CUMBERLAND
RESOURCES LTD.

MEADOWBANK GOLD PROJECT

TERRESTRIAL ECOSYSTEM IMPACT ASSESSMENT

JANUARY 2005

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DESCRIPTION OF SUPPORTING DOCUMENTATION

Cumberland Resources Ltd. (Cumberland) is proposing to develop a mine on the Meadowbank property. The property is located in the Kivalliq region approximately 70 km north of the Hamlet of Baker Lake on Inuit-owned surface lands. Cumberland has been actively exploring the Meadowbank area since 1995. Engineering, environmental baseline studies, and community consultations have paralleled these exploration programs and have been integrated to form the basis of current project design.

The Meadowbank project is subject to the environmental review and related licensing and permitting processes established by Part 5 of the Nunavut Land Claims Agreement. To complete an environmental impact assessment (EIA) for the Meadowbank Gold project, Cumberland followed the steps listed below:

1. Determined the VECs (air quality, noise, water quality, surface water quantity and distribution, permafrost, fish populations, fish habitat, ungulates, predatory mammals, small mammals, raptors, waterbirds, and other breeding birds) and VSECs (employment, training and business opportunities; traditional ways of life; individual and community wellness; infrastructure and social services; and sites of heritage significance) based on discussions with stakeholders, public meetings, traditional knowledge, and the experience of other mines in the north.

2. Conducted baseline studies for each VEC and compared / contrasted the results with the information gained through traditional knowledge studies (see Column 1 on the following page for a list of baseline reports).

3. Used the baseline and traditional knowledge studies to determine the key potential project interactions and impacts for each VEC (see Column 2 for a list of EIA reports).

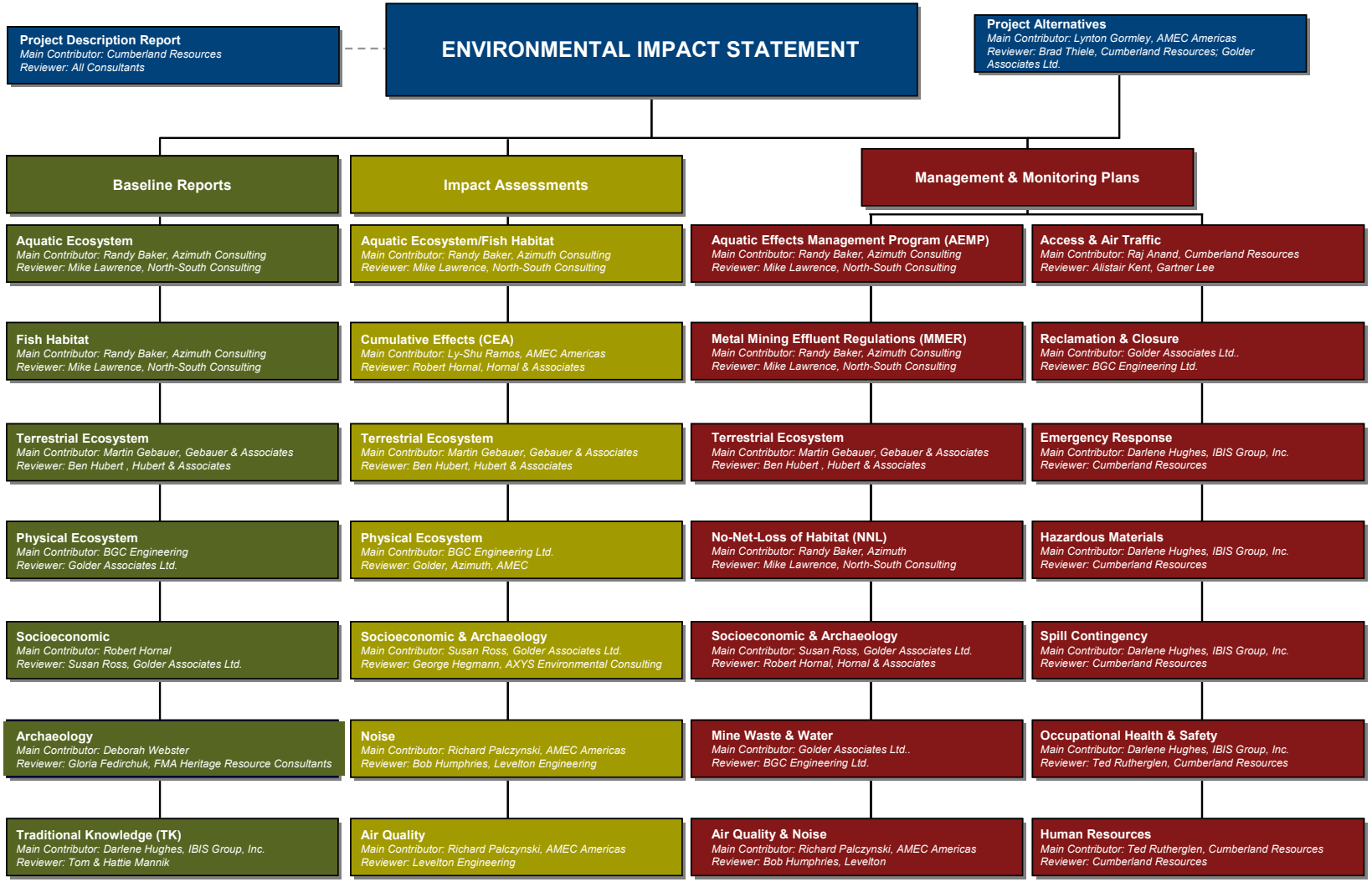
4. Developed preliminary mitigation strategies for key potential interactions and proposed contingency plans to mitigate unforeseen impacts by applying the precautionary principle (see Column 3 for a list of management plans).

5. Developed long-term monitoring programs to identify residual effects and areas in which mitigation measures are non-compliant and require further refinement. These mitigation and monitoring procedures will be integrated into all stages of project development and will assist in identifying how natural changes in the environment can be distinguished from project-related impacts (monitoring plans are also included in Column 3).

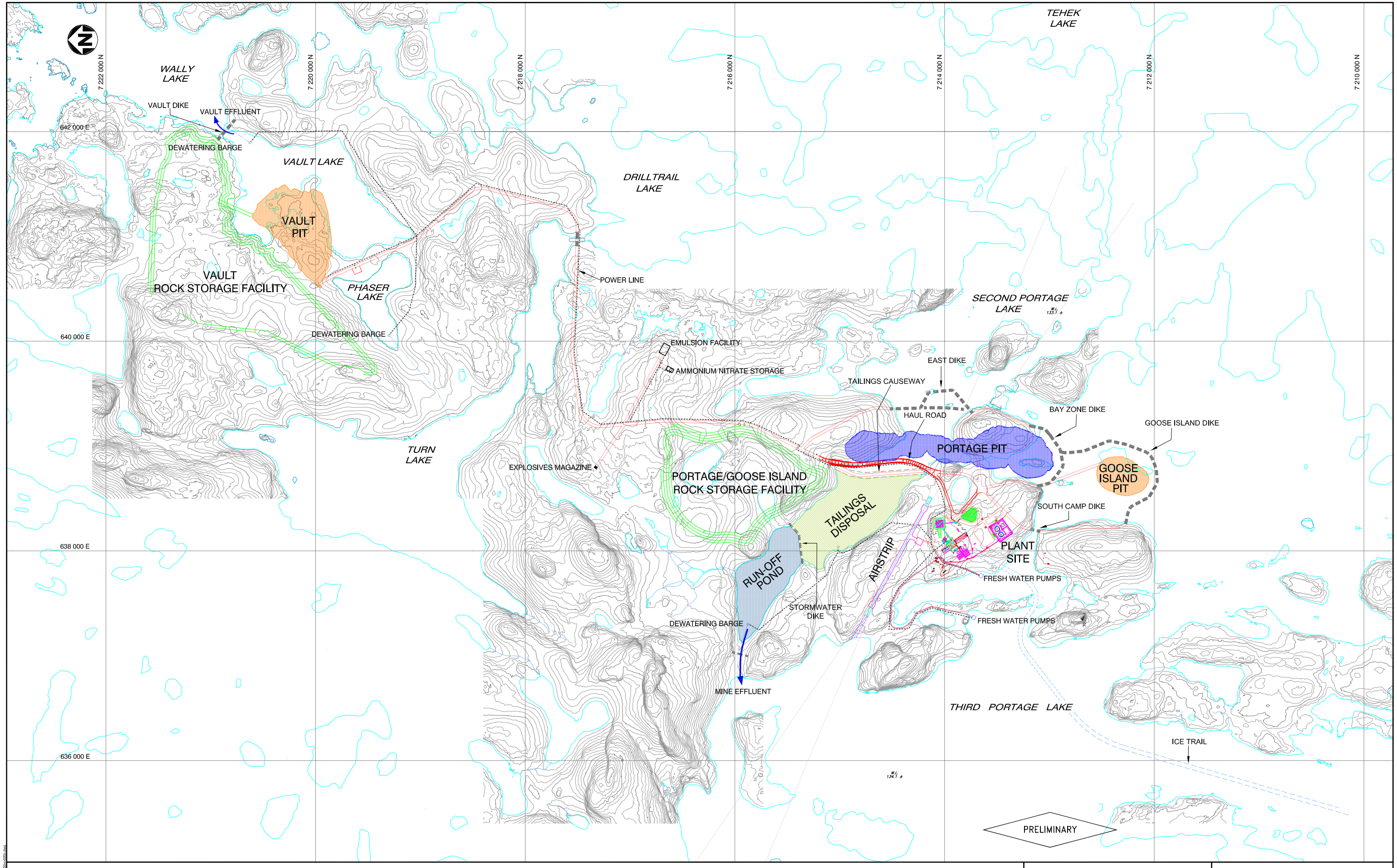
6. Produce and submit an EIS report to NIRB.

As shown on the following page, this report is part of the documentation series that has been produced during this six-stage EIA process**.**

EIA DOCUMENTATION ORGANIZATION CHART



PROJECT LOCATION MAP



Proposed Mine Site Layout

CUMBERLAND RESOURCES LTD.
Meadowbank Gold Project

SECTION 1 • INTRODUCTION

This report provides a comprehensive environmental impact assessment (EIA) of the terrestrial environment for the Cumberland Resources Ltd. (Cumberland) Meadowbank Gold project. The project is located approximately 70 km north of Baker Lake, 300 km inland from the northwest coast of Hudson Bay. The Meadowbank area is above the treeline near the Arctic Circle in an area of permanently frozen ground (permafrost) that extends to a depth of 400 to 500 m. The local physiography is characterized by numerous lakes and low, rolling hills covered mainly by heath tundra.

This terrestrial ecosystem EIA identifies potential residual effects to vegetation and wildlife and is based on a system of matrices that tabulate project components cross-referenced with potential effects, assessment of unmitigated effects, proposed mitigation, assessment of residual effects, and monitoring and management. Separate matrices have been prepared for each of seven terrestrial valued ecosystem components (VECs) (i.e., vegetation, ungulates, predatory mammals, small mammals, raptors, waterfowl, and other breeding birds) for each of the primary project phases (i.e., construction, operations, closure, and post-closure). Detailed matrices were not developed for the exploration, temporary closure, and long-term shutdown phases, but potential impacts during these phases are discussed in this report.

The general approach of this EIA can be categorized in six steps:

1. describe the key valued ecosystem components (VECs)
2. describe spatial and temporal boundaries
3. summarize existing conditions
4. describe key potential project interactions for each VEC
5. identify mitigation strategies for key potential interactions
6. summarize residual impacts of the project.

SECTION 2 • IMPACT ASSESSMENT METHODOLOGY

2.1 GENERAL SCOPE & APPROACH OF ASSESSMENT

The general approach of this report is to:

Describe terrestrial valued ecosystem components (VECs) – VECs were determined based on discussions with stakeholders, public meetings, traditional knowledge, and the experience of other mines in the north. The seven VECs identified through this process include: vegetation, ungulates, predatory mammals, small mammals, raptors, waterfowl, and other breeding birds (see Section 2.3).

Describe spatial and temporal boundaries – For the purposes of the baseline studies, three spatial boundaries were defined: (a) the local study area (LSA); (b) the regional study area (RSA), and (c) a 5 km wide survey corridor centred on the proposed winter road between Baker Lake and the mine development site. For the purposes of assessing the significance of project effects, spatial boundaries were established on a VEC-specific basis (see Section 2.4).

Summarize existing conditions – Baseline information has been gathered on the occurrence and distribution of all seven terrestrial VECs since 1999. This information is summarized in this report, but is presented in detail in the Baseline Terrestrial Ecosystem Report.

Describe key potential project interactions for each VEC – Potential impacts, proposed mitigation and monitoring measures, and identified residual effects to vegetation and wildlife for the construction, operations, and closure / post-closure stages of the mine life are described in detail in this report. The discussion is based on a system of matrices that tabulate project components cross-referenced with potential effects, assessment of unmitigated effects, proposed mitigation, assessment of residual effects, and monitoring and management. Separate matrices have been prepared for each of the seven VECs for each of the three primary project phases (i.e., construction, operations, and closure and post-closure). Detailed matrices were not developed for the exploration, temporary closure, and long-term shutdown phases, but potential impacts during these phases are discussed.

Identify mitigation strategies for key potential interactions – A preliminary mitigation and monitoring plan has been prepared (Wildlife Management Plan, 2005). A summary of these mitigation strategies is provided in this report.

Summarize residual impacts of the project – A summary of the significant residual effects (i.e., after mitigation) for each VEC is provided. It is these residual effects that will provide the basis for the cumulative effects assessment and the determination of the significance of effects (i.e., desirable, acceptable, unacceptable) by regulators (see NIRB EIA Terms of Reference).

2.2 SUMMARY OF KEY CONCEPTS

The following key concepts were applied during the impact assessment:

Focus on Valued Ecosystem Components – The concept of VECs means that a disproportionate amount of effort is expended towards understanding and describing the impacts on identified VECs (see Section 2.3). When mitigation is applied to reduce impacts to VECs, species deemed to be of lesser importance will also benefit.

Use Linkage Matrices to Identify Impacts – Development of impact matrices was a critical step in identifying how a particular mine activity might cause a tangible effect that, even after mitigation has been applied, could affect VECs and their habitats in a significant and unacceptable way. The impact matrices establish the relationship between all project-related activities, physical effects, mitigation, and residual ecological effects. Detailed summaries of the potential effects, mitigation and residual effects, and significance of all mine-related activities during construction, operation, and closure and post-closure are provided in a series of matrices appended to this document.

Focus Attention on Critical Issues – One of the purposes of developing detailed impact matrices was to identify the most critical issues that could adversely affect VECs during the various project phases. Detailed discussions have been developed around these issues, whereas less attention has been given to generic issues or effects that are not considered to be significant (i.e., acceptable) and/or are easily mitigated.

Focus on Residual Impacts – Ultimately, the effects remaining after all mitigation effort has been applied (i.e., residual effects) are of greatest concern. Therefore, considerable attention has been given to identifying, quantifying, and describing these residual effects so that determination of potential significant/unacceptable and/or cumulative effects is facilitated.

Linkage to Environmental Management Systems – As part of this EIA submission, a Terrestrial Management Plan (Cumberland, 2005) provides supporting documentation and a discussion of mitigation and monitoring strategies to address residual impacts.

2.3 SELECTION OF VALUED ECOSYSTEM COMPONENTS

2.3.1 Public & Stakeholder Consultation

Extensive consultations were held with government regulators, Baker Lake residents, and other stakeholders regarding the components of the ecosystem that were of greatest value or concern. Information from these consultations has been described and summarized in the Traditional Knowledge report included with this EIA submission.

2.3.2 Identification of Issues

During stakeholder consultations, a number of issues related to terrestrial organisms were raised. As expected, issues surrounding the health and well-being of caribou populations were of great concern to most stakeholders. Other VECs such as vegetation, small mammals, raptors, and other breeding birds were of concern primarily to regulatory agencies.

Issues raised in published scientific and grey literature and particularly in recent EIAs for other mines in the Arctic (e.g., Diavik, Ekati, Jericho, Snap Lake, and Hope Bay) were also considered, and used to put the VECs and potential project impacts into a broader perspective.

2.3.3 Baseline Studies & Research

Baseline studies were conducted to determine the presence/absence, distribution, and abundance of the VECs identified during the consultation and literature review phases. Baseline information was used to better understand how widespread project effects might be on any VEC.

2.3.4 Selection of Valued Ecosystem Components/Key Species

Key VECs were selected through consultation with regulatory and governmental authorities, discussions with members of the local community, and a review of VECs identified on other northern mine projects. Selection was further refined through the application of one or more of the following criteria: conservation status, relative abundance within the Meadowbank study areas, importance in Inuit subsistence lifestyle and economy, importance in predator-prey systems, habitat requirement size and sensitivity, and contribution to local area concerns. Based on this selection process, the key VECs were determined to be: vegetation, ungulates, predatory mammals, small mammals, raptors, waterfowl, and other breeding birds. Key wildlife species that are associated with each of these VECs are provided in Table 2.1 below.

Table 2.1: Valued Ecosystem Components & Key Wildlife Species in the Meadowbank Study Area

VEC	Common Name	Scientific Name
Vegetation	N/A	N/A
Ungulates	Barren-ground caribou Muskox	*Rangifer tarandus* ssp. Groenlandicus *Ovibos moschatus*
Predatory Mammals	Grizzly bear Wolverine Wolf	*Ursus arctos* *Gulo gulo* *Canis lupus*
Small Mammals	Arctic hare Arctic ground squirrel Collared lemming Northern red-backed vole	*Lepus arcticus* *Spermophilus parryi* *Dicrostonyx groenlandicus* *Clethrionomys rutilis*
Raptors	Peregrine falcon Gyrfalcon Rough-legged hawk Snowy owl	*Falco peregrinus* ssp. Tundrius *Falco rusticolus* *Buteo lagopus* *Nyctea scandiaca*
Waterfowl	Canada goose Long-tailed duck Loons	*Branta canadensis* *Clangula hyemalis* *Gavia* spp.
Other Breeding Birds	Ptarmigan Passerines Shorebirds	*Lagopus* spp. Various Various

2.4 BOUNDARIES

2.4.1 Spatial

For the purposes of baseline studies, the regional study area (RSA) was defined as a 100 x 100 km area (10,000 km^2) centered on the main mine site. The local study area (LSA) was defined as a 5 km

radius buffer around the main mine facilities and a 2 km radius buffer around the Vault Lake facilities. The LSA and the RSA were initially established as study areas within which wildlife and vegetation surveys were conducted; however, to assess the significance of project effects on VECs, spatial boundaries were established on a VEC-specific basis. At the VEC level, spatial boundaries vary depending on variables such as home range size, distribution, and densities. For example, the collared lemming has a much smaller home range than the barren-ground caribou. Other species, such as geese, are primarily migratory and may travel thousand of kilometres from the project area, while other animals, such as the wolverine and grizzly bear, have large home ranges that may extend well beyond the 100 x 100 km RSA (as defined for baseline survey and monitoring purposes). Accordingly, unique spatial boundaries have been established for each VEC (see Table 2.2).

The primary sources of impacts (e.g., direct impacts) are expected to occur within the LSA. These potential sources have been broken down into the following spatial components: main facilities, vault facilities, winter road, and Baker Lake facilities.

