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FINAL REPORT

SD 6-4 Terrestrial Environment Management and Monitoring Plan - Meliadine Gold Project, Nunavut

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REPORT

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Executive Summary

Agnico Eagle Mines Limited (AEM) is developing the Meliadine Gold Project (the Project), located approximately 25 kilometres (km) north from Rankin Inlet, and 80 km southwest from Chesterfield Inlet in the Kivalliq Region of Nunavut. Situated on the western shore of Hudson's Bay, the Project site is located on a peninsula between the east, south, and west basins of Meliadine Lake (63°1'23.8"N, 92°13'6.42"W), on Inuit owned land. This report presents a conceptual Terrestrial Environment Mitigation and Management Plan (TEMMP) for the Project and forms a component of the documentation series produced in accordance with the Project.

The Plan has been prepared for inclusion in the Project Final Environmental Impact Statement (FEIS). The Plan will be reviewed and updated on a regular basis as the Project proceeds into detailed design, construction, operations, closure and post-closure.

Monitoring will be focussed on the wildlife and bird Valued Ecosystem Components (VECs) identified in the FEIS where primary or minor effects pathways have been identified as a result of the Project. Monitoring study design and methods will be consistent with monitoring programs being implemented at other mining operations in Nunavut (e.g., Nunavut Environmental Consulting 2012). In addition, consultation with Government of Nunavut Department of Environment (GN DoE) personnel, Inuit communities, and Hunter and Trapper Organizations (HTO) has been initiated and will be further carried out prior to implementation of the plan.

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Abbreviation and Acronym List

AEM	Agnico Eagle Mines Limited
AWAR	All-Weather Access Road
CESA	Caribou Effects Study Area
CWS	Canadian Wildlife Service
FEIS	Final Environmental Impact Statement
Golder	Golder Associates Ltd.
GN DoE	Government of Nunavut, Department of Environment
HTO	Hunters and Trappers Organization
IQ	Inuit Qaujimajatuqangit (see note [1])
KIA	Kivalliq Inuit Association
LSA	Local Study Area
NIRB	Nunavut Impact Review Board
PRISM	Program for Regional and International Shorebird Monitoring
RSA	Regional Study Area
TEMMP	Terrestrial Environment Mitigation and Monitoring Plan
TSF	Tailings Storage Facility
VEC	Valued Ecosystem Component
WPRP	Wildlife Protection and Response Plan
ZOI	Zone of Influence

*Note: [1] IQ symbol appearing in right hand margin denotes where IQ is referenced in the assessment.

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1.0 TERRESTRIAL ENVIRONMENT MANAGEMENT AND MONITORING PLAN

1.1 Background and Project Description

Agnico Eagle Mines Limited (AEM) has prepared the Final Environmental Impact Statement (FEIS) for the development of the Meliadine Gold Project (Project). The FEIS has been developed to conform to The Guidelines for the Preparation of an Environmental Impact Statement (NIRB 2012). One of the requirements in the Guidelines (Section 9.4.17) is the development of a Wildlife Mitigation and Monitoring Plan, in combination with monitoring of vegetation and wildlife habitat, this document fulfills this requirement. Given that this document includes mitigation and monitoring requirements for vegetation and wildlife, from this point forward it is referred to as the Terrestrial Environment Management and Monitoring Plan (TEMMP). For the purposes of this document, wildlife refers to wildlife and wildlife habitat, and birds and bird habitat. This document represents a TEMMP intended to provide further detail on the Project-specific wildlife monitoring components and contributions to other regional monitoring programs. It also is intended to be a living document that can be used for discussion with regulators and the Hunter Trapper Organization (HTO) regarding wildlife monitoring undertaken for the Project. Regulatory and Inuit consultation regarding this TEMMP have commenced. The concordance table is found in Volume 1, Appendix 1-A.

1.1.1 Concordance with Terms of Reference

The purpose of this document is to address the Guidelines issued by the Nunavut Impact Review Board (NIRB) for the Project (NIRB 2012), and specifically those relating to the presentation of a Wildlife Mitigation and Management Plan (Section 9.4.17 of the Guidelines). Specific requirements set out in the Guidelines relating to the preparation of a Wildlife Mitigation and Management Plan were used to guide this TEMMP and are provided in FEIS Volume 1, Appendix 1.0-A.

NIRB recommends the following related to standardization of data for monitoring programs:

> *"all monitoring plans should be designed so that results from these programs can be coordinated with ongoing regional initiatives or programs with relevant government organizations, or regional authorities." NIRB guidelines, Section 9.3, page 78-79.*

> *"When designing data collection or baseline studies, it is recommended that the Proponent coordinate with ongoing programs with relevant developments, government organizations, regional authorities, and researchers. This recommendation applies to data collected for the Nunavut General Monitoring Program (NGMP), as per Article 12 of the NLCA, the Proponent's project-specific monitoring programs, as well as any regional monitoring initiatives in which the Proponent will participate. The Proponent is expected to coordinate on any initiatives undertaken by government organizations in respect to the NGMP and to liaise with the NGMP Secretariat whenever possible." NIRB guidelines, Section 7.7.1, page 40-41.*

AEM will comply with these principles, and has already established several programs that involve collaborations with regional initiatives and contribute to monitoring cumulative effects. These include:

- **Caribou Collar Program:** Supporting the GN's caribou satellite-collaring program for the Qamanirjuac herd, facilitating monitoring of cumulative effects at the herd level (SD 6-4, Section 3.4, page 12).
- **Regional Muskoxen Surveys:** AEM has provided the GN DoE with in-kind contributions and support for previous muskoxen surveys and will continue to do so.
- **Hunter Harvest Program:** AEM will establish a harvest study in association with the Rankin Inlet HTO to document harvest rates, harvesting distribution and seasonality, and monitor these data over time (SD 6-4, Section 3.5, page 13). This will contribute to an understanding of cumulative effects by increasing understanding of the regional distribution and seasonality of hunting.
- **Raptor Monitoring Program:** AEM in collaboration with the Arctic Raptor Project to develop and implement the raptor monitoring program (SD 6-4, Section 3.6, page 14). This will directly align monitoring efforts at Meliadine with this long-term regional research program which already involves government, non-government, First Nations, and academic partnerships.
- **Wildlife Surveys:** AEM in collaboration with the HTO will conduct wildlife surveys twice weekly along the All- Weather Access Road (AWAR) and with environment technicians around the proposed mine site. This will contribute to and understanding of cumulative effects by collecting routine wildlife survey data (including caribou) and assist in anticipating large herd migrations, communicating with the HTO and managing mine activities during migration events. In addition, AEM has contributed to regional muskoxen survey programs and will continue to do so in the future.

1.2 Objectives

This TEMMP outlines the policies, practices, designs, and procedures that AEM will implement to reduce Project-related effects to wildlife and wildlife habitat. The TEMMP is based primarily on experience at the Meadowbank Mine but also includes lessons learned at other Nunavut mines and mines in the Northwest Territories. The intent is to reduce effects to wildlife, and maintain safety for wildlife and personnel at the Project site. The effectiveness of mitigation and management practices and policies is determined through this program. References to operating procedures relevant to wildlife mitigation and management will be listed in this document.

The TEMMP is designed to monitor potential residual effects of the Project on wildlife habitat, wildlife distribution, and local wildlife abundance when mitigation strategies are implemented during operations. Considered as a whole, the TEMMP is guided by the following principles:

- to provide a set of achievable goals and measurable objectives based on input from communities, government, and other people interested in the Project;
- to use the results from monitoring for adaptive management actions (e.g., additional mitigation practices, modify objectives or study designs, or special studies to better understand effects) when required;
- to incorporate local knowledge and Inuit Qaujimajatuqangit (IQ); and
- to design studies and data collection protocols that are consistent and standardized with other programs in the region so that data can be used by government to assess and manage cumulative effects.

The principles are linked to an adaptive management framework for monitoring caribou and other wildlife. It is recognized that some management actions may not be identified initially, but likely determined in response to the outcome of monitoring programs. Therefore, adaptive management can be considered as the process of 'learning by doing'.

Importantly, the process of adaptive management is collaborative and requires input from communities, local knowledge and IQ, government, and other people interested in the Project. The framework is based on 3 questions that are related to the goals of the monitoring program. These questions are as follows:

1) Why do we monitor?
2) What components should we monitor?
3) How do we monitor the selected components?

The overall reason why we should monitor wildlife is to follow-up on the concerns that communities, government, and regulators have with respect to how the Project will influence the ecosystem. More specifically, the first goal (question) is related to the different types of monitoring that are typically completed at a project, such as the following:

- testing effects predictions, which can be related to measuring the response of the environment or population (i.e., monitoring component) to project stressors, and/or testing the assumptions associated with the predictions;
- testing the effectiveness of environmental design features and mitigation policies, practices, and procedures; and
- meeting and fulfilling regulatory requirements.

The information collected through the different types of monitoring is used to provide recommendations regarding study designs and sampling methods (e.g., frequency and duration of sampling), and possible changes to components of the TEMMP (another element of adaptive management). The results from monitoring can be used to increase the confidence of impact predictions in future environmental assessments. Another type of monitoring is contributing to the assessment and management of cumulative effects by government. The TEMMP for the Project will use appropriate and standardized study designs and methods so that the data from the Project and existing mining operations can be used to measure cumulative effects on wildlife.

The second goal is to determine what components of the environment and population should be monitored. Monitoring components for wildlife are based on the effects pathways evaluated in the EIS, which originate from the areas of public concern identified by communities and interveners during the EIS process.

Monitoring components broadly include wildlife, habitat, and people. To clarify the people aspect, people would be included as a component related to the effects pathway of hunter use of the AWAR. For each of the 3 broad components, there could be one or more monitoring themes. After determining the monitoring themes that will be completed for each component and the type of monitoring each theme falls under (e.g., testing predictions or verifying mitigation), a set of clear and measurable objectives need to be defined. The objectives will inform the appropriate spatial and temporal scales of the monitoring, and the study designs and sampling methods.

The objectives must be achievable and linked to the different types of monitoring. The ability to achieve objectives is often related to the limitations in associated measurement endpoints or variables, which should have the following attributes:

- good knowledge of the monitoring variable to provide confidence in interpreting the results;
- accessibility and repeatability of collecting robust monitoring data (i.e., practical and cost-effective measurement endpoints);
- high signal to noise ratio (can separate mine-related changes in the variable relative to natural factors); and
- provide reliable information for adaptive management.

The main effects pathways from the FEIS that will be addressed in this management and monitoring plan include the following:

- physical footprint decreases habitat quantity and causes fragmentation;
- sensory disturbance can change the amount of different quality habitats, and alter wildlife movement and behavior (distribution);
- improved access for harvesting wildlife can affect wildlife population sizes;
- disruption or alteration of caribou migration routes from the presence of the mine or from mine-related activities;
- permanent changes in wildlife habitat following closure of the mine site; and
- effects on population size and distribution changes the availability of animals for traditional and non-traditional use.

The evaluation of impacts to wildlife VCs considers the entire set of primary pathways that influence a particular assessment endpoint (e.g., effects to caribou population and caribou harvesting opportunities as a result of direct and indirect changes to habitat, behaviour, movement and harvesting). Rather, the relative contribution of each pathway is used to determine the effect of the Project (and other developments) on an assessment endpoint, which represents a weight of evidence approach (i.e., evaluating the persuasiveness of evidence indicating that a Project-related effect is occurring). The Project area is not particularly rich with wildlife abundance, consequently, the range of natural variability is quite high which yields a high signal to noise ratio and makes statistical power difficult to achieve. Consequently, a weight of evidence approach will be taken for identifying any trends in wildlife metrics that may be affected by the Project. Reporting will be completed annually with any identified trends reported and findings will be reviewed by the GN DoE. Opportunities to adaptively change the TEMMP based on feedback and discussions with the GN DoE and stakeholders will be possible after reviewing the annual reports.

Results from the monitoring studies are used to provide feedback to mine operations to determine if the goals and objectives are being met. Depending on the results, actions may be considered such as modifying and/or implementing additional mitigation. Similarly, changes to the objectives and/or study methods may be required if it is determined that the measurement variable has a low sensitivity to detect mine-related changes or that the scale of the response does not match the objective. The results are shared with the communities, government, and other people interested in the Project through annual monitoring and comprehensive analyses reports, and meetings. As part of the adaptive management framework, any changes to the monitoring program would need to include input from the communities and government.

1.3 Community Involvement

Involving communities in wildlife mitigation and monitoring is important so that local knowledge can be incorporated and community members can assess how well AEM is doing at reducing effects to wildlife, and to identify further mitigation. AEM in collaboration with the Rankin Inlet Hunters and Trappers Organization (HTO) will carry out a portion of the monitoring at the Meliadine Project site and will continue to provide opportunities for communities to share their views. Recommendations for including local and traditional knowledge (TK) in wildlife mitigation and monitoring include the following:

- including input from communities to reflect their priorities in the TEMMP;
- providing opportunities for community members to participate in monitoring (e.g., HTO);
- involving community representatives in adaptive management;
- providing opportunities for ongoing visits to the Project by community representatives;
- providing updates to communities as the Project progresses;
- initiating a community-based monitoring survey along the All Weather Access Road (AWAR); and
- using public education materials and signage on conservation and hunting from the Project Winter Access Road.

2.0 PROJECT DESCRIPTION

The Project is a proposed gold mine located 25 kilometres (km) north of the Hamlet of Rankin Inlet, Nunavut. Gold was discovered in 1969 with the first mineral claims staked in 1987. Over the ensuing years, there were episodic bursts of exploration by various operators and owners with the Project ultimately being purchased by AEM in 2010. The Project is largely on Inuit Owned Lands (IOL RI-01, RI-02) with some supporting infrastructure located within the municipal boundaries of the Hamlet. The proposed gold mine is comprised of 5 deposits, which will be mined using conventional mining methods. A conventional gold milling circuit will be employed to extract and recover the gold with tailings reporting to a tailings storage facility (TSF). Besides other normal mine infrastructure, the proposed mine site will have a power plant, fuel tank farm, accommodation complex, and sewage treatment plant – all common features of Arctic mines. The Phase 1 All-weather Access Road (AWAR) provides access between Rankin Inlet and the Project. This is a controlled access, single lane road, 23.8 km long. If construction of the mine is approved, the AWAR will be widened to 2 lanes and opened to public use. Volume 1, Appendix 1-2 provides detailed figures of the proposed Project components and its location including current activities, proposed development plans, and description of staffing resources on-site.

2.1 Study Area Boundaries

To facilitate the assessment and interpretation of potential effects associated with the Project, it is necessary to define appropriate spatial boundaries. Terrestrial study area boundaries were delineated based on the predicted spatial extent of the Project-related effects and the life history attributes of wildlife valued ecosystem components (VECs) potentially influenced by the Project. The following 3 spatial boundaries were used to assess effects on the terrestrial environment (see FEIS Volume 6 for figures):

- local study area (LSA) was used for small-scale direct and indirect effects from the Project, which consists of the mine site, mine roads, Rankin Inlet infrastructure, and the Project AWAR;
- regional study area (RSA) was used to assess the combined direct and indirect effects from the Project on permafrost, soils and terrain, plant and plant communities, and wildlife; and
- caribou effects study area (CESA) was used to assess the incremental and cumulative effects from the Project and other developments.

2.1.1 Local Study Area

The LSA boundary was defined based on the anticipated spatial extent of the immediate direct (e.g., Project footprint) and indirect (e.g., dust deposition) effects from the Project on the surrounding terrestrial environment, including soils, vegetation, and wildlife (FEIS Volume 6; Figure 6.1-1). The LSA for the anticipated mine site was defined to encompass the expected spatial extent of potential changes in water quantity and air quality directly related to the Project. Consequently, a 500 metre (m) buffer was used to define the LSA surrounding the mine footprint; where potential changes were greater than 500 m from the mine footprint, the LSA was expanded (FEIS Volume 6; Figure 6.1-1). The Phase 2 AWAR, the Discovery access and haul road, and the Rankin Inlet bypass road were buffered by 1000 m on either side of the anticipated road right-of ways to account for potential effects from the road (e.g., dust, increased access for recreation and hunting). The LSA for the Rankin Inlet footprint was limited to the Project footprint within the hamlet boundary (i.e., the outward limit of Rankin Inlet infrastructure) and did not include a buffer. A buffer was not included to assess the anticipated effects from the Project in isolation from effects due to Rankin Inlet. The total area of the LSA is 10 598 hectares (ha).

2.1.2 Regional Study Area

The RSA was selected to measure the existing baseline conditions at a scale large enough to capture the maximum predicted spatial extent of the combined direct and indirect effects (i.e., zone of influence [ZOI]) from the Project on soils, vegetation, and wildlife (FEIS Volume 6; Figure 6.1-2). This area is intended to capture effects that could extend beyond the immediate Project footprint, such as noise, lights, smells, and other factors that can indirectly affect the environment at a distance. Cumulative effects from the Project and other developments in the RSA (if present) can be assessed at this scale for VECs that exhibit little to no movement within the RSA, such as geology, permafrost, terrain and soil, and plants and plant communities. They can also be assessed at this scale for VECs that have most of the population distributed within the RSA. For species that have small to moderate breeding home ranges (e.g., waterbirds, songbirds, and raptors), the population would be primarily affected by natural and human-related factors that change survival and reproduction of individuals within the RSA, and should be little influenced by emigration and immigration (Berryman 2002). Developments outside of the RSA should have no or little influence on these populations during the breeding season.

During baseline data collection activities between 1998 and 2011, the Project RSA was 520 000 ha in size to encompass the potential ZOI on caribou from mining activities as described by Johnson et al. (2005). In 2012, the RSA was reduced to 280 000 ha (i.e., radius of 28 km centered on the proposed mine site) because of increased knowledge about the effects from disturbance on barren-ground caribou (Boulanger et al. 2009; Boulanger et al. 2012), and based on an estimated 14 km ZOI on caribou from the mine site. Recent analysis has suggested that caribou are 4 times more likely to occur in areas greater than 11 to 14 km from the Ekati-Diavik mine complex (Boulanger et al. 2009; Boulanger et al. 2012).

For the smaller Snap Lake Mine, caribou tend to prefer areas greater than 6.5 km from the mine, although the measurable avoidance of the mine was weak (Boulanger et al. 2009; Boulanger et al. 2012). The RSA extends an additional 14 km beyond the ZOI so that effects from the mine can be assessed through wildlife monitoring. The RSA encompasses the entire Project footprint, including the AWAR and Rankin Inlet infrastructure.

2.1.3 Caribou Effects Study Area

Barren-ground caribou (Qamanirjuaq and Lorillard herds) and wolf have the potential to interact with the Project. Annual and seasonal ranges for Qamanirjuaq and Lorillard herds were calculated using satellite and global positioning system collar data for caribou (courtesy of Government of Nunavut [GN], Department of the Environment). Based on annual and seasonal range estimates, the Lorillard Caribou Herd should not be influenced by the Project in most years. The Lorillard Caribou Herd is a sedentary herd (non-migratory) and their traditional calving grounds are north of Chesterfield Inlet (Section 6.6.3). While the Project will not contribute to the cumulative disturbance footprint in most GN defined seasonal home ranges for the Qamanirjuaq herd, the post-calving range of the Qamanirjuaq Caribou Herd has the potential to overlap with the Project (Section 6.6.3).

The post-calving range of the Qamanirjuaq Caribou Herd was delineated using collar data from 1998 to July 2011 to produce a 95% kernel density estimate. This was modified using an 85% volume contour to create the CESA for caribou and wolf (Figure 6.1-3). A percent volume contour is typically used to delineate animal home ranges (Laver and Kelly 2008) and represents the boundary of the area that contains x% of the volume of a probability density distribution. The 85% volume contour would therefore contain 85% of caribou collar locations recorded during the post-calving season.

Seasonal home ranges give space use at an ecologically relevant scale, and summarizing density of development at the annual home range scale would dilute the disturbance density. The complete post-calving range was modified to delineate the CESA as a conservative method for including areas around satellite positions where there were likely non-collared caribou (and wolf). A larger CESA would have diluted the effect of the Project when effects are calculated as a percentage of the range area. The GN has modified their approach to delineating seasonal home ranges for caribou herds since the CESA was originally defined, and new data have been collected. The most recently defined core ranges are smaller than previously identified. As such, the CESA now encompasses the entire spring migration, calving, post-calving, and summer ranges, as well as part of the rut, fall migration, and winter ranges (M. Campbell, Government of Nunavut, 2014, pers. comm). In the Kivalliq region, wolves likely migrate with the caribou herds, as do the wolves of the central Northwest Territories (NT) (see Walton et al. 2001).

Temporal scales for monitoring consider the 4 phases of mine development and decommissioning. These include construction, operation, final closure and post-closure decommissioning.

2.2 Monitoring Scales

The majority of monitoring program described below will focus on the local site-specific scale, however, AEM has committed to larger scale monitoring through collaborative programs and financial contributions as described below.

Regional Scale - contribute to the Government of Nunavut's caribou collaring program. Receive timely location data from the GN during key seasons (i.e., post-calving) to determine direction and rate of movement, particularly if portions of the herd move towards the Project area. In the past two years, this data has proven to be effective at providing information on the direction and rate of movement of caribou towards the Project, however, it is not possible to determine the herd size from this information or whether there will be other groups moving towards the Project sooner.

To provide regional level information a regional wildlife communication plan will be developed whereby a weekly communication check will be completed with individuals who may be out on the land or know of individuals out on the land in the regional area of the project to check for information regarding wildlife distribution and abundance. These individuals may be helicopter and airline pilots in the vicinity of the Project, HTO members, GN Conservation Officer and others. This plan will be developed with the HTO, KIA and AEM. There are very few options for completing more systematic surveys to yield this type of information due to the remoteness of the area. Consequently, technological solutions such as remote cameras will be difficult to use because there is no infrastructure to yield real-time data, therefore personnel are required to setup, check, and maintain cameras. The GN is also not supportive of aerial flights for the purposes of wildlife surveys as they are too disruptive to wildlife. The development of a systematic communication plan that reaches out as far as possible to the community to gather information from relevant people that may be out on the land or have access to this type of information is likely the most achievable solution for additional information on the regional distribution and abundance of wildlife.

Local Scale – wildlife sightings log, on-site surveillance and road surveillance monitoring will be completed to trigger mitigation actions when caribou occur near, or on-site. During periods when there is the highest potential for caribou to move through the Project site, increased height of land surveys in areas of known historical caribou paths will be completed. A review of the terrain Digital Elevation Model (DEM) will help to determine the best vantage points in and around the Project for height of land surveys.

2.3 Valued Ecosystem Component Selection

Valued ecosystem components (VECs) and Valued Social and Economic Components (VSECs) represent physical, biological, cultural, social, and economic properties of the environment that are either legally, politically, publically, or professionally recognized as important to a particular region, community, or by society as a whole. Several wildlife VECs were selected to assess Project-related effects on the terrestrial wildlife and wildlife habitat (Table 6.6-1). The only wildlife species for which concern was raised during public consultation was caribou (SD 3-1).

Wildlife baseline studies were completed for the Project in 1998, 1999, 2000, 2008, and 2009 in the RSA and CESA. Aerial surveys documented the abundance and distribution of caribou in the RSA. Bird baseline studies were completed for the Project in 1998, 1999, 2000, 2008, 2009, and 2011 in the RSA. Point-count surveys (100 m radius) determined the occurrence and abundance of upland breeding birds. Program for Regional and International Shorebird Monitoring (PRISM) plots surveyed shorebird occurrence and aerial surveys determined waterbird occurrence and abundance in the RSA. Ground and aerial surveys were used to locate swan and loon breeding areas and raptor nests in the RSA.

Table 1: Wildlife Valued Ecosystem Components

Valued Component		Rationale for Selection
Ungulates	Barren-ground Caribou	Important subsistence, cultural, and economic species; migratory species with extensive range requirements; may be affected by disturbance during seasonal movements; primary prey species for large carnivores in northern environments.
Carnivores	Gray Wolf	Large home range size linked to caribou migrations; top predator in ecosystem; can be attracted to human disturbance; long generation time means one individual may be affected by disturbance over multiple years resulting in potential regional population effects; important subsistence and cultural species.
	Polar Bear	Large home range size; top predator in ecosystem; can be attracted to human disturbance; long generation time means one individual may be affected by disturbance over multiple years resulting in potential regional population effects; listed as "Sensitive" in Nunavut (CESCC 2001), "Special Concern" and on Schedule 1 of SARA in Canada (COSEWIC 2013), and listed as "Vulnerable" by the IUCN (Schliebe et al. 2008).
Birds	Upland birds (including migratory birds)	Upland birds include upland migratory birds (i.e., songbirds and shorebirds) and non-migratory birds (i.e., ptarmigan). Upland birds have a small territory size so may be affected by habitat loss; migratory birds are susceptible to population declines as a result of changing environmental conditions on breeding and overwintering habitats.
	Waterbirds	Includes waterfowl, loons, and swans; waterbirds may be affected by loss of shoreline habitat for breeding; important staging habitat may also be lost; sensitive to noise disturbance and human activity; some species are important for subsistence; a number of species are listed as sensitive in NU.
	Raptors	Sensitive to noise disturbance and human activity during nesting; include peregrine falcon and short-eared owl (federal species at risk).

