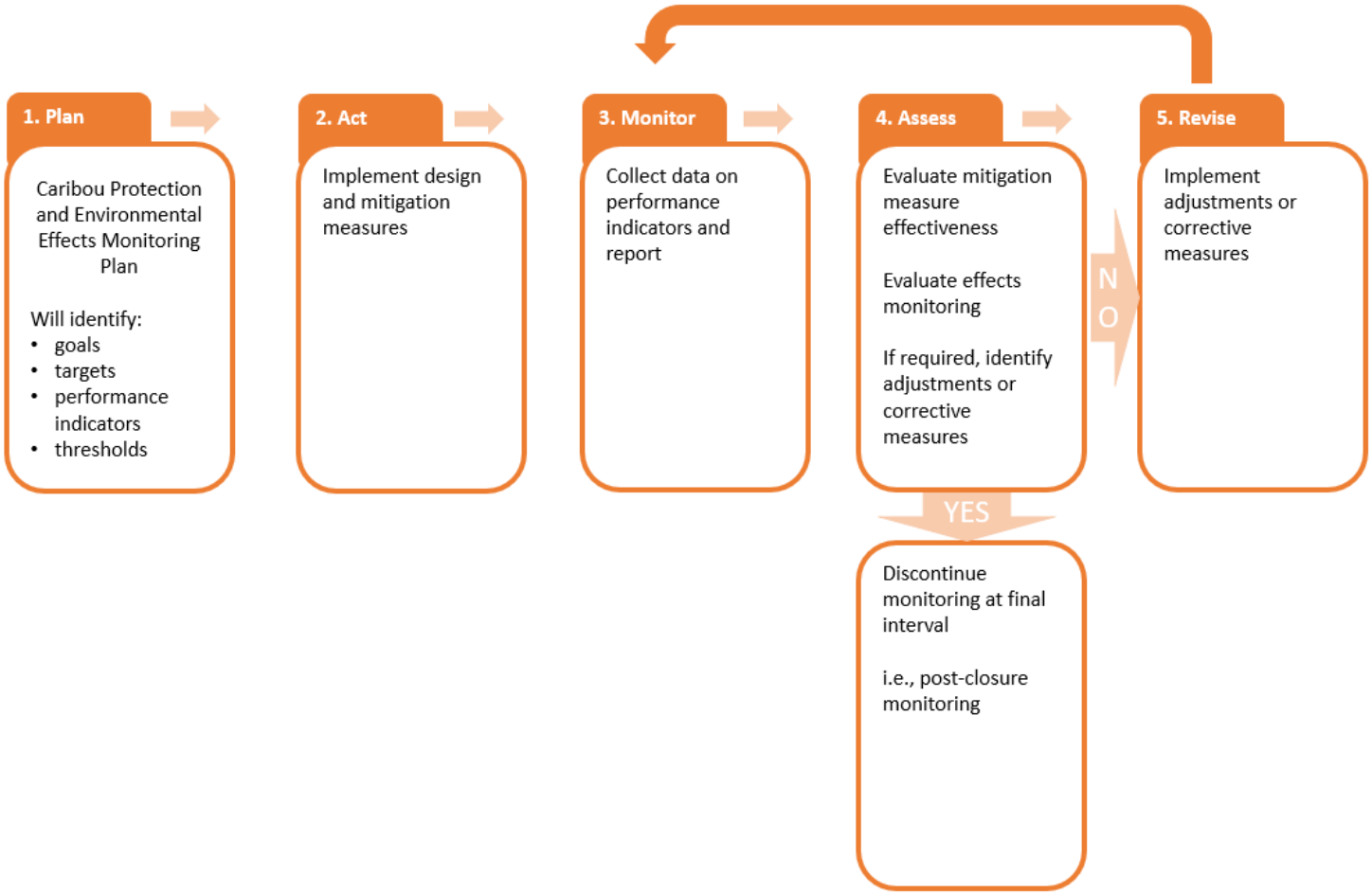

Figure 7-1 Adaptive Management Framework for the CPEEMP

8.0 MONITORING REPORTS

The specific schedule and format for monitoring reports will be reviewed in consultation with the NLDFFA-Wildlife Division and the reports will be made available to NLDFFA-Wildlife Division, Indigenous groups and stakeholders. The reports will contribute to adaptive management strategies to address potential Project effects on caribou habitat, movement, and mortality risk.

Field reports from camera surveys, aerial surveys, direct (visual) monitoring and on-site observations will be presented semi-annually, following completion of the field activities. These reports will include field data and preliminary analyses, as applicable, and will flag any potential issues or concerns. The field programs will be consolidated in an annual report that will include:

- A summary of remote camera and collar data results from the migration (spring or fall)
- Group composition and distribution (Grey River and Buchans caribou), and the population estimate (Buchans caribou) results from the aerial survey of the calving grounds (part of spring report)
- A summary of caribou observations from on-site personnel and monitoring
- Recommendations for changes in approaches for mitigation measures, if required

As noted, the collar data will be assessed following each migratory season, to identify any indications of changes in migratory patterns and timing. Given that the models utilize substantial datasets over greater time periods, comprehensive model runs will occur at two-year intervals and will present results from the GPS collar data [i.e., change in movement patterns (e.g., dBBMM, NSD); and change in seasonal distribution (kernel analysis)]. The associated, comprehensive report will also present comparisons between the most recent two-year period and the earlier monitoring periods for the purpose of identifying potential trends. The reports will contribute to adaptive management strategies to address the effectiveness of mitigation to reduce potential Project effects and risk to caribou.

Annual reports will also be prepared that will present the results of the on-going Project monitoring programs (e.g., noise, dust, lighting, traffic levels, effluent). This will be used to monitor compliance with regulatory requirements and other environmental commitments made in the EIS, IR responses, and conditions of EA release. Information from these programs will also inform the caribou-specific reports. The reporting schedule may be modified as the Project progresses and based on monitoring requirements identified by regulators (related to air quality and water) or through continued consultation with NLDFFA-Wildlife Division.