Table 2.2: Spatial Boundaries for VECs – Boundaries are Radius-Centred on Project Facilities

VEC	LSA	RSA	Justification
Vegetation	100 m	2 km	Vegetation is sedentary and vulnerable primarily to activities in close proximity.
Ungulates	5 km	Mainland Nunavut	Caribou individuals from several herds, including Ahiak, Boothia Peninsula, Beverly, Qamanirjuaq, Lorillard, and Wager Bay are known to occur in winter.
			Muskox are wide-ranging and have been thought to be moving northeast out of the Thelon River valley.
Predatory Mammals	5 km	100 km	Grizzly bear, wolverine, and wolf are wide-ranging species with large annual home ranges[1].
			Predatory mammals occur at very low densities within the study area.
Small Mammals	500 m	5 km	Small mammals are quite resilient (i.e., easily habituated) to human activity.
			Of small mammals, Arctic hare are the widest ranging (home range of 4 to 20 ha)[2].
Raptors	1 km	50 km	Birds nesting in close proximity to mine facilities may be disturbed during the nesting season.
			Nesting birds may forage considerable distances away from nesting areas.
			Some species (e.g., Rough-legged Hawk) are migratory and undergo long-distance movements.
Waterfowl	1 km	50 km	Birds nesting in close proximity to mine facilities may be disturbed during the nesting season.
			Species may be wide-ranging during the breeding season.
			All species are migratory, moving long-distances to wintering grounds.
Other Breeding Birds	500 m	5 km	Passerines are quite resilient (i.e., easily habituated) to human activity.
			During the breeding season, most species are restricted to home ranges <1 km^2.

Notes: 1. For males in Arctic habitats – grizzly bears: 6,000 km² to 7,000 km²; wolverines: 100 to 900 km²; and wolves: > 60,000 km². **2.** Macdonald, 1995.

2.4.2 Temporal

2.4.2.1 General Discussion

As specified in the Meadowbank project EIS Guidelines, the establishment of temporal boundaries will have two aspects. The first aspect is the time horizon that will be used in predicting change, which must be a function of the anticipated duration of the project, from construction to post-closure. Each stage of the project will have its own temporal boundaries. The greatest impacts on the terrestrial environment are most likely to occur during the construction phase of the project.

The second temporal aspect as specified in the EIS Guidelines refers to, "the temporal variability and periodicity that characterize the predicted impacts." This refers in part to global warming. The EIS Guidelines note, for example, that the western Arctic has experienced a warming trend in the past 50 years. This could affect the home ranges or migration patterns of various species, and is an element that must be separated from project-related impacts.

The EIA, as it applies to temporal boundaries, will also be applied to seasonal or life-cycle patterns of the VECs listed in Table 2.2. For example, the natural population cycles of voles and lemmings (Ehrlich et al, 2001) and their role as prey species for numerous predators (Reid et al, 1995) will be taken into account as a background variable in assessing predator movement, behaviour, abundance, and health apart from project-related causes. Many of the VECs follow seasonal migration patterns (e.g., caribou), while other territorial species may travel extensive distances as juveniles in the process of establishing their home ranges (e.g., wolverines; RWED, 1997). For small mammals such as the Arctic ground squirrel, northern red-backed vole, and collared lemming, individuals may spend an entire life cycle within the footprint of the mine site, while others, such as some raptors and waterfowl, are seasonal visitors and possibly breeders during the open-water season.

2.4.2.2 Construction

The construction phase of the project is the period from Year -2 to Year 0, a period when the majority of land clearing, lake dewatering, and facility development activities are undertaken. Construction of facilities during the operation phase (i.e., 0 to 10 years) is considered to be part of the operation phase.

2.4.2.3 Operations

The operation phase is from Year 0 to Year 10. The primary activities during this period include ongoing development of pits and continued expansion of waste rock and tailings piles. Construction of new facilities or structures during this phase (e.g., Goose Island dike) is considered to be part of the operation phase.

2.4.2.4 Closure / Post-Closure

The closure and post-closure phase is from Year 10 to the end of the mine monitoring period (~Year 25). Closure activities such as facility removal, deactivation of roads, revegetation and reclamation, as well as monitoring activities that extend well past the operational life of the mine, are part of this phase.

2.4.2.5 Temporary Closure

A temporary closure is a cessation of mining and processing operations for 3 to 12 months. The intention is that the mine will resume operations as soon as possible after the cause of the temporary shutdown has been removed. Possible causes for a temporary shutdown include a major mechanical equipment failure, late delivery of critical equipment or supplies, or labour conflict.

2.4.2.6 Long-Term Shutdown

An indefinite or long-term shutdown is a cessation of mining and processing operations for an indefinite period of time greater than 12 months. The intention is that the mine will resume operations as soon as possible after the cause of the indefinite shutdown has been rectified. The site will maintain safety and environmental stability during this time. Possible causes for an indefinite shutdown include prolonged adverse economic conditions or extended labour disputes.

2.4.2.7 Exploration

The exploration phase occurs both prior to and during the life of the mine. Because of this less distinct time frame, discussions regarding potential effects are considered separately from more distinct project phases.

2.5 DESCRIBING & CLASSIFYING IMPACTS

2.5.1 Approach

The *Canadian Environmental Assessment Act* (CEAA) defines environmental effects as, “any change that the project may cause in the environment, including any effect of any such change on health and socio-economic conditions, on physical and cultural heritage, on the current use of lands and resources…” The magnitude of this effect is related to, “the capacity of renewable resources that are likely to be significantly affected by the project to meet the needs of the present and those of the future.” To define a significant effect we have incorporated the principles of the above statements stated in the Act and followed guidance in the NIRB Terms of Reference for this project. Simply stated, any project-related residual effect (i.e., effects remaining after appropriate mitigation has been applied) that causes adverse effects to an ecological resource to such a degree that the resource is measurably impaired within a local or regional context, or whose function is measurably impaired over the long term, is significant.

The assessment of significance of residual impacts is made after mitigation is applied. For example, construction and maintenance of a berm around the fuel tank farm will ensure that, in the unlikely event of a spill, the impact will not be significant because the berm has eliminated the risk that fuel will contaminate surrounding terrestrial vegetation. Thus, the impact of a spill on the terrestrial environment is considered, but is not assessed with the same rigor as a potential impact that is more likely to occur; however, Section 4.25 of the NIRB Terms of Reference for the Meadowbank project states that, “the proponent shall describe effects of the project in a way that permits comparisons with the project’s potential effects in the absence of mitigation, and shall express their significance in the same manner as for the said potential effects, using the same criteria.” To satisfy this requirement and to illustrate and quantify the effectiveness of mitigation in reducing the magnitude, extent,

duration, and frequency of impacts, the potential environmental impacts of all project components and their impact with and without mitigation have been compared. As described previously, this is accomplished by contrasting the significance of impacts with and without mitigation within a series of impact matrices during construction, operation, and closure and post-closure.

2.5.2 Assessment Criteria

Criteria for evaluating the significance of impacts have been developed for this project based on best practice, professional judgment, and experience on other impact assessments for similar projects. The intent of this process is to be transparent and to document decision pathways so that others can review the process that was used to determine the likelihood of predicted impacts, how mitigation has avoided or reduced an impact, and the significance of impacts, particularly residual impacts. This section presents the definition for each criterion used to determine significance.

To determine whether or not an impact may have a significant adverse effect on a VEC, we have assessed, in order of importance, the magnitude, spatial extent, duration, frequency, and timing of effects for each project-related activity. How each of these criteria influences significance is summarized in Table 2.3 and discussed below.

Table 2.3: Evaluation Criteria to Determine Project Effects

Criteria	Levels/Ranks of Criteria	Definition of Levels/Ranks of Criteria
Magnitude	High	Effect is >25% change from baseline conditions within the LSA, is easily detectable, and has a high certainty of occurring.
	Medium	Effect is 10-25% change from baseline conditions in LSA, is moderately difficult to detect, and has a moderate to high certainty of occurring.
	Low	Effect is <10% or less change from baseline conditions in LSA, is very difficult to detect, and has a low to moderate certainty of occurring.
Spatial Extent	Regional	Effects extend to the RSA as defined for each VEC.
	Local	Effects restricted to the LSA as defined for each VEC.
Frequency	Continuous	Effect occurs continuously.
	Frequent	Effect occurs very regularly (i.e., daily or weekly).
	Infrequent	Effects occurs infrequently (i.e., monthly to yearly).
	Rare	Effect occurs rarely (i.e., yearly or less frequently).
Duration	Permanent	Effect continues beyond the mine life during operation and post-closure.
	Long-term	Effect occurs over a time period similar to the life span of the VEC.
	Medium-term	Effect occurs over a time period 25% to 100% of the life span of the VEC.
	Short-term	Effect occurs over a time period <25% of the life span of the VEC.
Timing	All Year	The effect can occur at any month of the year.
	Winter	The effect occurs during the time that waterways are frozen (i.e., Oct to May).
	Summer	The effect occurs during the time waterways are free-flowing (i.e., Jun to Sep).

Magnitude – is a measure of the intensity or severity of the effect of a mine-related activity relative to a change from background conditions. Magnitude is somewhat subjective and takes into consideration such factors as ecological relevance, degree of change from baseline conditions, certainty of occurrence, and ecological resilience (defined as the rate of ecosystem recovery to a stable state, following disturbance or stress). The certainty with which the magnitude of an effect can be quantified has a strong influence on whether magnitude is ranked as high, medium, or low (see Table 2.3).

High magnitude impacts are obvious, easily detectable with a minimum of effort, as well as having a high certainty of occurring. If impacts on a VEC results in a change of 10% or more from baseline conditions in the LSA, the impact magnitude is high. **Medium** magnitude impacts may not immediately be apparent, and some degree of effort is required to demonstrate a departure from baseline conditions, over and above natural changes. If impacts on a VEC results in a change of 1% to 10% from baseline conditions in the LSA, the impact magnitude is medium. **Low** magnitude impacts can be very difficult to detect, require considerable effort to demonstrate a departure from baseline, and usually have a low probability of occurrence. Impacts to VEC abundance, diversity, or condition of less than 1% from baseline conditions are generally low magnitude changes.

The primary method used for evaluating the magnitude of impacts on VECs was to quantify the area of important habitats lost due to various project components. Habitat suitability ratings (i.e., high, moderate, low) were assigned to each ecological land classification (ELC) unit for each of the terrestrial VECs (see Table 2.4). For some VECs, habitat utilization differs significantly by season (e.g., in winter, grizzly bears den in esker-type habitats but during the growing season forage in areas with high forb production); therefore, the assessment included seasonal differences, where appropriate. These ratings were based on knowledge of habitat preferences (i.e., through scientific literature, professional experience) for each of the VECs. A summary of habitat preferences by season (i.e., habitat model) is provided in Table 2.5.

Spatial Extent – is a measure of the geographic boundary of effects and has been divided into local and regional areas (see VEC-specific boundaries in Table 2.2 in Section 2.4.1).

Duration – is the length of time in weeks, months, or years that an effect is expected to persist. The endpoint is recovery or return to baseline of the ecological component and is linked to reversibility and ecological resilience (i.e., the likelihood of the potential for recovery from an effect), providing an indication of when/if the impact will diminish. Duration is described for each project activity, such as dewatering of impoundments (short-term) or development of waste rock piles (long-term), and its relative influence on particular VECs. Some activities, such as dike installation during construction, may occur over limited time frames, but may cause impacts that persist for time periods equivalent to or greater than the life span of the VEC (see Table 2.3).

Frequency – is a measure of how frequently effects will be felt by the VEC using standard measures (e.g., weeks, months, years) (see Table 2.3).

Timing – indicates whether the impact overlaps with a sensitive period of a VEC, such as wintering period for caribou (see Table 2.3).

Table 2.4: Habitat (ELC Unit) Suitability Rating Table for VECs by Seasons

	Ungulates		Predatory Mammals		Small Mammals		Raptors	Waterfowl	Other Breeding Birds	% Area of LSA
ELC Unit	Growing	Winter	Growing	Winter	All Year	Growing	Winter	Growing	Growing	
Water (deep & shallow)	L	L	L	L	L	M	L	H	L	40
Sedge	H	M	H	M	M	M	L	H	H	6
Moss	M	M	M	M	M	M	L	M	M	<0.1
Birch Seep	H	M	M	M	M	M	L	M	H	7
Riparian Shrub, Birch	H	M	M	M	H	M	L	M	H	2
Heath Tundra	M	H	M	H	H	H	H	M	H	34
Snowbank	M	L	M	L	L	L	L	L	L	1
Avens	L	M	H	H	H	M	M	M	M	1
Lichen-Rock (bedrock & boulders)	M	H	M	M	H	H	H	L	M	10
Ridge Crest (esker)	M	H	H	H	H	M	M	M	M	<0.1
Disturbed	L	L	L	L	M	L	L	L	L	<0.1

Note: L = Low; M = Moderate; H = High.

Table 2.5: Simplified Habit Model: VEC Habitat Preferences by Season

VEC	Key Species	Spring	Summer	Fall	Winter
Ungulates	Caribou	Heath Tundra, Lichen-Rock, Sedge	Sedge, Riparian Shrub, Esker, Snowbank	Heath Tundra, Lichen-Rock, Sedge	Heath Tundra, Lichen-Rock, Sedge
	Muskox	Sedge, Riparian Shrub	Sedge, Riparian Shrub	Heath Tundra, Lichen-Rock	Sedge, Avens, Birch Seep
Predatory Mammals	Grizzly bear	Sedge, Riparian Shrub, Heath Tundra, Birch Seep	Sedge, Riparian Shrub, Heath Tundra, Birch Seep	Riparian Sedge, Heath Tundra, Birch Seep	Ridge Crest, Avens, Heath Tundra, Lichen-Rock – Boulder
	Wolf	Esker, associated more with caribou distribution than habitat type	Sedge, Riparian Shrub, Eskers, Snowbank	Lichen rock, Heath Tundra, Lichen-Rock; Sedge	Esker, Sedge; Lichen-Rock; Heath Tundra; Lichen-Rock; Sedge
	Wolverine	Lichen-Rock – Boulder, Riparian Shrub, Lichen-Rock – Bedrock, Heath Tundra, Sedge, associated more with caribou distribution than habitat type	Lichen-Rock – Boulder, Riparian Shrub, Sedge, Lichen-Rock – Bedrock	Lichen-Rock – Boulder, Riparian Shrub, Lichen-Rock – Bedrock, Heath Tundra, Sedge	Lichen-Rock – Boulder, Riparian Shrub, Lichen-Rock – Bedrock, Heath Tundra
Small Mammals	Arctic hare	Heath Tundra, Sedge, Lichen-Rock	Heath Tundra, Sedge, Lichen-Rock	Lichen-Rock, Heath Tundra	Heath Tundra, Esker tops, and other snow-free areas
	Arctic ground squirrel	Esker, Avens	Esker, Avens	Esker, Avens	Esker, Avens
	Collared lemming	Esker, Avens, Heath Tundra	Esker, Avens, Heath Tundra	Esker, Avens, Heath Tundra	Esker, Avens, Heath Tundra, Snowbank
	Northern red-backed vole	Microhabitats	Microhabitats	Microhabitats	Microhabitats
Raptors[1]	Snowy owl	Heath Tundra, Esker, Water	Heath Tundra, Esker, Water	Heath Tundra, Esker, Water	Heath Tundra, Esker
Waterfowl[2]	Canada goose	Heath Tundra, Lichen-Rock, Water	Heath Tundra, Lichen-Rock, Water	Heath Tundra, Lichen-Rock, Water	N/A
Other Breeding Birds[3]	Rock ptarmigan	Sedge, Heath Tundra, Lichen-Rock, Esker	Lichen-Rock - Boulder, Heath Tundra, Sedge, Riparian Shrub	Lichen-Rock, Heath Tundra, Sedge, Esker	Sedge, Heath Tundra, Lichen-Rock, Esker

Notes: 1. The snowy owl was selected as the key raptor species partly because the other three raptor species in the project area – rough-Legged hawk, gyrfalcon and peregrine falcons – all nest on cliffs, which are not identified by the ELC. In addition, snowy owls nest in knolls, ridges, or other prominent locations, and may be seen year-round in the LSA or RSA. **2.** The Canada goose was selected as the key waterfowl species based on their apparent abundance in the general region of the RSA, conservation status, and use in the subsistence harvest. **3.** The ptarmigan was selected as the key species to represent other breeding birds based on its apparent abundance in the LSA and RSA, conservation status as sensitive by the Canadian Endangered Species Conservation Council, and importance in the subsistence harvest.

2.5.3 Determination of Significance

Measures of magnitude, spatial extent, frequency, duration, and timing are individually evaluated and ranked (e.g., high, medium, low; frequent, infrequent, rare) for each project-related activity to assess whether the impact is predicted to be significant or not. To determine significance, a transparent, step-wise process combining the outcome of individual criteria has been established to arrive at an overall conclusion. Therefore, significance is determined depending on a particular combination of previously defined criteria (see Table 2.6). A summary of the distinction between significant (i.e., potentially unacceptable) and non-significant (i.e., likely acceptable) impacts include:

- All high-magnitude impacts to VECs, regardless of spatial extent, duration, and frequency, with the exception of short-term rare events within the local study area are considered significant.
- All medium-magnitude impacts within the regional study area are also considered significant, regardless of duration or frequency.
- Low-magnitude impacts within the regional study area of a long-term or permanent nature that occur frequently are significant.
- Medium-magnitude impacts within the local study area of any duration are significant if frequency is continuous.
- Low-magnitude impacts within the local study area are not significant regardless of duration, frequency, or timing.

Table 2.6: Significance Evaluation Matrix for Project Impacts

Magnitude	Spatial Extent	Frequency	Duration	Timing	Conclusion About Significance
High	Regional	any	any	any	yes
		any	permanent	any	yes
	Local	any	long-term	any	yes
		frequent to continuous	medium-term	any	yes
		rare to continuous	short-term to medium-term	any	no
Medium	Regional	any	medium to permanent	any	yes
		frequent to continuous	short-term	any	yes
		frequent to continuous	long-term to permanent	any	yes
	Local	rare to infrequent	long-term to permanent	any	no
		continuous	short-term to medium-term	any	yes
		rare to frequent	short-term to medium-term	any	no
Low	Regional	frequent to continuous	long-term to permanent	any	yes
		rare to infrequent	long-term to permanent	any	no
		any	short-term to medium-term	any	no
	Local	any	any	any	no

2.6 APPROACH TO IMPACT ASSESSMENT

Construction, operation, and closure and post-closure phases of the project are assessed independently for each major project activity, creating a temporal phase approach to the impact assessment. The magnitude, duration, and frequency of project activities differ among temporal phases and the significance of these is determined separately. During assessment of construction-related impacts, the duration of impacts is restricted to a medium-term assessment because the activity of installing infrastructure components is not expected to exceed the life span of most VEC species.

The Meadowbank project has three distinct spatial components: the Portage development, the Vault development, and the Baker Lake development. The Portage and Vault developments share similar activities, dominated by dike installation, dewatering of impoundments, and development of waste rock piles. Developments at Baker Lake are entirely different and consist of a barge-unloading facility, winter road, tank farm, and staging facility.

The primary means by which impacts of construction, operation, and closure and post-closure activities on terrestrial VECs were assessed was through the use of impact matrices. Potential impacts on terrestrial VECs were assessed for each major development activity during construction, operation, and closure/post-closure in the absence of and with mitigation (i.e., residual impacts). The purpose of comparing unmitigated and residual impacts was to satisfy the Nunavut Impact Review Board's (NIRB) Terms of Reference and to highlight the effectiveness of planned mitigation efforts to avoid or reduce the magnitude, extent, and duration of impacts. By taking this approach, consideration is given to every possible combination of activity during the life of mine development to ensure that nothing is overlooked, the assessment procedure is thorough, and decision pathways are transparent.

The structure of the columns in the matrices is focused on evaluating the unmitigated and residual impacts of each major development component or activity. Major headings and their content are as follows:

Project Components – All major project components and activities are listed under three subheadings: main facilities, Vault facilities, and other facilities (i.e., Baker Lake and winter road).

Potential Effects – this column outlines the physical effect of the project component (e.g., dewatering of Second Portage Lake) and the ecological consequence (e.g., loss of foraging areas for waterbirds) in the absence of mitigation.

Assessment of Unmitigated Effects – The five criteria used in determining significance (i.e., magnitude, spatial extent, frequency, duration, and timing) are assessed in the absence of mitigation to arrive at an overall significance based on the combination of assessment results (see Table 2.6).

Proposed Mitigation – this column summarizes the mitigation proposed for each project component. A detailed discussion of proposed mitigation is provided in the Wildlife Management Plan.