Other species that will be considered within the TEMMP, but were not specifically designated as VECs in the FEIS include the following:

- muskoxen;
- arctic fox;
- grizzly bear; and
- wolverine.

Grizzly bear, muskox, and wolverine were also considered as VECs, but not selected because the core part of their distributional range does not overlap with the Project (GN 2011). In addition, there have been either no, or very few, observations of these animals in close proximity to the Meliadine camp. There are few wolverines, or grizzly bears harvested by the Rankin Inlet community (Priest and Usher 2004).

Concerns were raised during the review process of the Draft Environmental Impact Statement regarding future impacts to muskox populations. The distribution of muskox is changing in NU, thus muskox may increase in abundance and distribution during the life of the Project. Although not include as a VEC for the reasons stated above, future distribution was considered to guide monitoring and potential mitigation in the future. The historic range of muskox once overlapped the Project area; however hunting pressure resulted in extirpation of muskox from much of its southern range (Jenkins *et al* 2011). Elders noted that while muskoxen were present in the time of their ancestors, there were no muskox when they were young. As a result, muskox hunting fell out of common Inuit practice. Participants in consultation regarding the AWAR noted that muskoxen are increasing in numbers in the Rankin Inlet area, and there is much more hunting of muskox than before. Participants also said that muskoxen are being hunted near Diana River (Volume 9, Section 9.3.1.3.2.1). The current distribution lies west

of the Project area (Campbell et al. 2012). Observations in the RSA are limited to one in 2008, a group of 26 in 2009 and a group of 18 in 2010 (Section 6.6.2.5; J. Witteman, AEM, 2012, pers. comm.; FEIS Volume 9, Section 9.3). Annual hunting quotas are low (~ 5) and according to community feedback on hunter harvest surveys, muskox are not always taken (Priest and Usher 2004). Hunters report having to travel large distances to harvest muskox and in 2009, when 35 tags were issued by the HTO for muskox harvest, hunters went north of the Regional Study Area (RSA) (i.e., Peter's Lake) to fill their tags (Priest and Usher 2004; N. Ford, Director of the Kangiqliniq HTO, 2012, pers. comm.). The region near Diana River, which is southwest of the RSA, was also identified as a muskox hunting region (FEIS Volume 9, Section 9.3). Thus, muskox presence and abundance still appears to be low in the RSA.

AEM will communicate closely with GNDoE biologists to understand the range expansion of muskox. Considerations will be made to adapt the TEMMP (SD 6-4) to include detection surveys for muskox, if deemed necessary.

Arctic fox (*Vulpes lagopus*) was also considered as a VEC, but was not selected because the species is listed as secure or common by governmental agencies, and can thrive in and around human developments.

Any potential impacts from the Project on grizzly bear, wolverine, muskox, and Arctic fox populations are predicted to be negligible. Although the Project may influence the movement or behaviour of an occasional individual(s), the effect would likely not change the demographic performance (i.e., reproduction and survival) of the breeding population as the core of the breeding population for muskox, wolverine, and grizzly bear travelling within the RSA is located farther west or near the treeline, and would not be influenced by the Project. In addition, Elders in Rankin Inlet suggest that wolverines and other carnivores have not been negatively affected by mining in the past, and remained in the region even while mining was taking place. However, AEM commits to undertake a den survey (i.e., specifically for bears, wolverines and foxes) prior to construction of Project infrastructure and Phase II of the road should the Project be allowed to proceed. In addition, AEM will include management strategies for the management, mitigation and monitoring of grizzly, muskox, wolverine and Arctic fox, specifically as part of the human-wildlife conflict management plan and the wildlife protection and response plan. IQ

2.4 Baseline Summary

The terrestrial vegetation and wildlife baseline synthesis report can be found in Supporting Document 6-2. This synthesis report compiles all of the wildlife information collected since the mid-1990's when this property was explored by Western Mining Corporation International Ltd. (WMC) and was subsequently leased to Comaplex Minerals Corporation (Comaplex) prior to AEM taking over the property. A summary of the general findings are as follows:

- barren-ground caribou (Qamanirjuaq herd) are regular but transient inhabitants of the Project area during their spring migration and calving periods;
- 37 bird species have been observed including 14 species of waterfowl, 5 species of shorebird, 3 species of raptors and two owl species, with shorebirds being uncommon;
- pacific loons and tundra swans are confirmed regular breeding summer migrants in the Project area;
- peregrine falcons, rough-legged hawks and gyrfalcons are confirmed breeders in the Project area;

- short-eared owls are documented in the area and nest observations indicate that they are likely breeding in the Project area;
- arctic fox and arctic hare are the most common residents; and
- wolves are infrequently observed, and muskox, polar bears, grizzly bears and wolverines are very uncommon in the Project area.

For baseline data collection, aerial helicopter surveys for barren ground caribou were completed up to 2009. Subsequently, caribou information has been collected through collaboration with the GN DoE and AEM contributing to collaring initiatives for the Qamanirjuac herd. The majority of the caribou aerial surveys completed between 1998 and 2009 were completed during the spring migration/calving season (i.e., March to June) and post calving through to early winter (i.e., July – November). Caribou can be abundant in the regional study area during the post-calving season, however, numbers are highly variable. Although present within and near the Project area during the post-calving season, caribou numbers generally tend to be low, however, larger herds (i.e., a few thousand) have come through the Project area each of the last two years and IQ information has suggested that this happens every 10-12 years. Caribou are an important species for community residents, and as such, will be a focal species in this TEMMP.

Arctic foxes are common residents in the Project area, and information was obtained on den sites in 2008. Den sites in support of baseline surveys have usually occurred in June when pups emerge from their dens, and again in July to determine pup survival. These dens are stratified by habitat, mainly eskers, to focus on areas with the highest potential for active dens. The last survey for fox dens was in 2009, albeit the survey was more opportunistic than focused due to a lack of helicopter availability, and 21 den sites were observed to be active in the Project area in June. Arctic fox will likely be affected by the Project because they are common and may be attracted to the Project area. They will be an important focal species for the TEMMP.

Peregrine falcon and rough-legged hawks appear to be the most common raptors in and around the Project. Raptor nest occupancy and productivity surveys have been completed as part of the wildlife baseline program. As stated earlier, AEM is supporting raptor monitoring for the Meliadine Project through the Arctic Raptor Project. Activities associated with the raptor monitoring are discussed below. Peregrine falcon nests have been affected by Project-related activities (e.g., quarry) in the past and will be an important focal species in this TEMMP.

Songbirds and shorebirds are not very common in the Project area and, in general, species richness and densities are low. Although, songbirds and shorebirds will be monitored as part of the TEMMP, it is believed that there will be limited observable effects to these species as a result of the Project, outside of habitat loss from the Project footprint.

The most common waterfowl present in the Project area include Canada good, tundra swan, long-tailed duck, and sandhill crane. Although there is no shortage of habitat for waterfowl, the Project has the potential to affect waterfowl habitat, consequently, these species will be monitored within the TEMP. Waterfowl eggs and feathers are important for community residents.

The Project has the potential to affect wildlife habitat for a variety of species and cause direct and indirect effects (e.g., vehicle collisions, attraction to Project, sensory disturbance) to all wildlife species. However, the FEIS found that the effects to caribou and peregrine falcons would likely have the highest potential to be realized. Consequently, the focus of the TEMMP is on these species.

2.5 Incorporation of Inuit Qaujimajatuqangit

In 2010, Nanuk Enterprises completed additional IQ studies for the Project. Nanuk Enterprises sought to replicate the same methodology used for studies completed in 1997 and 1998. Many of the participants in the earlier studies were not available to participate in the studies done during 2010 and 2011. Of the participants named in the earlier studies, 2 were available to participate in the recent studies. The field studies done in 2010 and 2011 were expanded to include participants from Whale Cove, along with participants from Rankin Inlet and Chesterfield Inlet. The studies involved the participation of elders and younger adults, and a mixture of men and women. Under the terms of the scientific research licence, participants in the field studies are to remain anonymous.

Inuit Qaujimajatuqangit information derived from interviews was organized and documented under the following headings:

- hunting and trapping resources, including:
  - caribou;
  - other land animals; and
  - marine mammals.
- fish resources;
- vegetation resources; and
- culturally important areas.

In addition, IQ information has been gleaned from various conversations throughout the process of the FEIS including technical hearing and pre-hearing conference sessions in December, 2013 and from many community consultation presentations during preparation of the DEIS.

3.0 WILDLIFE MITIGATION

The FEIS predicted that the incremental changes to the quantity, quality, and spatial distribution of habitats should not have a significant impact on the structure and function of wildlife and bird populations and communities in the ecosystem relative to natural factors occurring over the same period of time and space. The predicted magnitude of effects to wildlife and wildlife habitat and birds and bird habitat are expected to be within or slightly exceed baseline conditions and natural variation over time. Consequently, the Project should not have a significant adverse impact on wildlife and bird population abundance and distribution, and on the continued opportunity for traditional and non-traditional use of wildlife and birds in the region.

These predictions were made after the initial pathway analysis (i.e., analysis of effects linkages between wildlife and birds with the Project) and determination of appropriate mitigation measures.

Potential impacts to wildlife and wildlife habitat from the Project are divided into three categories in the FEIS, and in this document. These categories are:

- direct habitat loss, describing the immediate loss of vegetation and other wildlife habitat from the physical Project footprint;

- indirect habitat loss, describing the changes to habitat use that occur beyond the physical Project footprint, from factors such as noise and dust; and
- project-related mortality.

The TEMMP provides the monitoring for mitigation specific to those effects that occur within the direct physical Project footprint and any Project-related wildlife mortality. These include mitigation for landfill practices, use of fencing (where necessary), building skirts, employee education and monitoring wildlife along the AWAR, and nesting activity by raptors. All wildlife observations, mitigation and location of the actions will be reported by AEM on an annual basis.

3.1 General Mitigation

The following are the general mitigation practices, for valid (i.e., minor or primary) pathway linkages, that will reduce the effects of the Project on wildlife (including birds) and wildlife habitat. The proposed mitigations follows a review of best practices from other similar operating mines in the region, including Meadowbank Mine, Snap Lake, Ekati, Diavik, and Gahcho Kué (BHPB 2010; DDMI 2010: De Beers 2007; De Beers 2013).

3.1.1 Direct Habitat Loss

Direct effects to wildlife populations includes the physical disturbance and loss of habitat (e.g., upland and riparian vegetation, wetlands, and water), which results in the direct displacement of wildlife. Direct habitat disturbance occurs through the construction of the Project footprint, such as the creation of roads, mine rock piles, core mine facilities, and increased water levels in some local lakes and streams. Mitigation proposed to reduce direct habitat loss includes the following:

- Compact plant arrangement is designed to reduce the overall project footprint.
- Design roads as narrow as possible, while maintaining safe construction and operation practices, and meeting legislated requirements. For example, minimum haul road widths are defined under the *Mine Health and Safety Act, SNWT (NU)*.
- Promote natural re-vegetation and practice progressive reclamation as the mine develops.
- Cross-drainage structures will be designed and constructed such that structures will not create a hydraulic barrier and will convey peak flows corresponding to 1:25 year 24-hour rainfall event.
- Use of staggered culvert configuration, and removal of snow at the culvert inlet and outlet prior to the freshet to promote drainage during spring thaw and freshet (see FEIS Volume 2, SD 2-9).
- Regular inspection of the road to identify any areas where ponding of water along the road represents a risk, and installing additional culverts to alleviate the risk (see FEIS Volume 2, SD 2-9).
- Shoreline areas susceptible to extensive erosion will be addressed by appropriate erosion protection measures to reduce erosion and associated re-suspension of fine sediment.
- Develop and implement a Site Water Management Plan (see FEIS Volume 2, SD 2-6).

- Discharge from dewatering of waterbodies will be sampled regularly to monitor for compliance with discharge criteria, and any water not meeting the criteria will be treated or stored within the controlled Attenuation Ponds until it meets criteria.
- Hydraulic connections to the natural receiving environment will be re-established once water quality monitoring demonstrates that the water meets water quality guidelines for direct release without further treatment. Site infrastructure will be decommissioned and removed from site.
- Implement a Mine Closure and Reclamation Plan (see FEIS Volume 2, SD 2-17).

3.1.2 Sensory Disturbance

Indirect effects to wildlife are associated with changes in habitat that can alter the movement and behaviour of individuals in the vicinity of mine sites as a result of sensory disturbance. The mechanisms of indirect effects are poorly understood, but are likely related to dust, noise, human activity, and changes to vegetation communities. The following mitigation is proposed to reduce indirect habitat effects to wildlife populations:

- Dust will be actively suppressed from roads (water and/or other dust suppressants). Potential use of chemical dust suppressants in accordance with the Environmental Guidance for Dust Suppression published by the Government of Nunavut Department of Environment (see FEIS Volume 2, SD 2-9).
- Enforcing speed limits will assist in reducing dust and noise generation from roads.
- Create passage ways for wildlife near pipelines so it will not be a barrier to wildlife movement.
- Wildlife will be provided the right-of-way. Vehicle access will be limited when large numbers of caribou are crossing the road; this will occur in consultation with the local Hunter and Trapper Organizations (HTO) (see FEIS Volume 2, SD 2-9).
- In consultation with GN, KIA, and KHTO access will be controlled when caribou are present at the mine site (see FEIS Volume 2, SD 2-9).
- Maximum speed limit on all site roads is 50 km/h and will be reduced to a maximum of 30 km/h when caribou or other wildlife are known to be on-site.
- When necessary, nest specific management plans for breeding peregrine falcons will be developed, which may include a 500 m no disturbance buffer. Specific scenarios are discussed below in Section 4.7.3.
- Site roads have been designed and constructed to use finer material size that facilitate caribou crossing (i.e., coarse boulders are not used).
- Minimize outside workforce when caribou herds (i.e., >50 animals) move through the Project.
- Blasting activities will not occur when caribou herds (i.e., >50 animals) are known to be within 5 km of the Project.
- Verbally report wildlife carcasses observed on and in the vicinity of the site, and along access roads, as soon as possible. Consult the GN Conservation Officer to determine appropriate course of action.
- Push the snow with a dozer when clearing the road to avoid buildup of snow banks on the sides of the roads.
- A near-miss between a vehicle and an animal should be reported as a wildlife incident.
- Road surfaces will be maintained through grading and the addition of granular material.

- Equipment and vehicles will comply with relevant emission criteria at the time of purchase.
- Regular maintenance of equipment and vehicles to meet emission standards.
- Project design will use conventional insulation, baffles, and noise suppressors on equipment.
- Stationary equipment will be housed inside buildings.
- Regular maintenance of equipment to limit noise.

An Air Traffic Management Plan has been developed (see Appendix IV) and requests that that all pilots of helicopter and fixed wing aircraft abide by the guidelines set forth when flying to/from the Meliadine Project or in the vicinity of the project area wherever possible (from a safety perspective).

- For long-range transportation flights (i.e. to and from Rankin Inlet), we ask all pilots to follow a practice that sees the aircraft fly at a minimum of 600 m above ground level. Exceptions may exist during takeoff and landing, low-level ceiling conditions, high winds, or other risks to flight safety.
- For relatively shorter transportation flights (e.g., movement of staff and equipment between camp and ore bodies within the Meliadine lease), we ask that all pilots follow a practice that sees all aircraft (including helicopters) flying at a minimum of 300 m above ground level. Exceptions may exist during takeoff and landing, low-level ceiling conditions, high winds, or other risks to flight safety.
- The Environment Department must be notified if caribou, muskox or other animals are within 5 km of the heli pad. The pilot should radio the Meliadine designated camp aircraft frequency and request that the camp radio operator call out the wildlife team to herd animals away from the strip before landing.
- At remote landing areas, we ask that helicopters not land within 1 km of individual or large aggregations of wildlife.
- We mandate that when flying over large concentrations of caribou (50 or more individuals in close proximity to one another), a 1,000 m vertical and 1,500 m horizontal distance from the herd is observed whenever possible. We ask that all pilots avoid helicopter flights over known areas of raptor nests and waterfowl and shorebird staging areas during critical seasons (when birds are present –spring and summer months). The Environment Department can inform pilots of these areas.
- Harassment of wildlife (flying below 300 m), especially grizzly bear, muskoxen, caribou, wolves, and wolverine, is expressly forbidden. Exceptions exist only in the rare instance the animal(s) poses an immediate danger to a person in the field.
- The Iqalugaarjuup Nunanga park is located between the Meliadine camp and Rankin Inlet. To minimize impact on the wildlife and the park's visitors, the pilots shall avoid to flight over or to land in the vicinity of the park.

3.1.3 Project-Related Mortality

Occasionally, mining operations lead to the direct mortality of wildlife. This may be either accidental (such as vehicle collisions with wildlife), or the deliberate removal (re-location or intentionally destroyed) of problem wildlife to protect worker safety. The most effective way to reduce the cases of wildlife mortality is to reduce the availability of food and shelter for wildlife, thus limiting the attraction and presence of animals within the Project site. Specific mitigation proposed to reduce direct Project-related wildlife mortality includes the following:

- All employees will be provided with wildlife environmental awareness training.
- The presence of wildlife will be monitored and communicated to site personnel.
- Develop and enforce “no hunting, trapping, harvesting, or fishing policy” for employees and contractors.
- The deliberate destruction or disruption of wildlife nests, eggs, dens, burrows is prohibited at all times at the Meliadine site.
- Access to the mine site will be controlled (gated); public vehicles (cars, trucks) allowed only with special authorization. Rules for use along the road will be posted at the gate.
- Upon consultation with the Kivalliq Inuit Association and HTO, an appropriate ‘no shooting zone’ will be established along the road and around the mine site (see FEIS Volume 2, SD 2-9).
- Keep sea can doors closed at all times to avoid wildlife using them as a shelter.
- Consideration of a boulder field design to deter caribou from close proximity to the TSF.
- All roads will be decommissioned and scarified during closure (see FEIS Volume 2, SD 2-9).
- Skirt all buildings and stairs to the ground to limit opportunities for use as shelter by wildlife.
- Littering, and feeding of wildlife, will be prohibited.
- No airstrip on-site.
- Complete land clearing for all facilities outside of the breeding season for migratory birds (15 May to 15 September) if birds are nesting in a work area.
- Prevent upland breeding birds and raptors from nesting on mine infrastructure and man-made structures. If a nest is found and eggs are present, then the nest will be monitored and efforts will be made to avoid the area.
- Isolate or remove any physical or chemical hazards to wildlife.
- Report to the GNDoE any raptor nesting activity observed on Project infrastructure or within 1.5 km of the Project.
- Removal of physical hazards will be part of the Mine Closure and Reclamation Plan (see FEIS Volume 2, SD 2-17).
- Problem wildlife will only be destroyed as a last resort, and with the approval of GN DoE.
- Contact GNDoE to receive additional direction regarding new issues that arise.
- Wildlife carcasses on or near roads will be reported and removed to minimize the attraction of predators and scavengers to roads and road edges where they would be at an increased risk of colliding with vehicles.
- A near miss between a vehicle and an animal should be reported as a wildlife ‘incident’.

3.1.4 Migratory Birds Protection

AEM will follow EC’s recommendation that avoidance should be the primary mitigation measure to avoid the incidental take of migratory birds. In the event that vegetation clearing cannot be scheduled outside the breeding season, migratory bird nest searches areas will be completed to search for active nests within four days of destruction/clearing activities by an avian biologist or naturalist with experience with migratory birds and migratory bird behavior indicative of nesting (e.g. aggression or distraction behavior; carrying nesting material or food). Nest surveys will be carried out using accepted standard protocols. If nests containing eggs or young of migratory birds are located or discovered, all activities in the nesting area will be halted until nesting is completed

(i.e. the young have left the vicinity of the nest). Any nest found should be protected with a buffer zone, through consultation with EC, appropriate for the species and the surrounding habitat until the young have left the nest.

AEM will incorporate the following EC recommendations for setback distances to minimize disturbance to nests for different bird groups nesting in tundra habitat (see footnotes for adjustments to setbacks for sensitive species and species at risk).

Species Group	Pedestrians /ATVs (m)	Roads / Construction / Industrial Activities (m)
Songbirds	30	100
Shorebirds	50[a]	100[a]
Terns/Gulls	200[b]	300[b]
Ducks	100	150
Geese	300	500
Swans/Loons/Cranes	500	750

[a] If project activities are within the breeding ranges of American Golden Plover or Ruddy Turnstone, these setbacks should be increased to 150 m for Pedestrians/ATVs and 300 m for Roads/Construction/Industrial Activities respectively. If project activities are within the breeding ranges of Black-bellied Plover, Whimbrel or Red Knot (a Species at Risk), these setbacks should be increased to 300m for Pedestrians/ATVs and 500m for Roads/Construction/Industrial Activities. If field crew are trained in the identification of these species then these higher setbacks need only apply to these more sensitive species, and lower setbacks can be used for the remaining shorebird species. In areas where several species are nesting in proximity, setbacks for the most sensitive species should be used if they are present.

[b] If project activities are in proximity to breeding colonies of Ross's Gull (SAR) or Ivory Gull (SAR) these setbacks should be increased to 500m Pedestrians/ATVs and 750m for Roads/Construction/Industrial Activities.

AEM has completed measures to deter waterbirds from using water management ponds at their Meadowbank operation, these measures primarily involve deterrents (i.e., cannons) and monitoring protocols. AEM will commit to monitoring these ponds, to document waterbird use of these areas and if monitoring suggests use of these areas by birds, AEM will consult with EC to determine if deterrent measures are required and what measures are the most appropriate.

3.1.5 Management of Toxic Substances

The following mitigation policy is to decrease the risks to wildlife from ingestion of toxic substances or encounters with toxic spills during all phases of activity on the Project site:

- wastes associated with mechanical maintenance and repairs will be managed of per the Hazardous Materials Management Plan (see FEIS Volume 2, SD 2-13);
- adhere to and regularly update the Emergency Response and Spill Contingency Plan;
- follow the procedures outlined in the Hazardous Material Management Plan;
- designate and train a spill response team consisting of on-site personnel;
- provide spill containment supplies at fuel transfer and storage areas;
- immediately isolate, clean and report any spills;
- keep spill response equipment readily available and maintained;

- maintain vehicles and equipment; and
- store fuel in double-walled containers or single-walled containers in lined containment areas.

3.1.6 Management of Attractants

Carnivores observed in the regional study area include wolf and fox, and potentially grizzly bear and wolverine. Carnivores have a keen sense of smell and can be attracted from long distances if food items are frequently present. Wildlife may also be attracted to infrastructure that can serve as a temporary refuge to escape extreme heat or cold. An important element in reducing interactions between the Project and wildlife is preventing carnivores from accessing food and food wastes. The Project will closely follow the procedures and practices presently in place at the other mines in Nunavut and NWT, and will incorporate the lessons learned from those mines into mitigation measures. The following policies and practices will be included in these management plans to reduce the numbers of scavenging wildlife (such as carnivores and birds) attracted to the Project, and limit human-wildlife interactions:

- Most construction of the Project will be based out of Rankin Inlet or the Meliadine camp, eliminating the need for temporary camps along the AWAR route.
- Education and reinforcement of proper waste management practices to all workers and visitors to the site.
- Education on the risk associated with feeding wildlife and careless disposal of food wastes and liquids, such as coffee and juices.
- Ongoing review of the efficiency of the waste management program and improvement through adaptive management.
- Kitchen garbage and waste from dormitories and offices will be incinerated on a daily basis to limit attractions to wildlife.
- Development and implementation of a Landfill and Waste Management Plan (see FEIS Volume 2, SD 2-11).
- Staff working outdoors will be provided designated indoor areas for lunch and coffee breaks.
- Waste facilities and incinerators will be enclosed.
- Hazardous material will be shipped off site for recycling or disposal at an appropriate facility.
- The landfill will be inspected and covered progressively.
- Waste products that cannot be incinerated or landfilled will be collected, sorted, and placed in designated areas within the Waste Management Area until they can be shipped off site.
- Best management practices for deterring waterfowl and waterbirds from using areas nearby mining operations (e.g. use of propane cannons).
- All temporary (small) storage containers (e.g., garbage cans) for garbage and recycling are wildlife protective (i.e. have bear proof lids).