8.1 MONITORING AND REPORTING ACTIVITIES

To gather the required data to answer the key questions posed through the monitoring program described in Section 6.0, the primary means of data acquisition, the associated scope, tasks and frequencies are presented in Table 8.1.

Table 8.1 Monitoring Program Requirements and Schedule

Analysis/Program	Scope	Project Phase Breakdown and Schedule
Analysis requiring Telemetry Data		
Collaring – Grey River and Buchans Herds	Minimum 60 active collars divided between Buchan (n=40) and Grey River (n-20) herds	**Baseline Phase** • Collar purchase and deployment • Update baseline conditions **Construction Phase** • Replace malfunctioning and offline collars as soon as reasonable possible to maintain the present number of active collars. • Every 3-4 years – collar replacement/refurbishment • Download and process collar data (frequency will depend on the time of the year), report twice annually **Operational Phase** • Replace malfunctioning and offline collars as soon as reasonable possible to keep total number of active collars at 60. • Every 3-4 years – collar replacement/refurbishment **Download and process collar data, report twice annually Closure and Rehabilitation Phase** • Replace malfunctioning and offline collars as soon as reasonable possible to keep total number of active collars at 60. • Download and process collar data (frequency will depend on the time of the year), report twice annually **Post-closure Phase** • Replace malfunctioning and offline collars as soon as reasonable possible to keep total number of active collars at 60. • Every 3-4 years – collar replacement/refurbishment • Download and process collar data (frequency will depend on the time of the year), report twice annually • Continue monitoring and collar maintenance for at least three complete annual migrations.

Table 8.1 Monitoring Program Requirements and Schedule

Analysis/Program	Scope	Project Phase Breakdown and Schedule
Assess Change in Movement	Regular monitoring of collar function and caribou locations (e.g., bi-weekly during non-sensitive periods, daily during sensitive periods). Qualitative – description of broad presence across the landscape and updates on collar status. Quantitative - statistical movement analysis for each Project phase and statistical comparison among phases Approach: Identify changes in patterns of migration, including timing, duration, location, changes in behavior etc. Browning bridge movement modelling	**Baseline** • Baseline will be updated with all available information prior to start of construction • **Construction Phase** • Movement analysis for construction, approximately 2 years (ideally two of each migratory periods) • Seasonal summary of movements • Reports detailing movements and comparing to baseline **Operational Phase** • Seasonal summary of movements • Reports detailing movements and comparing to baseline and construction Biennial movement analysis for early operation period **Closure - Rehabilitation Phase** • Seasonal summary of movements • Reports detailing movements annually post-operations **Post-closure Phase** • Continue monitoring and collar maintenance for at least three complete annual migrations • Annual reports for at least three complete annual migrations

Table 8.1 Monitoring Program Requirements and Schedule

Analysis/Program	Scope	Project Phase Breakdown and Schedule
Assess impacts on calving caribou	Quantitative – determine seasonal ranges and compare over time Approach: Monitor and identify changes in use of traditional calving areas using kernels to compare calving locations Quantitative – statistical movement analysis (e.g., DeMars Model – kernel analysis) and comparison over time Possible Approach: Compare calving timing	**Baseline** • Baseline will be updated with all available information prior to start of construction (ranges and timing of calving) **Construction Phase** • Seasonal range and calf timing analysis for construction, approximately 2 years (ideally two of each season) • One analysis and report detailing any changes in seasonal use areas and determination of calf-timing **Operational Phase** • Biennial analysis and report for operation period **Closure - Rehabilitation Phase** • Annual summary of seasonal ranges **Post-closure Phase** • Annual reports for at least three complete annual migrations
Original research to refine timing and duration of spring and fall migration periods, and the calving and post calving periods (guidelines pg.48)	Quantitative - statistical analysis Possible Approach: Identify seasonal timing and duration for each season using Net Squared Displacement (NSD).	**Baseline** • Baseline will be updated with all available information prior to start of construction **Construction Phase** • Seasonal timing, individual and herd for construction 20-24 months (ideally two of each season) • One report detailing any changes in seasonal use areas and determination of calf-timing • Operational Phase Biennial analysis and report of seasonal use ranges **Closure - Rehabilitation Phase** • One report detailing seasonal use areas and calf timing two years post-operations **Post-closure Phase** • Annual analysis and reports for at least three complete annual migrations

Table 8.1 Monitoring Program Requirements and Schedule

Analysis/Program	Scope	Project Phase Breakdown and Schedule
Programs Requiring Aerial Surveys		
Post-Calving Surveys – Resident and Buchans	Monitor changes in birth and recruitment, and relate these to population trends Results from calving surveys within 'Zone of Influence' Qualitative – comparison of rates over time (e.g., yearly or from construction to operation phases) Buchans Aerial survey of 'complete Buchans range' Population estimate and cow/calf ratio	**Baseline** • Baseline will be updated with all available information prior to start of construction **Construction Phase** • Annual overflights • Annual reports detailing population estimates and ratios, analysis of changes over time and relative to baseline **Operational Phase** • Annual overflights • Annual reports detailing population estimates and ratios, analysis of changes over time and relative to baseline and construction **Closure and Rehabilitation – Phase** • Annual overflights (two years) • Annual reports detailing population estimates and ratios, analysis of changes over time **Post-closure Phase** • Annual overflights for at least three calving seasons • Annual reports detailing population estimates and ratios, analysis of changes over time