Residual Effect & Influence of Mitigation – This column assesses the likely residual effects after mitigation has been applied and summarizes the consequences of mitigation and its influence on reducing the magnitude, extent, duration, frequency, and timing of the activity. In some cases,

significant impacts in the absence of mitigation can be reduced to not significant status after mitigation is applied. In other cases, although mitigation may reduce the relative magnitude or spatial extent of significant impacts, it may not be sufficiently effective to reduce significance to not significant (acceptable) levels.

Significance of Residual Effects – The overall ecological significance of residual impacts (i.e., after mitigation is applied) on terrestrial VECs (acceptable or unacceptable) is assessed based on the combination of magnitude, extent, duration, frequency, and timing (see Table 2.6).

Probability – This column assesses the probability or certainty that the proposed mitigation will be successful in reducing impacts and achieving the predicted residual assessment of significance stated in the previous column.

Monitoring & Management – This column describes whether or not a monitoring program (i.e., to confirm/refute the assessment of magnitude, extent, duration, frequency, and timing of impacts) exists to monitor residual effects. The Terrestrial Management Plan encompasses baseline and targeted monitoring, management, and mitigation of all mine components.

2.7 CUMULATIVE EFFECTS CONSIDERATIONS

The reduction of cumulative effects, both temporal and spatial, is an integral goal of this EIA and the Wildlife Management Plan. Despite the small footprint of the mine in a very large, mostly undeveloped area, future developments in the area and certain unrelated additive effects that only become measurable when combined, cannot always be anticipated. A case in point for weighing cumulative effects at an early stage is the intensive exploration and development of diamond projects and mines in the Slave Geological Province over the past 10 years in an area that had previously seen relatively little development. Mining-related impacts on wolverines in the Lac de Gras area represent a cumulative effect on the local population (BHP, 2002).

Ongoing monitoring programs associated with the Meadowbank Gold project as well as monitoring programs at existing mines (e.g., Ekati and Diavik) and proposed future mines (e.g., Snap Lake, Hope Bay, and Jericho), will be essential in determining whether an additive effect on any component of the terrestrial environmental is occurring. Potential cumulative effects are most likely to first be observed on wide-ranging sensitive species such as grizzly bear and wolverine, which are particularly vulnerable to human encroachment into pristine habitats. A more detailed discussion on cumulative effects on wildlife is provided in the cumulative impacts report included in this EIA.

SECTION 3 • VEGETATION COVER

3.1 SUMMARY OF EXISTING CONDITIONS

No rare vascular plants or plant communities were found within the Meadowbank LSA during baseline studies of vegetation communities. Water is the largest ELC unit in the LSA, composing 40% of the area. The most common vegetated ELC units in the Meadowbank LSA are the Heath Tundra community (34%) and the Lichen-Rock community (10%) (see Table 3.1). Two of the wetter ELC units, Sedge community and Birch Seep community, are relatively common, composing 13% of the LSA. Eskers and their typical ridge-top ELC units (e.g., Avens community) are uncommon in the area. The southern section of the LSA consists mainly of Heath Tundra with patches of the Birch Seep community and the Lichen-Rock associations. In the northern section of the LSA, the Lichen-Rock community – Boulder Association is the most abundant ELC unit with patches of Heath Tundra and Birch Seep (Baseline Terrestrial Ecosystem Report; Cumberland, 2005).

The Heath Tundra community unit is dominated by bog blueberry, lingonberry, white Arctic heather, Labrador tea, bearberry, and crowberry, and is typically found on morainal deposits on gently sloping uplands with low to medium moisture and nutrient regimes. The Lichen-Rock community unit is found on gentle slopes with low moisture and nutrient regimes, and thin or absent soils associated with boulder fields or bedrock outcrops. Felsenmeer frequently occurs. Foliose and fruticose lichens are characteristic of the Boulder Field association, and crustose lichens dominate the Bedrock association.

A detailed assessment and analysis of ELC distribution within the RSA and LSA can be found within the Baseline Terrestrial Ecosystem Report. A summary of the distribution of ELC units in the LSA as compared to the RSA is provided in Table 3.1. Because of slight differences in how ELC units were described between the RSA and LSA, some units were combined. For example, the RSA analysis of ELC unit distribution provided values for both deep and shallow water, whereas the LSA analysis only provided a value for water.

Table 3.1: Area & Percent Cover of ELC Units in the LSA & RSA

ELC Unit	Availability in LSA (ha)	% of LSA	Availability in RSA (ha)	% of RSA
Avens, Moss, Snowbank	168	1.8	N/A	N/A
Birch Seep	622	6.6	56,925	5.6
Disturbed	10	0.1	4	<0.1
Esker (Sand/Gravel)	1	<0.1	2,032	0.2
Heath Tundra	3,160	33.7	282,446	27.7
Lichen-Rock - Bedrock	337	3.6	137,760	13.5
Lichen-Rock - Boulder	601	6.4	262,674	25.8
Riparian Shrub (Birch)	168	1.8	6,845	0.7
Sedge	585	6.2	29,485	2.9
Water	3,733	39.8	241,135	23.6
Unclassified	0	0	673	<0.1
Total	**9,385**	**100**	**1,019,979**	**100**

From this analysis, it appears as though Birch Seep and Heath Tundra communities are distributed similarly within the LSA and RSA. A few of the notable differences in distribution include the following:

- Esker habitats are substantially more common within the RSA than within the LSA. This result is supported by field surveys, which documented very few esker-type habitats within the LSA. More significant esker formations are known to occur approximately 20 km to the north of Meadowbank camp.
- Lichen-Rock– Bedrock and Lichen-Rock–Boulder habitats are distributed much more widely within the RSA than in the LSA. The combined percentage for the LSA is 10% compared to 39.3% in the RSA. Part of this difference is apparently due to the relatively high incidence of water within the LSA.
- Water is considerably more abundant in the LSA (39.8%) relative to the RSA (23.6%). This is expected because the Meadowbank camp is on a narrow spit of land between Second Portage Lake and the large Third Portage Lake.
- Sedge is somewhat more common in the LSA than in the RSA.

3.2 ENVIRONMENTAL EFFECTS

3.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on vegetation cover during the construction, operations, and closure and post-closure phases is provided in Appendix G.

Mining activities can affect vegetation by causing vegetation loss, ecosite fragmentation, population isolation, altered species composition and successional stages of plant communities, and changes in plant health. These in turn can result in changes in plant species distribution and abundance, and changes in ecosite suitability and effectiveness.

In the LSA, plant cover will be removed or altered due to clearing associated with infrastructure construction, development of waste rock piles, or to abrasion caused by vehicle traffic and large structures being dragged over the land. These changes could lead to a shift in plant community structure from heath tundra to areas mostly devoid of vegetation. The removal of vegetation cover in northern environments and associated increased solar heat absorption may also produce long-term effects on the land leading to melting of permafrost, and increased water flow during the summer, leading to the development of pools of standing water and mounds of surface debris.

Additionally, changes in drainage patterns and soil pH, and the production of industry-related air emissions can have indirect effects on vegetation by causing successional and phenology changes, and by affecting plant health. Roads and other transportation corridors such as airstrips can act as boundaries to plant distributions, and so, can lead to fragmentation and isolation of populations. The development and use of transportation corridors can also lead to the introduction and invasion of alien plant species into previously pristine areas. Plant health can be affected by grading, salt application, and dust deposition associated with road use and maintenance because these activities can lead to reduced plant photosynthetic capability and reproductive effort (Eller, 1977; Forbes, 1995), retarded growth (Spatt and Miller, 1981), and altered respiration processes (Svoboda, 1997).

Dust deposition can also lead to early snowmelt, and thus, early flowering in some plant species (Walker and Everett, 1987; Forbes, 1995). The release of grey water or other nutrients from camp operations could also potentially affect plant health and could lead to a shift in plant community structure from heath tundra to grass communities.

3.2.2 Overall Habitat Losses

The overall terrestrial habitat loses at the main and Vault sites are estimated to be approximately 522 ha, or 9% of terrestrial habitats available in the LSA (see Table 3.2). The Heath Tundra unit will be subject to the greatest alteration (270 ha; ~8.6% of this habitat available in the LSA).; however, the greatest percent loss of existing habitats is the Lichen Rock – Boulder unit, which will be subject to alteration of 15% or 92 ha of existing habitats (see Table 3.2). The Lichen-Rock – Boulder community is not a limiting habitat type as it is very common within the RSA (see Table 3.1).

At the RSA level, the Heath Tundra community (including Lichen-Rock association) is subject to the greatest percent losses (i.e., 0.14% of all available Heath Tundra habitats; Table 3.2). The overall percent loss of terrestrial habitat within the RSA is 0.07%. The overall loss of habitat, including water, is 0.08%. None of the ELC habitats are limiting within the RSA.

Of note is the discrepancy in the total area of ELC units lost in the LSA versus the RSA (e.g., LSA Heath Tundra is 270 ha compared to 305 ha in the RSA). This discrepancy is because the ELC units for the LSA were determined from ground surveys, whereas the ELC units for the RSA were calculated by satellite imagery. There are also some minor differences in the terms used for categorizing the ELC units in the LSA and RSA. Despite the discrepancies, there is a very close agreement between the total calculated areas of the LSA (8,627,316 m^2 and 8,626,072 m^2, for LSA and RSA, respectively).

3.2.3 Construction

A comprehensive analysis of the environmental effects of the proposed mine development on vegetation cover during the construction phase is provided in Appendix G.

The majority of the facilities at the main site will be constructed during the construction phase. In addition, Second Portage Lake will be dewatered to prepare for construction of dikes for isolating the Portage pit and tailings deposition area. Overburden stripping will take place in the Portage pit area and the proposed waste rock storage area. Losses of habitats (i.e., by ELC unit) at the main site are described in this section; however, development of the Vault site, which will occur during the operational phase of the mine, is described in the next section (Section 3.2.4).

The combined area of plant community lost due to developing the mine, camp, airstrip, and related facilities at the main site, will be 263 ha, or 4.7% of terrestrial habitats in the LSA. The losses to each of the ELC vegetation units are approximately as follows: 132 ha of Heath Tundra, 49 ha of Birch Seep, 34 ha of Lichen-Rock – Bedrock and Lichen-Rock – Boulders, 28.3 ha of Sedge, 7.1 ha of Riparian Shrub, 3.8 ha of Snow Bank, and less than 1 ha of Moss. The residual impacts are not considered to be significant.

Table 3.2: Quantified Habitat Losses in the Meadowbank LSA & RSA

Local Study Area (LSA)				Regional Study Area (RSA)			
ELC Unit	**Availability in LSA (ha)**	**Area Lost in LSA (ha)**	**% Lost in LSA**	**ELC Unit**	**Availability in RSA (ha)**	**Area Lost in RSA (ha)**	**% Lost in RSA**
Avens	72	5.9	8.20	Birch Seep Community	56,925	26.2	0.05
Birch Seep	622	50.6	8.10	Deep Water	180,420	260.8	0.14
Disturbed	10	6.1	61.01	Disturbed Sites	4	3.4	84.46
Heath Tundra (Lichen Rock)	3,160	270.4	8.56	Eskers	588	N/A	-
Lichen-Rock - Bedrock	337	29.5	8.77	Heath Tundra Community	268,344	303.5	0.11
Lichen-Rock - Boulder	601	91.5	15.23	Heath Tundra/Lichen Rock Association	14,102	4.6	0.03
Moss	1	0.0	2.84	Lichen-Rock Community - Bedrock Association	137,760	72.1	0.05
Ridge Crest/Esker (Sand/Gravel)	1	0.0	0.00	Lichen-Rock Community - Boulder Association	262,674	101.3	0.04
Riparian Shrub – Birch	168	8.1	4.83	Riparian Shrub Community	6,845	N/A	-
Sedge	585	53.0	9.06	Sand/Gravel	1,444	0.7	0.05
Snowbank	95	5.9	6.21	Sedge Community	29,485	24.3	0.08
Unmapped		1.5		Shallow Water	60,715	63.0	0.10
Water (Deep and Shallow)	3,733	340.0	9.11	Unclassified	673	2.6	0.38
Total	**9,385**			**Total**	**1,019,979**		
	Mine Area, %	**497.0**	**5.30**		**Mine Area, %**	**496.8**	**0.05**
	Vault Area, %	**365.8**	**3.90**		**Vault Area, %**	**365.8**	**0.04**
	Total ha, %	**862.6**	**9.19**		**Total ha, %**	**862.6**	**0.08**

Note: Discrepancies in total areas between the LSA and RSA are due to different methods used in categorizing ELC units.

Vegetation in the immediate vicinity of construction sites will receive deposition of fugitive dust, primarily in downwind areas. As the prevailing winds in the region are northwesterly, the major impacts of dust deposition will generally be on plant communities to the southeast of the mine facilities or other source of dust disturbance (e.g., roadways). Results from modeling, air monitoring, and snow surveys indicate that most dust particles will settle out within 100 m of the source (BHP, 2000). With or without mitigation, the residual impacts of dust generated by project construction activities on the productivity of vegetation communities are not expected to be significant.

Spills of gasoline, diesel, hydraulic fluid, or other deleterious substances can cause degradation to surrounding vegetation communities, generally in a very localized area. Mitigation measures will ensure that spills are avoided or contained and will not result in significant impacts to vegetation cover.

3.2.4 Operations

A comprehensive analysis of the environmental effects of the proposed mine development on vegetation cover during the operations phase is provided in Appendix G.

By the operations phase, much of the anticipated loss of ELC vegetation communities at the main site will have already occurred. Further losses will be associated with the Goose Island dikes and the expanding waste rock dumps. These losses will be somewhat offset by vegetation becoming established on exposed sediments from the Second Portage Lake drawdown, on the expanding tailings beach, and on waste rock piles.

A total of 260 ha of terrestrial vegetation communities will be lost to all developments in the area of the Vault. The losses to each of the ELC vegetation units will be as follows: 138.1 ha of Heath Tundra, 2.1 ha of Birch Seep, 86.9 ha of Lichen-Rock - Bedrock and Lichen-Rock - Boulders, 24.8 ha of Sedge, 1.0 ha of Riparian Shrub, 2.1 ha of Snow Bank, and 3.2 ha of Avens. Additionally, 1.5 ha of terrestrial habitat will be lost to dikes and the roads between the Main and Vault sites. Therefore, the total loss of terrestrial habitats from development of the main and Vault sites will be up to 524 ha.

Both camps (north and south) will be removed during the operations phase and the habitats will be reclaimed, resulting in an increase of 2.5 ha of vegetated terrain. Dust and emissions from the mine plant and associated facilities, and from road traffic will continue to cause minor vegetation degradation and possibly increased contaminant levels; however, the residual impacts will be of low significance.

3.2.5 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on vegetation cover during the closure and post-closure phase is provided in Appendix G.

The closure and post-closure phase is the first significant opportunity to initiate major reclamation of areas lost during the construction and operations phases. Removal of project facilities, reclamation of tailings and waste rock facilities, and the deactivation of permanent roads and associated reclamation activities will result in the natural revegetation of many previously impacted areas of the project (see Cumberland's the Reclamation and Closure Plan (2005), and Terrestrial Management Plan (2005).

The removal and habitat reclamation of the mine plant and associated facilities, fresh water intake and pipeline, discharge facilities and pipelines, emulsion / ammonium nitrate (AN) storage / explosives magazine, sewage and solid waste disposal, and mine shop/office facilities will result in increases of approximately 19 ha of ELC habitats. An even greater reclaimed area will be associated with the tailings deposition area and waste rock piles.

The concrete foundation and footprint of the mine plant and other ancillary facilities will result in relatively permanent vegetation loss and disturbance. The significance of the impact is considered to be acceptable due to the small size of the footprint.

The airstrip may be retained in a usable condition for long-term safety and future industrial activity considerations. In the event that the airstrip is decommissioned near the end of the closure phase, restoration activities will strive to restore the disturbed area to its pre-development state and to establish normal drainage patterns.

3.3 SUMMARY OF MITIGATION MEASURES

A detailed discussion of proposed mitigation measures to reduce project interactions with vegetation cover is provided in the Terrestrial Management Plan (Cumberland, 2005).

Although the environmental impacts of the project on vegetation are not expected to be significant at a local and regional level, measures will be implemented to reduce or avoid impacts that might otherwise occur. The nature of the disturbance to vegetation during the construction phase will be such that regeneration of plant communities will occur over many years. Therefore, the most effective mitigation practice is to minimize the area of vegetation disturbed by the project's components. Mitigation measures for vegetation communities during the construction phase will include:

- minimizing the footprint of mine facilities and clearly delineating the footprint in order to reduce habitat degradation in surrounding areas
- minimizing the need for road access to Second and Third Portage lakes by maximizing air transport of equipment and materials
- minimizing potential degradation of vegetation by strict adherence to emissions and dust control protocols (see the Air Quality Management Plan, 2005)
- constructing a containment berm around fuel storage areas, and following hazardous materials handling guidelines (see Hazardous Materials Management Plan; Cumberland, 2005) and spill contingency guidelines (see the Spill Contingency Plan, 2005)
- maximizing the use of stripped materials and suitable waste rock for road construction.

Mitigation efforts for vegetation during the operations phase will include:

- minimizing encroachment into habitats adjacent to designated and established facilities
- minimizing the potential for habitat degradation through fugitive dust fall and spills—fugitive dust control measures will be implemented for various project components (e.g., process plant activity, roads, airstrip, tailings retention facilities, waste rock storage facilities).

Where necessary, additional mitigation steps will be taken to facilitate revegetation by scarifying and/or re-contouring surfaces, stabilizing slopes, and restoring natural drainage patterns, etc. Certain facilities will be reclaimed progressively during the life of the mine, such as camps, temporary workspace, marshalling yards, waste rock piles, and storage areas. Other facilities will be reclaimed during the closure and post-closure phase of the project.

3.4 SUMMARY OF RESIDUAL EFFECTS

The residual effects for vegetation cover after all mitigation measures have been completed will include:

- permanent loss of vegetation communities where concrete foundations of mine structures remain
- long-term loss of habitat from continued use of the airstrip
- moderate loss of vegetation communities due to persistent habitat degradation and contamination adjacent to sites of former roads, fuel storage areas, and mine plant facilities
- minor losses of vegetation due to soil and snow compaction
- elevated contaminant levels in mine tailings.

Due to the overall small amount of terrestrial habitat lost in the LSA (524 ha; 9%) and the overall wide distribution of all ELC units in the RSA, residual impacts are not considered to be significant. (i.e., are considered to be acceptable) on a local and regional scale.

SECTION 4 • CARIBOU & MUSKOX

4.1 SUMMARY OF EXISTING CONDITIONS

Barren-ground caribou and muskox are considered key wildlife species in the Meadowbank mine development area. Caribou was selected because of the vital role it plays in the subsistence economy in the Baker Lake region and the importance of its populations throughout Nunavut. Muskox was selected because of interest related to the ongoing success of its recent movement back into the region and its value to indigenous people.

Aerial and ground surveys of ungulate distribution have been conducted since 1999. Detailed results are provided in the Baseline Terrestrial Ecosystem Report (Cumberland, 2005) and are summarized below.

4.1.1 Barren-ground Caribou

The barren-ground caribou is listed as secure by the Nunavut Government (2001), and is not listed federally (COSEWIC, 2002). No caribou calving grounds are found within the RSA (i.e., the 100 x 100 km area established for baseline purposes). The Beverly calving grounds are west of the RSA, and the Qamanirjuaq calving grounds are to the south (BQCMB, 1999). Caribou are present in the Meadowbank RSA in all seasons, but based on the most recent aerial surveys (24 to 26 February 2004), are most abundant in the winter. During this period, 11 transects of 10 km each were flown over the 10,000 km^2 RSA grid (1,100 km^2), and an estimated 21,000 caribou were recorded. This figure is higher than numbers on other baseline surveys conducted by Cumberland, which estimated the approximate numbers of caribou within the RSA as 3,000 in spring 1999, 100 animals in summer 2002, 16,900 in fall 2002, and 7,500 in winter 2003.