3.1.7 Deterring Wildlife

The goal of wildlife deterrent action is to respond to situations using humane methods that keep both humans and wildlife safe. All deterrent actions start with the least intrusive method, and then increase in intensity. Each deterrent action will stop as soon as the animal moves away from the potentially hazardous site or activity or no longer poses a threat to humans. Deterrents may be used to remove wildlife from roads and potentially hazardous sites and activities. The intensity of the deterrent practice should increase only if previous steps are unsuccessful, and if warranted by the risk to staff or wildlife. All deterrent actions will be documented.

Wildlife deterrent actions will be performed only by designated individuals (such as the environmental monitors or security staff). Training for these individuals will include the following information:

- basic wildlife ecology and behaviour;
- prevention of wildlife-human encounters;
- contingencies for wildlife-human encounters;
- proper use of deterrents (such as bear bangers and firearms); and
- documenting and reporting any deterrent actions undertaken.

For deterrent actions to be successful there must be:

- knowledgeable, trained personnel who will select deterrent actions based on each situation;
- consistent application of deterrents;
- evaluation of the success of each deterrent action;
- documenting and reporting of deterrent actions to inform other staff, communities and regulatory agencies;
- effective implementation of the Non-hazardous Solid Waste Management Plan, Incinerator Management Plan, and Landfarm Management Plan (references), particularly as it relates to the disposal of food waste; and
- absence of food, shelter or other rewards for wildlife within the Project site.

3.1.8 Caribou Protection

It is anticipated that caribou will interact with the Project on an occasional basis, as caribou have moved through the Project area the past two summers. Baseline studies predict that the most common seasons for caribou to encounter the Project are during the post-calving migration and rut, approximately from mid-July through November. These groups are primarily cows and cows with calves, and therefore have a high priority for protection from harassment and sensory disturbance. Occasionally, actions may be required to move caribou away from areas where they may be at risk. The appropriate level of action for a situation is one that removes the risk with the least disturbance to the caribou. The decision to use deterrent actions for caribou should consider the number of animals, and the potential for risk to caribou and human safety. The following policies, practices, and procedures are specifically related to caribou protection (see Appendix III and IV for further details).

- site roads have been designed and constructed to use finer material size that facilitate caribou crossing (i.e., coarse boulders are not used);

- wildlife shall have the right-of-way except where it is judged to be unsafe to do so;
- feeding wildlife is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the mine site;
- harassment (defined as to kill, injure, seize, capture or trap, pursue and includes to stalk, track, search for, lie in wait for, or shoot at – for any of these purposes not authorized by the Environment Department) of wildlife is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site;
- site roads have been designed and constructed to use finer material size that facilitate caribou crossing (i.e., coarse boulders are not used);
- obey all traffic signs;
- verbally report wildlife observations (by radio or telephone to the environment department or security), including carcasses, observed on and in the vicinity of the mine site and along access roads, as soon as possible;
- all incidents involving interactions, deterrents or injury of caribou will be documented and evaluated;
- all sightings of caribou will be reported to environmental staff;
- if caribou are crossing Project roads, traffic will stop and wait for them to cross (i.e., caribou have the right-of-way); and
- caribou will only be moved away from roads in specific circumstances, such as when there is an emergency.

Caribou are only exposed to hazards from the mine when they are within hundreds of metres of the mine, however, the zone of influence of the mine on caribou distribution and abundance may be kilometres from the mine. It is the areas within the immediate vicinity of the mine and the mine infrastructure itself where collisions or exposure to contaminants or other hazards may occur.

As stated above, wildlife have the right-of-way, therefore one caribou on or immediately adjacent to, the AWAR or in the mine site will warrant radio alert, yielding to the animal (i.e. traffic stoppages) and/or actions appropriate to ensure the safety of the caribou and personnel depending on the location of the caribou. AEM Will implement the work suspension protocol when 50 or more caribou are observed moving in the direction of the activities and cross the 5 km mark from site activities. Observations of 50 or more caribou immediately adjacent to, or on the AWAR and/or the mine site will warrant traffic signs, radio alerts and traffic/work stoppages (e.g., suspension of flights, drilling operations, and circulation of vehicles) depending on where the animals are occurring, until the animals leave the area.

Upon approval of the Project and prior to detailed engineering design, AEM will engage with the HTO, KIA and GN DoE to develop a caribou decision tree for mitigating project operation effects to caribou, This decision tree will follow recently developed tools for other Projects in Nunavut (e.g., Baffinland Mary River Project) but will be refined based on local knowledge of caribou. This decision tree will consider the gender and age class of caribou (i.e., cows with calves being most sensitive and bulls being least sensitive), proximity to the AWAR and mining infrastructure, and caribou behaviour (e.g., resting, feeding, moving), among other factors that may be site-specifically important for the HTO, KIA and GN DoE.

4.0 WILDLIFE AND WILDLIFE HABITAT MONITORING

4.1 Monitoring Approach

The general approach of the wildlife monitoring program is to measure wildlife presence, relative abundance, movement, and use of the Project area during all phases of the Project (i.e., construction, operations, closure, and post-closure). Effectiveness of mitigation is uncertain. Consequently, the monitoring program attempts to understand the efficacy of these mitigation practices and also attempts to validate impact predictions. Based on information gained from the monitoring program, additional mitigation can be implemented, where necessary. The following sections describe each component of the TEMMP.

The distribution and abundance of caribou within and around the mine site will be determined through data collected from the following programs:

- ***Collar Information*** – weekly to bi-weekly updates from the GN.
- ***AWAR Road Surveillance*** – completed on an ongoing basis by all mine staff using the AWAR; wildlife sightings are immediately communicated to radio dispatch and recorded.
- ***AWAR Wildlife Surveys*** - completed twice per week, or more frequently when necessary (e.g., large herds of caribou in the immediate vicinity of the Project).
- ***Regional Wildlife Communication Plan*** – a plan will be developed whereby a weekly communication check will be completed with individuals who may be out on the land or know of individuals out on the land in the regional area of the project to check for information regarding wildlife distribution and abundance. These individuals may be helicopter and airline pilots in the vicinity of the Project, HTO members, GN Conservation Officer and others. This plan will be developed with the HTO, KIA and AEM.
- ***Site Monitoring*** – completed weekly, or more frequently when necessary.
- ***Sightings Log*** – completed by all mine staff and contractors on a daily basis.

4.2 Wildlife Sightings Log and Road Surveillance Monitoring

The general mine site wildlife sighting log and road surveillance monitoring is designed to determine the frequency and distribution of wildlife interactions with the mine site infrastructure and the AWAR site (see FEIS Volume 2, SD 2-9). Results from these surveys will be used to verify impact predictions and will focus on areas that have the highest potential to cause mortality (i.e., haul roads, AWAR, waste rock piles, TSF) or lead to mortality (i.e., waste management and landfill areas, camp). This component of the monitoring program will build from AEM's experiences and protocols developed for the Meadowbank Project (Nunavut Environmental Consulting 2012). The wildlife sightings log component is not completed systematically but does contain repeated observations, deterrence activities, monitoring location and mitigation that will provide an indication to AEM environment staff of the potential for wildlife incidents or other trends in wildlife presence. Road surveillance monitoring that will extend to the mine site, will be completed systematically as described below.

4.2.1 Target Species

Target species for these surveys include terrestrial mammals, such as caribou, Arctic fox, wolf, among other less frequently observed species (e.g., muskoxen and polar bear) and birds including raptors, waterfowl, shorebirds, and songbirds. Particularly, this portion of the program is designed to inform AEM when and where wildlife are most likely to interact with the Project and what species are most common. This will help to inform AEM's Wildlife Protection and Response Plan.

4.2.2 Objectives and Thresholds

The primary objectives of these general mine site and road inspections is to record the presence of wildlife and/or wildlife sign in relation to Project infrastructure. Of particular importance is the frequency of wildlife entering the mine infrastructure areas and along the AWAR corridor. This information can then be used to determine any areas of attraction to wildlife, document human-wildlife conflicts, areas/timing of wildlife mortality or potential mortality; seasonal trends of wildlife occurrence in the Project area, and effectiveness of mitigation (e.g., waste management and landfill).

Monitoring thresholds are not well established, however, AEM will work with the GN DoE to better refine these thresholds and adapt their practices, nevertheless, the following thresholds are suggested as a starting point for adaptive management and TEMMP refinement:

- Project Infrastructure Mortality – no more than 1 caribou/year and no more than 1 Arctic fox/year.
- Vehicle Collisions – no more than 1 caribou and/or 1 Arctic fox/year.
- Caribou Movement – no more than 10% deflection of caribou approaching roads and infrastructure (deflections defined as the animal staying on the same side of the road as when initiating the road-crossing).

4.2.3 Monitoring Approach

Wildlife Sightings Log

These surveys will be completed by AEM's environmental staff during all phases of the Project. Inspections of specific areas will have area-specific frequencies based on the potential to cause harm to wildlife or the potential for human-wildlife interactions. For example, TSF, haul roads, and the AWAR will have more frequent inspections than waste rock piles. Information recorded for each wildlife observation and/or sign will include species, number of individuals, and other characteristics if readily discernible (e.g., sex, age). In addition, the location, date, and any site-specific comments will also be recorded. Where animals are sighted in close proximity to roads and a risk of collision with vehicles is possible, the environmental monitors or site personnel using the area will report the number of animals, location and direction of travel to the mine radio dispatcher who will inform all vehicle operators. This program will include a wildlife awareness poster posted at key locations (e.g., kitchen, orientation centre) and sightings cards that workers will be encouraged to take with them each day to record any incidental observations of wildlife.

AWAR Road Surveillance

This surveillance will be completed by all AEM staff travelling along the AWAR to the mine site during all phases of the Project on an ongoing basis. If wildlife is sighted by the driver or passenger, the driver will communicate wildlife observations that will include species, approximate number of individuals, the approximate km location and any site-specific comments will also be recorded. This will complement the wildlife sighting logs and the information will be collected by the road radio dispatcher who will inform all vehicle operators along the road. This program will include a wildlife awareness poster posted at key locations (e.g., kitchen, orientation centre) and will encourage active participation for all employees using the road.

Road Wildlife Surveys

AEM in collaboration with Kangipliniq HTO in Rankin Inlet will carry out bi-weekly (twice per week) wildlife surveys along the AWAR. The AWAR will be surveyed approximately twice per week. Surveys will be conducted by two people scanning both sides of the road (to a maximum horizontal distance of approximately 1 km from the road edge) travelling at a maximum speed of 30 km/hr. Information collected from this program will be the same as per the sightings log and will include species, sex, age, location, date and any other relevant comments.

Data from these programs will be summarized and presented annually in the overall wildlife monitoring summary report.

4.2.4 Mitigation and Management Scenarios

Results from baseline surveys indicate that caribou and, only recently, muskoxen are present in the Project Area for part of the four seasons, but caribou are observed in greatest abundance between May and September.

The baseline study established a map of historical wildlife presence in the region of the Meliadine project, including historical migration routes for the caribou. This map is shown in Figure 1.

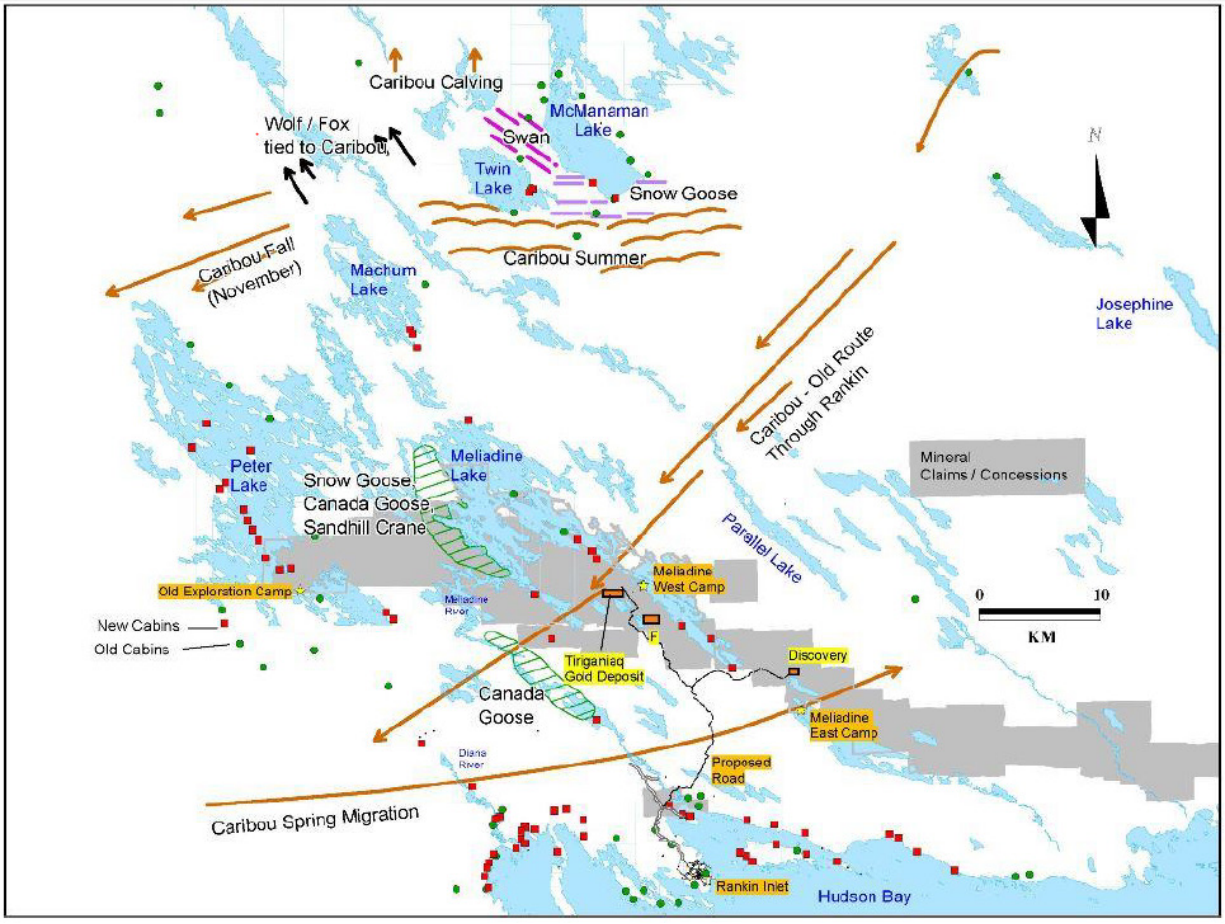

Figure 1: Map of Historical Caribou Movements through the Project Area

The protocol will have 4 components:

- A far-field caribou herd monitoring protocol during the migration season.
- A caribou and muskox herd sighting and protection protocol.
- An activity shutdown protocol including crew change and helicopter flight control.
- An activity restart protocol.

Far-Field Caribou Herd Monitoring Protocol during the Migration Season

It is difficult to predict the exact path of the caribou migration or its timing. For this reason, the first part of this protocol will be the establishment of a far-field caribou herd monitoring protocol during the migration period.

Between mid-June to mid-August the helicopter pilots will verify for caribou herd sighting during their usual flights (as drill crew change or travels to Rankin Inlet). If a caribou herd is seen, a report will be sent to the Kivalliq Inuit Association (KIA), Hunters and Trappers Organization (HTO) and Government of Nunavut (GN) Environmental Department by email. This information will be processed by the environmental technicians at site and discussed with our biologist. Communication will be established with the HTO, the GN and the KIA to assess the potential movements of any detected herd.

In the migration time starting about the end of June, herds of 1000 to 5000 animals can cross the area of Meliadine camp. For a period of 3 to 5 days the caribous can therefore be present around the site for the annual migration. During this period we need to report any sighting and prevent human activities that could disturb the herd. Caribou will have the "right-of-way", and will not be blocked or deterred from moving through the Project area.

AEM must take all possible measures to avoid disturbance to the caribou or muskox herd. At all times, it's **strictly forbidden to harass wildlife**. This includes persistently worrying or chasing animals, or disturbing large groups of animals.

When Observing Herds of Caribou Or Muskox:

We must report immediately the presence of the caribou (50 or more) or muskox (10 or more) herd to the Meliadine Environmental Department which will immediately contact the Kivalliq Inuit Association (KIA), Hunters and Trappers Organization (HTO) and Government of Nunavut (GN) Environmental Department. When reporting the presence of the herd, specify the location and the numbers.

When to Activate the Work Suspension Protocol:

During migration of Muskox (10 or more animals) or Caribou (50 or more animals) herds AEM must start implementing the work suspension protocol when the caribou herd is moving in the direction of the activities and crosses the 5 km mark from the site activities (the activities include the road construction, drilling, camp operation, etc).

Work Suspension Protocol

Work that could interfere with the caribou herd migration will be suspended as follows (see Appendix III for additional details):

- helicopter flight;
- drill operation; and
- circulation of vehicles.

Upon activation of the work suspension protocol, the following steps will be taken:

- Inform all employees at the drill sites that are in the direction of the caribou migration that they will need to shut down their operation so that these operations are down before the caribou herd reaches the 3 km^2 boundary.
- Remove drill rods from the holes and secure the drill station.
- Organize transport of the affected personnel to the camp. Personnel that do not require air transportation will be requested to walk back.
- During helicopter evacuation of personnel the Air Traffic Management Plan (see Appendix III) will be applied to protect the caribou herd (avoidance distance of 1,000 m vertical and 1,500 m horizontal). Use of helicopter for emergency evacuation of personnel for medical reason will still be allowed.

Road Utilisation

- For a group of caribou (≥50) or muskoxen (≥10) within 100 m from a road.
- Vehicle traffic is suspended.
- Wildlife has the right of the way and vehicles must wait without disturbing their movements.

Activity Restart Protocol

Through ground based monitoring, the AEM wildlife monitor will determine when caribou are outside the 3 km^2 buffer, and report the information to the Meliadine Site Manager or designate. The observations will also be shared with the KIA, GN and HTO by email. Activities can resume when caribous are outside the 5 km mark or if the caribou herd is outside the 3 km^2 area for more than 2 days and if an agreement is reached with the KIA, GN and HTO to resume activities. The decision and time to resume activities will be communicated to the KIA, GN and HTO by email.

4.3 Site Surveillance Monitoring

Wildlife is expected to be present near the Project throughout construction, operation and closure. Site surveillance monitoring is intended to provide timely and continual information of wildlife activity at the mine, and will provide direct feedback to mine operations regarding the effectiveness of waste management and wildlife mitigation practices. Examples of wildlife activities that will be documented through the surveillance monitoring include presence of wildlife in areas where food may be available, use of buildings for shelter or nesting, and use of water management ponds by waterfowl.

4.3.1 Target Species

Target species for these surveys include terrestrial mammals, such as caribou, Arctic fox, wolf, among other less frequently observed species (e.g., muskoxen and polar bear) and birds including raptors, waterfowl, shorebirds, and songbirds. Particularly, this portion of the program is designed to inform AEM when and where wildlife are most likely to interact with the Project and what species are most common. This will help to inform AEM's Wildlife Protection and Response Plan.

4.3.2 Objectives and Thresholds

Through systematically recording the presence of all wildlife within and around the Project footprint, Environmental staff will remain appraised of current and emerging issues, and will be able to manage issues as they arise. To use a common example, surveillance monitoring may detect that wildlife has gained access and is taking shelter beneath a building. The common mitigation is to block the access through improved skirting, and follow-up surveillance monitoring will confirm whether the mitigation was successful, or if further action is required.

Monitoring thresholds are not well established, however, AEM will work with the GN DoE to better refine these thresholds and adapt their practices, nevertheless, the following thresholds are suggested as a starting point for adaptive management and TEMMP refinement:

- Project Infrastructure Mortality – no more than 1 caribou/year and no more than 1 Arctic fox/year.

- Vehicle Collisions – no more than 1 caribou/year and/or 1 Arctic fox/year.

Caribou movement – no more than 10% deflection (as described above) of caribou approaching roads and infrastructure.

4.3.3 Monitoring Approach

Environmental staff will undertake systematic tours of the Project site and record all wildlife observations or recent wildlife sign (e.g., tracks, scat). The survey will be completed on foot and by truck, and staff will record the area surveyed, and the nature and location of all observations. This will build upon information gathered as part of the AWAR monitoring, and this will be completed by AEM Environment staff on the mine site. The surveillance monitoring survey will include all areas of the mine, but will focus on areas where there is greater risk of wildlife attractants (such as waste management areas), risk of wildlife using the mine for shelter, denning or nesting, or where there are people working outdoors.

In addition to data collection methods mentioned above, height of land survey locations will also be completed, and locations will be determined, to scan for wildlife around the perimeter of the mine site and to supplement data being collected as part of the AWAR survey. During July and August when caribou have the highest potential to occur in the immediate vicinity of the project, frequency of height of land surveys will be increased with survey locations occurring in the traditional caribou crossing areas, as shown above. Staff will communicate regularly with the KHTO and KIA, who will appraise the environment staff of any far-field observations of wildlife from local harvesters. As stated above a regional wildlife communication plan will be developed so that there is a greater awareness of when wildlife are within or approaching the regional areas surrounding the Project. Pre-construction surveys (i.e., seasonally relevant) will be completed prior to any construction activities to determine presence of denning sites (e.g., Arctic foxes), nesting sites or other areas of high wildlife use. Depending on the findings, appropriate mitigation and/or management options will be discussed with GNDoE staff. AEM is also considering the placement of remote cameras to monitor areas of high potential wildlife attraction (e.g., kitchen area, waste management areas) to determine the level of wildlife activity and assess further mitigation options.

Surveillance monitoring will occur systematically at least once per week, or more as necessary. Monitoring will be continuous throughout all phases of the Project. Pre-construction surveys will be completed prior to any construction activities.

Environmental staff may at any time suggest or undertake improvements to environmental design features, mitigation and management practices and policies, the need for additional training for staff, or other improvements to mitigation identified by the surveillance monitoring, as required. Investigation and reporting of incidents will be completed as they occur.

4.4 Vegetation and Wildlife Habitat

The vegetation monitoring component outlines the means by which AEM plans to reduce Project-related effects to plant populations and communities and includes both environmental and follow-up monitoring. Environmental monitoring programs are used to track conditions and implement further mitigation as required, while follow-up monitoring is used to verify the accuracy of impact predictions and adaptively manage and implement further mitigation as required.

4.4.1 Objectives and Thresholds

The objectives of the vegetation monitoring and management component are as follows:

- measure direct loss of plant communities as a result of the Project footprint;
- measure degree of re-vegetation of disturbed areas;
- measure distribution and abundance of non-native invasive plant species; and
- measure plant health as part of the dust monitoring program.

Specific thresholds for vegetation and wildlife habitat monitoring include the following:

- direct habitat loss measures must stay within impact predictions (i.e., 2039 ha of terrestrial habitat loss);
- areas deemed to be re-vegetated will all show signs of natural vegetation encroachment, otherwise additional management practices may be necessary;
- no non-native invasive species will occur as a result of mining operations (i.e., new equipment or materials arrival); and
- no effects to plant health as a result of dust deposition will occur.

4.4.2 Monitoring Approach

The vegetation monitoring component is intended to provide a framework for maintaining both a healthy vegetative cover and re-vegetating disturbed areas to reduce the overall effect of the Project on plant populations and communities, and consequently wildlife habitat. Direct loss of plant communities will be measured through the evaluation of as-built drawings, GIS mapping, and possibly aerial photography to determine Project footprint advancement. These calculations will be compared to predictions made in the FEIS.

Maintaining and re-establishing healthy vegetation has important benefits to the overall ecosystem by reducing potential soil related effects (e.g., erosion) and providing valuable habitat for a range of plant and wildlife species.

Disturbed areas are expected to recover naturally as described in the Closure and Reclamation Plan (SD 2-17) and will generally involve the following processes:

- preparation of disturbed surfaces associated with mine facilities and structures, which may include scarification and re-contouring of surface, slopes stabilization, and restoration of natural drainage patterns, to provide a suitable environment for natural re-vegetation of these surfaces to take place;
- the AWAR and temporary mine roads will be scarified, culverts and bridges removed, drainage patterns restored, and slopes stabilized, to facilitate natural re-vegetation to imitate esker habitats, if feasible; and
- implementation of re-vegetation monitoring plans and protocols to assess the effectiveness of the natural recovery process.

As part of the re-vegetation monitoring plan, studies will be carried out at selected test plots to assess natural re-vegetation processes in disturbed areas. The focus of these test plots will be on evaluating plant species ingress, growth and survival on various disturbed sites, including rock fill covers, to determine re-vegetation success and the length of time it takes to re-establish vegetation on these sites. Information on which plant species are becoming established on these sites and associated percent covers will be recorded, along with site photographs to document re-vegetation progress.