Table 8.1 Monitoring Program Requirements and Schedule

Analysis/Program	Scope	Project Phase Breakdown and Schedule
Program Requiring Remote Cameras		
Migratory group sizes and composition	To collect information on caribou group size and composition, and to supplement collar information on the timing of spring and fall migration through the mine site Results may require adjustment to locations of camera set-ups	**Baseline** • Baseline will be updated with all available information prior to start of construction **Construction Phase** • Annual reporting detailing group size, composition movements and timing **Operational Phase** • Annual reporting detailing group size, composition movements and timing **Closure and Rehabilitation Phase** • Annual reporting detailing group size, composition movements and timing **Post-closure Phase** • Annual reporting detailing group size, composition movements and timing comparing for at least three complete migratory seasons

9.0 ADDITIONAL INFORMATION

Marathon is committed to the mitigation and monitoring program described above and working with NLDFFA-Wildlife Division, Indigenous groups, and stakeholders to protect caribou through the avoidance and reduction of potentially adverse Project-related effects. Marathon understands that there is a need to provide operational and financial support to assist the NLDFFA-Wildlife Division monitor and assess information related to the Valentine Gold Project.

Marathon is committed to:

- Adhering to the mitigation and monitoring program as described in the CPEEMP
- Working directly with NLDFFA-Wildlife Division, Indigenous groups, and stakeholders to implement the plan and respond to results in a timely and transparent manner
- Working as a partner to deliver the commitments made in this and other documents that may stipulate Project conditions of approval.

While addressed above, Marathon reaffirms the commitment to review and update this CPEEMP in collaboration with NLDFFA-Wildlife Division based on the data collected via monitoring.

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APPENDIX A

Revision Log and Distribution List

CONTROLLED COPY DISTRIBUTION LIST

Marathon	Individual or Location

REVISION HISTORY LOG

Version	Date Issued	Revision Notes

REVISION REQUEST FORM

SECTION TO BE REVISED:

NATURE OF REVISION:

RATIONALE FOR REVISION:
(i.e., environment/worker safety, etc.)

SUBMITTED BY:

Please submit request to the Marathon Gold Corporation Environmental Manager, Environmental Superintendent or Environmental Coordinator.