Radio-collaring data from the governments of Nunavut and the Northwest Territories (NWT) suggest that individuals wintering in the Meadowbank area may originate from any one of several identified herds in mainland Nunavut, including the Beverly, Qamanirjuaq, Lorillard, Wager Bay, Boothia Peninsula, and Ahiak herds. Based on the patterns of seasonal abundance observed to date, the Meadowbank area does not appear to represent critical caribou habitat during spring migration, calving, or summer post-calving.

For Arctic tundra caribou, such as the Lorillard and Wager Bay herds, winter range is probably more important than summer range as a limiting factor (Ferguson et al, 2001). Caribou wintering on the tundra seek areas such as ridge tops where snow is relatively shallow (BQCMB, 1999); in spring, they forage on ridges and other high points of land where the snow is relatively shallow (BQCMB, 1999). Later in the season, once green-up has begun, meadows are also used (BQCMB, 1999). Caribou summer diet in the central Canadian Arctic is dominated by willow (Van Egmond and Rowell, 1998). ELC units with a significant willow component, such as the Sedge and Riparian Shrub communities, are available to a limited extent in the study areas (combined coverage <10%). Migration to winter range and rutting occur in the fall (BQCMB, 1999). In the Meadowbank area, suitable fall forage is found within the same ELC units as are used in the spring. There is evidence that Arctic tundra caribou make frequent and unpredictable winter range shifts (Ferguson et al, 1998;

Buckland et al, 2000; Ferguson et al, 2001), thus, the importance of the Meadowbank area as winter range may vary over the long term. Continued monitoring will provide valuable information in this regard.

4.1.2 Muskox

The muskox is listed as secure in Nunavut (Government of Nunavut, 2001) and is not listed federally (COSEWIC, 2002). Nunavut is home to most of Canada's muskox, with a population of about 60,000 animals (JWEL, 2001). The species was once hunted to near extinction and has only recently begun to reestablish populations in parts of Nunavut (Campbell and Setterington, 2001). The Thelon Wildlife Sanctuary, located west of Baker Lake, was established in 1927 to save the muskox population (Keith, 1997).

Based on seasonal sampling, a small but relatively stable (and possibly increasing [Campbell and Setterington, 2001]) population of muskox resides near the project site. Herd sizes ranged from single individuals to up to 80 animals. The most recent baseline surveys (24 to 26 February 2004) located herds ranging from 12 to 80 animals (cow/calf) and documented a total of 108 individuals. An estimated number of muskox for the RSA is difficult to determine because of their clumped distribution; however, a population of between 500 to 1,000 animals is likely. These numbers are supported by surveys undertaken in the central Kivalliq Region by the Department of Sustainable Development (DSD) in the summers of 1999 and 2000, which estimated a density of 0.043 muskoxen per km^2 (i.e., 430 individuals/10,000 ha) in an area that included the western half of the RSA (Campbell and Setterington, 2001). This density was considered to be fairly low compared to areas surveyed to the southwest, which had densities of approximately 1,000 animals/10,000 ha (Campbell and Setterington, 2001).

4.2 ENVIRONMENTAL EFFECTS

4.2.1 General

An analysis of the environmental effects of the proposed mine development on ungulates during the construction, operations, and closure and post-closure phases is provided in Appendix F.

Mining activities can affect caribou and muskox by causing habitat changes, behavioural disturbances, and health or mortality risks. These, in turn, can result in changes in species distribution and abundance, disruption of species movements, and changes in habitat suitability and effectiveness. The greatest potential direct impacts to caribou and muskox are likely to occur during the construction phase, when topsoil stripping, road construction, and pit excavation activities are underway. Facility development will result in direct loss of habitat, and uncontrolled vehicle access and improperly stored building materials can lead to unnecessary and unacceptable habitat degradation. Potential direct impacts include injury or death related to project facilities (e.g., vehicle collisions) or increased hunting pressure, as well as indirect effects related to contaminated water and vegetation.

To assess the potential impacts of habitat loss on ungulates, three tables were developed to quantify the loss of high suitability habitats. Table 4.1 quantifies the area of low, moderate, and high suitability ELC units lost to mine development in the LSA and RSA (for the purposes of this analysis, the LSA

and RSA are as defined for the baseline studies). Habitat suitability ratings for ungulates are provided in Table 2.4 in Section 2.5. Table 4.2 summarizes the high, moderate, and low suitability habitat lost during the growing season and winter in the LSA, and Table 4.3 summarizes similar information for the RSA.

Table 4.1: Ungulates – ELC Areas Lost to Mine Development in LSA & RSA During Growing Season & Winter

	Area Lost in LSA (Growing - m^2)				**Area Lost in LSA (Winter - m^2)**		
	Habitat Suitability				**Habitat Suitability**		
ELC Type	**Low**	**Moderate**	**High**		**Low**	**Moderate**	**High**
Water (Deep and Shallow)	3,400,280				3,400,280		
Sedge			530,262			530,262	
Moss		284				284	
Birch Seep			505,536			505,536	
Riparian Shrub, Birch			81,161			81,161	
Heath Tundra		2,704,001					2,704,001
Snowbank		58,950			58,950		
Avens	59,040					59,040	
Lichen-Rock		1,210,913					1,210,913
Ridge Crest (Esker)		-					-
Disturbed	61,009				61,009		
Unmapped				Total (m^2)			
Totals	**3,520,329**	**3,974,147**	**1,116,958**	**8,611,434**	**3,520,239**	**1,176,282**	**3,914,913**
	Low	**Moderate**	**High**		**Low**	**Moderate**	**High**
Percent of LSA (m^2)	**9.23%**	**9.48%**	**8.12%**		**9.17%**	**8.42%**	**12.91%**
	Area Lost in RSA (Growing - m^2)				**Area Lost in RSA (Winter - m^2)**		
	Habitat Suitability				**Habitat Suitability**		
ELC Type	**Low**	**Moderate**	**High**		**Low**	**Moderate**	**High**
Birch Seep Community			262,371			262,371	
Deep Water	2,608,381				2,608,381		
Disturbed Sites	33,784				33,784		
Eskers		N/A					N/A
Heath Tundra Community		3,035,437					3,035,437
Heath Tundra/Lichen Rock Ass'n		46,098					46,098
Lichen-Rock Community - Bedrock Ass'n		721,420					721,420
Lichen-Rock Community - Boulder Ass'n		1,012,686					1,012,686
Riparian Shrub Community			N/A			N/A	
Sand/Gravel	7,200				7,200		
Sedge Community			242,533			242,533	
Shallow Water	630,371				630,371		
Unclassified	25,792			Total (m^2)	25,792		
Totals (m^2)	**3,305,528**	**4,815,640**	**504,904**	**8,626,072**	**3,305,528**	**504,904**	**4,815,640**
	Low	**Moderate**	**High**		**Low**	**Moderate**	**High**
Percent of RSA	**0.14%**	**0.07%**	**0.05%**		**0.14%**	**0.10%**	**0.04%**

Table 4.2: Ungulate High, Moderate & Low Suitability Habitat Lost during Growing Season & Winter at Main & Vault Sites based on LSA Analysis

Ungulates	Area Lost in LSA (ha) Growing Season			Ungulates	Area Lost in LSA (ha) Winter		
	Main Site	Vault Site	Total		Main Site	Vault Site	Total
Avens community (L)	2.7	3.2	5.9	Avens community (M)	2.7	3.2	5.9
Birch seep (H)	48.5	2.1	50.6	Birch seep (M)	48.5	2.1	50.6
Disturbed features (L)	6.1	-	6.1	Disturbed features (L)	6.1	-	6.1
Heath tundra (M)	132.3	138.1	270.4	Heath tundra (H)	132.3	138.1	270.4
Lakes or ponds (L)	233.9	106.2	340.0	Lakes or ponds (L)	233.9	106.2	340.0
Lichen rock on outcrops (M)	11.9	17.7	29.5	Lichen rock on outcrops (H)	11.9	17.7	29.5
Lichen rock with boulders (M)	22.3	69.2	91.5	Lichen rock with boulders (H)	22.3	69.2	91.5
Moss community (M)	0.0	-	0.0	Moss community (M)	0.0	-	0.0
Riparian shrub (H)	7.1	1.0	8.1	Riparian shrub (M)	7.1	1.0	8.1
Sedge community (H)	28.3	24.7	53.0	Sedge community (M)	28.3	24.7	53.0
Snowbank community (M)	3.8	2.1	5.9	Snowbank community (L)	3.8	2.1	5.9
Unclassified (L)	-	1.5	1.5	Unclassified (L)	-	1.5	1.5
High	83.87	27.82	111.70	High	166.52	224.97	391.49
Moderate	170.33	227.08	397.41	Moderate	86.61	31.02	117.63
Low	242.66	110.87	353.53	Low	243.74	109.78	353.52
Total Hectares	**496.87**	**365.77**	**862.64**	**Total Hectares**	**496.87**	**365.77**	**862.64**

Table 4.3: Ungulate High, Moderate & Low Suitability Habitat Lost during Growing Season & Winter at Main & Vault Sites Based on RSA Analysis

Ungulates	Area Lost in RSA (ha) Growing Season			Ungulates	Area Lost in RSA (ha) Winter		
	Main Site	Vault Site	Totals		Main Site	Vault Site	Totals
Avens community (L)	N/A	N/A	N/A	Avens community (M)	N/A	N/A	N/A
Birch seep (H)	24.5	1.7	26.2	Birch seep (M)	24.5	1.7	26.2
Disturbed features (L)	3.4	-	3.4	Disturbed features (L)	3.4	-	3.4
Heath tundra (M)	181.7	126.4	308.1	Heath tundra (H)	181.7	126.4	308.1
Lakes or ponds (L)	222.6	101.3	323.9	Lakes or ponds (L)	222.6	101.3	323.9
Lichen rock on outcrops (M)	24.1	48.1	72.1	Lichen rock on outcrops (H)	24.1	48.1	72.1
Lichen rock with boulders (M)	21.7	79.6	101.3	Lichen rock with boulders (H)	21.7	79.6	101.3
Moss community (M)	N/A	N/A	N/A	Moss community (M)	N/A	N/A	N/A
Riparian shrub (H)	N/A	N/A	N/A	Riparian shrub (M)	N/A	N/A	N/A
Sedge community (H)	17.4	6.9	24.3	Sedge community (M)	17.4	6.9	24.3
Snowbank community (M)	N/A	N/A	N/A	Snowbank community (L)	N/A	N/A	N/A
Unclassified (L)	1.3	1.3	2.6	Unclassified (L)	1.3	1.3	2.6
High	41.89	8.61	50.49	High	227.42	254.11	481.53
Moderate	227.42	254.14	481.56	Moderate	41.89	8.61	50.49
Low	227.27	102.56	329.83	Low	227.27	102.56	329.83
Total Hectares	**496.58**	**365.31**	**861.88**	**Total Hectares**	**496.58**	**365.28**	**861.85**

4.2.1.1 LSA

In the growing season, a total of 1,375 ha of high suitability ungulate habitat (i.e., 14.7% of total LSA area) is present within the LSA. Of this, an anticipated 112 ha (1.2% of total LSA area) or 8.2% of high suitability habitat is expected to be lost due to mine development activities (see Table 4.4). On an ELC unit basis, loss of high suitability habitats includes 53 ha of Sedge, 51 ha of Birch Seep, and 8 ha of Riparian Shrub (Table 4.1).

In the winter, a total of 4,098 ha of high suitability ungulate habitat (i.e., 43.7% of total LSA area) is present within the LSA. Of this, an anticipated 392 ha (4.2% of total LSA area) or 9.6% of high suitability habitat is expected to be lost due to mine development activities (see Table 4.4). On an ELC unit basis, loss of high suitability habitats includes 270 ha of Heath Tundra and 122 ha of Lichen-Rock (Table 4.1).

With overall losses less than 10% of the Ungulate LSA (i.e., 5 km radius or 7,850 ha), the overall magnitude of the impact is considered to be low and the unmitigated impact to be insignificant.

When the Ungulate-specific RSA is considered (i.e., mainland Nunavut), the impacts of habitat loss described above are very insignificant; however, potential cumulative effects of this project combined with other projects proposed for mainland Nunavut need to be considered (see the Cumulative Effects Assessment report included as part of this EIA).

Table 4.4: Ungulates – Total High Suitability Habitat Lost in the LSA

	Main Site High Suitability Habitat Lost in LSA (ha)	Vault Site High Suitability Habitat Lost in LSA (ha)	Total of LSA Lost (ha)	Total High Suitability Habitat Available (ha) in LSA	% High Suitability Habitat Lost in LSA	Total LSA (ha)	% Total LSA Lost
Growing	84	28	112	1,375	8.2	9,385	1.19
Winter	167	225	392	4,098	9.6	9,385	4.18
Total	497	366	863	-	-	9,385	9.19

Note: The bottom row is for the *entire* LSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

4.2.1.2 RSA

For the growing season, a total of 93,255 ha of high suitability ungulate habitat (i.e., 9.1% of total RSA area) is present within the RSA. Of this, an anticipated 51 ha (0.01% of total RSA area) or 0.05% of high suitability habitat is expected to be lost due to mine development activities (see Table 4.5). On an ELC unit basis, loss of high suitability habitats includes 26 ha of Birch Seep and 24 ha of Sedge (Table 4.1).

For the winter season, a total of 682,880 ha of high suitability ungulate habitat (i.e., 67.0% of total RSA area) is present within the RSA. Of this, an anticipated 481 ha (0.05% of total RSA area) or 0.07% of high suitability habitat is expected to be lost due to mine development activities (see Table 4.5). On an ELC unit basis, loss of high suitability habitats includes 308 ha of Heath Tundra and 173 ha of Lichen-Rock (Table 4.1).

Table 4.5: Ungulates – Total High Suitability Habitat Lost in the RSA

	Main Site High Suitability Habitat Lost in RSA (ha)	Vault High Suitability Lost in RSA (ha)	Total of LSA Lost in RSA (ha)	Total High Suitability Habitat Available (ha) in RSA	% High Suitability Habitat Lost in RSA	Total RSA (ha)	% Total RSA Lost
Growing	42	9	51	93,255	0.05	1,019,979	0.01
Winter	227	254	481	682,880	0.07	1,019,979	0.05
Total (H,M,L)	497	365	862	-	-	1,019,979	0.08

Note: The bottom row is for the *entire* RSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

4.2.2 Construction

4.2.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on ungulates during the construction phase is provided in Appendix F.

To simplify this discussion regarding potential impacts during the various project phases, the main site development is discussed in the construction phase, since most activities at the main site occur during this phase, and the Vault site development is discussed during the operations phase.

The main sources of impacts during the construction phase will be the development of the pits (Portage and Goose Island), waste rock storage areas (Portage and Goose Island), borrow pit(s), dikes (South, Third Portage, West, East), fuel storage area, camps (south and north), plant site (footprint), freshwater intake pipeline, discharge pipeline, airstrip, air traffic, main site roads, ground traffic, emulsion / AN storage / explosives magazines, increased human presence, and camp waste disposal.

The primary potential effects of construction activities on ungulates will be direct and indirect loss of habitat, avoidance of foraging habitat and areas of human activity (i.e., reduced habitat effectiveness), deflection from normal travel routes and energetic costs, health risk from drinking contaminated water from the tailings pond, reduced habitat effectiveness in areas close to noise and activity, possible injury or mortality from encounters with pits and other mine facilities, mortality due to collisions with vehicles or aircraft, contaminant loading from eating contaminated vegetation, and possible attraction of predators with increased local depredation rates.

The total amount of habitat lost to the development of the mine at the main site will be approximately 497 ha. If aquatic habitat if excluded, the terrestrial habitat lost will be approximately 263 ha.

4.2.2.2 Habitat Loss

LSA Habitat Loss Assessment

During the growing season, an estimated 84 ha of high suitability habitat will be lost at the main mine site: 49 ha of Birch Seep, 7 ha of Riparian Shrub and 28 ha of Sedge (Table 4.2). This 84 ha of habitat represents approximately 16.9% of all habitats lost due to construction activities, 31.9% of lost

terrestrial habitats, and 0.9% of the entire LSA. Moderate-rated habitats represent 170 ha, or 34.3%, and low-rated habitats represent 243 ha, or 48.8%, of habitats lost due to mine development. The majority of low-rated habitat (96.4%) is Water.

During the winter season, an estimated 167 ha of high suitability habitat will be lost at the main mine site: 132 ha of Heath Tundra and 34 ha of Lichen-Rock (Table 4.2). This 167 ha of habitat represents approximately 33.5% of all habitats lost due to construction activities at the main site, 63.3% of lost terrestrial habitats at the main site, and 1.8% of the entire LSA. Moderate-rated habitats represent 87 ha, or 17.4%, and low-rated habitats represent 244 ha, or 49.1%, of habitats lost due to mine development.

RSA Habitat Loss Assessment

During the growing season, an estimated 42 ha of high suitability habitat will be lost at the main mine site: 25 ha of Birch Seep and 17 ha of Sedge (Table 4.3). This 42 ha of habitat represents approximately 8.4% of all habitats lost due to construction activities at the Main site, 15.3% of lost terrestrial habitats lost at the main site, and <0.01% of the entire RSA. Moderate-rated habitats represent 227 ha, or 45.8%, and low-rated habitats represent 227 ha, or 45.8%, of habitats lost due to mine development.

During the winter season, an estimated 227 ha of high suitability habitat will be lost at the main mine site: 182 ha of Heath Tundra and 46 ha of Lichen-Rock (Table 4.3). This 227 ha of habitat represents approximately 45.8% of all habitats lost due to construction activities at the main site, 82.9% of lost terrestrial habitats at the main site, and 0.02% of the entire RSA. Moderate-rated habitats represent 42 ha, or 8.4%, and low-rated habitats represent 227 ha, or 45.8%, of habitats lost due to mine development.

4.2.2.3 Other Impacts

The potential effects from noise and activity related to construction will include avoidance of foraging habitat (reduced habitat effectiveness), deflection from normal travel routes, and energetic costs. Without mitigation, these impacts could have measurable impacts on ungulates utilizing the area; however, with mitigation (e.g., right-of-way to caribou), residual impacts are anticipated to be of low significance.

Potential effects from roads, airstrip, and traffic will include mortality due to collisions with vehicles, reduced habitat effectiveness and habitat degradation due to dust and exhaust, and potential for increased contaminant loading in food sources. With or without mitigation, these overall impacts in the LSA are not expected to be significant.

4.2.3 Operations

A comprehensive analysis of the environmental effects of the proposed mine development on ungulates during the operation phase is provided in Appendix F.

4.2.3.1 Main Site

During the operations stage, most of the main site facilities will have been developed or will be under development, and most of the major sources of impacts will have already affected the receiving environment. For example, the construction of the mine shop/office will result in the loss of a small amount of habitat, and no further impacts are expected. Alternatively, the development of the processing plant and ancillary facilities will not only result in direct habitat loss, but the operation of the plant could produce continuous dust and emissions resulting in habitat degradation and contaminant loading in food sources in an area much larger than the footprint of the plant itself.

Potential effects from the tailings facilities will be loss and disturbance of terrestrial foraging habitat around the edge of the lake (Second Portage Arm) to 4 m above current lake elevation. There is also the potential for ungulates to drink contaminated tailings pond water and/or to become embedded in the tailings. The amount of habitat lost due to development of the tailings facilities will be 90 ha. Residual impacts are not expected to be significant, as aversive techniques will be implemented to ensure that ungulate contact with tailings facilities is minimized.

Camps will have been removed by this time, resulting in increased habitat and reduced disturbance as habitat reclamation is undertaken.

4.2.3.2 Vault Site

Most of the Vault site facilities will be developed during the operation phase of the project. Potential effects of pit and waste rock pile development, noise and activity, and other related effects will be comparable to those described for the main site. Losses of high suitability habitats for ungulates are described below.