In addition, monitoring programs for non-native invasive plant species will be completed during the construction and operations phase of the Project. Surveys for non-native invasive plant species will be undertaken in disturbed areas (e.g., active mine site, borrow pits) to identify and document the extent of any non-native invasive plant species that may occur during construction and operations. The early detection of non-native invasive plant species is important, as preventing these species from becoming established is the most effective mitigation that can be employed. If non-native invasive plant species are identified in the Project area, they will be reported to Government of Nunavut Department of Environment (GN DoE), as per DoE guidelines. As part of the reporting process, the following information will collected and sent to DoE:

- location of the species (i.e., GPS coordinates);
- species identification and population extent; and
- photographs of the species in question to confirm identification.

Additionally, as part of the air quality monitoring program, a number of dust monitoring sites will be established around the Project, where dust fall devices are installed and corresponding plant samples of importance to wildlife and humans (e.g., lichens or berries) are collected and tested for metal concentrations.

4.4.3 Vegetation Management Plan

The Vegetation Management Plan incorporates a number of best management practices to mitigate the effects of the Project on plant populations and communities. These include the following:

- where possible, limit the size of the footprint area (thus limiting the extent of disturbance) and optimize the placement of infrastructure (e.g., avoiding sensitive ecosystems and plants);
- promote natural re-vegetation of disturbed areas;
- follow DoE guidelines regarding non-native invasive plant species and incorporate protocols for monitoring non-native invasive plant species;
- use of design features (i.e., dams, drainages, dykes, and diversions) to reduce changes to local flows, drainage patterns, and drainage areas; and
- implement the Risk Management and Emergency Response Plan (SD 2-15), Spill Contingency Plan (SD 2-16), and Hazardous Materials Management Plan (includes Fuel Management Plan) (SD 2-13), specifically as it relates to spills and releases.

4.5 Caribou Collaring Program

AEM has committed to supporting the GN DoE's caribou satellite-collaring program for the Qamanirjuaq herd. AEM is currently supporting a similar program as part of their Meadowbank Project for the Beverly and Qamanirjuaq herds. This component of the program will be an extension of AEM's existing commitments and contributions.

4.5.1 Target Species

The target species for this component of the program is the Qamanirjuaq caribou herd, and secondarily the Lorillard herd, that has the potential for seasonal interaction with the Project LSA, RSA, and CESA.

4.5.2 Objectives and Thresholds

The objectives of this program are to provide information on the distribution, relative abundance, and seasonality of caribou occurring within the Project LSA, RSA, and CESA in a real-time fashion as collar information is delivered to the GNDoE and shared with AEM. In addition, this program will help to assist the GN DoE with monitoring and management of caribou herds in Nunavut, and contribute to the scientific knowledge of caribou activity near mining operations and caribou population dynamics in Nunavut.

The following thresholds are suggested as a starting point for adaptive management and TEMMP refinement:

- Indirect Habitat Loss – Caribou movement near the Project Area is not hindered by Project infrastructure (i.e., mine site infrastructure and AWAR).

4.5.3 Monitoring Approach

Deployment, data collection, and monitoring of caribou collars will be completed by GN DoE personnel. However, this information, including collar location data, will be provided to AEM on an annual basis as part of data sharing agreement with the GN DoE. In addition, location updates will also be provided to AEM so that proactive planning can be completed if caribou are moving towards the Project. Collaring details will be discussed between GN DoE staff and AEM upon Project approval.

If the collar data confirms that caribou are moving in the general area of the mine site, then height of land surveys will be conducted everyday in areas where caribou are commonly known to cross through the Project area (e.g., the narrows between the northwest basin of Meliadine Lake and the southeast basin of Meliadine Lake) to determine if the herd is approaching the mine site. This will help the environment staff on-site to coordinate a response and initiate stop work orders as necessary.

4.6 Hunter Harvest Survey

One of the potential effects of the Project to wildlife is increased hunter harvest efficiency as a result of the construction of the AWAR. Frequency of access likely will not change from Rankin Inlet as a result of the AWAR, but harvest efficiency may increase. AEM has experience in acquiring traditional harvesting data from Inuit and other hunters at their Meadowbank Project. The Meadowbank Project constructed an AWAR from Baker Lake to the mine, which increased access and altered hunter harvest success. AEM will establish a harvest study in

association with the Rankin Inlet HTO, GN, KIA and local harvesters to document harvest rates, harvesting distribution and seasonality, and monitor these data over time. Harvest data will help to determine changes in hunter harvest levels, and consequently effects to wildlife, as a result of the AWAR.

4.6.1 Target Species

The target species include all wildlife species that are targeted for harvest including caribou, wolves, foxes, wolverine, and waterfowl, among others. In addition, there is the potential to gather information on angling success as elevated angling pressure is anticipated, at least for Arctic char. Thresholds for adaptive management will need to be discussed with, and set in collaboration with the HTO and GN DoE personnel, based on findings.

4.6.2 Objectives and Thresholds

The specific objectives of the hunter harvest survey are as follows:

- gather information on Inuit and non-Inuit harvesting rates of caribou in the Project area;
- gather information on Inuit and non-Inuit harvesting rates of non-caribou wildlife in the Project area;
- gain further understanding of regional distribution and seasonality of hunting and fishing activity;
- determine if the AWAR has had an effect on Inuit and non-Inuit harvesting rates of caribou and other wildlife; and
- provide information to the KHTO, GN and KIA to help make informed decisions regarding fish and wildlife management in the Rankin Inlet.

Due to a lack of existing baseline data, no thresholds related to caribou harvesting in the Project area can be identified. Provided the data and collaboration with local harvesters is suitable, after three years of data collection through implementation of the hunter harvest survey, AEM, in collaboration with the GN DoE, will discuss the next steps to reduce increased harvest associated with improved access due to the road.

4.6.3 Monitoring Approach

The monitoring methods will be primarily in the form of a hunter survey. One of the greatest challenges will be hunter participation. However, AEM has experienced these issues in the past when implementing a harvest survey as part of their Meadowbank Project and developed novel and unique mechanisms to promote increased hunter participation (i.e., prize draws, provision of full-colour calendar with participant images). Discussions with the Rankin Inlet HTO have commenced to introduce this concept and help to promote the implementation of this program.

Survey data collected by AEM and in collaboration with the GN, will include documentation of harvest success including the following: number of harvested animals by species for each visit, harvesting locations, timing of harvesting, hunter efficiency (# animals harvested/participant). Hunters will also subjectively qualify their hunting experience (i.e., casual hunter or life-long hunter) and their hunting location preferences (i.e., convenient locations, favorite hunting spots, remote areas). This information can be used to present the harvest data in addition to the data being presented based on distance from the AWAR and hunting vehicle used

(i.e., ATV or truck) to determine if the AWAR is allowing for greater hunting efficiency, and if so, to what extent. Participation will be encouraged through prizes and the information collected by participants will be kept anonymous.

The hunter harvest survey program will be reported on an annual basis. A harvest study administrator is appointed and they meet with hunter harvest study participants on at least on a quarterly basis to document harvests, which are written on the provided annual hunter harvest calendar provided by AEM (see Appendix I) and discus general hunting trends and observations. The harvest study administrator will also conduct radio addresses and posts promotional material around the Hamlet of Rankin Inlet during the visits.

4.7 Raptors

AEM has engaged the Arctic Raptors Research Program (http://www.arcticraptors.ca/) to develop and implement the raptor monitoring program (Franke 2012) (See Appendix II for 2013 annual update report).

4.7.1 Target Species

The target species for the raptor monitoring program will primarily be peregrine falcons; however, information will be collected on other raptor species if they occur in the LSA and RSA, including rough-legged hawks, gyrfalcons, and short-eared owls.

4.7.2 Objectives and Thresholds

The raptor monitoring program will be completed on an annual basis with the following objectives:

- annual occupancy survey of all known nesting sites;
- first year survey of high quality habitat to search for new nesting sites;
- monitor distribution and breeding density;
- monitor clutch size and productivity; and
- marking individual adults and nestlings to identify site fidelity and mortality causes.

Thresholds for the raptor monitoring program will be developed in conjunction with the Artic raptor Research Program and GN DoE personnel. However, a proposed threshold of no more than a 20% difference in occupancy and productivity between nest sites near Project infrastructure (e.g., 1 km) and nest sites far from Project infrastructure (e.g., > 1 km). In addition, site specific monitoring opportunities (e.g., cameras) will be discussed with the Artic raptor Research Program to determine potential mechanisms for differences in productivity, which can then be incorporated into adaptive management strategies.

4.7.3 Monitoring Approach

Methods will include ground-based occupancy surveys, marking of breeding adults and nestlings, remote camera monitoring (RECONYX cameras) to identify cause of mortality (i.e., nestlings), monitoring precipitation and temperature at nest sites, and potentially estimating prey abundance.

Annual activity reports and raw data will be prepared and submitted to the GN. The raw data will be shared with the GN through a data sharing agreement. All incidental wildlife observations will be recorded and reported. All permit applications will be handled by the Artic Raptors Research program.

4.7.4 Mitigation and Management Scenarios

Magnitude of disturbance to raptor nests can range from mild to extreme. Mild disturbance is unlikely to cause sufficient disturbance that would prevent falcons from engaging in normal breeding season behaviors. Mild disturbance would be any disruption that is occasional (once per week) and occurs over a short period (<20 minutes). In general, any occasional disturbance that involves vehicular traffic greater than 100 m from a nest site at any point during the breeding season should be considered mild. However, vehicles (passenger trucks, gravel trucks, ATVs) should not stop within 100 m of a nest site, and travel speed of vehicles should be reasonable, particularly in dry and potentially dusty conditions. Foot traffic is also considered mild if it occurs at greater than 100 m from the nest sites and occurs for short periods (<20 minutes). In the event that a vehicle must stop within 100 m of a nest site, passengers should remain in the vehicle. In the event that passengers must disembark, they should endeavor to minimise the number of people exiting the vehicle at any one time.

Moderate disturbance would include disruptions like those described above, but which occur at greater frequency and/or for longer duration. On-going moderate disturbance may result in negative but sub-lethal effects (e.g. slower growth of nestlings and/or reduced body condition in adults)

Severe disturbance would likely occur in instances where vehicles repeatedly stop in close proximity (<100m), where traffic volume is high (even without stopping), where vehicles are continuously working in one location (e.g. grader repairing a road wash-out), where foot traffic occurs with 2 or more people, or during blasting. Reduced reproductive success is likely to occur with severe disturbance, particularly repeated disruptions also occurs over long periods of time (>60 minutes), particularly if it occurs early in courtship or soon after the first egg is laid.

Extreme disturbance includes activities that would without doubt prevent or interrupt a breeding attempt, for example, total removal of rock out-crop on which a known nest site exists.

In general, avoidance of any disturbance is of greater importance during early occupancy and shortly after egg-laying has commenced; falcons are much less likely to abandon a nesting attempt late in incubation or after eggs have hatched and nestlings are present. Well-developed nestlings (those with evidence of second down) are at minimal risk from occasional disturbance (1X per week) of short duration (<20 minutes). This includes site visits where nestlings are handled.

Most disturbance can be easily managed if it occurs occasionally (1 X per week) relatively far from nest sites (>100 m), over short periods of time (~20 minutes). Any activity that occurs from October 1st through May 1st should be of no concern. Mild disturbance during early occupancy and early egg-laying (May 15-June 30) is unlikely to be the cause of reproductive failure or reduced reproductive success; moderate to extreme disturbance should be avoided during this period. Moderate disturbance is unlikely to be the cause of reproductive failure or reduced reproductive success during mid- to late-incubation (June 20 – July 20), but may cause nestling mortality within the 48 hours after hatching. The hatching period extends from ~July 10 to ~July 20; it is critical that sites within 1km of mine infrastructure are identified and avoided.

Thus two windows of time emerge that are important (May 15-June 30 and July 10-July 20) and disturbance should not exceed those outlined as mild.

4.8 Waterfowl and Waterbirds

This program will be designed to determine nesting distribution within 200 m, considered to be the approximate zone of influence from sensory disturbance in the FEIS, of mining and mine-related infrastructure (e.g., AWAR). The program will attempt to determine mated pair distribution and nesting success in ponds, wetlands, and lake shorelines within 200 m of Project infrastructure. Waterfowl and waterbird density was low during baseline surveys; consequently, a low number of mated pairs is anticipated.

4.8.1 Target Species

The target species for the waterfowl and waterbirds monitoring program include ducks, geese, loons, mergansers, and swans.

4.8.2 Objective and Thresholds

The primary objective of the waterfowl and waterbird monitoring program is to determine the effects, if any, of sensory disturbance from mining activities, including access along the AWAR on breeding success or changes in distribution of mated pairs. The threshold for investigation of additional mitigation will be determined in collaboration with the GN DoE.

Threshold triggers for additional mitigation or evaluation of mitigation will be determined through discussions with appropriate Environment Canada and GN DoE personnel. This threshold may be difficult to initially establish due to low bird densities and high variability. However, thresholds will likely be based on habitat loss (i.e., 515 ha of aquatic habitat) with no additional habitat loss than FEIS predictions. After initial data collection (first 3 years of operations) and a range of natural variability is determined, breeding and productivity thresholds will be determined.

4.8.3 Monitoring Methods

Ground-based surveys will be conducted for ponds, wetlands, and lake shorelines within 200 m of mining-related infrastructure. Two observers will walk along the water's edge to assess the presence, or any indication, of breeding waterfowl and/or waterbirds. One observer will walk 5 m from the water's edge, while the second observer will walk 15 m from the water's edge with the intent of flushing any breeding waterfowl or waterbird pair in the vicinity. This survey will occur during the peak of the breeding season (i.e., early July). Any observations will be recorded on a datasheet and location coordinates will be recorded. If breeding is confirmed along any portion of the surveyed areas within 200 m of mining infrastructure, then a follow-up survey will be completed only at those specific nesting sites to determine nesting success.

In consultation with the GN, monitoring will be conducted in the proposed infrastructure for the first 3 years of operations. This will assist in determining the effectiveness of this monitoring program to determine effects of the project on waterfowl; this will inform the frequency of monitoring thereafter. Annual reporting will be completed for this component of the overall monitoring program.

4.9 Upland Birds and Shorebirds

This program is designed to measure mining-related effects on upland bird (i.e., songbirds) and shorebird species richness, diversity, and relative abundance. Specifically, the intent is to measure these parameters in response to mining development and increased traffic along the AWAR. PRISM surveys (CWS 2008) will be completed for upland birds and shorebirds. The objectives of PRISM include estimating breeding population size; describing the distribution, abundance, and habitat relationships; and monitoring trends in breeding population size of shorebirds (Bart et al. 2005), and we will also use this method for assessing the same parameters for upland birds. The PRISM survey methods are used consistently across North America so data can be compiled and compared across the continent. PRIMS plots will be selected to compare shorebird data near the mine with data collected outside the zone of influence of the mine (i.e., control areas).

4.9.1 Target Species

The target species for the upland bird and shorebirds monitoring program include upland migratory birds (i.e., songbirds and shorebirds) and non-migratory birds (i.e., ptarmigan).

4.9.2 Objective and Thresholds

The objectives of the upland bird and shorebirds monitoring program are to determine any mine-related changes in upland and shorebird abundance, species richness, diversity, and distribution. PRISM plots will seek to determine changes to these parameters as a result of general proximity to mining-related disturbance, whereas upland bird point count surveys will specifically examine the potential effects of the AWAR (i.e., increased traffic and dust) on songbird abundance, species richness, diversity, and distribution along the AWAR.

Threshold triggers for additional mitigation or evaluation of mitigation will be determined through discussions with appropriate Environment Canada personnel. This threshold may be difficult to initially establish due to low bird densities and high variability.

4.9.3 Monitoring Methods

Upland bird plots will be completed along transects on either side of the AWAR. Transect length has yet to be determined and will be planned based on topographic constraints (i.e., cliffs), waterbody constraints, and habitat consistently along the AWAR. However, it is anticipated that transect length will be at least 1 km on either side of the road (2 km in total) with the first point count occurring at 50 m from the road on either side of the transect and each subsequent plot spaced 100 m from the centre of the preceding plot. Data from these surveys will be compared to the predicted zone of influence, and evaluate impacts due to activity such as reduced habitat effectiveness, from the AWAR.

PRISM plots completed as part of the baseline surveys were rapid plots, which are 400 m x 300 m (12 ha) following the PRISM protocols (CWS 2008). Two observers spaced at 25 m intervals walk through each plot along a systematic grid and record all birds and nests observed. A sufficient sample size will be determined and established within control areas (i.e., outside the zone of influence of the mine) and mine areas (i.e., within the zone of influence of the mine). Plots will be placed within a single habitat type, if possible, Data analysis will be completed to determine differences in measured parameters (i.e., relative abundance, richness, diversity) between control plots and mine plots while considering temporal patterns. In consultation with the GN,

monitoring will be conducted in the proposed infrastructure for the first 3 years of operations. This will assist in determining the effectiveness of this monitoring program to determine effects of the project on upland birds and shorebirds; this will inform the frequency of monitoring thereafter.

4.10 Wildlife Incidents

Wildlife incidents refer to a range of possible occurrences at the Project, including:

- human-wildlife interactions that present a risk to either;
- wildlife-caused damage to property or delay in operations;
- wildlife deterrent actions; and
- wildlife injury or mortality.

All incidents will be investigated and reported. Documenting incidents allows for adaptive management and further development of mitigation. All wildlife incidents will require immediate follow-up. They will be reviewed and reported to determine if mine operations contributed to an incident, and what can be done to prevent similar occurrences in future. For greater detail on wildlife encounter and responses, see the Wildlife Protection and Response Plan (Appendix III).

4.10.1 Target Species

Target species for these surveys include terrestrial mammals, such as caribou, Arctic fox, wolf, among other less frequently observed species (e.g., muskoxen and polar bear) and birds including raptors, waterfowl, shorebirds, and songbirds. Of particular interest to this program, would be wildlife encounters by carnivores (e.g., Arctic fox) as they are potentially attracted to the site.

4.10.2 Objectives and Thresholds

Provide appropriate information to on-site Environment staff for dealing with wildlife interactions at the Meliadine mine site. Provide an array of example encounters so that appropriate mitigation and management can be implemented to keep humans and wildlife safe, using only humane control methods.

As previously mentioned, anticipated thresholds will be as follows:

- Project Infrastructure Mortality – no more than 1 caribou/year and no more than 1 Arctic fox/year.
- Vehicle Collisions – no more than 1 caribou/year and/or 1 Arctic fox/year.
- Migratory Birds – thresholds will be discussed and evaluated with Environment Canada.

4.10.3 Monitoring Approach

All incidents and deterrent actions will be investigated and documented. This will include photographs, names of people involved, the nature of the incident, and supporting information such as the time, date, location, and follow-up actions that occurred. Wildlife incident monitoring will be undertaken as required, continuously throughout the construction, operation, and closure phases of the Project. Further details can be found in the Wildlife Protection and Response Plan in Appendix III.

All incidents will require follow-up to determine what can be done to prevent similar occurrences in future. All wildlife mortalities will be reported to GNDoE immediately. Migratory bird mortalities will also be reported to Environment Canada.

4.10.4 Mitigation and Management Scenarios

Response to Encounters

Predatory mammals such as wolves, wolverine, arctic fox and grizzly bears rarely attack people; however, they are extremely strong and vicious, and should be given respect. **Polar bears are known to attack humans.** Members of the dog family (such as wolves and foxes) are more at risk of carrying rabies, and other zoonotic diseases, and therefore should be avoided. Arctic fox in particular is easily tamed, quickly losing their fear of humans and often approaching very close. Sick or injured animals may no longer be able to feed themselves, and could be in a state of starvation. Often they show few physical signs that something may be wrong, but typically act more aggressively or even 'friendly' towards humans. Therefore, a close encounter with a predatory mammal could be dangerous. All bites and scratches from wildlife should be reported immediately to Health & Safety since animals can be vectors for rabies.

If you encounter a predatory mammal, the following actions should be taken:

- back away slowly and do not turn your back on the animal;
- do not make sudden movements;
- do not make loud noises or attempt to scare the animal if it is simply traveling through the area;
- use radio/satellite phone to report the presence of the animal to the Environmental department;
- stay in radio/phone contact until the animal moves away or you have returned to a safe area. (e.g. inside vehicle or building); and
- wait for the animal to pass before continuing work in the area.

If the predatory mammal does not back away, or shows interest in you:

- continue to back away slowly and ensure a 10 m distance between yourself and the animal;
- make sure the animal has a safe route of escape;
- make noise to alert the animal of your presence or to scare it off;
- avoid provoking it;
- return to a safe area as soon as possible (e.g. inside a building or vehicle); and
- keep the Environmental department informed of situation using the radio/phone.

If the predatory mammal still does not back away, call for deterrent action by the Environment Department

The Environment Department is to treat all predatory mammals that are threatening or aggressive as they would treat a grizzly bear or polar bear, which are perceived to be most dangerous. All predatory mammals that are showing interest in a person or site facilities must be aggressively deterred to prevent habituation to the site. Detailed response recommendations are provided in Section 3.2.2.3 below. If an animal is not of an immediate safety concern, the Wildlife Response team should discuss options to deter or remove the animal with Government of Nunavut conservation personnel.

Environment Department Protocols for Managing Problem Predatory Mammals

As part of the detailed response plan, the Environment Department will follow the procedures included here when responding to predatory mammal sightings and encounters. It is assumed that the reporting person(s) has followed procedures for predatory mammal incidents, and has requested the Environment Department to be dispatched due to the failure of human presence to deter the predatory mammal. If an animal is not of an immediate safety concern, the Environment Department should discuss options to deter or remove the animal with Government of Nunavut conservation personnel. All wildlife problems are to be recorded in the wildlife database.

The Environment Department will:

- Collect all deterrent equipment and receive briefing from the Environmental Coordinator or delegate (s) on location and circumstances of the call.
- When firearms are to be used there will always be two individuals, one person with a firearm (12 gauge) for deterrent use, the other as back up having a rifle with lethal force. No lethal force will be taken without consent from the Environmental Coordinator in conjunction with the consultation of the Government of Nunavut Wildlife Officer unless the situation is deemed to be life threatening.
- The appropriate action, usually less than lethal deterrent, will be chosen and used in an effort to scare the predatory mammal away.
- If the deterrent is successful, the incident will be recorded in the Wildlife database and should detail the type and level of deterrent used, information on the predatory mammal involved, and all information on the circumstances leading up to the incident.

If the deterrent is not effective and the predatory mammal continues to approach or doesn't move away from the area of human activity or project footprint:

- Increase deterrent efforts to less than lethal projectile (rubber bullet) if not already being employed.
- Ensure the animal has an open escape route.
- Continue aggressive use of less than lethal projectile deterrents to try and chase the animal away.

All but the most aggressive animals should have been deterred at this point. The situation is now extremely dangerous and the Environment Department must be ready to use lethal force.

The risk to human life or property is imminent since the predatory mammal has not responded to non-lethal deterrent options and the safety of the team or site property is now compromised.

- Shoot with the intention of stopping the threat, using the buckshot or 1-ounce lead slugs, as appropriate, to kill the animal.
- Shots should be aimed at the chest area, not the head or hind quarters.
- If lethal force has been used, the Environment Department must complete a full report detailing the event immediately.
- The GN conservation officers will be notified by phone. Direction will then be given to properly dispose of the carcass.
- Any wildlife showing signs of rabies will be killed (never shot in the head) and reported.

5.0 REPORTING

An annual Terrestrial Environment Monitoring Summary Report for the project will be completed. The purpose of this report will be to summarize the annual data collected from the various terrestrial monitoring programs, and to identify and communicate natural variation and potential mine-related changes in terrestrial populations within and adjacent to the Meliadine project area through the interpretation of accumulative monitoring datasets.

The annual report will provide the objectives, methodology, historical and current year results, as well as a comparison to impact predictions, mitigation and management recommendations of each monitoring program.

6.0 SUMMARY

This Terrestrial Environment Management and Monitoring Plan (TEMMP) has been prepared for inclusion in the Project Final Environmental Impact Statement (FEIS). The Plan will be reviewed and updated on a regular basis as the Project proceeds into detailed design, construction, operations, closure and post-closure. Monitoring will be focussed on the wildlife and bird Valued Ecosystem Components (VECs) identified in the FEIS where primary or minor effects pathways have been identified as a result of the Project. Monitoring study design and methods will be consistent with monitoring programs being implemented at other mining operations in Nunavut (e.g., Nunavut Environmental Consulting 2012). A summary of predicted effects, monitoring thresholds, monitoring methods and frequency are presented in Table 2, and were introduced and discussed above.

Table 2: Summary of Predicted Effects, thresholds and proposed monitoring methods for the Meliadine TEMMP.