APPENDIX B

Camera and Collar Timing Data

Camera data – timing of animals through the Project area

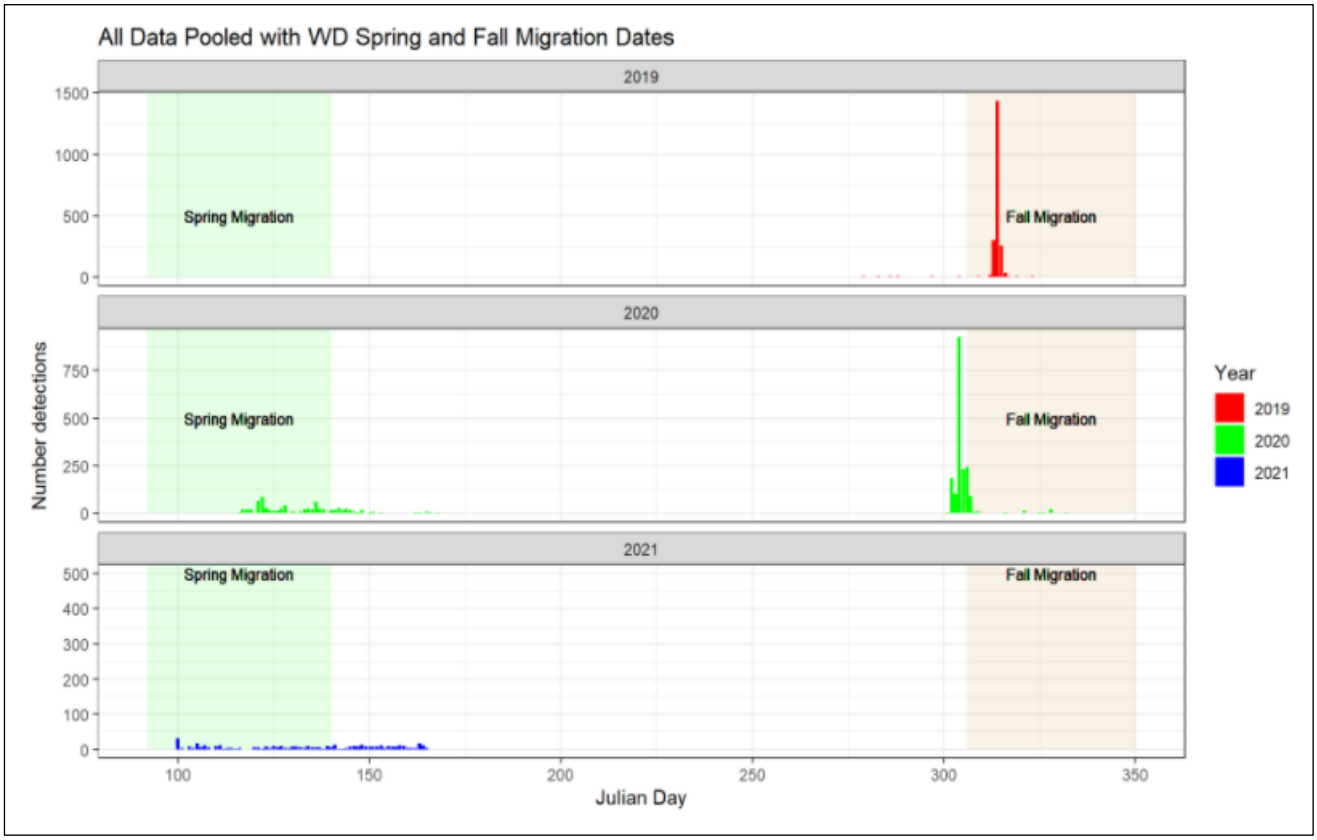

Figure B-1 Available Spring and Fall Camera Data

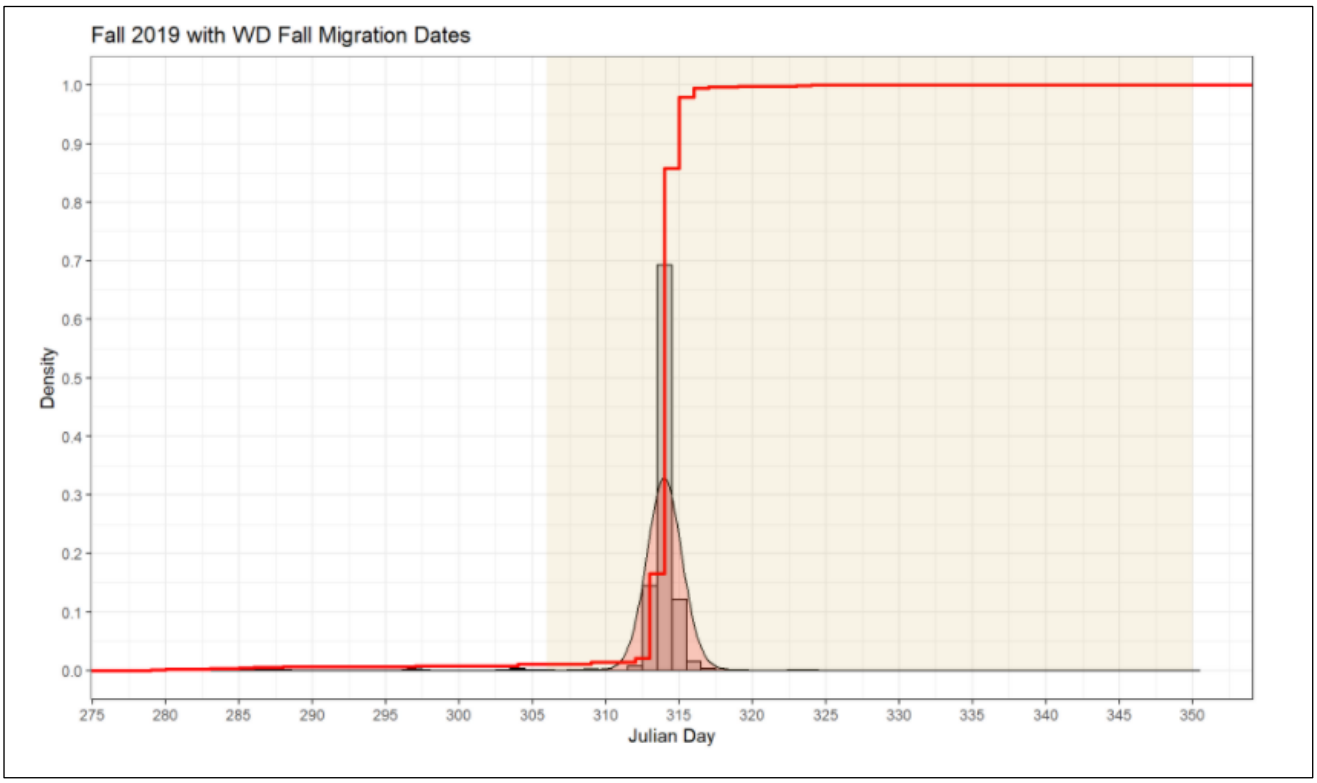

Figure B-2 Fall 2019 Camera Data

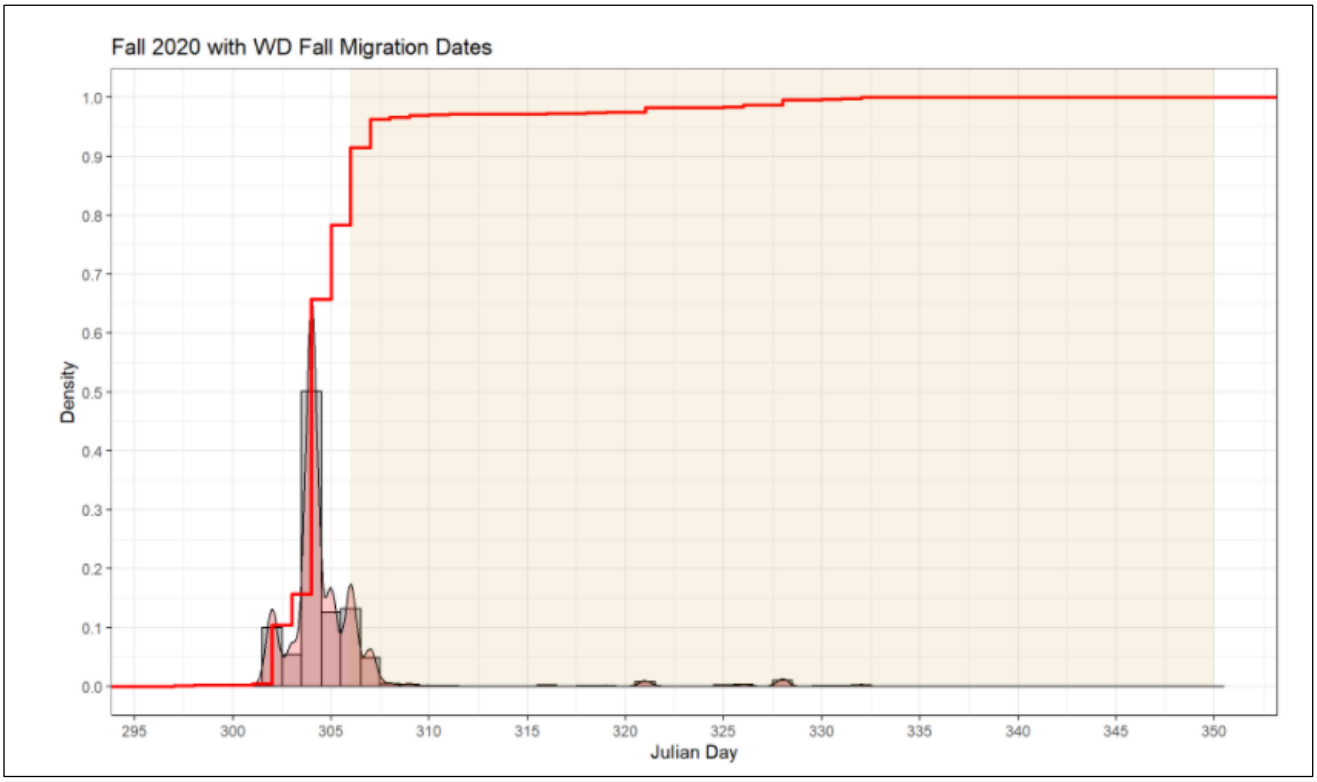

Figure B-3 Fall 2020 Camera Data

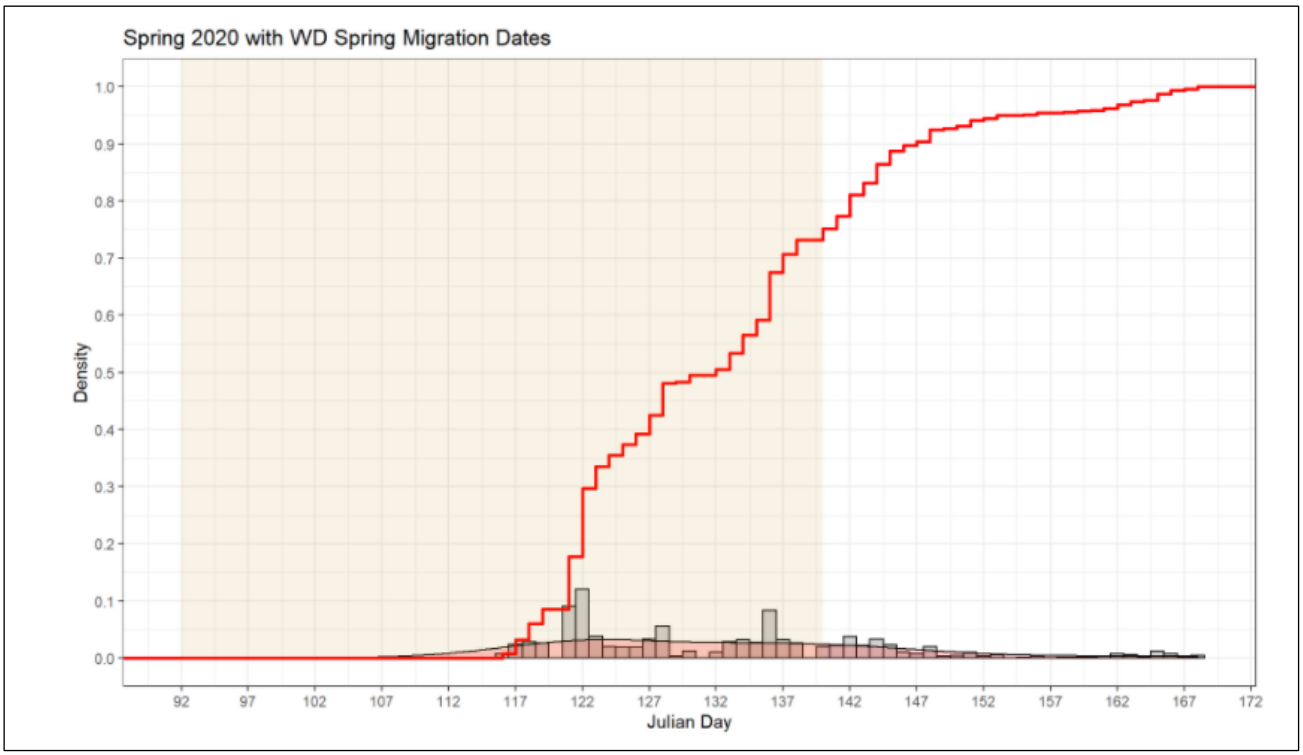

Figure B-4 Spring 2020 Camera Data

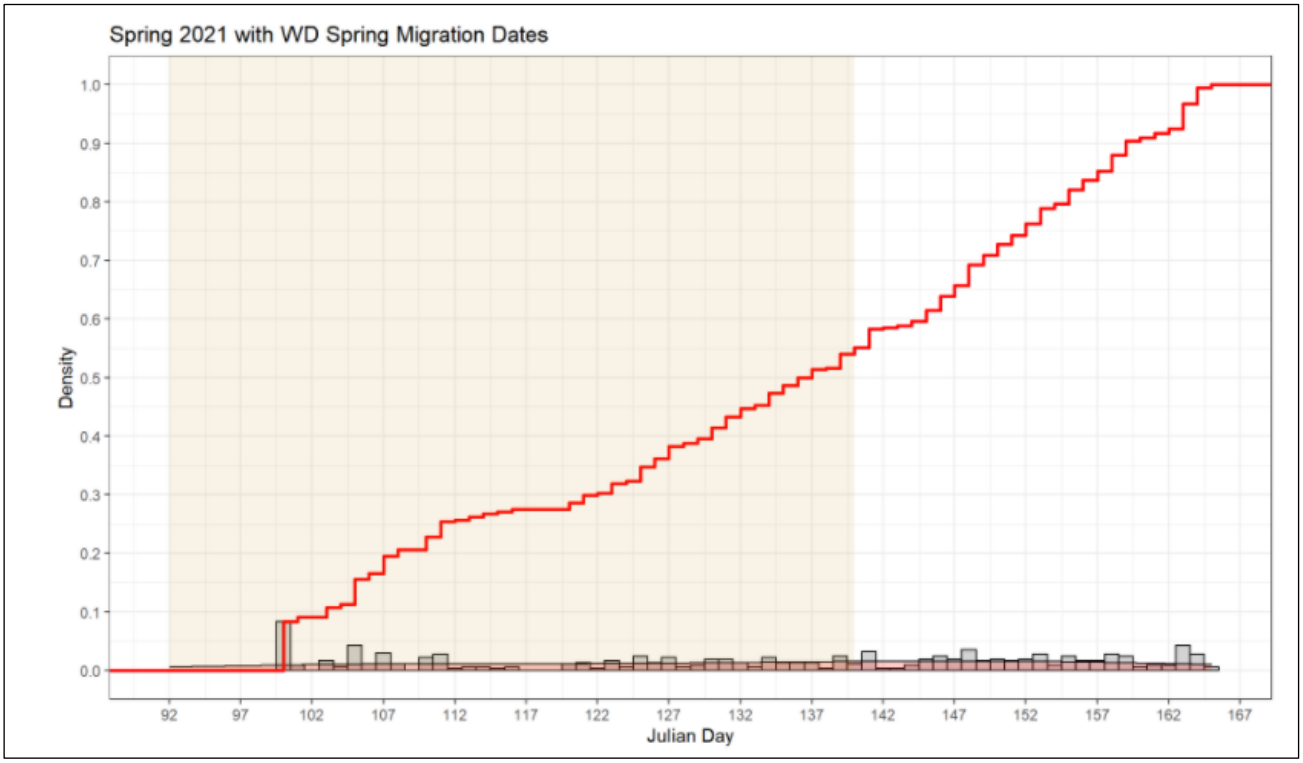

Figure B-4 Spring 2020 Camera Data

Collar data – timing of animals through the Project area

Data

- Collar Data summarized by year
- Calculated first Caribou in date by zone
- Calculated Last Caribou Outout Date by zone
- Calculated median First Caribou In Date
- Calculated median Last Caribou Out Date
- Calculated Lower and Upper Confidence Interval (CI) of Median using 95% quantiles (i.e 95% of data is within upper and lower CI)
- Used Lower CI from Caribou in Date and Upper CI from Caribou out date. (ie. Range = 95% lower CI of Caribou In and 95% Upper CI of Caribou Out)
- Range of Dates plotted by year

Julian Date

Spring migratory period - Spring Migration/Pre-calving Apr 1 – May 19 Fall migratory period - Fall Migration/Dispersal Nov 1 – Dec 15

Full Zone – entire area covered by dBBMM
KM Zone – distance from Mine site
Fall trigger is 15 KM to move to Caribou Protection Level 4: Reduction or Suspension of Project Activities