LSA Habitat Loss Assessment

During the growing season, an estimated 28 ha of high suitability habitat will be lost at the Vault site: 2 ha of Birch Seep, 1 ha of Riparian Shrub, and 25 ha of Sedge (Table 4.2). This 28 ha of habitat represents approximately 7.6% of all habitats lost due to development activities at the Vault site, 10.7% of terrestrial habitats lost at the Vault site, and 0.3% of the entire LSA. Moderate-rated habitats represent 227 ha, or 62.1%, and low-rated habitats represent 111 ha or 30.3% of habitats lost due to mine development. The majority of low-rated habitat (i.e., 96.4%) is Water.

During the winter season, an estimated 225 ha of high suitability habitat will be lost at the Vault site: 138 ha of Heath Tundra, and 87 ha of Lichen-Rock (Table 4.2). This 225 ha of habitat represents approximately 61.5% of all habitats lost due to construction activities at the Vault site, 86.7% of lost terrestrial habitats at the Vault site, and 2.4% of the entire LSA. Moderate-rated habitats represent 31 ha, or 8.5%, and low-rated habitats represent 110 ha, or 30.0%, of habitats lost due to mine development.

Although a high percentage of habitats lost due to development activities are rated as being of high suitability, they represent only a few percent of the entire LSA. In addition, all high suitability habitats are well represented in the RSA, therefore overall impacts to ungulate high suitability habitats are considered to be low.

RSA Habitat Loss Assessment

During the growing season, an estimated 9 ha of high suitability habitat will be lost at the Vault site: 2 ha of Birch Seep and 7 ha of Sedge (Table 4.3). This 9 ha of habitat represents approximately 2.5% of all habitats lost due to construction activities at the Vault site, 3.4% of terrestrial habitats lost at the Vault site, and <0.01% of the entire RSA. Moderate-rated habitats represent 254 ha, or 69.5%, and low-rated habitats represent 103 ha, or 28.1%, of habitats lost due to mine development.

During the winter season, an estimated 254 ha of high suitability habitat will be lost at the Vault site: 126 ha of Heath Tundra and 128 ha of Lichen-Rock (Table 4.3). This 254 ha of habitat represents approximately 69.6% of all habitats lost due to construction activities at the Vault site, 96.3% of lost terrestrial habitats at the Vault site, and 0.02% of the entire RSA. Moderate-rated habitats represent 9 ha, or 2.5%, and low-rated habitats represent 103 ha, or 28.1%, of habitats lost due to mine development.

4.2.4 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on ungulates during the closure and post-closure phase is provided in Appendix F.

Impacts to ungulates during the closure and post-closure phase will be reduced compared to impacts during the construction and operation phases. In general, a reduction in noise and activity and reclamation of waste rock piles, roads, and other facilities will result in an improvement of habitat conditions during this phase.

4.3 SUMMARY OF MITIGATION MEASURES

4.3.1 Mitigation

A detailed discussion of proposed mitigation measures to reduce project interactions with ungulates is provided in the Terrestrial Management Plan (Cumberland, 2005).

The primary objectives of mitigation measures for ungulates are to avoid injury and death of individuals, ensure that the health of individuals is maintained by minimizing contamination of water and vegetation, avoid barriers to movement, and maintain the integrity and viability of local and regional populations.

Minimizing blast noises, engine noises, maintaining and ensuring vehicles are properly muffled, establishing speed limits, minimizing the number of take-offs and landings, dust suppression, proper containment of fuel storage areas and explosives, contingency plans (for fires, spills and explosions), complying with hazardous materials guidelines, environmental awareness programs, incineration of all garbage and foods (domestic waste), and establishing blasting windows if possible are important mitigation measures (see Cumberland's Air Quality and Noise Management Plan, and Access and Air Traffic Management Plan, included as part of this EIA documentation series). Behavioural studies at the Ekati mine indicated that caribou did not undergo significant movements following blasting, suggesting that caribou quickly became habituated to the noise.

In addition, ungulates are to be given the right-of-way on all roads. The people of Baker Lake have expressly indicated that they do not want any fences or berms around the pits or other structures. It is their wish that the ungulates have freedom to move wherever they want, without obstruction. Accordingly, there will be no fences or berms around the pits; however, thought is being given to sloping the sides of the pits more gradually near their edges to create different littoral and nearshore habitats for both terrestrial wildlife and aquatic wildlife. This would also reduce the likelihood of animals falling into the pits.

Caribou have been known to rest on the airstrip (Baker Lake Impact Workshop, 24 to 26 March 2003). They may also venture near the tailings impoundment and risk drinking contaminated water or becoming embedded in tailings. In such cases, it may be necessary to use bear bangers, cracker shells, or bullhorns to scare them away.

Upon closure, tailings impoundments will be capped, reclaimed, and made accessible or inaccessible as necessary. Waste rock piles will be capped with non-potentially acid generating (PAG) material and contoured to allow passage of wildlife such as caribou through the site.

4.3.2 Monitoring

Monitoring would include maintaining daily logs of ungulates, locations, numbers, sex, direction of travel, and any long-term population indicators. Pilots would be required to report all ungulate/plane collisions and near misses as well as any caribou or muskox sighted in the area, and to maintain a wildlife sighting logbook. All operators of vehicles would be required to report any collisions with ungulates.

Caribou are an important food source for carnivores. Due to the large geographic range of the caribou herds, effective monitoring of caribou herd health and well-being is best conducted on a scale that matches the range of these animals. Cumberland would prefer to assist, where practical, caribou-monitoring programs sponsored by the Government of Nunavut, other governments, and industry. Ongoing collaboration with government researchers and review of government radio-collaring programs will provide further information on the movement patterns and herd origins of caribou found in the Meadowbank area.

4.4 SUMMARY OF RESIDUAL EFFECTS

A detailed analysis of anticipated residual effects of the proposed project on ungulates during the construction, operation and closure and post-closure phases is provided in Appendix F.

Mitigation measures to avoid interaction between project components and effects and ungulates are not always successful because caribou are known to habituate to human presence and may be inclined to reside for days or weeks within the mine site. Limiting access to potential hazards or sources of contamination may be more difficult in these circumstances. Caribou, particularly those that occur in the Meadowbank area in fall and spring, are highly migratory, and may only be within the Meadowbank LSA for a few days during these seasons. In addition, wintering animals appear to be transient in nature. This high mobility may make it be difficult to monitor the health or any potential effects that the mine or a given project component has on caribou; however, based on the patterns of

seasonal abundance observed to date, the Meadowbank area does not appear to represent critical caribou habitat during spring migration, calving, summer post-calving, or fall migration.

Residual losses to high suitability habitats are expected; however, these losses make up only a small percentage of overall available habitat in the LSA. Even with all losses considered, irrespective of the suitability to ungulates, the losses represent less than 10% of the LSA, and less than 0.1% of the RSA. The losses described in this section represent the worst-case scenario. Reclamation activities and natural revegetation of disturbed areas during the closure and post-closure phases will improve these lost habitats and reduce residual effects even further. Based on this analysis, it is highly unlikely that residual impacts to caribou related to the Meadowbank project will result in measurable changes in ungulate population distribution or abundance. Monitoring activities will attempt to illustrate that this is indeed the case. If not, an adaptive management strategy will be taken to ensure that perceived significant impacts are reduced further.

SECTION 5 • PREDATORY MAMMALS

5.1 SUMMARY OF EXISTING CONDITIONS

Three large carnivores are considered key wildlife resources based on their conservation status: grizzly bear, wolf, and wolverine.

5.1.1 Grizzly Bear

The grizzly bear is designated as sensitive in Nunavut (Government of Nunavut, 2001), and is listed as a species of special concern by COSEWIC (2002). Grizzly bears are distributed across most of mainland Nunavut except for the northeast (including Boothia and Melville peninsulas), and the coastal fringe south of Chesterfield Inlet (McLoughlin, 2001). Population density decreases from west to east, but traditional knowledge suggests that the grizzly bear's range is expanding eastward (McLoughlin, 2001). There is no demographic data for grizzly bears in Kivalliq, but the west Kitikmeot population is thought to be stable or slightly increasing (McLoughlin, 2001).

Grizzly bears (a sow with two cubs) were only seen on one occasion on the spring 1999 aerial survey within the RSA. Little other evidence of grizzly bear was recorded during the surveys. These data suggest that a small population of grizzly bear occurs in the Meadowbank RSA, as would be expected for a wide-ranging species typically existing at low densities (e.g., three individuals per 1,000 km^2). An increased number of bears observed and killed in the Baker Lake area has lead to concerns by local residents that the grizzly bear population is increasing rapidly and needs to be controlled. To determine the actual status of the grizzly bear, the Hunters' and Trappers' Organization (HTO) has initiated a traditional grizzly bear study that is being co-funded by Cumberland Resources, the World Wildlife Fund (WWF), the HTO, and the Nunavut Department of Sustainable Development. The results of this study have not yet been released.

5.1.2 Wolverine

The wolverine is listed as sensitive in Nunavut (Government of Nunavut, 2001), and the western Canadian population (which includes Nunavut) is considered vulnerable (COSEWIC, 2002). Wolverine is an important furbearing species for residents of Baker Lake, and the maintenance of a healthy population of the species is important for local trappers.

Wolverines are solitary animals that occur at densities that are generally low relative to other carnivores (Banci, 1994). Trapping data indicate that wolverine populations have decreased in many regions of the NWT in the last 20 years (Banci, 1994; Peterson, 1997); however, population estimates for the NWT (including Nunavut) suggest there is a stable (or increasing), sparsely distributed population of more than 3,000 animals (Dauphiné, 1989; NWTRWED, 2001). Wolverines are less abundant in the eastern Canadian Arctic than in the west and central Canadian Arctic (Dauphiné, 1989).

Wolverine and their sign have rarely been detected in the study area. Single wolverines were observed several kilometres south of the Meadowbank site in April 2002 and in September 2002. The

infrequent sightings are expected given the wide-ranging habits and low densities of this species. The wolverine is an important furbearing species for the Baker Lake community, partially because the anti-icing qualities of wolverine fur make it a highly sought-after trim on parkas. The presence of both grizzly bears and wolverine in the area is considered an important indicator of an intact wilderness ecosystem. Both species are sensitive to disturbance and require special management consideration.

5.1.3 Wolf

The wolf is listed as sensitive in Nunavut (Government of Nunavut, 2001), but is not federally listed (COSEWIC, 2002). Wolf populations are stable or increasing within their range, except in northern Alberta and some parts of the NWT (Hayes and Gunson, 1995). Baker Lake residents have indicated that the wolf harvest in the Meadowbank area has increased in recent years; however, regional population numbers and trends remain poorly understood.

The annual ranges of Arctic wolves are much larger than wolves that rely on resident rather than migratory (i.e., barren-ground caribou) prey (Walton et al, 2001). A study in the central Canadian Arctic estimated annual range sizes of approximately 63,000 km^2 for males, and approximately 45,000 km^2 for females (Walton et al, 2001). The same study also indicated that winter ranges were larger than summer ranges.

Wolves are distributed throughout the NWT and Nunavut. Their patterns of distribution, densities, territory boundaries, and dispersal movements are influenced by interactions between packs, and by prey abundance and distribution (Fuller and Keith, 1980; Ballard et al, 1987). Densities in northern Canada have been recorded as low as one wolf per 944 km^2 (van Zyll de Jong and Carbyn, 1998).

Wolves were observed infrequently throughout the RSA during all survey sessions, but were most common in the fall, likely in response to increased caribou abundance at that time of year. Wolves apparently reproduce in the area as two young pups were observed with two adults during the fall 2002 RSA survey. Camp personnel also observed wolf pups within the LSA, on the east side of Turn Lake in July 2002.

5.2 ENVIRONMENTAL EFFECTS

5.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on predatory mammals during the construction, operations, and closure and post-closure phases is provided in Appendix C.

Grizzly bears and wolverines are particularly vulnerable to mine development. Due to their wide-ranging and scavenging natures, they are drawn to mine sites where waste and garbage may be readily available. Once they have been attracted and habituated to a site they may be difficult to avert and may eventually become a human-safety concern. Experience at active mines in the NWT suggests that this may be one of the most challenging wildlife issues facing a new mine. For example, during the MVEIRB (2003) Technical Sessions for De Beers Snap Lake Diamond project in Yellowknife in January 2003, it was pointed out by RWED that between 1998 and 2002, 16 wolverines had been killed or removed from mines in the Lac de Gras area. BHP acknowledged

that the loss of 16 wolverines represented a cumulative effect on the local population. Wolverines had been seen on three separate occasions at the domestic landfill at Ekati, and one had become so desensitized to human presence that not even bear bangers or rubber bullets could drive it off. Eventually, it had to be live-trapped and destroyed. Although no direct link could made between the wolverines seen at the landfill and the wolverine that was destroyed, the possibility that the landfill may have contributed to the death of the wolverine cannot be dismissed (BHP, 2002).

Other potential impacts to grizzly bears and wolverines, such as changes in prey abundance, distribution, or health, are of lesser concern. Mitigation measures to ensure that the viability and integrity of prey populations is maintained (e.g., ungulates) will also mitigate the potential impact to their predators.

To assess the potential impacts of habitat loss on predatory mammals, three tables were developed to quantify the loss of high suitability habitats, as defined previously. Table 5.1 quantifies the area of low, moderate, and high suitability ELC units lost to mine development in the LSA and RSA (for the purposes of this analysis, the LSA and RSA are as defined for the baseline studies). Habitat suitability ratings for predatory mammals are provided in Table 2.4 in Section 2.5. Table 5.2 summarizes the high, moderate, and low suitability habitat lost during the growing season and winter in the LSA, and Table 5.3 summarizes similar information for the RSA.

5.2.1.1 LSA

In the growing season, a total of 657 ha of high suitability predatory mammal habitat (i.e., 7.0% of total LSA area) is present within the LSA. Of this, an anticipated 59 ha (0.6% of total LSA area) or 9.0% of high suitability habitat is expected to be lost due to mine development activities (see Table 5.4). On an ELC unit basis, loss of high suitability habitats includes 6 ha of Avens and 53 ha of Sedge (see Table 5.1).

In the winter, a total of 3,232 ha of high suitability predatory mammal habitat (i.e., 34.4% of total LSA area) is present within the LSA. Of this, an anticipated 276 ha (2.9% of total LSA area) or 8.5% of high suitability habitat is expected to be lost due to mine development activities (see Table 5.4). On an ELC unit basis, loss of high suitability habitats includes 6 ha of Avens and 270 ha of Heath Tundra (see Table 5.1). With overall losses less than 10% (see Tables 2.3 and 2.6) of the predatory mammal LSA (i.e., 5 km radius or 7,850 ha), the overall magnitude of the impact is considered to be low and the unmitigated impact to be insignificant.

When the predatory mammal-specific RSA is considered (i.e., 100 km radius or 3,140,000 ha), the impacts of habitat loss described above are very insignificant; however, potential cumulative effects of this project combined with other projects proposed for mainland Nunavut need to be considered.

5.2.1.2 RSA

For the growing season, a total of 29,485 ha of high suitability predatory mammal habitat (i.e., 2.9% of total RSA area) is present within the RSA. Of this, an anticipated 24 ha (<0.01% of total RSA area), or 0.08%, of high suitability habitat is expected to be lost due to mine development activities (see Table 5.5). On an ELC unit basis, loss of high suitability habitats includes 24 ha of Sedge (see Table 5.1).

Table 5.1: Predatory Mammals – ELC Areas Lost to Mine Development in LSA & RSA during Growing Season & Winter

	Area Lost in LSA (Growing – m^2)				Area Lost in LSA (Winter - m^2)		
	Habitat Suitability				Habitat Suitability		
ELC Type	**Low**	**Moderate**	**High**		**Low**	**Medium**	**High**
Water (Deep and Shallow)	3,400,280				3,400,280		
Sedge			530,262			530,262	
Moss		284				284	
Birch Seep		505,536				505,536	
Riparian Shrub, Birch		81,161				81,161	
Heath Tundra		2,704,001					2,704,001
Snowbank		58,950			58,950		
Avens			59,040				59,040
Lichen-Rock		1,210,913				1,210,913	
Ridge Crest (Esker)			-				-
Disturbed	61,009				61,009		
Unmapped							
Totals	3,461,289	4,560,844	589,301		3,520,239	2,328,155	2,763,040
Percent of LSA	**9.17%**	**9.37%**	**8.56%**		**9.17%**	**8.12%**	**9.53%**
	Area Lost in RSA (Growing - m^2)				**Area Lost in RSA (Winter - m^2)**		
	Habitat Suitability				**Habitat Suitability**		
ELC Type	**Low**	**Moderate**	**High**		**Low**	**Medium**	**High**
Birch Seep Community		262,371				262,371	
Deep Water	2,608,381				2,608,381		
Disturbed Sites	33,784				33,784		
Eskers			N/A				N/A
Heath Tundra Community		3,035,437					3,035,437
Heath Tundra/Lichen Rock Ass'n		46,098					46,098
Lichen-Rock Community - Bedrock Ass'n		721,420				721,420	
Lichen-Rock Community - Boulder Ass'n		1,012,686				1,012,686	
Riparian Shrub Community		N/A				N/A	
Sand/Gravel			7,200				7,200
Sedge Community			242,533			242,533	
Shallow Water	630,371				630,371		
Unclassified	25,792				25,792		
Totals (m2)	3,298,328	5,078,011	249,733		3,298,328	2,239,010	3,088,734
Percent of RSA	**0.14%**	**0.07%**	**0.06%**		**0.14%**	**0.11%**	**0.06%**

Note: The percentages lost indicate the amount within that category. For example, 0.06% (bottom right-hand corner) indicates 0.06% of total available high-suitability habitat lost in the RSA.