Predicted Effect	Proposed TEMMP Thresholds	Monitoring Methods	Frequency of Data Collection
Vegetation (Wildlife Habitat)			
Habitat Loss	Terrestrial – 2039 ha Aquatic – 515 ha	Ground Surveys, Mapping, GIS Analysis	Every Three Years
Habitat Degradation by Contamination	TBD – SLRA[1] No invasive plant species established No effects to plant health rom dust deposition	Vegetation and Soil Samples	Every 3 Years
Habitat Reclamation following Mine Closure	NA	Ground Surveys, Vegetation Plots, Mapping	Once pre- construction baseline and 3 times Post-Closure
Ungulates			
Habitat Loss and Degradation	No greater than 2039 ha of terrestrial habitat loss	Ground Surveys, Mapping, GIS Analysis	Every Three Years
Sensory Disturbance	<10% caribou deflections from AWAR	Ground Surveys, Satellite-collaring	Daily/Weekly
Vehicle Collisions	1 individuals	Ground surveys	Daily
Hunting by Rankin Inlet Residents	After 3 years of data collection, in collaboration with GN, establish a threshold level	Hunter Harvest Study	Collected throughout the year and reported annually

Predicted Effect	Proposed TEMMP Thresholds	Monitoring Methods	Frequency of Data Collection
Other Mine-related Mortality	1 individuals	Ground surveys	Daily
Exposure to Contaminated Water or Vegetation	TBD – SLRA[1]	Vegetation and Soil Samples	Every 3 Years
Predatory Mammals			
Project-related Mortality	1 Arctic Fox	Ground Surveys Cameras in attractant areas	Daily
Raptors			
Disturbance of Nesting Raptors	To be determined in consultation with GN and Alastair Franke, related to occupancy and productivity.	Active Nest Monitoring	Nests within 200m – Daily Nests from 200-1000m - Weekly
Project-related Mortality	To be determined in consultation with GN and Alastair Franke	Ground Surveys, Collision Reporting System	Mine Site-Daily AWAR - 2x/Week
Waterbirds			
Habitat Loss and Degradation	515 ha of Aquatic Habitat	Ground Surveys, Mapping, GIS Analysis	Every Three Years
Disturbance of Nesting Waterfowl	TBD once NRV[2] is established through consultation with EC and GNDoE	Waterfowl Nest Surveys	Yearly - For Active Nests within 200m
Exposure to Contaminated Water or Vegetation	TBD – SLRA[1]	Vegetation and Soil Samples	Every 3 Years
Project-related Mortality	1 individuals	Ground Surveys, Collision Reporting System	Mine Site-Daily AWAR - 2x/Week
Other Breeding Birds			
Habitat Loss and Degradation	No greater than 2039 ha of terrestrial habitat loss	Ground Surveys, Mapping, GIS Analysis	Every Three Years
Exposure to Contaminated Water or Vegetation	TBD – SLRA[1]	Vegetation and Soil Samples	Every 3 Years
Changes in Breeding Bird Populations	TBD once NRV[2] is established through consultation with EC	Breeding Bird Plots and Transects	Every 3 years

1 SLRA – Screening Level Risk Assessment
2 NRV – Natural Range of Variability

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APPENDIX I

2013 Hunter Harvest Study Calendar for Rankin Inlet, Nunavut

Meliadine Lake Harvest Study

2013

Caribou Bull

Maria Quqsuut

Successful Wolverine Hunt

Roy Avaala

January | ᖁᓇᐅᑎᓪ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐅᓕ	Monday ᓴᓇᑕᐅᓕᐅᓚᓂᖅ	Tuesday ᑐᐱᓯᖏᓐᓇᖅ ᓯᕗᓕᖅ	Wednesday ᐱᖓᓱᓯᐊᓕ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᖏᓐᓇᖅ
		1 New Year's Day	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

December 2012

S	M	T	W	T	F	S
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2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

February 2013

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Hunting Party

Tom Mannik

February | ᐊᖏᑭᐊᓗ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᓕ	Monday ᓴᓇᑕᓕᐅᔪᓂᖅ	Tuesday ᑐᐸᐊᖅᓯᖅ ᑭᒃᓕᖅ	Wednesday ᐱᖓᓱᐊᑦ	Thursday ᓯᑕᒡ	Friday ᑕᓕᒡ	Saturday ᓂᖅᐃᑐᖅᓯᖅ
January 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	March 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				1	2 Groundhog Day
3	4	5	6	7	8	9
10	11	12	13 Ash Wednesday	14 Valentine's Day	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Elder Carving Meat

Basil Tiktaalaaq

March | ᓚᐳ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐃᓕ	Monday ᓴᓇᑕᐃᓕᐅᓚᓴᖅ	Tuesday ᑐᐸᓯᐊᖅᓇᖅ ᓯᕗᓕᖅ	Wednesday ᐱᖓᓱᓯᐊᑦ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᐊᖅ
					1	2
3	4	5	6	7	8	9
10 Daylight Savings Time Begins	11	12	13	14	15	16
17 St. Patrick's Day	18	19	20 First Day of Spring	21	22	23
24 Palm Sunday	25	26 Passover	27	28	29 Good Friday	30
31 Easter Sunday						

February 2013

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

April 2013

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	1	2	3	4	5	6
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21	22	23	24	25	26	27
28	29	30				

Aberdeen Lake Ice and Longspur

Martin Gebauer

April | ᐊᐃᓇᓕ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐃᓕ	Monday ᓴᓇᑕᐃᓕᐅᓚᓂᖅ	Tuesday ᑐᐱᔪᖅᓇᖅ ᔫᑦᓕᖅ	Wednesday ᐱᖓᓱᐊᑦ	Thursday ᔪᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᖅᓇᖅ
	1 April Fool's Day	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22 Earth Day	23	24	25	26	27
28	29	30				

March 2013

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24	25	26	27	28	29	30
31						

May 2013

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26	27	28	29	30	31	

Caribou Herds

Damian Power

May | ᒪᐃ 2013

Meliadine Lake Harvest Study

April 2013

S	M	T	W	T	F	S
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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

June 2013

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Sunday ᓴᓇᑕᐅᓕ	Monday ᓴᓇᑕᐅᓕᐅᒪᓂᖅ	Tuesday ᑐᐊᓯᖅᓯᓇᖅ ᓯᕗᓕᖅ	Wednesday ᐱᖓᓱᐊᕐ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᖅᓇᖅ
		Hamlet Days TBA	1	2	3	4
5	6	7	8	9	10	11
12 Mother's Day	13	14	15	16	17	18
19	20 Victoria Day	21	22	23	24	25
26	27	28	29	30	31	


Drying Char
William Noah

June | ᐊᓂ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᓂ	Monday ᓴᓇᑕᓂᐅᓚᓂᖅ	Tuesday ᑐᖅᓯᐊᖅᓭᖅ ᓯᕗᓂᖅ	Wednesday ᐱᖃᓚᐊᑦ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᖅᓭᖅ
May 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	July 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31					1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16 Father's Day	17	18	19	20	21 First Day of Summer National Aboriginal Day	22
23	24	25	26	27	28	29
30						

Hunting Blinds

Victor Utatnaq

July | ᕿᓪᐃ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐃᓕ	Monday ᓴᓇᑕᐃᓕᐅᓂᖅ	Tuesday ᑐᑭᓯᖅᓯᖅ ᓯᑲᓕᖅ	Wednesday ᐱᖓᓱᓪᓗᒍ	Thursday ᓯᑕᒪᒃ	Friday ᑕᓕᒪᒃ	Saturday ᓄᖅᐃᑐᖅᓯᖅ
	1 Canada Day	2	3	4	5	6
7	8	9 Nunavut Day	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

June 2013

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23	24	25	26	27	28	29
30						

August 2013

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11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Fall Caribou Bull

Kate Fremlin

August | ᐊᔪᓂ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᓂ	Monday ᓴᓇᑕᓕᒫᓂᖅ	Tuesday ᑐᖅᓂᐊᖅᓯᖅ ᓂᕆᓕᖅᖢᓂ	Wednesday ᐱᖃᓐᓇᐊᑦ	Thursday ᓂᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓄᖅᐃᑐᖅᓯᖅ
July 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	September 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30			1	2	3
4	5 Civic Holiday	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

Caribou Cows

Kate Fremlin

September | ᓯᑎᐱᓇ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐱᓕ	Monday ᓴᓇᑕᐱᓕᐅᓚᓂᖅ	Tuesday ᑐᐳᔪᐊᖅᓇᖅ ᔪᖕᓕᖅ	Wednesday ᐱᖃᓐᓇᐊᑦ	Thursday ᔪᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᐊᓇᖅ
1	2 Labour Day	3	4	5	6	7
8 Grandparent's Day	9	10	11	12	13	14
15 Terry Fox Run	16	17	18	19	20	21
22 First Day of Autumn	23	24	25	26	27	28
29	30					

August 2013

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

October 2013

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13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Inukshuk Sunset

Victor Utatnaq

October | ᐅᖅᑐᐱᓗ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐱᓕ	Monday ᓴᓇᑕᐱᓕᕆᓂᖅ	Tuesday ᑐᖅᓯᐊᖅᓯᖅ ᓯᑲᓕᖅ	Wednesday ᐱᖁᓴᐊᑦ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᖅᓯᖅ
		1	2	3	4	5
6	7	8	9	10	11	12
13	14 Thanksgiving Day	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31 Halloween		

September 2013

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

November 2013

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Caribou

Kevin Martee

November | ᓄᕆᐱᒃ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐱᓕ	Monday ᓴᓇᑕᐱᓕᐅᓚᓴᖅ	Tuesday ᑐᐳᔪᓴᓇᖅ ᓯᕗᓕᖅᖢᓴ	Wednesday ᐱᖃᓐᓇᔪᑦ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᓴᓇᖅ
October 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	December 2013 S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31				1	2
3 Daylight Savings Time Ends	4	5	6	7	8	9
10	11 Remembrance Day	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

Skinning Caribou

Tom Mannik

December | ᑎᓯᐱᓗ 2013

Meliadine Lake Harvest Study

Sunday ᓴᓇᑕᐱᓕ	Monday ᓴᓇᑕᐱᓕᐅᓚᓂᖅ	Tuesday ᑐᐳᔪᐊᖅᓇᖅ ᓯᕗᓕᖅ	Wednesday ᐱᖃᓐᓇᐊᑦ	Thursday ᓯᑕᒪᑦ	Friday ᑕᓕᒪᑦ	Saturday ᓂᖅᐃᑐᖅᓇᖅ
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21 First Day of Winter
22	23	24	25 Christmas Day	26 Boxing Day	27	28
29	30	31				

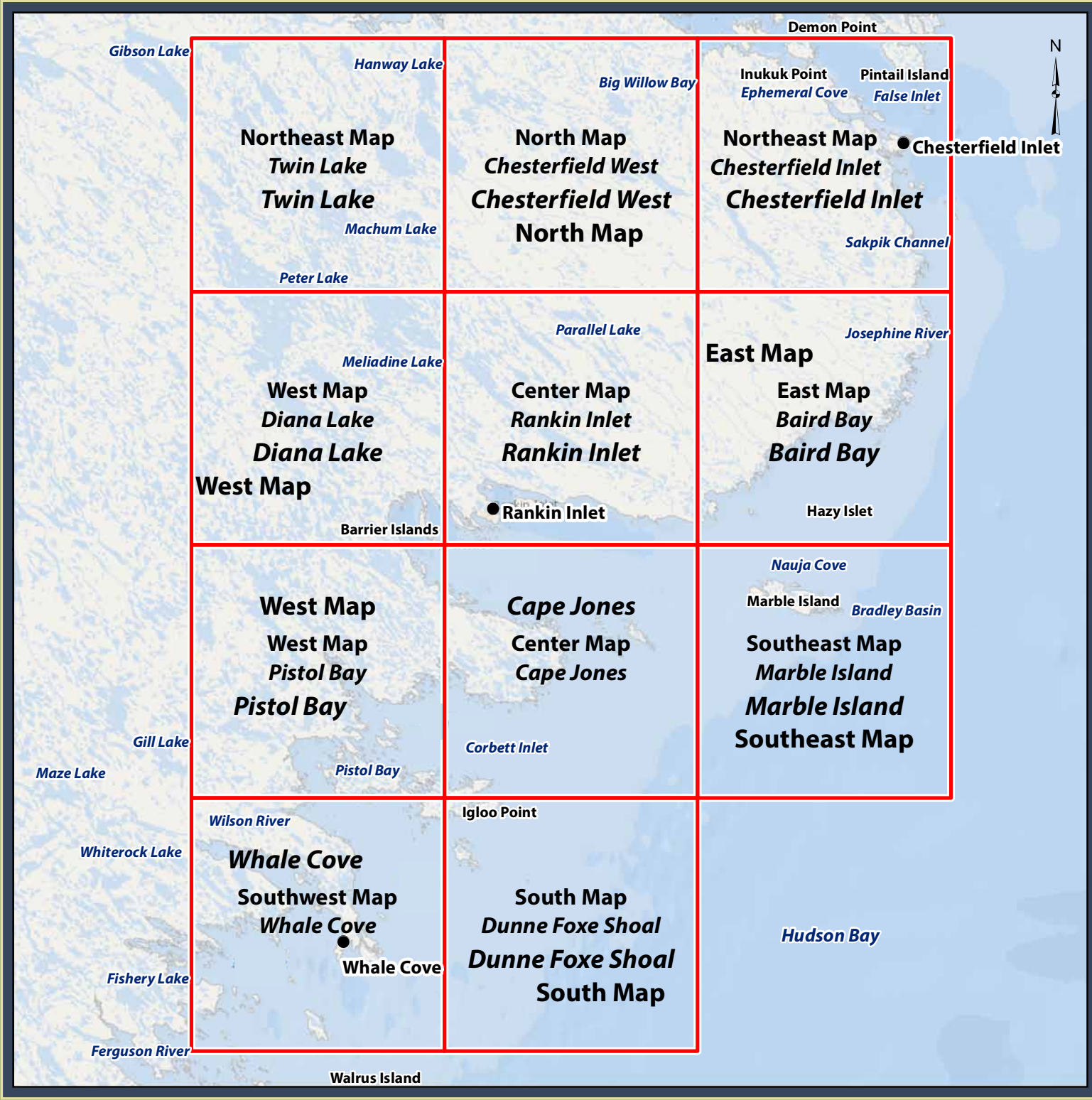
Please return the calendar to the Agnico-Eagle office for entry into the participant draw.

November 2013

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

January 2014

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	



Meliadine Lake Harvest Study

Key Map

0 5 10 20 30 40 50

Kilometres

Projection: UTM Zone 15 NAD83

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

Prepared For:

AGNICO EAGLE

Prepared By:

DOUGAN & ASSOCIATES

CASLYS CONSULTING

93°W
92°30'W
63°30'N
63°15'N
N
A1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 A21
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 U21
Hanway Lake
McManaman Lake
Twin Lake
K11
Machum Lake
Peter Lake

Meliadine Lake Harvest Study

Northeast Map
Twin Lake

Twin Lake	**Chesterfield West**	**Chesterfield Inlet**
Diana Lake	**Rankin Inlet**	**Baird Bay**
Pistol Bay	**Cape Jones**	**Marble Island**
Whale Cove	**Dunne Foxe Shoal**	

0 2 4 6 8 10
Kilometres

Projection: UTM Zone 15 NAD83

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

Prepared For:

AGNICO EAGLE

Prepared By:

DOUGAN & ASSOCIATES ECOLOGICAL CONSULTING & DESIGN

CASLYS CONSULTING

92°W

91°30'W

63°30'N

63°15'N

N

A22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 A42

B C D E F G H I J K L M N O P Q R S T

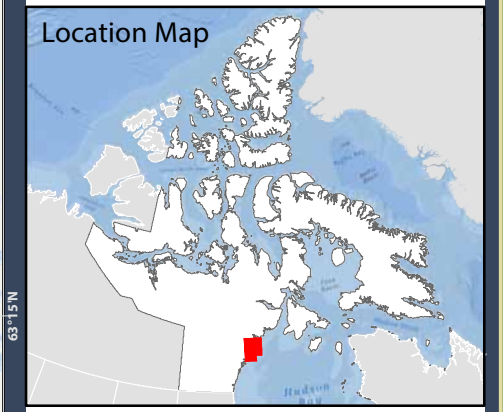
K32

U22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 U42

Meliadine Lake Harvest Study

North Map
Chesterfield West

Twin Lake	***Chesterfield West***	*Chesterfield Inlet*
Diana Lake	*Rankin Inlet*	*Baird Bay*
Pistol Bay	*Cape Jones*	*Marble Island*
Whale Cove	*Dunne Foxe Shoal*	



Projection: UTM Zone 15 NAD83

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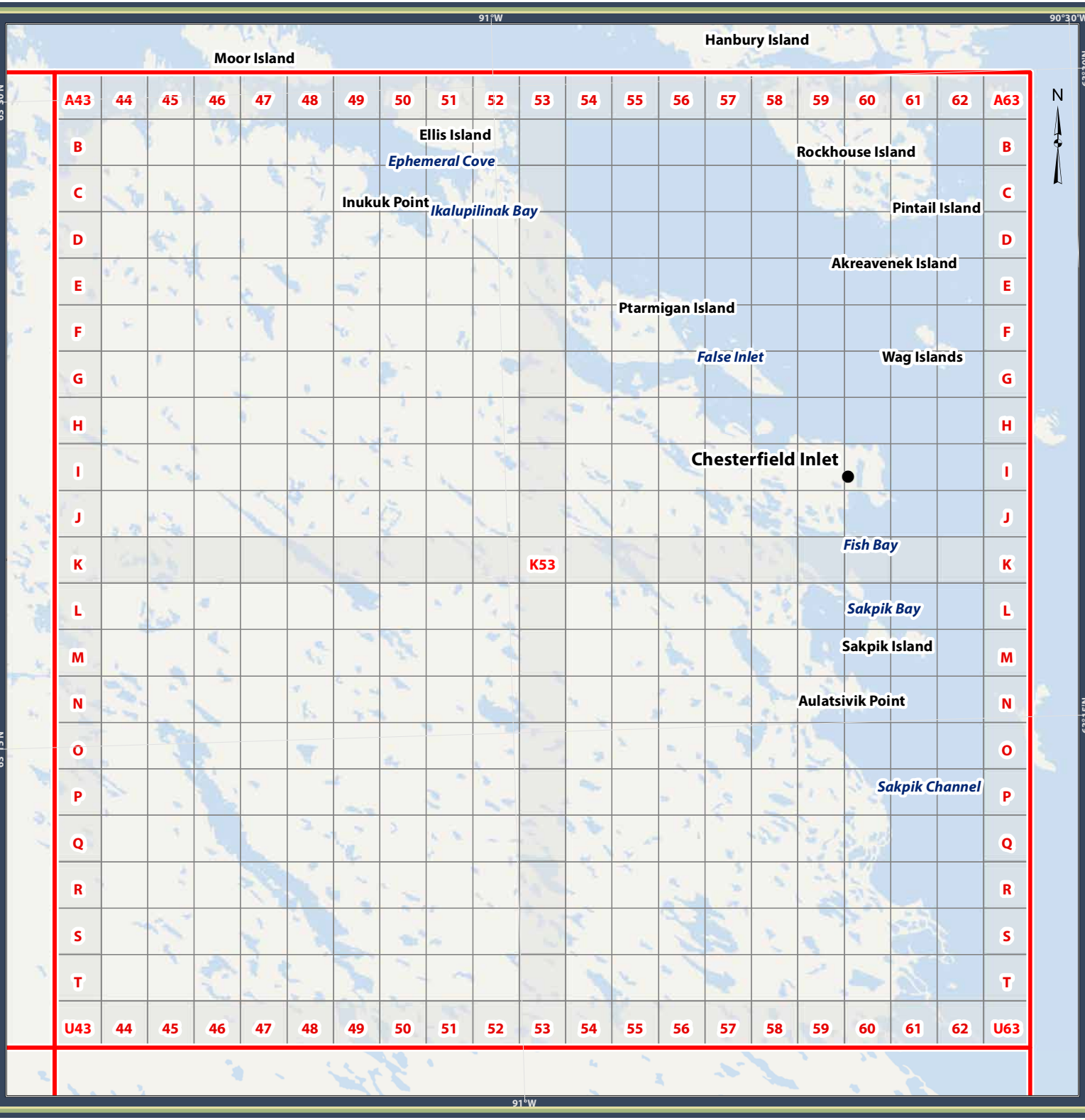

Meliadine Lake Harvest Study

Northeast Map
Chesterfield Inlet

Twin Lake	*Chesterfield West*	*Chesterfield Inlet*
Diana Lake	*Rankin Inlet*	*Baird Bay*
Pistol Bay	*Cape Jones*	*Marble Island*
Whale Cove	*Dunne Foxe Shoal*	

0 2 4 6 8 10

Kilometres

Projection: UTM Zone 15 NAD83

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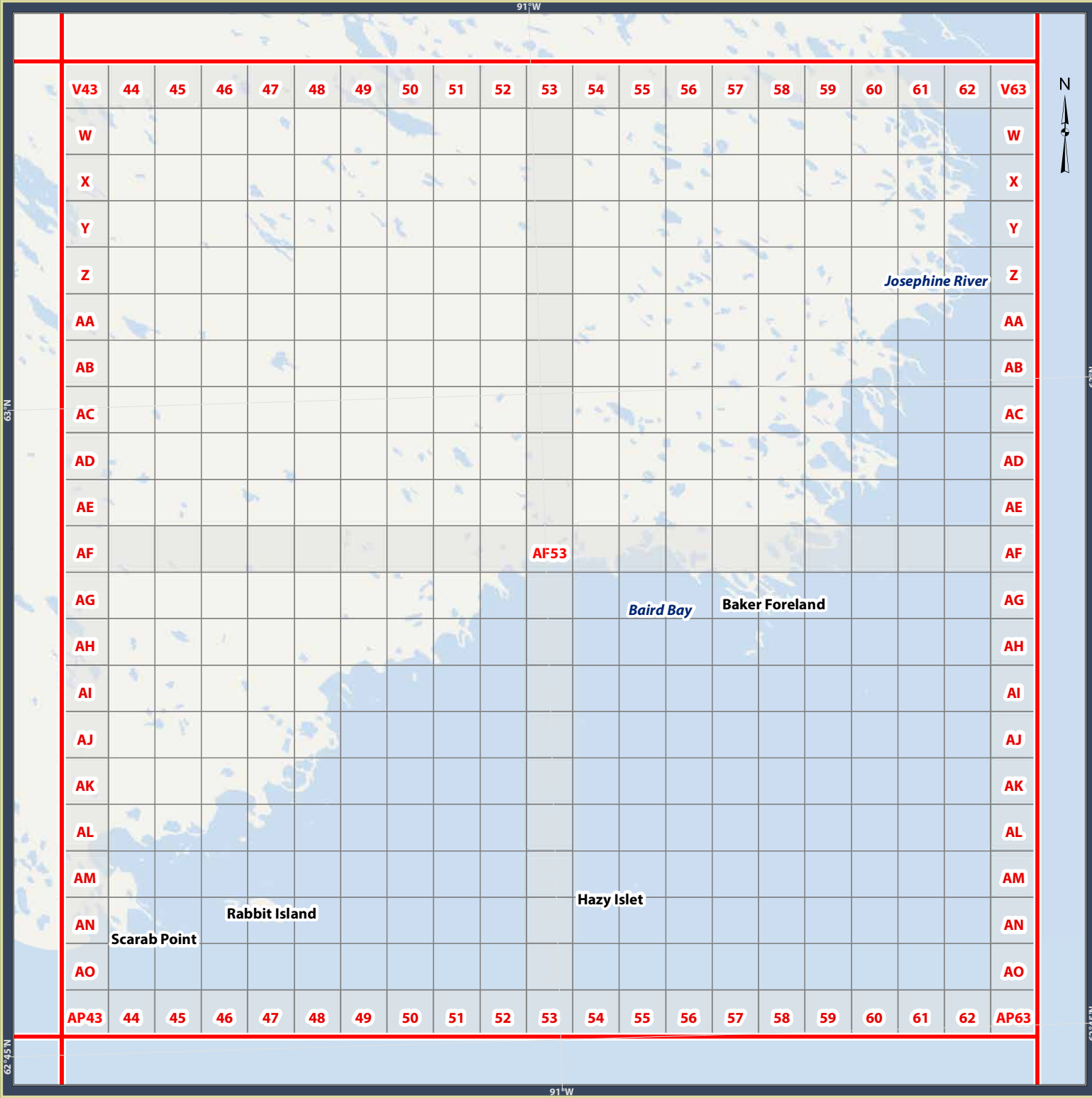
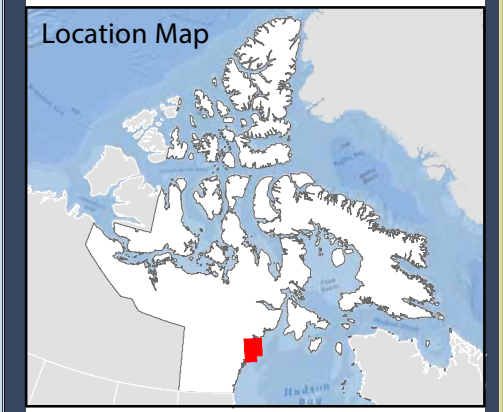