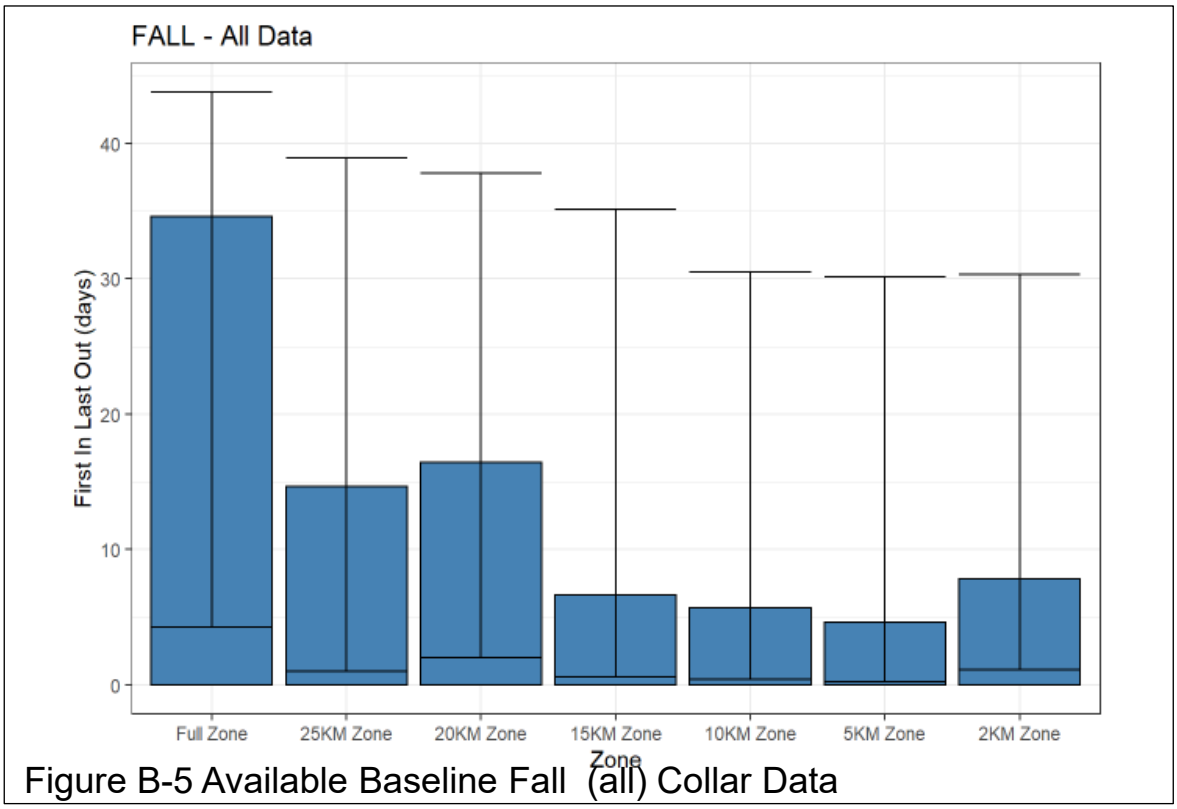

Figure B-5 Available Baseline Fall (all) Collar Data

PLOT - 15KM ZONE

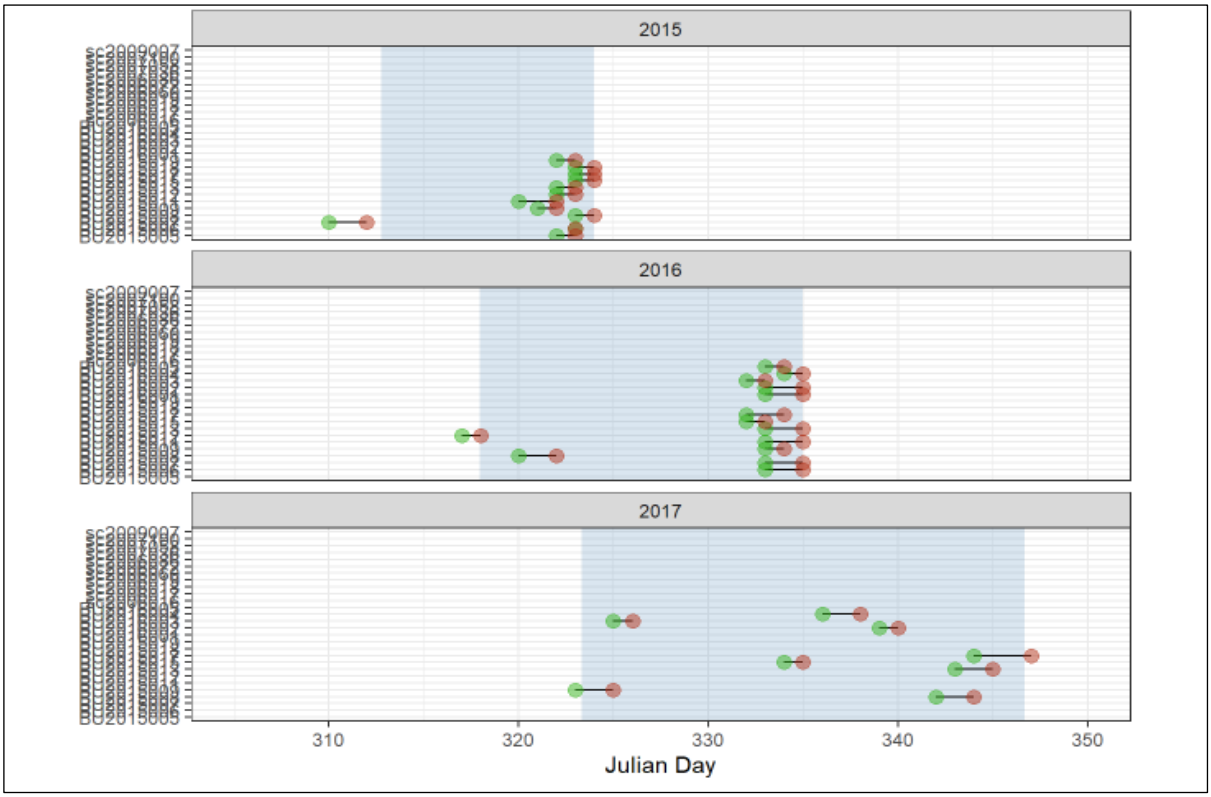

Figure B-6 Baseline Fall Collar Data*

* Earlier years of data were not used due to number of collared animals being <5

Full Zone – entire area covered by dBBMM
KM Zone – distance from Mine site
Spring trigger is 10 KM to move to Caribou Protection Level 4: Reduction or Suspension of Project Activities .