Table 5.2: Predatory Mammal High, Moderate & Low Suitability Habitat Loss during the Growing & Winter Seasons in Main & Vault Site based on LSA Analysis

Predatory Mammals	Area Lost in LSA (ha) Growing Season			Predatory Mammals	Area Lost in LSA (ha) Winter		
	Main Site	Vault Site	Totals		Main Site	Vault Site	Totals
Avens community (H)	2.7	3.2	5.9	Avens community (H)	2.7	3.2	5.9
Birch seep (M)	48.5	2.1	50.6	Birch seep (M)	48.5	2.1	50.6
Disturbed features (L)	6.1	-	6.1	Disturbed features (L)	6.1	-	6.1
Heath tundra (M)	132.3	138.1	270.4	Heath tundra (H)	132.3	138.1	270.4
Lakes or ponds (L)	233.9	106.2	340.0	Lakes or ponds (L)	233.9	106.2	340.0
Lichen rock on outcrops (M)	11.9	17.7	29.5	Lichen rock on outcrops (M)	11.9	17.7	29.5
Lichen rock with boulders (M)	22.3	69.2	91.5	Lichen rock with boulders (M)	22.3	69.2	91.5
Moss community (M)	0.0	-	0.0	Moss community (M)	0.0	-	0.0
Riparian shrub (M)	7.1	1.0	8.1	Riparian shrub (M)	7.1	1.0	8.1
Sedge community (H)	28.3	24.7	53.0	Sedge community (M)	28.3	24.7	53.0
Snowbank community (M)	3.8	2.1	5.9	Snowbank community (L)	3.8	2.1	5.9
Unclassified (L)	-	1.5	1.5	Unclassified (L)	-	1.5	1.5
High	30.99	27.94	58.93	High	135.04	141.27	276.30
Moderate	225.93	230.16	456.08	Moderate	118.09	114.72	232.82
Low	239.95	107.67	347.63	Low	243.74	109.78	353.52
Total Hectares	**496.87**	**365.77**	**862.64**	**Total Hectares**	**496.87**	**365.77**	**862.64**

Table 5.3: Predatory Mammal High, Moderate & Low Suitability Habitat Loss during the Growing & Winter Seasons in Main & Vault Site based on RSA Analysis

Predatory Mammals	Area Lost in RSA (ha) Growing Season			Predatory Mammals	Area Lost in RSA (ha) Winter		
	Main Site	Vault Site	Totals		Main Site	Vault Site	Totals
Avens community (H)	N/A	N/A	N/A	Avens community (H)	N/A	N/A	N/A
Birch seep (M)	24.5	1.7	26.2	Birch seep (M)	24.5	1.7	26.2
Disturbed features (L)	3.4	-	3.4	Disturbed features (L)	3.4	-	3.4
Heath tundra (M)	181.7	126.4	308.1	Heath tundra (H)	181.7	126.4	308.1
Lakes or ponds (L)	222.6	101.3	323.9	Lakes or ponds (L)	222.6	101.3	323.9
Lichen rock on outcrops (M)	24.1	48.1	72.1	Lichen rock on outcrops (M)	24.1	48.1	72.1
Lichen rock with boulders (M)	21.7	79.6	101.3	Lichen rock with boulders (M)	21.7	79.6	101.3
Moss community (M)	N/A	N/A	N/A	Moss community (M)	N/A	N/A	N/A
Riparian shrub (M)	N/A	N/A	N/A	Riparian shrub (M)	N/A	N/A	N/A
Sedge community (H)	17.4	6.9	24.3	Sedge community (M)	17.4	6.9	24.3
Snowbank community (M)	N/A	N/A	N/A	Snowbank community (L)	N/A	N/A	N/A
Unclassified (L)	1.3	1.3	2.6	Unclassified (L)	1.3	1.3	2.6
High	17.35	6.90	24.25	High	181.70	126.42	308.12
Moderate	251.96	255.81	507.77	Moderate	87.61	136.29	223.90
Low	227.27	102.56	329.83	Low	227.27	102.56	329.83
Total Hectares	**496.58**	**365.28**	**861.85**	**Total Hectares**	**496.58**	**365.28**	**861.85**

Table 5.4: Predatory Mammals – Total High Suitability Habitat Lost in the LSA

	Main Site High Suitability Habitat Lost in LSA (ha)	Vault Site High Suitability Habitat Lost in LSA (ha)	Total of LSA Lost (ha)	Total High Suitability Habitat Available (ha) in LSA	% High Suitability Habitat Lost in LSA	Total LSA (ha)	% Total LSA Lost
Growing	31	28	59	657	9.0	9,385	0.63
Winter	135	141	276	3,232	8.5	9,385	2.94
Total	497	366	863	-	-	9,385	9.19

Note: The bottom row is for the *entire* LSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

Table 5.5: Predatory Mammals – Total High Suitability Habitat Lost in the RSA

	Main Site High Suitability Habitat Lost in RSA (ha)	Vault High Suitability Lost in RSA (ha)	Total of LSA Lost in RSA (ha)	Total High Suitability Habitat Available (ha) in RSA	% High Suitability Habitat Lost in RSA	Total RSA (ha)	% Total RSA Lost
Growing	17	7	24	29,485	0.08	1,019,979	<0.01
Winter	182	126	308	282,446	0.11	1,019,979	0.03
Total	497	365	862	-	-	1,019,979	0.08

Note: The bottom row is for the *entire* RSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

For the winter season, a total of 282,446 ha of high suitability ungulate habitat (i.e., 27.7% of total RSA area) is present within the RSA. Of this, an anticipated 308 ha (0.03% of total RSA area), or 0.11%, of high suitability habitat is expected to be lost due to mine development activities. On an ELC unit basis, loss of high suitability habitats includes 308 ha of Heath Tundra.

When the predatory mammal-specific RSA is considered (i.e., 100 km radius; Table 2.2), the impacts of habitat loss are not considered to be significant; however, potential cumulative effects of this project, particularly the potential for human-caused deaths of predators, combined with other projects proposed for mainland Nunavut need to be considered.

5.2.2 Construction

5.2.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on predatory mammals during the construction phase is provided in Appendix C.

The main sources of impacts during the Construction phase will be the development of the pits (Portage and Goose Island), waste rock storage areas (Portage and Goose), borrow pit(s), dikes (South, Third Portage, West, East), fuel storage area, camps (South and North), plant site (footprint), freshwater intake pipeline, discharge pipeline, airstrip, air traffic, main site roads, ground traffic, emulsion / AN storage / explosives magazines, increased human presence, and camp waste disposal.

The primary potential effects on predatory mammals will be: direct and indirect loss of habitat; displacement, reduced habitat effectiveness, and behavioural changes due to noise and activity; loss and disturbance of terrestrial foraging habitat; mortality due to collisions with vehicles or aircraft; potential degradation of surrounding habitats and increased contaminant loading in prey due to fuel spills/dust and emissions from the plant site; habituation to human structures and presence; food conditioning and desensitization to humans due to improper preventative deterrents/disposal of domestic and industrial waste; and relocation and/or destruction of the animal.

5.2.2.2 Habitat Loss

High suitability habitat changes between the growing season and winter for wolverines and wolves may be more a function of the distribution of prey than of ELC units. The annual ranges of Arctic wolves are much larger than those of wolves that rely on resident rather than migratory (i.e., barren-ground caribou) prey. A study in the central Canadian Arctic estimated annual range sizes of approximately 63,000 km^2 for males, and approximately 45,000 km^2 for females (Walton et al, 2001, as cited in Cumberland, 2003b). Food availability is also the fundamental factor influencing movement patterns and home range selection for wolverines (Banci, 1994). During winter, wolverine distribution is determined by the distribution of ungulates, as wolverines rely upon the availability of ungulate carrion (Banci, 1987). This ties wolverine productivity to the availability of caribou and wolf populations (Dauphiné, 1989; Mulders, 1999).

LSA Habitat Loss Assessment

During the growing season, an estimated 31 ha of high suitability habitat will be lost at the main mine site: 3 ha of Avens and 28 ha of Sedge (see Table 5.2). This 31 ha of habitat represents approximately 6.2% of all habitats lost due to construction activities at the main site, 11.8% of lost terrestrial habitats, and 0.3% of the entire LSA. Moderate-rated habitats represent 226 ha, or 45.5%, and low-rated habitats represent 240 ha, or 48.3%, of habitats lost due to mine development.

During the winter season, an estimated 135 ha of high suitability habitat will be lost at the main mine site: 3 ha of Avens and 132 ha of Heath Tundra. This 135 ha of habitat represents approximately 27.2% of all habitats lost due to construction activities at the main site, 51.3% of lost terrestrial habitats at the main site, and 1.4% of the entire LSA. Moderate-rated habitats represent 118 ha, or 23.8%, and low-rated habitats represent 244 ha, or 49.1%, of habitats lost due to mine development.

RSA Habitat Loss Assessment

During the growing season, an estimated 17 ha of high suitability habitat (i.e., 17 ha of Sedge) will be lost at the main mine site (see Table 5.3). This 17 ha of habitat represents approximately 3.4% of all habitats lost due to construction activities at the main site, 6.2% of lost terrestrial habitats lost at the main site, and <0.01% of the entire RSA. Moderate-rated habitats represent 247 ha, or 49.8%, and low-rated habitats represent 227 ha, or 45.8%, of habitats lost due to mine development.

During the winter season, an estimated 182 ha of high suitability habitat (i.e., 182 ha of Heath Tundra) will be lost at the main mine site. This 182 ha of habitat represents approximately 36.7% of all habitats lost due to construction activities at the main site, 66.4% of lost terrestrial habitats at the

main site, and 0.02% of the entire RSA. Moderate-rated habitats represent 88 ha, or 17.6%, and low-rated habitats represent 227 ha, or 45.8%, of habitats lost due to mine development.

5.2.2.3 Other Impacts

The potential effects on predatory mammals from noise and activity related to construction will include avoidance of foraging habitat (reduced habitat effectiveness), deflection from normal travel routes, and energetic costs. Without mitigation, these impacts could have measurable impacts on predatory mammals utilizing the area; however, with mitigation (e.g., right-of-way to all predatory mammals), residual impacts are anticipated to be of low significance.

Potential effects from roads, airstrip, and traffic will include mortality due to collisions with vehicles, reduced habitat effectiveness and habitat degradation due to dust and exhaust, and potential for increased contaminant loading in food sources. With or without mitigation, these impacts are not expected to be significant.

The fuel storage and explosives facilities have the potential to contaminate or degrade the surrounding environment and increase contaminant loading in prey through leaks, spills, fires, and explosions. The main impact of the other facilities would be habitat loss, disturbance and reduced habitat effectiveness. Bears and wolverines may also be attracted to certain kinds of aromatic compounds, including oil products, typically oily rags and grease tubes, as well as aerosol cans and batteries (BHP, 2002).

The domestic waste disposal facility may attract predators if waste is not properly disposed. Food and other camp wastes attract scavengers including grizzly bear, Arctic fox, and wolverine, increasing risk to human safety. Mortality of animals may occur if they are deemed to be problem.

5.2.3 Operation Phase

A comprehensive analysis of the environmental effects of the proposed mine development on predatory mammals during the operation phase is provided in Appendix C.

5.2.3.1 Main Site

During the operations stage, most of the main site facilities will have been developed or will be under development, and most of the major sources of impacts will have already affected the receiving environment. For example, the construction of the mine shop / office will result in the loss of a small amount of habitat, and no further impacts are expected; however, the operation of the plant could produce continuous dust and emissions resulting in habitat degradation and contaminant loading in food sources in area much larger than the footprint of the plant itself.

Potential effects from the tailings facilities will be loss and disturbance of terrestrial foraging habitat around the edge of the lake (Second Portage Arm) to 4 m above current lake elevation. There is also the potential for predatory mammals to drink contaminated tailings pond water. Residual impacts are not expected to be significant, as aversive techniques will be implemented to ensure that predatory mammal contact with tailings facilities is minimized.

The domestic waste disposal facility could continue to potentially attract predators (grizzly bear, Arctic fox, and wolverine) if waste (food and other camp wastes) is not properly disposed of, or oil products and other aromatic compounds are not properly sealed and stored. The risk to human safety would remain, and the mortality of animals may occur if they are deemed to be problem.

5.2.3.2 Vault Site

Most of the Vault site facilities will be developed during the operation phase of the project. Potential effects of pit and waste rock pile development, noise and activity, and other related effects will be comparable to those described for the Main site. Losses of high suitability habitats for predatory mammals are described below.

LSA Habitat Loss Assessment

During the growing season, an estimated 28 ha of high suitability habitat will be lost at the Vault site: 3 ha of Avens and 25 ha of Sedge (see Table 5.2). This 28 ha of habitat represents approximately 7.6% of all habitats lost due to development activities at the Vault site, 10.7% of terrestrial habitats lost at the Vault site, and 0.3% of the entire LSA. Moderate-rated habitats represent 230 ha, or 63.0%, and low-rated habitats represent 108 ha, or 29.5% of habitats lost due to mine development.

During the winter season, an estimated 141 ha of high suitability habitat will be lost at the Vault site: 3 ha of Avens and 138 ha of Heath Tundra. This 141 ha of habitat represents approximately 38.6% of all habitats lost due to construction activities at the Vault site, 54.4% of lost terrestrial habitats at the Vault site, and 1.5% of the entire LSA. Moderate-rated habitats represent 115 ha, or 31.4%, and low-rated habitats represent 110 ha, or 30.0%, of habitats lost due to mine development.

The percentage of predatory mammal habitat lost within the LSA due to Vault site activities is less than 2% and is not expected to result in a significant impact to predatory mammals.

RSA Habitat Loss Assessment

During the growing season, an estimated 7 ha of high suitability habitat (i.e., 7 ha of Sedge) will be lost at the Vault site (see Table 5.3). This 7 ha of habitat represents approximately 1.9% of all habitats lost due to construction activities at the Vault site, 2.6% of terrestrial habitats lost at the Vault site, and <0.01% of the entire RSA. Moderate-rated habitats represent 256 ha, or 70.0%, and low-rated habitats represent 103 ha, or 28.1%, of habitats lost due to mine development.

During the winter season, an estimated 126 ha of high suitability habitat (i.e., 126 ha of Heath Tundra) will be lost at the Vault site. This 126 ha of habitat represents approximately 34.6% of all habitats lost due to construction activities at the Vault site, 47.9% of lost terrestrial habitats at the Vault site, and 0.01% of the entire RSA. Moderate-rated habitats represent 136 ha, or 37.3%, and low-rated habitats represent 103 ha, or 28.1%, of habitats lost due to mine development.

5.2.4 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on predatory mammals during the closure and post-closure phase is provided in Appendix C.

Impacts to predatory mammals during the closure and post-closure phase will be reduced from impacts during the construction and operation phases. In general, a reduction in noise and activity and reclamation of waste rock piles, roads, and other facilities will result in an improvement of habitat conditions during this phase.

Impacts of roads on habitat effectiveness in adjacent areas due to noise and activity, and habitat degradation due to dust and exhaust, would be reduced during closure and eliminated during post-closure. Risks and disturbances to predatory mammals from traffic during this phase will decrease and ultimately become minimal. Habitat degradation due to dust and exhaust may persist.

The domestic sewage and waste disposal facility and kitchen and camp facilities may still have the potential to attract predators (especially grizzly bears and wolverines), with consequent threats to human safety, prey animals, and ultimately, the predators themselves.

Ongoing effort must be made in restricting hunting within the vicinity of the project site during the closure and post-closure phase.

5.3 SUMMARY OF MITIGATION MEASURES

5.3.1 Mitigation

A detailed discussion of proposed mitigation measures to reduce project interactions with predatory mammals is provided in the Terrestrial Management Plan (Cumberland, 2005).

The only significant potential impact to predatory mammals identified in the impact matrix process is the potential for food and other wastes to attract grizzly bears, wolverines, and Arctic foxes. Experiences at other mines have shown that predatory mammals that became problem animals were most likely attracted to the mine sites and allowed into the landfills as a result of lax wildlife management practices and generally poor housekeeping practices with food and other aromatic substances.

The Meadowbank mine site will not have a landfill for domestic waste. All domestic waste and garbage will be incinerated. The incinerator has been designed to be capable of completely incinerating waste, without any residue that would attract predators or scavengers. The incinerator will be housed in a module connected directly to the mess hall or cooking facility so that it will not be necessary to expose the odours of domestic waste to the open air and so add to the risk of attracting predators or scavengers. Domestic waste facilities have been designed to be tightly sealed, and to trap all odours. However, the mine site will have a landfill for solid inorganic waste. Care will be taken that aromatic substances such as oil products (such as grease, oily rags, and paint), and other contaminants (such as aerosol cans and batteries) are removed off site.

All edible products and even inedible aromatic products, such as oil and paint, will be stored in sealed, bear-proof trailers or compounds. Skirts (i.e., sheet metal sheathing) will be placed along the

base of these facilities to prevent animals such as wolverines from gaining access from beneath. Sheathing will also be necessary on other facilities that may contain substances that have the potential to attract scavengers.

A safety education program for all personnel on procedures for dealing with bear-human interactions and avoiding interactions with wildlife in general will be implemented. Measures that will be discussed will include management of food, food wastes, and garbage, and maintaining safe distances from wildlife. Strict prohibition of all contact with wildlife, especially Arctic foxes and Arctic ground squirrels, which easily become dependent on humans for food, will be emphasized. Nine foxes that became habituated to human activity at the Ekati mine had to be destroyed ("a fed animal is a dead animal"). Every effort will be made to avoid this potential negative effect.

Grizzly bears will be hibernating during the period when the winter road is in use, therefore mitigation measures specific to bears are not anticipated. Interactions between vehicles and wolverine or wolf are unlikely but possible. Posted speed limits, reporting all incidences of wildlife sighting, and giving animals the right-of-way will ensure that the potential for vehicle/predator collisions is minimized. Every possible effort will be made to enforce a no-hunting zone of 1 km on either side of the winter road to reduce potential impacts on predators in the area and for the safety of mine employees utilizing the road. Mine employees will not be permitted to carry firearms or hunt while they are working. Only specific authorized personnel will be allowed to carry firearms.

5.3.2 Monitoring

Wildlife logs, of both sightings and interactions, will be kept on an ongoing basis to document the sightings of large predators near the mine facilities. These records will be one of the core elements for the site-specific monitoring plan and will provide support for actions required to prevent critical situations. Regular analyses of these data may provide solutions by way of adaptive management.

Cooperative programs will be discussed with the NWMB and representatives from Baker Lake to develop population estimates for grizzly bears, wolverines, and wolves. If applicable, potential or existing den sites will also be identified and monitored for use throughout the life of the mine.

5.4 SUMMARY OF RESIDUAL EFFECTS

A detailed analysis of anticipated residual effects of the proposed project on predatory mammals during the construction, operation and closure and post-closure phases is provided in Appendix C. One of the main objectives of the wildlife monitoring program in the Meadowbank area will be to evaluate the success of preventative programs designed to proactively avoid the occurrence of problem animals, as opposed to reactively trying to manage them by relocation or destruction. Despite the implementation of a wide range of mitigation plans to prevent the creation of problem wildlife, it is possible that predators will still be attracted to the site.

Some residual losses to high suitability habitats are expected; however, these losses make up only a very small percentage of overall available habitat in the LSA. Predatory mammals are wide-ranging and are more likely dependent on prey populations than the availability of habitat. Because residual impacts to ungulates are expected to be of low significance, impacts to predatory mammals are also considered to be of low significance.

SECTION 6 • SMALL MAMMALS

6.1 SUMMARY OF EXISTING CONDITIONS

Small mammals are important prey species for many mammals (e.g., Arctic wolf, grizzly bear, Arctic fox, ermine) and raptors (e.g., rough-legged hawk, peregrine falcon, gyrfalcon, snowy owl) in the tundra ecosystem. For this reason, they are considered collectively as a key wildlife resource. The Arctic hare, Arctic ground squirrel, collared lemming, and northern red-backed vole were selected as representative species for this key wildlife resource group.

6.1.1 Arctic Hare

The Arctic hare is considered to be secure in Nunavut (Government of Nunavut, 2001), and is not listed federally (COSEWIC, 2002). The species is widely distributed north of the treeline in Canada (Best and Henry, 1994, Atlantic Canada CDC, 2003). Likely predators of the Arctic hare in the Meadowbank area are raptors, Arctic foxes, wolves, and wolverines.

Arctic hares were recorded in relatively small numbers in the spring, summer, and fall in the LSA. They were, however, the most frequently observed mammal species, after caribou, in the LSA in the fall. Hare pellet densities and direct observations during ground surveys also indicate that Arctic hares were abundant throughout the Meadowbank LSA. An apparent increase in Arctic hare abundance was observed between the summer and fall of 2002 in the LSA. This may be a result of an increased population following a productive summer season, or increased visibility of white hares against a generally dark background in the fall.

6.1.2 Arctic Ground Squirrel

The Arctic ground squirrel is considered to be secure in Nunavut (Government of Nunavut, 2001), and is not listed federally (COSEWIC, 2002). Arctic ground squirrels are found throughout the northern boreal forest and Arctic tundra (Hubbs and Boonstra, 1997); however, information on the abundance and distribution of this species in the Arctic is scarce. The main predator of the Arctic ground squirrel in the Meadowbank area is likely the grizzly bear, which is easily capable of excavating squirrel colonies.

Arctic ground squirrels were recorded in relatively small numbers in the spring, summer, and fall in the LSA. They were, however, the most frequently observed mammal species in the LSA in the summer (Baseline Terrestrial Ecosystem Report; Cumberland, 2005). Arctic ground squirrels were also observed throughout the Meadowbank RSA. Burrows were concentrated in areas with sandy substrates suitable for digging, such as eskers and grassy slopes.

6.1.3 Collared Lemming

The status of the collared lemming in Nunavut is undetermined (Government of Nunavut, 2001), and the species is not listed federally (COSEWIC, 2002). Collared lemmings have a nearly circumpolar distribution (Federov et al, 1999), and genetic analyses suggest that they disperse long distances

over sea ice (Ehrlich et al, 2001). This species is well known for its population cycles (Ehrich et al, 2001; Wilson and Bromley, 2001). Synchrony between the population abundance of lemmings and voles has been demonstrated in the Canadian Arctic (Krebs et al, 2002). There are also links between lemming cycles, Arctic Fox predation, and the reproductive success of geese in the Arctic (Wilson and Bromley, 2001; Bêty et al, 2001).