Meliadine Lake Harvest Study

East Map
Baird Bay

Twin Lake	Chesterfield West	Chesterfield Inlet
Diana Lake	Rankin Inlet	**Baird Bay**
Pistol Bay	Cape Jones	Marble Island
Whale Cove	Dunne Foxe Shoal	



0 2 4 6 8 10

Kilometres

Projection: UTM Zone 15 NAD83

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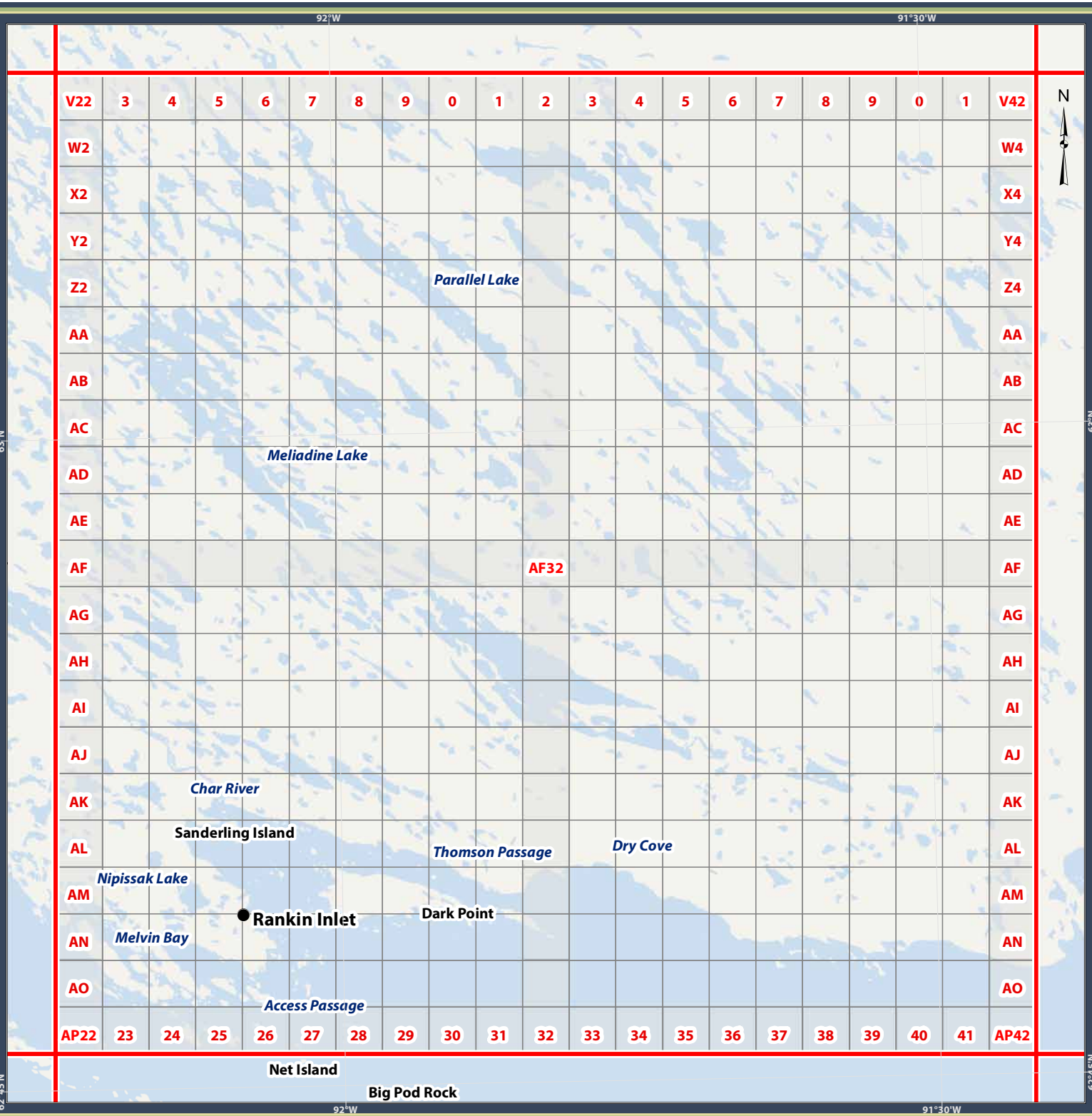


Meliadine Lake Harvest Study

Center Map
Rankin Inlet

Twin Lake	Chesterfield West	Chesterfield Inlet
Diana Lake	**Rankin Inlet**	Baird Bay
Pistol Bay	Cape Jones	Marble Island
Whale Cove	Dunne Foxe Shoal	

0 2 4 6 8 10

Kilometres

Projection: UTM Zone 15 NAD83

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

Prepared For:

AGNICO EAGLE

Prepared By:

DOUGAN & ASSOCIATES ECOLOGICAL CONSULTING & DESIGN

CASLYS CONSULTING

93°W

92°30'W

63°N

62°45'N

Peter Lake

Meliadine Lake

Diana Lake

Diana River

Char River

Barrier Islands

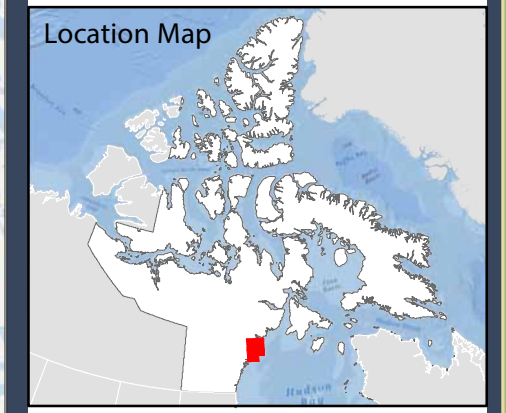
V1									0	1	2	3	4	5	6	7	8	9	0	V21
W1																				W2
X1																				X2
Y1																				Y2
Z1																				Z2
AA																				AA
AB																				AB
AC																				AC
AD																				AD
AE																				AE
AF										AF11										AF
AG																				AG
AH																				AH
AI																				AI
AJ																				AJ
AK																				AK
AL																				AL
AM																				AM
AN																				AN
AO																				AO
AP1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	AP21

N

Meliadine Lake Harvest Study

West Map
Diana Lake

Twin Lake	Chesterfield West	Chesterfield Inlet
Diana Lake	Rankin Inlet	Baird Bay
Pistol Bay	Cape Jones	Marble Island
Whale Cove	Dunne Foxe Shoal	



0 2 4 6 8 10

Kilometres

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Prepared For:

AGNICO EAGLE

Prepared By:

DOUGAN & ASSOCIATES ECOLOGICAL CONSULTING & DESIGN

CASLYS CONSULTING

93°W 92°30'W

62°45'N 62°30'N

AQ1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	AQ21
AR																				AR
AS																				AS
AT																				AT
AU																				AU
AV																				AV
AW																				AW
AX																				AX
AY																				AY
AZ																				AZ
BA										BA11										BA
BB																				BB
BC																				BC
BD																				BD
BE																				BE
BF																				BF
BG																				BG
BH																				BH
BI																				BI
BJ																				BJ
BK1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	BK21

Ground Squirrel Island

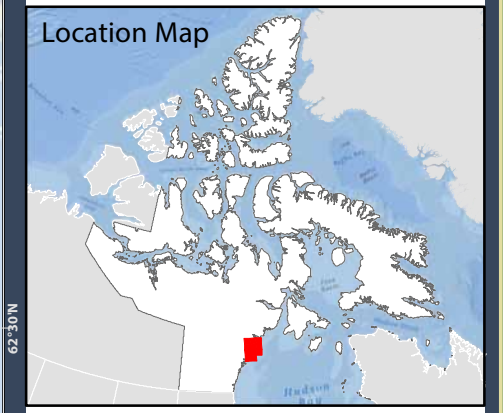
Pistol Bay

N

Meliadine Lake Harvest Study

West Map
Pistol Bay

Twin Lake	*Chesterfield West*	*Chesterfield Inlet*
Diana Lake	*Rankin Inlet*	*Baird Bay*
Pistol Bay	*Cape Jones*	*Marble Island*
Whale Cove	*Dunne Foxe Shoal*	



0 2 4 6 8 10

Kilometres

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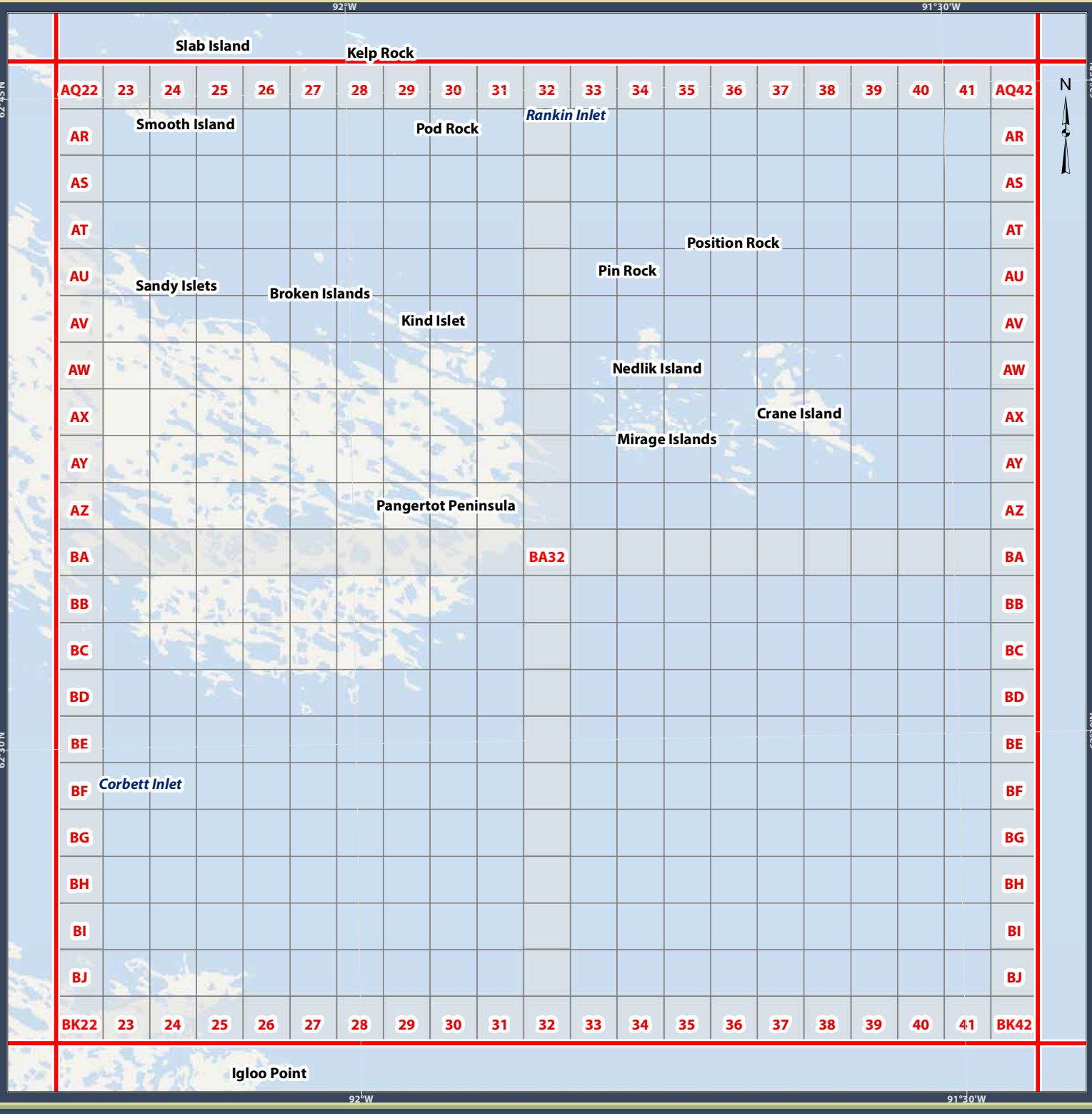
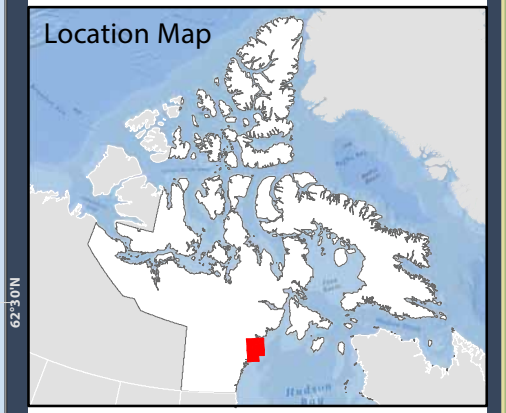


Meliadine Lake Harvest Study

Center Map
Cape Jones

Twin Lake	*Chesterfield West*	*Chesterfield Inlet*
Diana Lake	*Rankin Inlet*	*Baird Bay*
Pistol Bay	*Cape Jones*	*Marble Island*
Whale Cove	*Dunne Foxe Shoal*	



0 2 4 6 8 10

Kilometres

Projection: UTM Zone 15 NAD83

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

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AGNICO EAGLE

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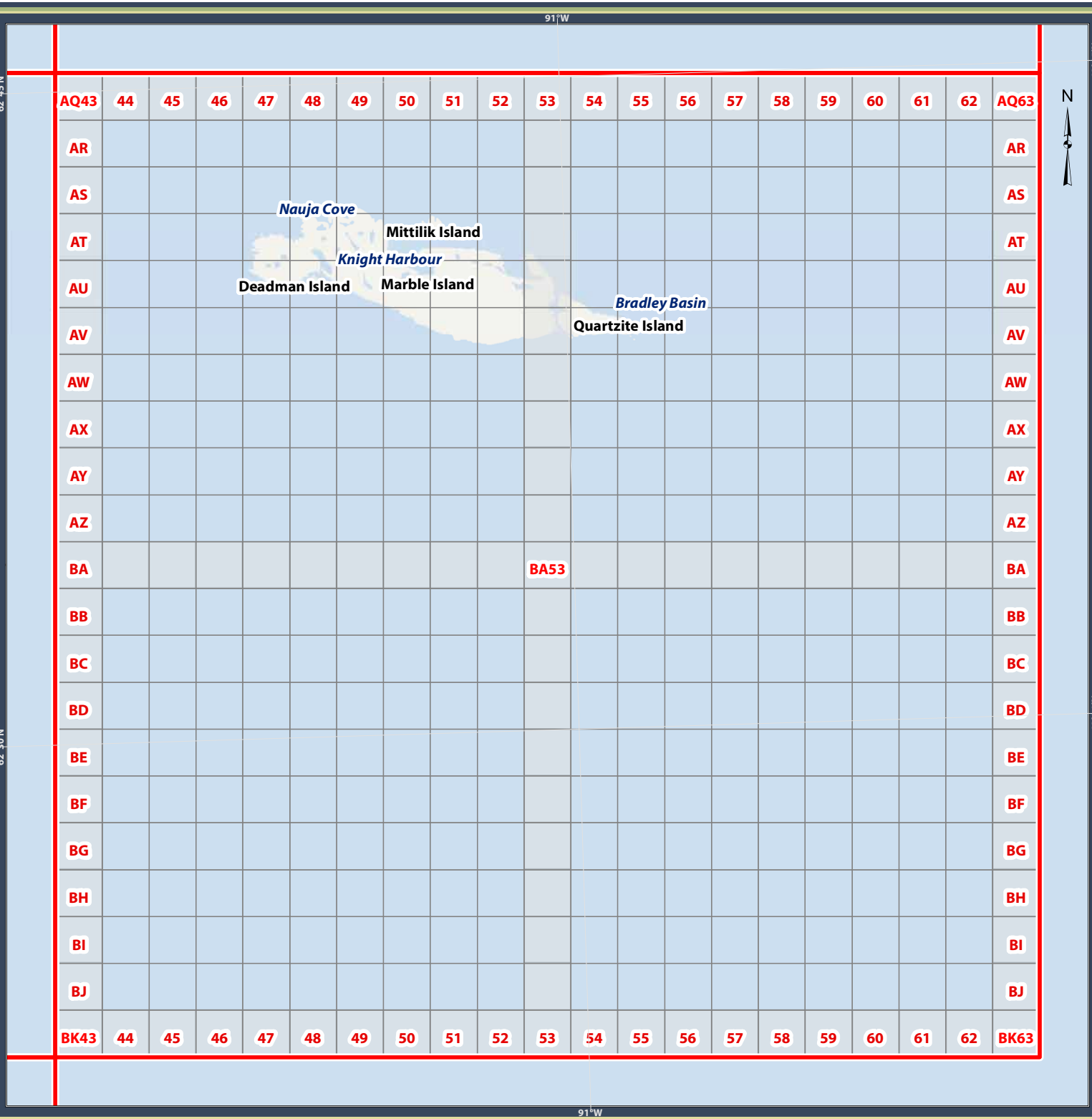

Meliadine Lake Harvest Study

Southeast Map
Marble Island

Twin Lake	Chesterfield West	Chesterfield Inlet
Diana Lake	Rankin Inlet	Baird Bay
Pistol Bay	Cape Jones	Marble Island
Whale Cove	Dunne Foxe Shoal	

0 2 4 6 8 10

Kilometres

Projection: UTM Zone 15 NAD83

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

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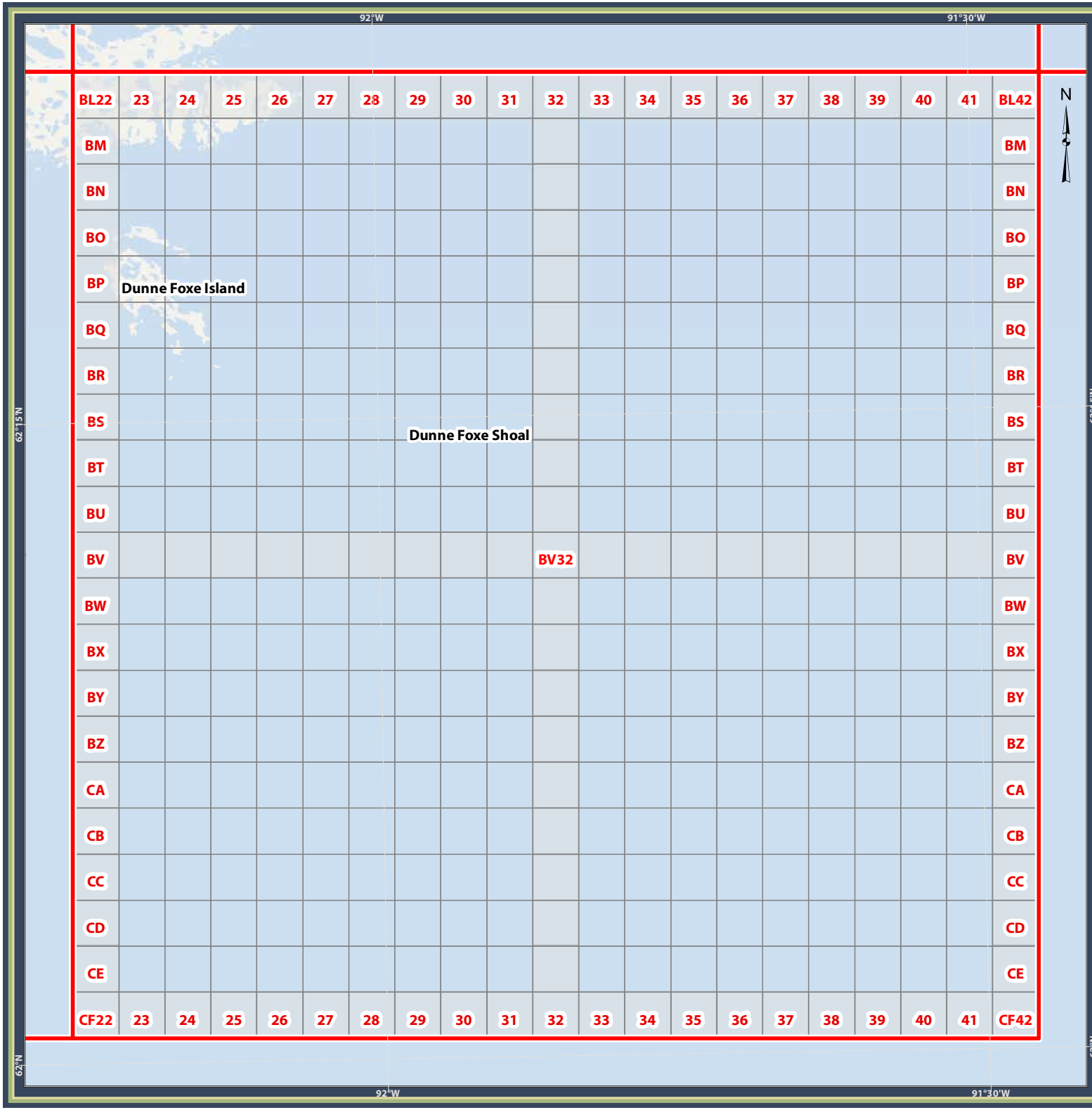
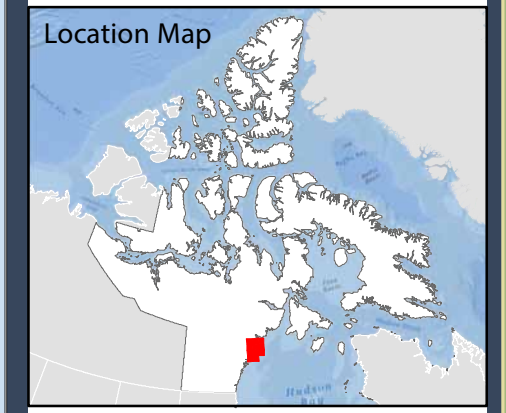


Meliadine Lake Harvest Study

South Map
Dunne Foxe Shoal

Twin Lake	*Chesterfield West*	*Chesterfield Inlet*
Diana Lake	*Rankin Inlet*	*Baird Bay*
Pistol Bay	*Cape Jones*	*Marble Island*
Whale Cove	*Dunne Foxe Shoal*	



0 2 4 6 8 10

Kilometres

Projection: UTM Zone 15 NAD83

Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

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AGNICO EAGLE

Prepared By:

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CASLYS CONSULTING

93°W

92°30'W

62°15'N

62°N

Pistol Bay

Pork Peninsula

BL1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 BL21

BM BN BO BP BQ BR BS BT BU BV BW BX BY BZ CA CB CC CD CE

CF1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 CF21

Wilson Bay

Kayak Island

BV11

Whale Cove

Mistake Bay

Issatik Point

Term Point

Flattop Island

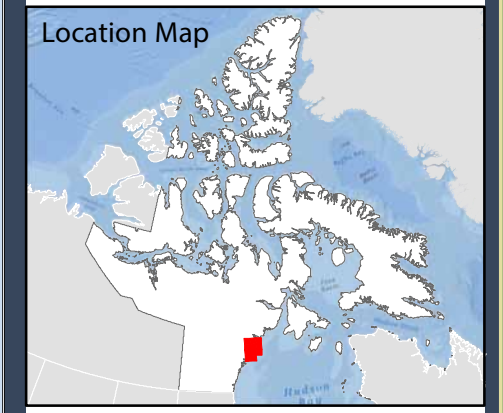
N

Meliadine Lake Harvest Study

Southwest Map
Whale Cove

Twin Lake	*Chesterfield West*	*Chesterfield Inlet*
Diana Lake	*Rankin Inlet*	*Baird Bay*
Pistol Bay	*Cape Jones*	*Marble Island*
Whale Cove	*Dunne Foxe Shoal*	

Location Map



0 2 4 6 8 10

Kilometres

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Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and other contributors; Natural Resources Canada; National Topographic Database; GeoBase

Prepared For:

AGNICO EAGLE

Prepared By:

DOUGAN & ASSOCIATES ECOLOGICAL CONSULTING & DESIGN

CASLYS CONSULTING

Rock Ptarmigan

Kevin Martee

AGNICO EAGLE

Produced By:

DOUGAN & ASSOCIATES
ECOLOGICAL CONSULTING & DESIGN

and

CASLYS CONSULTING

APPENDIX II

Agnico Eagle Raptor Activity Report 2013 – Meliadine Project

ARCTIC RAPTORS INC.