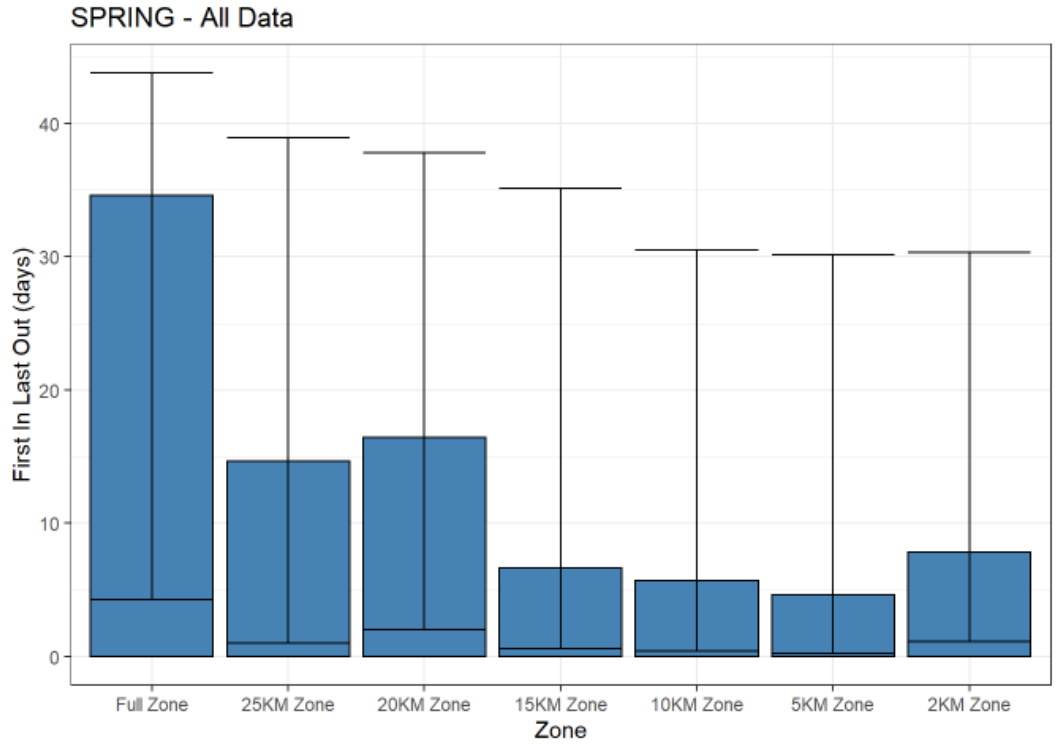

Figure B-7 Available Baseline Spring (all) Collar Data

PLOT - 10KM ZONE

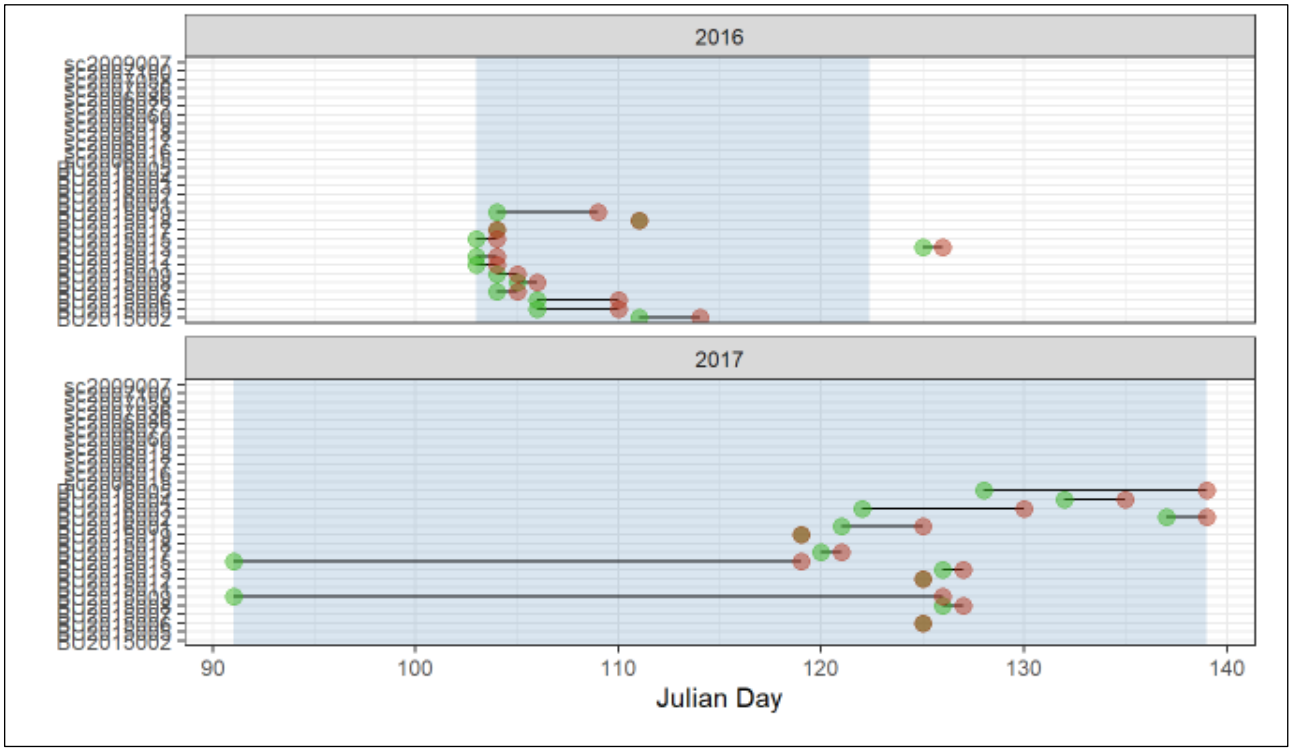

Figure B-8 Baseline Spring Collar Data*

* Earlier years of data were not included due to number of collared animals being <5

Caribou Group Composition based on Remote Camera Results for Fall 2019 and Fall 2020

	Total	
	Fall 2019	**Fall 2020**
Total Caribou	2,071	1,847
Total Adults[1]	1,641	1,555
Adult Females	1,260	1,200
Adult Males	381	330
Adult Unknown[2]	N/A	25
Yearlings	7	42
Calves	203	198
Unknown[3]	220	52
Male:100 Females[4]	30	28
Percent Males[4] (%)	18	18
Calf:100 Females[4]	16	17
Percent Calves[4] (%)	10	11
Percent Yearlings[4] (%)	<1	2
Mean Group Size[4, 5] (range in brackets)	13 (1-164)	10 (1-178)
Number of Collared Caribou	3	10

Notes:

1. Total adults = adult females + adult males + adult unknown
2. Adult Unknown = adults of unknown sex
3. Unknown includes caribou of unknown sex and/or age class
4. Numbers rounded to the nearest whole number
5. Mean group size and range based on all cameras

Stantec. 2021a. Valentine Gold Project: Fall 2020 Caribou Survey – Remote Cameras

Caribou Group Composition based on Remote Camera Results for Spring 2020 and Spring 2021

	Total	
	Spring 2020	**Spring 2021**
Total Caribou	701	374
Total Adults[1]	638	333
Adult Females	351	162
Adult Males	189	131
Adult Unknown[2]	98	40
Yearlings	52	20
Calves	3	12
Unknown[3]	8	9
Male:100 Females[4]	54	81
Percent Males[4] (%)	27	35
Calf:100 Females[4]	1	7
Percent Calves[4] (%)	<1	3
Percent Yearlings[4] (%)	7	5
Mean Group Size[4, 5] (range)	6 (1-84)	2 (1-18)
Number of Collared Caribou	0	4

Notes:

1. Total adults = adult females + adult males + adult unknown
2. Adult Unknown = adults of unknown sex
3. Unknown includes caribou of unknown sex and/or age class
4. Numbers rounded to the nearest whole number
5. Mean group size and range

Stantec. 2021c. Valentine Gold Project: Spring 2021 Caribou Survey – Remote Cameras