Lemmings were not observed during the field surveys, suggesting that this species could be at the low phase of its population cycle (3 to 4 years). Although the collared lemming has not yet been confirmed in the Meadowbank area, it is highly probable that it occurs there. Likely predators of this small mammal in the Meadowbank area are rough-legged hawk, Arctic fox, and ermine. Grizzly bears, Arctic ground squirrels, and snowy owls may also prey on this species (Reid et al, 1995).

6.1.4 Northern Red-backed Vole

The status of the northern red-backed vole in Nunavut is undetermined (Government of Nunavut, 2001), and the species is not listed federally (COSEWIC, 2002). The northern red-backed vole is found throughout much of northern Canada. In the south, it is replaced by the southern red-backed vole (*C. gapperi*); however, the exact distributions of these species are unknown due to the difficulties in distinguishing between them (Banfield, 1974; NWTRWED, 2000). This species exhibits marked population fluctuations (Douglass, 1984; Gilbert and Krebs, 1991). Likely predators of this vole in the Meadowbank area are rough-legged hawk, Arctic fox, and ermine. As with the collared lemming, grizzly bears, Arctic ground squirrels, and snowy owls may also prey on this species.

The northern red-backed vole has been recorded incidentally six times in the Meadowbank area, and is expected to be common throughout the area.

6.2 ENVIRONMENTAL EFFECTS

6.2.1 General

An analysis of the environmental effects of the proposed mine development on small mammals during the construction, operations, and closure and post-closure phases is provided in Appendix E. Habitat fragmentation is likely to pose a greater risk for impacts to small mammal populations in the Meadowbank project than to other wildlife species due to their limited mobility (with the exception of Arctic hares). Roads, open pits, the airstrip, and waste rock dumps would present significant barriers. Small mammals may also colonize roadsides, which would increase the likelihood of collisions with vehicles.

Small mammal populations in Arctic environments tend to be cyclic, exhibiting great fluctuations varying from 10 to 50 times peak values compared to lows values, generally occurring on a regular basis of three to four years (BHP, 1995, as cited in BHP, 2000). Because of these fluctuations, it will be difficult to determine whether changes in abundance are due to natural fluctuations or mine-related effects. Small mammal fluctuations can also influence the population dynamics of numerous predator species including predatory mammals and raptors, as well as the availability of food for herbivores such as caribou and muskox. During a peak year for small mammals, lemmings utilized about 15% of the vegetative standing crop at Baker Lake (Krebs, 1964).

To assess the potential impacts of habitat loss on small mammals, two tables were developed to quantify the loss of high suitability habitats. Table 6.1 quantifies the area of low, moderate, and high suitability ELC units lost to mine development in the LSA and RSA (for the purposes of this analysis, the LSA and RSA are as defined for the baseline studies). The data in Table 6.1 are applicable for the whole year. This is because most of the small mammals being considered remain within the LSA throughout the year. The collared lemming and northern red-backed vole are mostly subnivean, and the Arctic hare remains active all winter. Only the Arctic ground squirrel hibernates.

Table 6.2 summarizes the high, moderate, and low suitability habitat lost during the growing season and winter in the LSA and the RSA.

Table 6.1: Small Mammals – ELC Areas Lost to Mine Development in LSA & RSA for Whole Year

	Area Lost in LSA All Year (m^2)		
Small Mammals	**Low**	**Moderate**	**High**
Water (Deep and Shallow)	3,400,280		
Sedge		530,262	
Moss		284	
Birch Seep		505,536	
Riparian Shrub, Birch			81,161
Heath Tundra			2,704,001
Snowbank	58,950		
Avens			59,040
Lichen-Rock			1,210,913
Ridge Crest (Esker)			-
Disturbed		61,009	
Unmapped			
Totals	**3,459,230**	**1,097,090**	**4,055,114**
	9.17%	**8.56%**	**11.47%**
	Area Lost in RSA All Year (m^2)		
Small Mammals	**Low**	**Moderate**	**High**
Birch Seep Community		262,371	
Deep Water	2,608,381		
Disturbed Sites	33,784		
Eskers			N/A
Heath Tundra Community			3,035,437
Heath Tundra/Lichen Rock Ass'n			46,098
Lichen-Rock Community - Bedrock Ass'n			721,420
Lichen-Rock Community - Boulder Ass'n			1,012,686
Riparian Shrub Community			N/A
Sand/Gravel			7,200
Sedge Community		242,533	
Shallow Water	630,371		
Unclassified	25,792		
Totals	**3,298,328**	**504,904**	**4,822,840**
	0.14%	**0.10%**	**0.04%**

Table 6.2: Small Mammal High, Moderate & Low Suitability Habitat Loss at the Main & Vault Sites Based on LSA & RSA Analysis

Small Mammals	Area Lost in LSA (ha) All Year			Small Mammals	Area Lost in RSA (ha) All Year		
	Main Site	Vault Site	Totals		Main Site	Vault Site	Totals
Avens community (H)	2.7	3.2	5.9	Avens community (H)	N/A	N/A	N/A
Birch seep (M)	48.5	2.1	50.6	Birch seep (M)	24.5	1.7	26.2
Disturbed features M)	6.1	-	6.1	Disturbed features (M)	3.4	-	3.4
Heath tundra (H)	132.3	138.1	270.4	Heath tundra (H)	181.7	126.4	308.1
Lakes or ponds (L)	233.9	106.2	340.0	Lakes or ponds (L)	222.6	101.3	323.9
Lichen rock on outcrops (H)	11.9	17.7	29.5	Lichen rock on outcrops (H)	24.1	48.1	72.1
Lichen rock with boulders (H)	22.3	69.2	91.5	Lichen rock with boulders (H)	21.7	79.6	101.3
Moss community (M)	0.0	-	0.0	Moss community (M)	N/A	N/A	N/A
Riparian shrub (H)	7.1	1.0	8.1	Riparian shrub (H)	N/A	N/A	N/A
Sedge community (M)	28.3	24.7	53.0	Sedge community (M)	17.4	6.9	24.3
Snowbank community (L)	3.8	2.1	5.9	Snowbank community (L)	N/A	N/A	N/A
Unclassified (L)	-	1.5	1.5	Unclassified (L)	1.3	1.3	2.6
High	176.34	229.17	405.51	High	227.42	254.11	481.53
Moderate	82.89	26.82	109.71	Moderate	45.26	8.61	53.87
Low	237.64	109.78	347.42	Low	223.89	102.56	326.45
Total Hectares	**496.87**	**365.77**	**862.64**	**Total Hectares**	**496.58**	**365.28**	**861.85**

6.2.1.1 LSA

A total of 4,338 ha of high suitability small mammal habitat (i.e., 46.2% of total LSA area) is present within the LSA. Of this, an anticipated 405 ha (4.3% of total LSA area) or 9.3% of high suitability habitat is expected to be lost due to mine development activities (see Table 6.3). On an ELC unit basis, loss of high suitability habitats includes 6 ha of Avens, 270 ha of Heath Tundra, 121 ha of Lichen-Rock and 8 ha of Riparian Shrub (Table 6.1).

On a small mammal-specific LSA basis (i.e., 500 m radius or 78.5 ha), the 405 ha of high suitability habitat lost due to mine development represents an impact of high magnitude and significance to local populations of small mammals. On a small mammal-specific RSA basis (i.e., 5 km radius or 7,850 ha), the 405 ha of lost high suitability habitat represents approximately 5.2% of the small mammal RSA, an impact considered to be of low magnitude and significance.

Table 6.3: Small Mammals – Total High Suitability Habitat Lost in the LSA

	Main Site High Suitability Habitat Lost in LSA (ha)	Vault Site High Suitability Habitat Lost in LSA (ha)	Total of LSA Lost (ha)	Total High Suitability Habitat Available (ha) in LSA	% High Suitability Habitat Lost in LSA	Total LSA (ha)	% Total LSA Lost
All Year	176	229	405	4,338	9.3	9,385	4.32
Total	497	366	863	-	-	9,385	9.19

Note: The bottom row is for the *entire* LSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

6.2.1.2 RSA

For the growing season, a total of 675,623 ha of high suitability small mammal habitat (i.e., 66.2% of total RSA area) is present within the RSA. Of this, an anticipated 481 ha (0.05% of total RSA area), or 0.07%, of high suitability habitat is expected to be lost due to mine development activities (see Table 6.4). On an ELC unit basis, loss of high suitability habitats includes 308 ha of Heath Tundra and 173 ha of Lichen-Rock (Table 6.1).

Table 6.4: Small Mammals – Total High Suitability Habitat Lost in the RSA

	Main Site High Suitability Habitat Lost in RSA (ha)	Vault High Suitability Lost in RSA (ha)	Total of LSA Lost in RSA (ha)	Total High Suitability Habitat Available (ha) in RSA	% High Suitability Habitat Lost in RSA	Total RSA (ha)	% Total RSA Lost
All Year	223	254	477	675,623	0.07	1,019,979	0.05
Total	497	365	862	-	-	1,019,979	0.08

Note: The bottom row is for the *entire* RSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

6.2.2 Construction

6.2.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on small mammals during the construction phase is provided in Appendix E.

The main sources of impacts during the construction phase will be the development of the pits (Portage and Goose Island), waste rock storage areas (Portage and Goose), borrow pit(s), dikes (South, Third Portage, West, East), fuel storage area, camps (South and North), plant site (footprint), freshwater intake pipeline, discharge pipeline, airstrip, air traffic, main site Roads, ground traffic, emulsion / AN storage / explosives magazines, increased human presence, and camp waste disposal.

The primary potential effects on small mammals will be: direct and indirect loss of habitat; displacement and reduced habitat effectiveness; mortality due to collisions with vehicles or aircraft; potential degradation of surrounding habitats and increased contaminant loading in plants due to fuel spills/dust and emissions from the plant site; habituation to human structures and presence; and food conditioning.

The domestic waste disposal facility would potentially attract rodents (e.g., voles, lemmings, or Arctic ground squirrels).

6.2.2.2 Habitat Loss

LSA Habitat Loss Assessment

An estimated 176 ha of high suitability habitat will be lost at the main mine site: 3 ha of Avens, 132 ha of Heath Tundra, 34 ha of Lichen-Rock, and 7 ha of Riparian Shrub (see Table 6.2). This 176 ha of habitat represents approximately 35.5% of all habitats lost due to construction activities at the main site, 67.1% of lost terrestrial habitats lost, and 1.9% of the entire LSA. Moderate-rated habitats represent 83 ha, or 16.7%, and low-rated habitats represent 238 ha, or 47.8%, of habitats lost due to mine development.

RSA Habitat Loss Assessment

An estimated 227 ha of high suitability habitat will be lost at the main site: 182 ha of Heath Tundra and 46 ha of Lichen-Rock (see Table 6.2). This 227 ha of habitat represents approximately 45.7% of all habitats lost due to construction activities at the main site, 83.0% of lost terrestrial habitats at the main site, and 0.02% of the entire RSA. Moderate-rated habitats represent 45 ha, or 9.1%, and low-rated habitats represent 224 ha, or 45.1% of habitats lost due to mine development.

6.2.2.3 Other Impacts

The potential effects on small mammals from noise and activity related to construction will include avoidance of foraging habitat (reduced habitat effectiveness), interception of normal dispersal routes, and energetic costs. Despite these potential effects, the residual impacts to small mammals are not anticipated to be significant.

Potential effects from roads, airstrip, and traffic will include mortality due to collisions with vehicles, reduced habitat effectiveness and habitat degradation due to dust and exhaust, and potential for increased contaminant loading in roadside vegetation sources. With or without mitigation, these impacts are not expected to be significant.

6.2.3 Operation Phase

A comprehensive analysis of the environmental effects of the proposed mine development on small mammals during the operation phase is provided in Appendix E.

6.2.3.1 Main Site

During the operations stage, most of the main site facilities will have been developed or will be under development, and most of the major sources of impacts will have already affected the receiving environment. Ongoing operation of the plant is expected to produce low concentrations of dust and emissions resulting in possible habitat degradation and contaminant loading in vegetation in an area much larger than the footprint of the plant itself.

Potential effects from the tailings facilities will be loss and disturbance of terrestrial living habitat around the edge of the lake (Second Portage Arm) to 4 m above current lake elevation. The domestic waste disposal facility may continue to attract small mammals if the facility is not properly managed.

6.2.3.2 Vault Site

Most of the Vault site facilities will be developed during the operation phase of the project. Potential effects of pit and waste rock pile development, noise and activity, and other related effects will be comparable to those described for the main site. Losses of high suitability habitats for small mammals at the Vault site are described below.

LSA Habitat Loss Assessment

An estimated 229 ha of high suitability habitat will be lost at the Vault site: 3 ha of Avens, 138 ha of Heath Tundra, and 87 ha of Lichen-Rock (see Table 6.2). This 229 ha of habitat represents approximately 62.7% of all habitats lost due to construction activities at the Vault site, 88.3% of lost terrestrial habitats at the Vault site, and 2.4% of the entire LSA. Moderate-rated habitats represent 27 ha, or 7.3%, and low rated habitats represent 110 ha, or 30.0%, of habitats lost due to mine development.

The low percentage of small mammal habitat lost within the LSA due to Vault site activities (i.e., 2.4%) is not expected to result in a significant impact to small mammals.

RSA Habitat Loss Assessment

An estimated 254 ha of high suitability habitat will be lost at the Vault site (see Table 6.2). This 254 ha of habitat represents approximately 69.6% of all habitats lost due to construction activities at the Vault site, 96.3% of lost terrestrial habitats at the Vault site, and 0.02% of the entire RSA. Moderate-rated

habitats represent 9 ha, or 2.4%, and low-rated habitats represent 103 ha, or 28.1%, of habitats lost due to mine development.

6.2.4 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on small mammals during the closure and post-closure phase is provided in Appendix E.

Impacts to small mammals during the closure and post-closure phase will be reduced from impacts during the construction and operation phases, particularly as vegetation becomes reestablished on waste rock piles, roads, and other facilities, resulting in an improvement of habitat conditions. Recolonization of these areas by small mammals is expected.

Risks and disturbances to small mammals from traffic during this phase will decrease significantly and eventually be eliminated; however, habitat degradation due to dust and exhaust may persist. The open pits will have resulted in a permanent loss of terrestrial habitat during the operation phase; however, during the closure and post-closure phase, the dikes will be breached and pits allowed to fill with water. The flooded pits will disrupt small mammal movement and dispersal.

6.3 SUMMARY OF MITIGATION MEASURES

A detailed discussion of proposed mitigation measures to reduce project interactions with small mammals is provided in the Terrestrial Management Plan (Cumberland, 2005).

The primary objective of mitigation is to maintain high quality habitats wherever possible, even in close proximity to project facilities, so that small mammals can continue to use these areas. Maintenance of high quality habitats even in close proximity to buildings is of importance because small mammals are easily habituated to the presence of structures and humans and are likely to utilize all available habitats.

Microtine rodents and possibly Arctic ground squirrels may inhabit roadsides, which would make them particularly vulnerable to being hit by vehicles. Drivers will make every effort to avoid small mammals, providing drivers do not endanger themselves or their loads. Roads will be watered as necessary to reduce dust, emissions and dust control protocols will be followed, and vehicles will be maintained in good condition to minimize contaminant loading of roadside and downwind vegetation.

Arctic ground squirrels will be hibernating during operation of the winter road and are unlikely to be affected by winter road use. Speed limits on the winter road will be enforced, however, to reduce the potential for vehicle collisions with Arctic hare. Small mammals other than Arctic hare are subnivean during the winter (i.e., under the snow) and have the potential to be crushed under the weight of vehicles. Winter road maintenance such as building up low-snow areas with snow and using water spray to ice roads will minimize the potential for this impact.

To avoid dependence of small mammals (e.g., Arctic ground squirrel) on human foods, feeding will be prohibited, food will be properly and securely stored, and all food wastes will be incinerated.

During closure and post-closure, it may be possible to create esker-like habitat from the roads once they have been scarified. It may also be possible to create habitat for microtine rodents on the slopes of waste rock dumps either during operations or during closure and post-closure. Microtine rodents prefer microhabitats as well as Ridge Crest, Avens, and Heath Tundra. If rock size and angularity and interstitial spaces can be duplicated, even if the slope face is disturbed, voles and lemmings may inhabit these spaces as long as they are stable and properly drained, and especially if and when they begin to revegetate with edible plant species. Opportunities to exploit microhabitats and refugia in and around the mine site (e.g., around buildings) will be investigated.

Areas where facilities have been removed, waste rock piles, tailings, roads, and other areas where vegetation has been disturbed will be considered for revegetation during closure and post-closure.

6.4 SUMMARY OF RESIDUAL EFFECTS

A detailed analysis of anticipated residual effects of the proposed project on small mammals during the construction, operation and closure and post-closure phases is provided in Appendix E.

The natural cyclic nature of vole and lemming populations may make it difficult to determine whether changes in abundance in these species are due to natural fluctuations or mine-related effects. Because the home ranges of small mammals are relatively small, local populations could be affected by loss of habitat within existing home ranges. Much of the habitat loss is unavoidable. The major impacts to small mammals will be fragmentation of habitat due to development of open pits, waste rock disposal areas, tailings impoundments, and roads. Through the application of mitigation measures summarized in the section above and tabulated in detail in the matrices, residual impacts can be managed adequately.

Small mammals are likely to readily adapt to temporary changes in their environment; however, if the temporary shutdown occurs during winter, small mammals that have found habitat under heated buildings may perish if the heat is turned off. Predators may also move into the mine facilities and prey on the otherwise-protected animals. Small mammals may also create habitats in areas that would otherwise be high-use (e.g., roadsides or areas near machinery). This could be fatal to some animals once the mine resumes operations.

Residual impacts for all project components during all stages of the mine life are not considered to be significant on a regional basis because overall loss of high suitability habitat in the LSA is less than 10% of high suitability habitat available; however, on a local level (i.e., small mammal LSA of 500 m radius), impacts are significant.

SECTION 7 • RAPTORS

7.1 SUMMARY OF EXISTING CONDITIONS

Nesting habitat for breeding falcons and hawks in the Meadowbank area is assessed as having low suitability because the ELC identifies only boulder, bedrock, or esker units, rather than cliff habitats, the preferred nesting locations; however, habitat suitability for foraging raptors is moderate to high because the area contains large areas of heath tundra combined with grassy meadows, bare rocky areas, patches of low shrub, and shallow and deep-water habitats, which support prey such as Arctic hares, rodents, passerines, ptarmigan, shorebirds, and waterfowl.

Baseline surveys indicate the presence of four raptor species in the Meadowbank area: rough-legged hawk, gyrfalcon, snowy owl, and peregrine falcon. Of these four, only one, peregrine falcon (i.e., *anatum* subspecies) has been identified as a species of special concern by COSEWIC (2002).

Based on information on raptor migration through the Warden Grove area along the Thelon River, rough-legged hawks and peregrine falcons are believed to arrive in the Meadowbank area from early to mid-May, and depart in late September and gyrfalcons are known to overwinter (Norment, 1985).

During baseline surveys, most raptor sightings were made in the western half of the RSA, particularly in the northwestern portion (Baseline Terrestrial Ecosystem Report; Cumberland, 2005). Fall surveys found that observations of raptors were most often associated with heath tundra and esker habitats, presumably because such sites provide potential foraging and nesting habitat.

Peregrine falcons have been confirmed as nesting in the RSA. In the summer of 1998, camp personnel observed a nesting falcon along the Meadowbank River and in spring 1999, an inactive nest site within 2.5 km of the field camp was noted. No peregrine falcons were observed during the June 2003 breeding bird surveys within the LSA.

It is possible that the other three raptor species also breed in the area (Richards et al, 2002), however, suitable nesting cliffs are not widespread in either the LSA or RSA. Nevertheless, rough-legged hawks have been reported nesting on the faces of rock outcrops, eroded riverbanks, on breaks of slopes, tops of rocks on steep slopes, and other platforms (Bechard and Swem, 2002). On Banks Island, Northwest Territories, a nest with large young was observed on an easily approachable bluff similar to many within the LSA and RSA.