170 52260 RR223
Sherwood Park AB
T8C 1J3

Stéphane Robert
Manager Regulatory Affairs Nunavut
Agnico-Eagle Mines Ltd.

CC. Ryan VanEngen, Environment Department, Agnico-Eagle Mines Ltd.
Kimberly Dawe, Wildlife Biologist, Golder Associates Ltd.
Corey De La Mare, Principal, Senior Biologist, Golder Associates Ltd.

Dear Stéphane,

RE: Agnico-Eagle Raptor Project Activity Report

Thank you for the support provided to undertake detailed and on-going monitoring of raptor species associated with the Agnico-Eagle Meliadine (AEM) Project near Rankin Inlet, Nunavut. The$36 000.00 investment from AEM was used to leverage an additional $77 000.00 to support field staff including graduate student stipends and operating costs for 3 M.Sc. students and 1 post-Doctoral scholar. All projects are currently on-going, and preliminary results are not yet available. Please refer to the MITACS project proposal for expected end-dates.

The overall goal of our work was to provide better understanding of the ecology and demographics of raptor species breeding within the confines of the local and regional study areas, and to examine these within the context of the long-term study that currently exists for the population breeding near Rankin Inlet. In addition, we agreed to work with, and provide Agnico Eagle personnel with advice in regard to mitigation of any potential disturbance to raptors at breeding sites that overlap with development and operating activities.

We hope that work described here addresses information needs for impact assessment and on-going monitoring. If you require additional information or would like to discuss our activities and results, please contact me at any time that is convenient for you.

Sincerely,

Alastair Franke

170 52260 RR223
Sherwood Park AB
T8C 1J3

1. Study Area

The study population of Peregrine Falcons is located north of the hamlet of Rankin Inlet, Nunavut, Canada (Figure 1). The region is known to harbor a density that is among the highest for the species in the world and the highest recorded in the tundra biome (Franke et al. 2011). Though relatively southern for Peregrine Falcons in Canadian Arctic, (62°49'N 92°05'W), environmental conditions are as, or more, severe than any encountered in the range of the species. Passerines and small mammals comprise the bulk of the diet and lemming consumption increases significantly during peak abundance (Court et al. l988a, l988b, Bradley and Oliphant 1991). Terminology used in describing nesting activities of Peregrine Falcons and a general description of vegetation, climate, and geology of the study area are reported elsewhere (Court 1986; Court et al. 1988a; Court et al. 1988b; Court et al. 1989).

2. Methods

Standard definitions of measures used to monitor raptor populations are generally widely accepted; however, as terms are not always used in exactly the same way among researchers (Stenhoff 2007), we used the following definitions:

Site Occupancy is defined as the proportion of known breeding locations occupied by pairs per year. Mearns and Newton (1984) indicated that the proportion of known territories occupied by pairs in any given year can be used to index the size and status of breeding populations.

Clutch Size is defined as the number of eggs laid by pairs at occupied breeding locations. Data on clutch size can provide insight into the mechanisms of a population's response to food supply or other environmental factors.

Productivity is defined as the number of young to reach banding age per occupied territory in a particular year.

The best estimates for each measure are usually achieved by conducting repeated site visits throughout the breeding season. When repeated visits are not possible, a large number of sites visits can be categorized into one of three stages associated with breeding cycle; pre-laying occupancy, egg-laying/incubation, and chick rearing. Monitoring data for each site was accumulated on the basis of observations made at the time of the site visit, or the site was considered "not visited" for that stage of the breeding cycle. For example, a site that was visited once only during pre-laying period can provide information regarding occupancy only; no information regarding egg laying or production of chicks can be determined as the site was not visited in either the egg-laying or chick rearing stages. However, if a site was visited once only, and that visit occurred during the chick rearing phase and 4 chicks were observed, it can be assumed the site was occupied by a pair of adults and that 4 eggs were laid, and that 4 eggs hatched. Although this approach provides additional information regarding breeding success

170 52260 RR223
Sherwood Park AB
T8C 1J3

despite as few as a one visit annually, it represents minimum values for each measure as sites that are occupied and abandoned early are under-represented in the sample; thus occupancy is potentially higher than estimated from the sample. However, where samples are large (i.e. many sites receive a single visit in each phase of the breeding cycle), we assumed that estimates of site occupancy, clutch size and productivity were representative of the regional population, and also assumed that among year comparisons were representative of temporal trends for each measure given that the same approach was used among survey years.

Occupancy

Beginning in May, as Peregrine Falcons arrived from their wintering grounds, known sites and intervening habitat thought to be capable of harboring raptors were surveyed by snowmobile to determine the presence or absence of territorial raptors. In addition, one helicopter survey (2 hours 26 minutes) was conducted on June 26. Sites were considered occupied if one or more adults displayed territorial or nest building behavior (e.g. vocalization and/or flight behavior associated with defense of breeding territory or presence of nest building). Locations that exhibited nest building or old nests without presence of breeding aged adults were not considered occupied. In addition, sites that were missed in May, but discovered with eggs or nestlings later in the breeding season were also considered occupied. This approach has the potential to underestimate overall occupancy as breeding pairs that are missed in May and abandon early in the breeding season can be missed entirely.

Occupancy was calculated as follows:

$$\text{Occupancy}=N_{Occ}/\ N_{Total} \quad (1)$$

where N_{Occ} is equal to the count of occupied sites and N_{Total} is equal to the count of visited sites known to exist (i.e.from previous and current survey effort).

<u>Reproductive Success</u>

After break-up of the sea-ice, coastal sites and those located on islands were surveyed by boat while inland sites were monitored by all-terrain vehicle, helicopter or on foot. Sites located on or near the shores of large in-land lakes were visited by boat. Counts of eggs laid, eggs hatched, and number of chicks to reach banding age were calculated as follows:

$$\text{Eggs laid per occupied site}=N_{Laid}/\ N_{TotalSites} \quad (2)$$

where N_{Laid} is equal to the count of egg laid and $N_{TotalSites}$ is equal to the count of visited sites known to exist (i.e. from previous and current survey effort).

$$\text{Eggs hatched per occupied site}=N_{Hatch}/\ N_{TotalSites} \quad (3)$$

where N_{Eggs} is equal to the count of egg hatched and $N_{TotalSites}$ is equal to the count of visited sites known to exist (i.e. from previous and current survey effort).

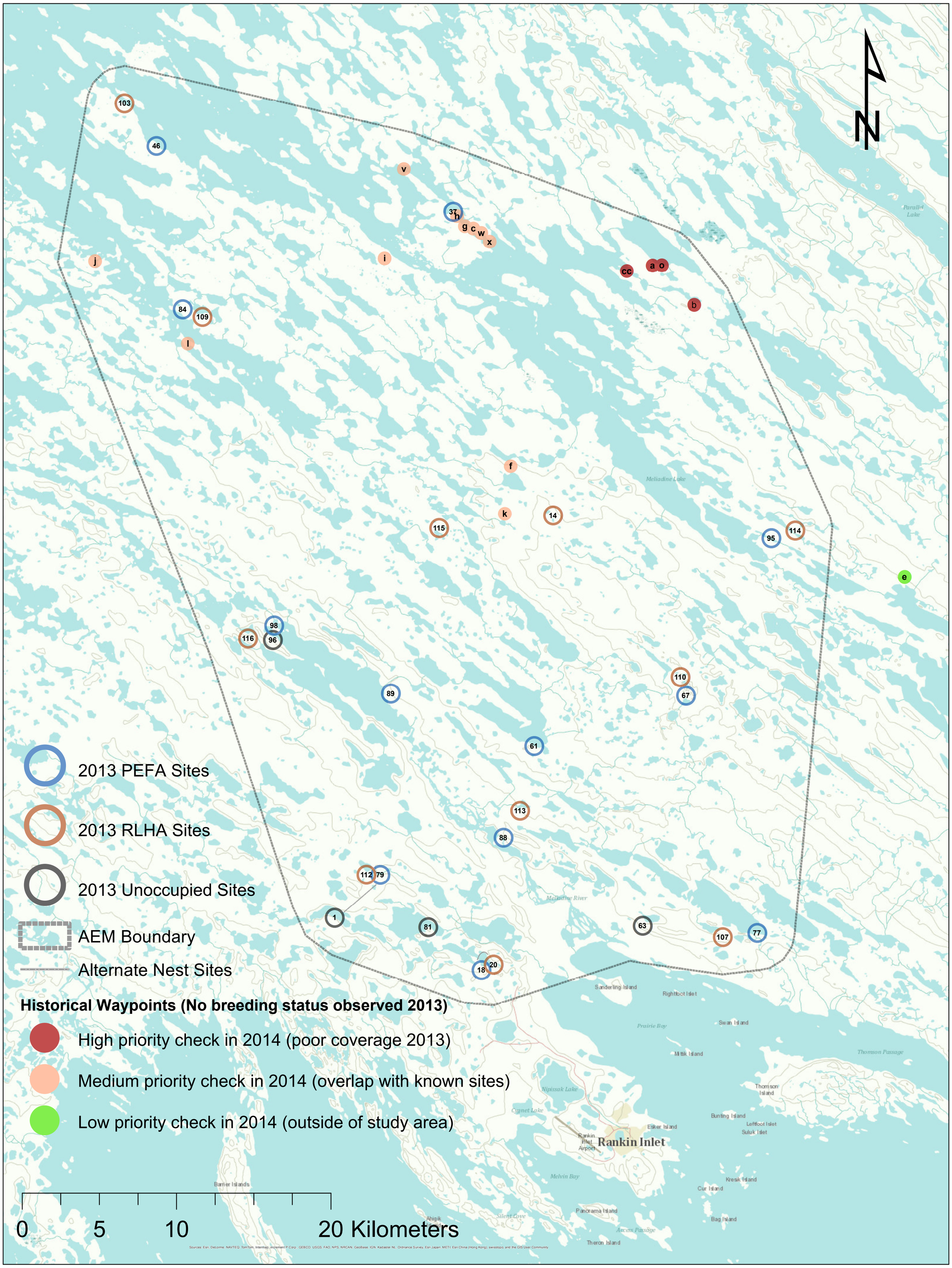

Figure 1. AEM raptor monitoring study area north of Rankin Inlet, NU for Peregrine Falcons and Rough-legged Hawks.

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Sherwood Park AB
T8C 1J3

$$\text{Chicks banded per occupied site} = N_{Chicks} / N_{TotalSites} \quad (4)$$

where N_{Chicks} is equal to the count of chicks to reach banding age and $N_{TotalSites}$ is equal to the count of visited sites known to exist (i.e. from previous and current survey effort).

3. Results

There were 58 eggs laid at 19 Peregrine Falcon nest sites in 2013; 41 of 58 (70.69%) eggs hatched. Twenty nestlings reached banding age resulting in 1.05 nestlings per occupied site, which is not dissimilar from the long-term mean (1.12) for peregrines monitored from 1980 – 2013 near Rankin Inlet, but was lower than that (1.36 nestlings per occupied site) found for the Rankin inlet region outside of the AEM study area in 2013.
An additional 13 nest sites were occupied by Rough-Legged Hawks. A total of 13 nestlings reached age of banding from 34 eggs (see Table 1. for summaries and Table 2. for site counts). All 33 nestlings were banded, and the banding data were submitted to the Canadian Bird Banding Lab; there have been no band returns to date (i.e. banded birds have not been encountered elsewhere). There were no occurrences of Gyrfalcons breeding in the AEM sturdy area or other areas surveyed near Rankin Inlet. There were no occurrences of Snowy Owls breeding in the region despite high lemming abundance.

Table 1. 2013 Summary data for site occupancy and reproductive success for AEM Meliadine Project near Rankin Inlet, NU. PEFA = Peregrine Falcon; RLHA = Rough-legged Hawk.

Species	sites	eggs	hatch	band	eggs/site	hatch/site	band_age/site
PEFA	19	58	41	20	3.05	2.16	1.05
RLHA	13	34	15	13	2.62	1.15	1.00
Total	32	92	56	33	2.88	1.75	1.03

One Peregrine nest site (Site 84; See Figure 1.) on Big Meliadine Lake, west of the mine was located at the base of a small rock outcrop almost at ground level; an unusual choice for locating a nest. A motion sensitive camera was placed at the site in order to monitor the activity at the site. Images collected from the camera showed that on August 8 at approximately 1:00 a.m., a wolverine depredated the nestlings. Predation is relatively uncommon, and nest placement was very likely associated with the loss of the young at this site. Additional camera monitoring of sites outside of the AEM study area showed relatively high levels of mortality associated with black fly infestation; this phenomenon has not been documented in the Rankin Inlet area before 2013. There were no sites within the AEM study area at which mortality associated with black flies was confirmed; however, given the incidence of black fly infestation at sites outside of the AEM study site, it is very possible that some mortality within the AEM was attributed to black flies. The breeding status of a subset of histrocal waypoints identified in the terrestrial baseline remain unconfirmed, no raptor nests were identified at these locations in 2013; these waypoints have been classified by priority (high, medium, low) for monitoring in 2014 (see Figure 1.).

Table 2. 2013 site occupancy status and reproductive success for AEM Meliadine Project near Rankin Inlet, NU. PEFA = Peregrine Falcon; RLHA = Rough-legged Hawk. Counts of eggs laid and hatched, and nestlings banded are minimum values. Hash symbol indicates site monitoring was inadequate (usually not visited)

AEM Site ID	ARInc. Site ID	Occupied	Species	Eggs	Hatched	Banded
A08-05 A	37	Pair	PEFA	1	0	0
A08-02						
F08-01	67	Pair	PEFA	4	4	3
F08-03						
F08-02						
F08-04						
D08-02	95	Pair	PEFA	4	4	0
D08-01						
H98-01	89	Pair	PEFA	0	0	0
G08-01	69	Pair	RLHA	0	0	0
H98-02	98	Pair	PEFA	4	4	0
G98-02	18	Pair	PEFA	3	0	0
G98-03	31	Pair	PEFA	4	4	3
J98-01	109	Pair	RLHA	4	0	0
NA	105	Pair	RLHA	3	#	0
NA	46	Pair	PEFA	4	#	0
NA	37	Pair	PEFA	#	#	0
NA	84	Pair	PEFA	4	4	0
NA	109	Pair	RLHA	0	0	0
NA	114	Pair	RLHA	*3*	3	3
NA	95	Pair	PEFA	4	#	0
NA	14	Pair	RLHA	5	5	5
NA	115	Pair	RLHA	#	#	0
NA	116	Pair	RLHA	3	3	0
NA	67	Pair	PEFA	4	4	3
NA	61	Pair	PEFA	4	3	0
NA	113	Pair	RLHA	4	3	2
NA	88	Pair	PEFA	4	3	3
NA	20	Pair	RLHA	4	#	0
NA	18	Pair	PEFA	3	0	0
NA	81	0	NA	0	0	0
NA	79	Pair	PEFA	4	4	2
NA	112	Pair	RLHA	1	1	1
NA	89	Pair	PEFA	0	0	0
NA	116	Pair	RLHA	3	#	0
NA	96	0	NA	0	0	0
NA	1	0	NA	0	0	0
NA	77	Pair	PEFA	3	3	3
NA	107	Pair	RLHA	4	#	2
NA	63	Pair	PEFA	4	4	3

Figure 2 Wolverine depredating Peregrine Falcon nestling at Site 84

4. Recommendations and Requests

The following recommendations are made for monitoring in 2014:

- Increased ground coverage of historical waypoints for which no breeding status was observed in 2013 and remain unconfirmed (See Figure 1; high, medium, low priority).
- Increased ground coverage of areas where nest sites appear to be under represented (i.e. confirm absence is true)
- Additional camera monitoring at nests close to the mine site in order to ascertain cause of mortality (black fly in particular).
- Use of 2 snowmobiles May 15 - June 15.
- Use of boat of Big Meliadine Lake August 5 – August 15.
- Periodic helicopter support (up to 10 hours June 10 – August 30).
- Bear monitor May 15 – August 30.
- Use of laundry and shower facilities at guest house (up to twice weekly)

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APPENDIX III

Wildlife Protection and Response Plan – Meliadine Project

MELIADINE DIVISION

Wildlife Protection and Response Plan

March 2014

SECTION 1 – INTRODUCTION

As part of the TEMMP (2014), mitigation measures and monitoring initiatives have been proposed to lessen the likelihood that wildlife will become habituated to the Meliadine Mine Site (the 'mine site') and its infrastructure. The TEMP identified measures to deter wildlife from obtaining food rewards, finding shelter around the mine site, gaining access to harmful substances present on the project site, being injured as a result of vehicle collisions, and damaging mine property.

Despite these mitigation measures, personnel may occasionally come into contact with wildlife that inhabit the Meliadine area. To manage these incidents, a specific Wildlife Protection and Response Plan (WPRP) has been developed. Incidents must be managed to keep both humans and wildlife safe, using only humane control methods.

Furthermore, all staff must be familiar with the standard operating procedures and best practices aimed at ensuring human-wildlife conflicts are minimized during the life of the project. All personnel, including contractors, on site have a role to play in ensuring human safety, conservation of wildlife and documenting wildlife activities in the mine area.

The following WPRP provides information on general human-wildlife conflicts policies and regulations, species-specific response plans for ungulates and predatory mammals, and wildlife awareness.

SECTION 2 – HUMAN-WILDLIFE CONFLICTS

2.1 Overview

Wildlife encounters can take many forms. A conflict occurs when either human or wildlife health, and/or safety are put at risk. Human health and safety can be affected by contact or conflict with wildlife in several ways, including direct or indirect physical injury, and exposure to animal diseases that can infect humans (i.e., known as zoonotic diseases).

The most common conflict faced by wildlife is the increased risk of mortality from human encounters, which most often occurs when wildlife become habituated to human activity and lose their natural fear of people. The most serious form of habituation is directly correlated to the animal obtaining food, which is known as food conditioning. Food-conditioned animals become dependent on humans as sources of food. Because these human-induced habits become engrained in the animal, attempts to deter the habituated behaviour generally fail with the end result usually the death of the animal. Loss of habitat effectiveness (how the animal uses its available habitat), and effects to wildlife movement (how the animal travels through its available habitat) can also result from wildlife in conflict with human development. Ultimately, this will affect both the health and safety of the wildlife species involved.

While it is impossible to remove all risk to both human and wildlife health and safety, approaches to minimize the risk do exist. Reactive measures do have their place in stopping the conflicts when they occur, but proactive strategies are the most effective means of preventing potential conflicts.

2.2 Mine Policies and Regulations

The following summarizes the general rules regarding wildlife on the site and will form the basis of the Wildlife Awareness Orientation and Courses (see below).

Employees and contractors are advised to report all incidents of unauthorized activities on or in the vicinity of the mine site to the Environmental Department.

2.2.1 General Restrictions for Wildlife Protection

The following are general restrictions for mine site workers and contractors, intended to minimize the potential for negative project-related effects (e.g., increased mortality risk) on wildlife in and around the mine site.

- Wildlife shall have the right-of-way except where it is judged to be unsafe to do so. All species of wildlife (i.e., from small mammals to large carnivores, songbirds to raptors) when encountered by personnel on foot or in vehicles will be given the right-of way.
- Non-mine-registered firearms are not permitted on site,(i.e. carrying of firearms in private vehicles to and from the project site on workdays).
- Feeding wildlife is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the mine site.
- Harassment (defined as to kill, injure, seize, capture or trap, pursue and includes to stalk, track, search for, lie in wait for, or shoot at - for any of those purposes not authorized by the Environment Department) of wildlife is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site.
- The deliberate destruction or disruption of wildlife nests, eggs, dens, burrows, and the like, is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site.
- Hunting and fishing is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site on workdays.
- Pets are prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site on workdays.
- Maximum speed limit on all access roads is 50 km/h (30 mph).
- Traffic (including ATVs and snowmobiles) is restricted to designated access roads and trails.

The mine site refers to any mine facility present during the operations phase of the project, including but not limited to, outbuildings (e.g., machine shop, offices), pits, parking areas, tailings storage facilities and waste piles.

2.2.2 Wildlife Attractants

A list of potential wildlife attractants is provided below. The list is intended as a general summary of attractants but may not be comprehensive of all potential attractants.

- Food wastes and garbage;
- Chemicals (e.g., road salt) and their refuse (e.g., empty fuel containers);
- Wildlife carcasses (e.g., road kills, hunter kills);
- Movement and human activity (e.g., movement of people and equipment outdoors); and
- Roads, which may create preferential travel corridors for wildlife, can lead to vehicle collisions and increased exposure to wildlife encounters at the mine site.

General recommendations directed at minimizing wildlife concerns related to food wastes and garbage are presented under Section 2.2.3 (Garbage Management).

Protocols for dealing with chemical storage, disposal and spills are presented in Meliadine's Hazardous Materials Management Plan and Spill Contingency Plan. These protocols will minimize the potential for adverse wildlife effects, and are referenced under Section 2.2.3 (Garbage Management) and Section 2.2.4 (Wildlife Health).

Requirements related to the reporting and removal of wildlife carcasses are presented under Section 2.2.6 (Reporting Wildlife Observations and Incidents).

2.2.3 Garbage Management

General recommendations directed at minimizing wildlife concerns related to food wastes and garbage are provided below.

- Littering is prohibited on and in the vicinity of the mine site and along access roads. All garbage (e.g., lunch bags) must be returned to temporary storage containers. Note: organic wastes (e.g., orange peels, apple cores) are included.
- Waste will be incinerated on a daily basis, including kitchen and food wastes,
- Wastes associated with mechanical maintenance and repairs (e.g., motor oil and antifreeze) will be disposed of as per the Hazardous Materials Management Plan.

- All temporary (small) storage containers (e.g., garbage cans) for garbage and recycling are wildlife protective (i.e. have bear proof lids).
- Feeding wildlife is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site on workdays.
- Wildlife incidents related to garbage or human food attractants will be reported as soon as possible. See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for more information.
- Improperly disposed of garbage, particularly food wastes, will be reported as soon as possible. See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for more information.

While arctic fox tend to be the greatest concern with respect to access to garbage, other animals (e.g., wolverines, wolves and grizzly bears) may be attracted to uncontained garbage sources. Problem wildlife data at the Meliadine mine to date indicate that Arctic fox and wolves are the most likely species to be attracted to the site. Only one wolverine (and no grizzly bear) has become habituated to the site to date.

2.2.4 Wildlife Health

The following recommendations are intended to reduce potential mine-related effects on wildlife health (including non-vehicle related accidents and consumption of toxic substances).

- Feeding wildlife is prohibited at all times on or in the vicinity of the mine site, including during travel to and from the site.
- Company procedures on the safe and prompt clean up of any chemical spills will be followed. See Meliadine's Spill Contingency Plan for a more detailed protocol.
- Any observations of wildlife in and around potential sources of contaminants (e.g., fuelling sites) will be reported. See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for details.

2.2.5 Wildlife and Vehicles

The following recommendations are intended to reduce the incidence of wildlife-vehicle collisions and near misses.

- Wildlife has the right-of-way except where it is judged to be unsafe to do so.
- Obey all traffics signs.
- Maximum speed limit on all access roads is 50 km/h (30 mph).
- Verbally report wildlife carcasses observed on and in the vicinity of the mine site, and along access roads, as soon as possible. See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for more information.
- Restrict traffic (including ATVs and snowmobiles) to designated access roads and trails.

- Report all wildlife-vehicle collisions that results in the death or injury of wildlife as soon as possible. See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for details.
- A near miss between a vehicle and an animal should be reported as a wildlife 'incident'. See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for details.

2.2.6 Reporting Wildlife Observations and Incidents

2.2.6.1 Reporting Requirements of Project Workers and Contractors

Project workers and contractors are required to verbally notify the Environmental Department of the following wildlife observations or incidents as soon as possible.

- Signs of animal presence (e.g., tracks, scat, nests, burrows) in close proximity to site facilities, vehicles, equipment, or areas frequented by workers.
- Sightings of animals in close proximity to site facilities, vehicles, equipment, or areas frequented by workers.
- Aggressive or unusual wildlife behaviour in and around site facilities.
- Instances of workers feeding wildlife.
- Instances of improper disposal of garbage or other waste materials.
- Observed maintenance issues (e.g., improper placement or maintenance of garbage containers).
- Instances of workers not following vehicle use guidelines (e.g. speed limits).
- Vehicle collisions with wildlife or near misses.
- Observations and locations of dead (e.g., road kill) or injured animals.

Following the verbal report of a wildlife incident or observation, completion of a Wildlife Incident Report form may be requested at the discretion of the Environmental Coordinator or designate (s).

2.2.6.2 Reporting Requirements of Wildlife Occurences

Wildlife Incident Reports provide essential information that may identify: 1) potentially dangerous situations requiring intervention (e.g., problem wildlife); 2) situations that require notification of the Nunavut Department of Environment; 3) weaknesses in garbage-handling and problem wildlife prevention measures; and 4) areas that may require warning signs (e.g., poor visibility road corners). The Environmental Coordinator or designate(s) should ensure that records of wildlife observations and incidents are thoroughly documented. Reports should attempt to include the following information wherever possible:

- Identification and number of wildlife observed;
- Specific timing and location of the observation(s);

- Details regarding the animal behaviour, including direction of approach and departure, what it was doing, any aggressive behaviour, etc.;
- Assessment of local attractants, such as garbage, odours, movement of people, other wildlife, etc.;
- If local attractants are identified as a factor, determination of what steps were or will be taken to address/remove potential attractants;
- Identification of any potential mitigation measures available to deter wildlife or limit access and how they will be implemented (refer to Section 2.2.7 for additional information on dealing with problem wildlife); and
- If an animal is destroyed, a description of the lethal measures deployed (e.g., rifle), statement of the rationale for use of lethal measures (e.g., proximity to workers, repeated incidents, observed condition of the animal, etc.), and indication of what previous non-lethal measures were employed (e.g., deterrents, hazing, trapping and relocating etc.).

2.2.7 Protocols for Dealing with Problem Wildlife

A problem wildlife situation may arise where animal acts in an aggressive manner and/or is a repetitive nuisance or threat to worker safety. The following protocols should be used to deal with problem wildlife:

- Immediately notify the Environmental Coordinator or designate(s) of any problem wildlife issue. Reporting wildlife incidents as they occur will ensure that proactive rather than reactive measures can be taken to prevent a serious outcome (e.g., human injury, destruction of the problem animal). See Section 2.2.6 (Reporting Wildlife Observations and Incidents) for details.
- If deemed necessary by the Environmental Coordinator, notify the Conservation Officer in the Hamlet of Baker Lake or other designated Government of Nunavut representative, inform them of the problem wildlife encountered on site, discuss appropriate aversive and mitigation actions, and determine timing when lethal methods should be implemented, if necessary.
- The Environmental Coordinator or designate(s) will initiate the appropriate actions in response to a problem wildlife issue, Recommended actions include:
    - Assess potential local attractants and address or remove all those identified, where practical;
    - Utilize non-lethal deterrents (e.g., aversive conditioning, hazing, trapping and relocating), projectiles (e.g., rubber bullets) or consider trapping and relocation of animals (e.g. arctic fox), where it is considered appropriate and safe to do so (refer to Sections 3 and 4 for species-specific deterrents); and

  - Use lethal measures. Lethal measures should only be considered as a last resort in the event of aggressive animal behaviour and/or repeated nuisance animals that pose a threat to worker safety and/or site facilities.

- Only authorized personnel (Environment Department) are permitted to use lethal and non-lethal projectiles (e.g., rubber bullets) or deploy traps for problem wildlife interventions.
- Do not attempt to deal with a problem wildlife issue on your own. Problem wildlife can be dangerous.
- Conform to recommendations regarding predator safety. All staff should have received a predatory mammal (i.e., grizzly bear, wolverine, wolf and fox) awareness training orientation. See Section 5.

SECTION 3 – SPECIES-SPECIFIC RESPONSE PLANS

3.1 Purpose

Response plans specific to species groups (i.e., ungulates and predatory mammals) are required to ensure that all personnel at the Meliadine Division are provided guidance on how to respond in a manner that is safe to both humans and wildlife should they encounter wildlife on or around the project site.

3.2 Species Groups Addressed

Ungulates (caribou and muskoxen) and predatory mammals (grizzly bear, wolverine, wolf and Arctic fox) have the highest potential for interactions with humans during the life of the mine, and thus require specific response plans. If other wildlife are encountered, adaptive management strategies will be implemented if mitigation techniques and the mine policies and regulations mentioned in this document are not effective for these species. The proposed wildlife monitoring program will be the best measure of identifying potential areas in need of new mitigation strategies, or changes in policies or regulations.

For each of the species groups described below, the seasonal activity in the project area is discussed, as well as the protocol in the event of an encounter.

3.2.1 Ungulates

3.2.1.1 Seasonal Activity in the Project Area

Results from baseline surveys indicate that caribou and muskoxen are present in the Meliadine area in all four seasons, but are observed in greatest abundance in the fall (e.g., October) when 1,000's of animals may be present in the vicinity of the mine and access road, and in lowest abundance in the summer (see the 'Terrestrial Ecosystem Baseline Report' for more details). Calving or post-calving

aggregations or movements of caribou have not been observed within the mine study areas since baseline studies were initiated in 1999.

3.2.1.2 Response to Encounters

It is extremely rare for humans to have physical altercations with caribou. Caribou do rut in the fall when they are at relatively high numbers on the project site and the levels of aggression displayed, particularly by males, increases substantially. There is some anecdotal information suggesting that a bull caribou may attack a person or vehicle during the rut. Although considered rare, muskoxen will charge humans if they are threatened (especially lone bulls), or defending territory or their young. Therefore, a close encounter with caribou (during the fall) or muskoxen could be dangerous.

If you encounter a single or herds of caribou or muskoxen, the following actions should be taken:

- Back away slowly;
- Ensure animal(s) have an escape route;
- Do not make sudden movements;
- Do not make loud noises or attempt to scare the animal(s);
- Use radio/satellite phone to report presence of the animal(s) to the Environmental Department;
- Stay in radio/phone contact until the animal(s) moves away or you have returned to a safe area (e.g. inside vehicle or building); and
- Wait for the animal(s) to pass before continuing work in the area

3.2.2 Predatory Mammals

3.2.2.1 Seasonal Activity in the Project Area

Grizzly Bear

The Meliadine Project area is not part of the grizzly bear's range in the Arctic, however, the occasional bear may encounter the Project. In addition, increasing hunting and food caches along the Meliadine access road in all seasons may also attract grizzly bears to the area.

Polar Bear

The Meliadine Project area is not regularly visited by polar bears, however, on occasion polar bears may encounter, or approach, the Project area. In addition, increasing hunting and food caches along the Meliadine access road in all seasons may also attract polar bears to the area.

Wolverine

Wolverines may occasionally occur in the project area on a year-round basis. Records of wolverine sightings or their sign were infrequent in the Meliadine area during baseline studies beginning in 1999. Similar to grizzly bears, the limited evidence for wolverine in the area is not surprising given their wide-ranging movements and characteristically low population.

Wolf

Although they do occur year round in the project area, wolves were observed infrequently throughout the project area during all survey sessions, but were most common in the fall, perhaps in response to the increased caribou abundance at that time of the year. Wolves have been one of the most frequent problem wildlife species encountered since the Meliadine mine became operational in 2009. The majority of problem wolves were single and emaciated.

Arctic Fox

Camp personnel have regularly observed Arctic foxes close to camp and in and around camp buildings during most months of operation, including winter. Arctic foxes are the most common predatory mammal species to be encountered at the Meliadine mine.

3.2.2.2 Response to Encounters

Predatory mammals (such as wolves, wolverine, arctic fox and bears) rarely attack people; however, they are extremely strong and vicious, and should be given respect. Members of the dog family (such as wolves and foxes) are more at risk of carrying rabies, and other zoonotic diseases, and therefore should be avoided. Arctic fox in particular is easily tamed, quickly losing their fear of humans and often approaching very close. Sick or injured animals may no longer be able to feed themselves, and could be in a state of starvation. Often they show few physical signs that something may be wrong, but typically act more aggressively or even 'friendly' towards humans. Therefore, a close encounter with a predatory mammal could be dangerous.

If you encounter a predatory mammal, the following actions should be taken:

- Back away slowly and do not turn your back on the animal;
- Do not make sudden movements;
- Do not make loud noises or attempt to scare the animal if it is simply traveling through the area;
- Use radio/satellite phone to report the presence of the animal to the Environmental department;
- Stay in radio/phone contact until the animal moves away or you have returned to a safe area. (e.g. inside vehicle or building); and
- Wait for the animal to pass before continuing work in the area.

If the predatory mammal does not back away, or shows interest in you:

- Continue to back away slowly and ensure a 10 m distance between yourself and the animal;
- Make sure the animal has a safe route of escape;
- Make noise to alert the animal of your presence or to scare it off;
- Avoid provoking it;
- Return to a safe area as soon as possible (e.g. inside a building or vehicle); and
- Keep the Environmental department informed of situation using the radio/phone.

If the predatory mammal still does not back away, call for deterrent action by the Environment Department

The Environment Department is to treat all predatory mammals that are threatening or aggressive as they would treat a grizzly bear, which is perceived to be most dangerous. All predatory mammals that are showing interest in a person or mine site facilities must be aggressively deterred to prevent habituation to the mine site. Detailed response recommendations are provided in Section 3.2.2.3 below. If an animal is not of an immediate safety concern, the Wildlife Response team should discuss options to deter or remove the animal with Government of Nunavut conservation personnel.

3.2.2.3 Environment Department Protocols for Managing Problem Predatory Mammals

As part of the detailed response plan, the Environment Department will follow the procedures included here when responding to predatory mammal sightings and encounters. It is assumed that the reporting person(s) has followed procedures for predatory mammal incidents, and has requested the Environment Department to be dispatched due to the failure of human presence to deter the predatory mammal. If an animal is not of an immediate safety concern, the Environment Department should discuss options to deter or remove the animal with Government of Nunavut conservation personnel. All wildlife problems are to be recorded in the wildlife database.

The Environment Department will:

- Collect all deterrent equipment and receive briefing from the Environmental Coordinator or delegate (s) on location and circumstances of the call.
- Once at the scene of the sighting or encounter, the members will fully load a 12-gauge shotgun's magazine with rubber bullets, buckshot and/or 1-ounce lead slugs, depending on the predatory mammal species. Deterrents will be loaded directly into the shotgun's chamber one at a time as needed.
- The appropriate non-lethal deterrent will be chosen and used in an effort to scare the predatory mammal away.

- If the deterrent is successful, the incident will be recorded in the Wildlife database and should detail the type and level of deterrent used, information on the predatory mammal involved, and all information on the circumstances leading up to the incident.

If the deterrent is not effective and the predatory mammal continues to approach or doesn't move away from the area of human activity or project footprint.

- Increase deterrent efforts to non-lethal projectile (rubber bullet) if not already being employed.
- Ensure the animal has an open escape route.
- Continue aggressive use of non-lethal projectile deterrents to try and chase the animal away.

All but the most aggressive animals should have been deterred at this point. The situation is now extremely dangerous and the Environment Department must be ready to use lethal force. Immediately contact the GN, provide an update to the conservation officer and determine the next steps.

The risk to human life or property is imminent since the predatory mammal has not responded to non-lethal deterrent options and the safety of the team or mine property is now compromised.

- Shoot with the intention of stopping the threat, using the buckshot or 1-ounce lead slugs, as appropriate, to kill the animal.
- Shots should be aimed at the chest area, not the head or hind quarters
- If lethal force has been used, the Environment Department must complete a full report detailing the event immediately.
- If deemed necessary by the GN representative (s), the carcass is to be sent to the GN conservation office.

SECTION 4 – WILDLIFE AWARENESS INFORMATION AND ENCOUNTER STRATEGIES

This section deals with general predatory mammal (ie. Wolves, wolverines and grizzly bears) awareness information and encounter strategies. It does not replace the need for all personnel to take a recognized wildlife awareness course.

4.1 Factors that Influence a Predatory Mammal's Reaction

Wolverines, wolves and grizzly bears will react differently to chance encounters with humans, depending upon many factors, including each bear's past experience with humans. Their reaction is difficult to predict because of the variability of factors with each encounter.

- Female mammals may aggressively defend her cubs (i.e. Female bears with cubs are more likely to attack than to flee).
- Wolverines or bears may be defending a food cache (i.e. the bear's main objective is to eat from the time it leaves its den to the time it returns to a winter den. Hunting bears will cache food after eating part of it by covering the food with dirt, branches or leaves. They will often establish a daybed nearby and return later for another meal. Bears will aggressively defend their food cache. Bears may defend hunter caches).
- Individual Space: All predatory mammals have a minimum distance surrounding them within which any intrusion is considered a threat. A cornered or surprised predatory mammal may be dangerous. If there is no cover to retreat to, their usual response to danger is to attack or to stand its ground.
- Old, wounded or predatory mammals with teeth malformations can be dangerous because they are very hungry or starving (e.g., wolves).
- Wolverines, wolves, artic fox and bears are easily attracted to human food sources and may become aggressive to obtain it. Predatory mammals that have regularly obtained food from humans have become "human food habituated." These mammals are accustomed to humans and link people as sources for obtaining food.

4.2 Predatory Mammal Encounters

Most of predatory mammal safety is prevention – avoiding an encounter is the best way to stay safe while working in the home ranges of wolverines, wolves and grizzly bears.

4.3. How to React to Predatory Mammal Encounters

Your reaction should depend on circumstances and the behaviour of the mammal.

1. Stop and assess the situation before you act.
2. Does the wolverine, wolf or bear know you are there?
3. How is the mammal reacting to the nearby activity?
4. Remain calm.
5. Do not turn your back on the mammal.

DO NOT RUN – You will trigger the mammal's natural response to chase you. Wolverines, wolves and bears are extremely fast and you cannot outrun them.

4.3.1 Defensive Predatory Mammal Encounters

Wolverine, wolf, or bear is not aware of you:

- Leave the area quietly in the same direction that you came from.
- Move while the predatory mammal is not aware of you and stop moving when the mammal lifts its head to check its surroundings.
- Stay downwind so the wolverine, wolf or bear will not pick up your scent.
- When you have moved a safe distance away and preferably to your truck or shop where you can watch and wait until the predatory mammal leaves.

If the wolverine, wolf or bear is unaware of you and approaching:

- Allow the mammal the right of way. Make sure there is a safe escape route and that you are not in the way.

If you cannot leave undetected:

- Let the predatory mammal know that you are present by smell first; therefore, move upwind so they can pick up your scent.
- If it is possible, try to keep the predatory mammal in your sight.
- Watch to see if the predatory mammal leaves when it smells that a person is nearby.

If the wolverine, wolf or bear is aware of you but in the distance:

- Continue walking slowly in the same general direction, but head away from the predatory mammal.
- **DO NOT RUN.**
- If the mammal begins to follow you, drop your jacket, or pack or some other article (not food) to distract the wolverine, wolf or bear. This may distract the bear long enough for you to escape.

The wolverine, wolf or bear is aware of you and close:

- A predatory mammal will feel threatened in a close confrontation. Generally their natural tendency will be to reduce or to remove the threat. Assist the wolverine, wolf or bear by acting as non-threatening as possible.
- Do not make direct eye contact.

- Do not make any sudden moves.
- Do not run.
- In the case of a bear, they need to identify you as a person, so talk in low tones and slowly wave your arms over your head.
- Attempt to give the wolverine, wolf or bear an opportunity to leave. Be sure they have an open escape route.
- Try to back away slowly.

The wolverine, wolf or bear is close and threatening:

- If you have a deterrent such as a bear banger or bear spray be prepared to use it depending on how close the predatory mammal is.
- If you do not have a deterrent, or if using the deterrent is not successful, act as non-threatening as possible.
- Talk to the predatory mammal in a calm authoritative tone of voice.
- Do not startle or provoke the predatory mammal by making sudden moves.
- Back slowly away from the wolverine, wolf or bear and drop a pack, jacket, or some other article in order to distract the mammal momentarily.
- Remember that the wolverine, wolf or bear may be defending their cubs that you have not yet seen or they may have a food cache nearby. Attempt to look as non-threatening as possible.

The wolverine, wolf or bear is very close and approaching:

A distance of less than 50 meters in an open area is considered very close.

- If the predatory mammal continues to approach use your deterrent when in range.
- If the predatory mammal does not respond to the deterrent you must now **STAND YOUR GROUND**!

The wolverine, wolf or bear charges:

In the case that you have done something that has provoked the wolverine, wolf or bear into showing signs of aggression towards you. It is often not clear to the person what they have done to provoke the mammal until after the attack. It is important that you act passively, humble your posture and do not look directly at the wolverine, wolf or bear. Always keep the mammal in sight.

- Never yell or throw things as these are obvious signs of aggression

When faced with a charging wolverine, wolf or bear :

1. First use your deterrent, either a banger or pepper spray. If authorized (only Environment Department representatives or local security personnel) to carry a firearm, shoot the predatory.

2. **DO NOT PLAY DEAD IF THE PREDATORY MAMMAL CONSIDERS YOU FOOD**.

3. You must defend yourself with whatever means are available, act aggressively towards the bear.

4. Stand up on something high and try to make yourself look bigger. Try to appear dominant. Try to frighten it. Yell, scream, shout and wave your arms. Jump up and down and fight back.

5. Hold your jacket or backpack over your head to make yourself look bigger

6. If being aggressively attacked in a predatory attack, fight back. Concentrate your efforts on the face, eyes and nose of the bear. Use whatever means you have, rocks, sticks, tools, hardhat, or simply kick and punch with all the strength you can muster.

4.4 Wildlife Deterrents

4.4.1 Noise

- Pencil Flare Guns are highly portable but many people have received injuries from this type of deterrent as the pen explodes while they are holding it. This deterrent is still sold and is not recommended. Canadian Conservation Officers no longer using pencil flares.
- Pyrotechnics, including bangers, screamers, whistlers and flares. Requires a magazine launcher. These launchers look like a small handgun. There are different types available, some carry only a single shot, and some will carry multiple cartridges. The bangers, screamers and whistlers are charges that will explode and emit a variety of different noises. The name of the device indicates the noise it will make.

4.4.2 Wildlife Deterrents

Bear Sprays are highly effective but they must be used correctly to be effective. As with all deterrents they have their good points and their bad points.

- The main ingredient in bear spray is “Capsicum” an extract from hot peppers.
- Capsicum needs to strike the eyes, nose or mouth of the mammal, (open membranes) to be effective.
- These sprays can only be used at very close range, 3 to 8m or 10 to 25 ft.
- You cannot discharge the bear spray too early – or it will be completely ineffective.

- If the predatory mammal comes within the range of the bear spray – aim directly into their face and spray.
- You must be aware of the wind direction. If you the wind is blowing towards you, the spray will be carried by the wind into your face.
- Bear spray may not be effective in sub-zero weather. (Spray cans do not fire well in very cold temperatures.) In colder weather you need to keep the can of bear spray warm in order for it to fire effectively.
- Bear spray will not be effective in the rain. When you fire a can of bear spray, the spray will create a billowing cloud of capsicum and propellant. Rain can/will wash the spray right out of the air before it strikes the bear in the face.
- If you have used your can of bear spray to deter a mammal, wash the nozzle off with soap and water to remove the scent. Replace your can of spray as soon as possible. You do not want to have another bear encounter with a half a can of spray left.
- Bear sprays have a shelf life. Always replace your bear spray when you are nearing the end of the shelf life. The Capsicum does not deteriorate over time; it is the canister seals that deteriorate over time.
- Do not test your can of spray before going out into the field. You need to take a full can of spray into the field, not a partially used one.

Wildlife deterrents are only to be used for the purpose they are intended for. Misuse of wildlife deterrents such as chemical sprays, bangers, and pyrotechnics is considered a criminal offence.

SECTION 5 – TRAINING PROTOCOL

5.1 Scope

The Wildlife Training Protocol outlines recommended levels of training that specific groups of people at the Meliadine division site should receive. It is important that human activity at the site does not result in wildlife encounters that put people or wildlife at risk. All personnel on site have a role to play in ensuring human safety, conservation of wildlife, and documenting wildlife activities in the project area.

5.2 Assumptions and Key Considerations

Meliadine must assign overall accountability, recording and reporting responsibility to the Environmental Coordinator or designate(s) if the various wildlife response plans and training initiatives are to be effective.

The Environmental Coordinator or designates (s) will be responsible for ensuring that all employees, contractors and visitors at the Meliadine Division receive wildlife training appropriate to their roles and responsibilities.

The Environment Department will be responsible for all deterrent action whenever it is necessary to deter wildlife from mine infrastructure or personnel. All members of the Environment Department will receive specialized training in various levels of deterrent use. Security personnel and the Environment Department will be the only onsite personnel to have access to a firearm.

5.3 Training

Mandatory wildlife awareness orientation for all staff will include the following:

5.3.1 Wildlife-Human Conflict

- General restrictions for wildlife protection
- Wildlife Attractants
- Garbage Management
- Wildlife Health
- Wildlife and Vehicles
- Preventing Problem Wildlife
- Dealing with Problem Wildlife
- Reporting Wildlife Observations and Incidents

5.3.2 Wildlife Awareness Training

This orientation will be aimed at providing awareness of potential wildlife encounters that may occur at the Meliadine Mine. The course should review:

- Wildlife that commonly occur near the mine site
- Behaviour of wildlife that may be encountered near the mine site
- Wildlife encounters
- Wildlife Deterrents

5.3.3 Environment Department

In addition to the required mine site orientation, the Environment Department may require additional training. The following training is recommended, especially for those without experience in situations where wildlife occurrences are common.

Bear Safety Training

Provided by qualified contractor or Territorial, Provincial or Federal Wildlife Officer, this course will provide:

- Instruction on the use of lethal and non-lethal deterrents for emergency response to bear incidents;
- Techniques for euthanizing bears during an emergency response;
- Other types of deterrent options available in non-emergency situations;
- In depth aversive conditioning techniques;
- Live trapping techniques and protocols;
- Necropsy techniques, and biological sampling; and
- Practicum.

Carnivore Safety Training

Provided by qualified contractor or Territorial, Provincial or Federal Wildlife Officer to include:

- Biology, ecology and behaviour of wolverine, wolf, Arctic fox;
- Rabies and other zoonotic diseases;
- Detailed deterrent and aversive conditioning techniques;
- Live trapping techniques;
- Instruction on the use of lethal and non-lethal deterrents for emergency response to incidents involving large carnivores;
- Necropsy techniques and biological sampling; and
- Practicum.

APPENDIX IV

Caribou Migration Procedure – Meliadine Project

		PROCEDURE NUMBER:	**MEL-ENV-0005**
Date in effect:	**2012-07-23**	**Prepared by**	Environmental Department
		Page	1of 3
Revision Date	**2013-06-10**	**Revision**	**June 2013**
This procedure corresponds to the minimum standard requirements. All employees/contractors of Agnico-Eagle: Meliadine Division must comply with the rules and regulations established by the Government of Nunavut regarding occupational health and safety.			

In the spring, from June, Far-field caribou/muskoxen herd monitoring will start. The goal of this procedure is to monitor caribous prior to their arrival in the activity vicinity of the Meliadine Project and take the proper actions.

Between June to mid-August the helicopter pilots will verify for caribou herd sighting during their usual flights (as drill crew change or travels to Rankin Inlet).

At all-time, when helicopter are flying over a group of fifty caribous and more (≥50) or ten muskoxen and more (≥10) , they need to be a minimal 1,000 m vertical and 1,500 m horizontal distance from the group/herd.

When it becomes clear the caribous are heading in the camp vicinity the site manager, the geology project manager(s) and the Meliadine environmental department need to be ready to put those rules in action:

- If a group of caribou (≥50) or muskoxen (≥10) is at or within 5 km from a drill :
  - The drill fall in ''BLIZZARD MODE''
    - Rods are turning without drilling, water stay in recirculation, drillers keep quiet in their drill and report wildlife activities every hour to geologist project manager
  - The helicopter slinging activities goes on hold
    - If the herd is around the camp and drill all helicopter will be grounded

- If a group of caribou (≥50) or muskoxen (≥10) is at 100 m from a road :
  - Traffic is suspended
  - Wildlife has the right of the way and vehicles must wait without disturbing their movements.

The decision to stop the activities will always be taken by the Site Manager in concert with Geology Project Manager and the Meliadine Environmental Department and then be communicated with respective supervisors.

The decision to restart the activities will always be taken by the Site Manager in concert with Geology Project Manager and the Meliadine Environmental Department and then be communicated with respective supervisors.

The Site Manager, The Project Manager Geologist and the Environmental Department will meet in the geo-office to take the proper decision regarding the wildlife decision. All members shall be present before any decision is taken.

The environmental department will ensure phone communication with the GN Wildlife Officer in Rankin Inlet and e-mail communication of activities with KIA / HTO / GN wildlife activities.

- GN Wildlife Rankin Inlet Officer Phone number : (867)-645-8084
- HTO e-mail address : rankinhto@qiniq.com
- GN Wildlife Rankin Inlet Officer e-mail address : JCoutu-autut@GOV.NU.CA
- KIA e-mail address : SHartman@kivalliqinuit.ca

_____ _____

Environmental Representative Mine Manager

_____

Date

I, undersigned, have read and understood this procedure and will comply with its contents at all times.

Date	Company	Name	Signature
Date	Company	Name	Signature
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