The rough-legged hawk was recorded in low numbers (<5 visuals per season) in the Meadowbank RSA and LSA in the spring, summer, and fall surveys. The species was associated primarily with heath tundra habitats, although observations were also made in lichen-rock sites.

Gyrfalcons were also recorded in low numbers (<5 visuals per season) in the Meadowbank LSA in the spring and fall, but were seen only in the fall in the RSA (2 observations). Gyrfalcons were not observed during the June 2003 breeding bird surveys within the LSA.

Habitat suitability for snowy owls is likely moderate-to-high in both the LSA and RSA because their nesting habitat generally consists of hummocky or rolling tundra with promontories that are used for nest sites or perches (Godfrey, 1976; Parmelee, 1992), all habitat features common within the LSA and RSA. Nevertheless, the breeding status of the snowy owl in the Meadowbank area is uncertain since no owl nests were observed during the June 2003 breeding bird surveys in the LSA. Snowy owls were seen, however, during baseline surveys in the summer and fall in the LSA and were the most frequently recorded raptor (10 visuals) during the fall 2002 ground survey in the LSA. Additionally, camp personnel recorded three observations of snowy owls in the LSA in early spring in 1997. Snowy owls were observed in low numbers (<5 visuals per season) in the spring and fall in the RSA.

7.2 ENVIRONMENTAL EFFECTS

7.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on raptors during the construction, operations, and closure and post-closure phases is provided in Appendix D.

Mining activities can affect breeding raptors by causing habitat changes, behavioural disturbances, and health or mortality risks. These in turn can result in changes in species distribution and abundance, disruption of species movements, and changes in habitat suitability and effectiveness. Changes in habitat use among raptors may result from disturbances to nest sites or to changes in habitat suitability and use by prey species. Construction of project facilities can result in mortality of prey and loss of their habitat, while changes in snow melt and vegetation growth due to dust deposition can alter local prey distributions (AXYS, 1998). Such changes can affect the availability and suitability of raptor foraging habitat.

Behavioural responses of breeding raptors to disturbances can vary among individuals and species, according to the timing and type of disturbance and the extent of previous experience with disturbances. Responses can range from tolerance and habituation to nest abandonment (AXYS, 1998). Platt (1977) reported that on the Yukon North Slope, the percentage of gyrfalcons flushed from nest sites was inversely proportion to flight altitude, and that rates of re-use of nest sites that had been disturbed during the previous breeding season declined in the following year. Helicopter flights at 300 m altitude were shown to illicit stress response postures among nesting gyrfalcons, while fixed-winged aircraft and helicopter over-flights at 150 m altitude or less can cause flight responses among both incubating and non-incubating gyrfalcons. Over-flights of 600 m altitude may cause no disturbance, and approaches from above have been found to cause fewer disturbances than lateral approaches. Martin (1978) noted that disturbances at gyrfalcon nest sites can be critical in areas where suitable sites are limited. In contrast to these studies, Windsor (1977) found that low level aircraft flights caused little disturbance among incubating peregrine falcons, while Campbell and Davies (1973) noted that peregrines tolerated flights within 100 m of their nest sites. White and Sherrod (1973) reported that disturbance effects to nesting raptors are reduced if aircraft are visible from a distance. Windsor (1977) reported that pedestrian traffic near nest sites can cause greater disturbances to breeding raptors than helicopters.

Raptor responses to road construction and use have also been variable. Hickey (1969) reported that gyrfalcons abandoned their nest when a bridge was constructed 410 m from the site, whereas Ritchie

(1991) found that rough-legged hawks successfully nested within 400 m of the Dalton Highway in Alaska, even though there were no visual barriers to traffic from the nest site.

Collisions with motor vehicles, aircraft, and powerlines, electrocution due to perching on powerlines, and nest abandonment due to disturbances are all potential sources of mortality for raptors (Clum and Cade, 1994; AXYS, 1998; Bechard and Swem, 2002).

To assess the potential impacts of habitat loss on raptors, three tables were developed to quantify the loss of high suitability habitats. Table 7.1 quantifies the area of low, moderate, and high suitability ELC units lost to mine development in the LSA and RSA (for the purposes of this analysis, the LSA and RSA are as defined for the baseline studies). Habitat suitability ratings for raptors are provided in Table 2.4 in Section 2.5. Table 7.2 summarizes the high, moderate, and low suitability habitat lost during the growing season and winter in the LSA and Table 7.3 summarizes similar information for the RSA.

Table 7.1: Raptors – ELC Areas Lost to Mine Development in LSA & RSA for Growing Season & Winter

ELC Type	Habitat Suitability				Habitat Suitability		
	Low	**Moderate**	**High**		**Low**	**Moderate**	**High**
Water (Deep and Shallow)		3,400,280			3,400,280		
Sedge		530,262			530,262		
Moss		284			284		
Birch Seep		505,536			505,536		
Riparian Shrub, Birch		81,161			81,161		
Heath Tundra			2,704,001				2,704,001
Snowbank	58,950				58,950		
Avens		59,040				59,040	
Lichen-Rock			1,210,913				1,210,913
Ridge Crest (Esker)			-			-	
Disturbed	61,009				61,009		
Unmapped	15,000			Total	15,000		
Totals	**134,959**	**4,576,562**	**3,914,914**	**8,626,435**	**4,652,481**	**59,040**	**3,914,914**
	11.43%	**9.88%**	**9.56%**		**2.83%**	**6.21%**	**18.41%**
ELC Type	**Area Lost in RSA (Growing Season (m^2))**				**Area Lost in RSA in Winter (m^2)**		
	Low	**Medium**	**High**		**Low**	**Medium**	**High**
Birch Seep Community		262,371			262,371		
Deep Water		2,608,381			2,608,381		
Disturbed Sites	33,784				33,784		
Eskers		N/A				N/A	
Heath Tundra Community			3,035,437				3,035,437
Heath Tundra/Lichen Rock Ass'n			46,098				46,098
Lichen-Rock Community - Bedrock Ass'n			721,420				721,420
Lichen-Rock Community - Boulder Ass'n			1,012,686				1,012,686
Riparian Shrub Community		N/A			N/A		
Sand/Gravel		7,200				7,200	
Sedge Community		242,533			242,533		
Shallow Water		630,371			630,371		
Unclassified	25,792			Total	25,792		
Totals	**59,576**	**3,750,856**	**4,815,640**	**8,626,072**	**3,803,232**	**7,200**	**4,815,640**
	0.31%	**0.11%**	**0.07%**		**0.16%**	**0.00%**	**0.07%**

Table 7.2: Raptor High, Moderate & Low Suitability Habitat Loss during Growing & Winter Seasons in Main & Vault Sites based on LSA Analysis

	Main Site	Vault Site	Totals		Main Site	Vault Site	Totals
Avens community (M)	2.7	3.2	5.9	Avens community (M)	2.7	3.2	5.9
Birch seep (M)	48.5	2.1	50.6	Birch seep (L)	48.5	2.1	50.6
Disturbed features (L)	6.1	-	6.1	Disturbed features (L)	6.1	-	6.1
Heath tundra (H)	132.3	138.1	270.4	Heath tundra (H)	132.3	138.1	270.4
Lakes or ponds (M)	233.9	106.2	340.0	Lakes or ponds (L)	233.9	106.2	340.0
Lichen rock on outcrops (H)	11.9	17.7	29.5	Lichen rock on outcrops (H)	11.9	17.7	29.5
Lichen rock with boulders (H)	22.3	69.2	91.5	Lichen rock with boulders (H)	22.3	69.2	91.5
Moss community (M)	0.0	-	0.0	Moss community (L)	0.0	-	0.0
Riparian shrub (M)	7.1	1.0	8.1	Riparian shrub (L)	7.1	1.0	8.1
Sedge community (M)	28.3	24.7	53.0	Sedge community (L)	28.3	24.7	53.0
Snowbank community (L)	3.8	2.1	5.9	Snowbank community (L)	3.8	2.1	5.9
Unclassified (L)	-	1.5	1.5	Unclassified (L)	-	1.5	1.5
High	166.52	224.97	391.49	High	166.52	224.97	391.49
Moderate	320.46	137.19	457.66	Moderate	2.71	3.20	5.90
Low	9.89	3.61	13.49	Low	327.64	137.61	465.25
Total Hectares	**496.87**	**365.77**	**862.64**	**Total Hectares**	**496.87**	**365.77**	**862.64**

Table 7.3: Raptor High, Moderate & Low Suitability Habitat Loss during Growing & Winter Seasons in Main & Vault Sites based on RSA Analysis

Raptors	Area Lost in RSA (ha) Growing Season			Raptors	Area Lost in RSA (ha) Winter		
	Main Site	Vault Site	Totals		Main Site	Vault Site	Totals
Avens community (M)	N/A	N/A	N/A	Avens community (M)	N/A	N/A	N/A
Birch seep (M)	24.5	1.7	26.2	Birch seep (L)	24.5	1.7	26.2
Disturbed features (L)	3.4	-	3.4	Disturbed features (L)	3.4	-	3.4
Heath tundra (H)	181.7	126.4	308.1	Heath tundra (H)	181.7	126.4	308.1
Lakes or ponds (M)	222.6	101.3	323.9	Lakes or ponds (L)	222.6	101.3	323.9
Lichen rock on outcrops (H)	24.1	48.1	72.1	Lichen rock on outcrops (H)	24.1	48.1	72.1
Lichen rock with boulders (H)	21.7	79.6	101.3	Lichen rock with boulders (H)	21.7	79.6	101.3
Moss community (M)	N/A	N/A	N/A	Moss community (L)	N/A	N/A	N/A
Riparian shrub (M)	N/A	N/A	N/A	Riparian shrub (L)	N/A	N/A	N/A
Sedge community (M)	17.4	6.9	24.3	Sedge community (L)	17.4	6.9	24.3
Snowbank community (L)	N/A	N/A	N/A	Snowbank community (L)	N/A	N/A	N/A
Unclassified (L)	1.3	1.3	2.6	Unclassified (L)	1.3	1.3	2.6
High	227.42	254.11	481.51	High	227.42	254.11	481.53
Moderate	264.49	109.88	374.37	Moderate	-	-	-
Low	4.67	1.28	5.96	Low	269.15	111.17	380.32
Total Hectares	**496.58**	**365.28**	**861.86**	**Total Hectares**	**496.58**	**365.28**	**861.85**

7.2.1.1 LSA

In the growing and winter seasons, a total of 4,098 ha of high suitability raptor habitat (i.e., 43.7% of total LSA area) is present within the LSA. Of this, an anticipated 391 ha (4.2% of total LSA area), or 9.5%, of high suitability habitat is expected to be lost due to mine development activities (see Table 7.4). On an ELC unit basis, loss of high suitability habitats includes 270 ha of Heath Tundra and 111 ha of Lichen-Rock (see Table 7.1).

On a raptor-specific LSA basis (i.e., 1 km radius or 314 ha), the 391 ha of high suitability habitat lost due to mine development represents an impact of high magnitude and significance to local nesting populations of raptors. On a raptor-specific RSA basis (i.e., 50 km radius or 785,000 ha), the 391 ha of lost high suitability habitat represents approximately 0.1% of the raptor RSA, an impact considered to be of low magnitude and significance.

Table 7.4: Raptors – Total High Suitability Habitat Lost in the LSA

	Main Site High Suitability Habitat Lost in LSA (ha)	Vault Site High Suitability Habitat Lost in LSA (ha)	Total of LSA Lost (ha)	Total High Suitability Habitat Available (ha) in LSA	% High Suitability Habitat Lost in LSA	Total LSA (ha)	% Total LSA Lost
Growing	167	225	391	4,098	9.54	9,385	4.17
Winter	167	225	391	4,098	9.54	9,385	4.17
Total	497	366	863	-	-	9,385	9.19

Note: The bottom row is for the *entire* LSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

7.2.1.2 RSA

For the growing and winter seasons, a total of 682,880 ha of high suitability raptor habitat (i.e., 67.0% of total RSA area) is present within the RSA. Of this, an anticipated 482 ha (0.05% of total RSA area) or 0.07% of high suitability habitat is expected to be lost due to mine development activities (see Table 7.5). On an ELC unit basis, loss of high suitability habitats includes 308 ha of Heath Tundra and 173 ha of Lichen-Rock (see Table 7.1).

Table 7.5: Raptors – Total High Suitability Habitat Lost in the RSA

	Main Site High Suitability Habitat Lost in RSA (ha)	Vault High Suitability Lost in RSA (ha)	Total of LSA Lost in RSA (ha)	Total High Suitability Habitat Available (ha) in RSA	% High Suitability Habitat Lost in RSA	Total RSA (ha)	% Total RSA Lost
Growing	227	254	482	682,880	0.07	1,019,979	0.05
Winter	227	254	482	682,880	0.07	1,019,979	0.05
Total	497	365	862	-	-	1,019,979	0.08

Note: The bottom row is for the *entire* RSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

7.2.2 Construction

7.2.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on raptors during the construction phase is provided in Appendix D.

The densities of breeding pairs of birds (i.e., species preyed on by raptors) observed during June 2003 breeding bird surveys indicate that the loss of 522 ha of ELC terrestrial vegetation communities at the Main and Vault sites may displace approximately 250 to 270 pairs of Lapland longspurs, 40 to 60 pairs of horned larks, 4 to 6 pairs of American pipits, 10 to 20 pairs of rock ptarmigan, 5 to 10 pairs of semipalmated sandpipers, and minor numbers of other passerine species (see Section 8). Because the habitats for these species are widespread within the LSA and RSA, the effects on the total regional bird populations can be expected to be minimal; however, the local reduction in the prey base may have a moderate impact on nesting raptors in the vicinity of the project. At the present time, no quantitative data are available on population sizes of small mammals or breeding waterfowl within the project area. Habitat losses for birds and small mammals will be 9.2% of the LSA and 0.08% of the RSA. The overall residual impact of the decrease in prey base on raptor populations is not expected to be significant.

Based on survey information to date, no raptor nesting sites will be affected due to construction activities. The nearest known raptor nest site (an inactive peregrine falcon nest) was within 2.5 km of the field camp. Court and others (1988) reported an average spacing of 3.3 km between peregrine falcon nests in Nunavut, with the closest being within 0.7 km. Optimal nesting habitats for breeding raptors, other than the snowy owl, are limited in the Meadowbank area due to the general lack of cliff topography.

During the nesting season, human activity and noise may cause some disturbance and displacement of nesting raptors, resulting in increased energy expenditures and stress levels, and possibly reduced reproductive success and subsequent survival of young. Susceptibility to disturbance can vary between individuals and between raptor species. When breeding, raptors tend to be quite tenacious with regard to their chosen nest site and are reluctant to abandon it. Provided the disturbance is not too intense or prolonged, raptors will generally return to the nest when the disturbance has ceased (Clum and Cade, 1994; Bechard and Swem, 2002; White et al, 2002). At Rankin Inlet, peregrine falcons have nested successfully within 2 km of the town and airport over a 14-year period despite frequent disturbance from air, boat, and snowmobile traffic (Johnstone, 1998). Besides disrupting nesting raptors, human activity and noise can result in reducing the effectiveness of their habitats.

7.2.2.2 Habitat Loss

High suitability habitat changes between the growing season and winter for raptors is more a function of the distribution and densities of prey than the availability of ELC units. Home ranges are generally large, so small relative changes in habitat availability are not expected to affect regional raptor populations. Habitat loss in close proximity to nesting birds may have an effect; however, actively nesting raptors have not been documented in close proximity to mine facilities to date.

The following discussion related to the main site where development of most facilities and structures will take place during the construction phase (Year -2 to Year 0). The Vault site, which will be developed primarily during the operation phase, is discussed in the operation section below.

LSA Habitat Loss Assessment

During the growing and winter seasons, an estimated 167 ha of high suitability habitat will be lost at the main mine site: 132 ha of Heath Tundra and 34 ha of Lichen-Rock (see Table 7.2). This 167 ha of habitat represents approximately 33.5% of all habitats lost due to construction activities at the main site, 63.3% of lost terrestrial habitats lost, and 1.8% of the entire LSA. During the growing season, moderate-rated habitats represent 320 ha, or 64.5%, and low-rated habitats represent 10 ha, or 2.0%, of habitats lost due to mine development. During the winter season, moderate-rated habitats represent 3 ha, or 0.6%, and low-rated habitats represent 328 ha, or 65.9%, of habitats lost due to mine development.

RSA Habitat Loss Assessment

During the growing and winter seasons, an estimated 227 ha of high suitability habitat will be lost at the main mine site: 182 ha of Heath Tundra and 46 ha of Lichen-Rock (see Table 7.3). This 227 ha of habitat represents approximately 45.8% of all habitats lost due to construction activities at the main site, 83.0% of lost terrestrial habitats lost at the main site, and 0.02% of the entire RSA. During the growing season, moderate-rated habitats represent 264 ha, or 53.3%, and low-rated habitats represent 5 ha, or 0.9%, of habitats lost due to mine development. During the winter season, no habitats were rated as moderate, but low-rated habitats represent 269 ha, or 54.2%, of habitats lost due to mine development.

7.2.2.3 Other Impacts

Habitat degradation due to dust, exhaust, and fuel spills has a potential for increasing contaminant loading in raptor prey. Aircraft traffic poses a collision hazard to raptors, particularly on or in the vicinity of the airstrip, and raptor mortality may occur due to vehicle/bird collisions on the roads, or collision and electrocution with powerlines; however, due to the relative rarity of raptors in the area, these hazards are deemed to be minor and the residual impacts will be of low magnitude and low significance.

Potential effects from roads, airstrip, and traffic will include mortality due to collisions with vehicles and potential for increased contaminant loading in food sources. With or without mitigation, these impacts are not expected to be significant.

7.2.3 Operation Phase

A comprehensive analysis of the environmental effects of the proposed mine development on raptors during the operation phase is provided in Appendix D.

7.2.3.1 Main Site

By the operations phase, much of the anticipated habitat losses for birds and small mammals will have already occurred. There will continue to be a disruption of birds and other wildlife occurring in the immediate vicinity of project facilities as a result of construction noises, blasting, operations, vehicle traffic, and machinery.

Habitat degradation due to dust, exhaust, and minor spills will continue, leading to increased contaminant loading in prey species. Raptors will continue to feel the effects of displacement and reduced habitat effectiveness, and possibly disruption of birds nesting in the vicinity; however, there will be an increase of nesting and perching opportunities for raptors on some structures.

During the operations phase, development of the Vault pit, waste dump, borrow pit/quarry, and tailings facilities (Second Portage Lake) will cause more loss of small mammal habitats and nesting and foraging habitats for birds. Overall, the residual impacts on raptors from habitat loss, disturbance, and degradation during the operations phase are not expected to be significant.

7.2.3.2 Vault Site

Most of the Vault site facilities will be developed during the operation phase of the project. Potential effects of pit and waste rock pile development, noise and activity, and other related effects will be comparable to those described for the main site. Losses of high suitability habitats for raptors at the Vault site are described below.

LSA Habitat Loss Assessment

During the growing and winter seasons, an estimated 225 ha of high suitability habitat will be lost at the Vault site: 138 ha of Heath Tundra and 87 ha of Lichen-Rock (see Table 7.2). This 225 ha of habitat represents approximately 61.5% of all habitats lost due to development activities at the Vault site, 86.7% of terrestrial habitats lost at the Vault site, and 2.4% of the entire LSA. During the growing season, moderate-rated habitats represent 137 ha, or 37.5%, and low-rated habitats represent 4 ha, or 1.0%, of habitats lost due to mine development. During the winter season, moderate-rated habitats represent 3 ha, or 0.9%, and low-rated habitats represent 138 ha, or 37.6%, of habitats lost due to mine development.

The percentage of raptor habitat lost within the LSA due to Vault site activities is less than 3% and is not expected to result in a significant impact to raptors, particularly because raptors are wide-ranging species with access to prey populations throughout the RSA.

RSA Habitat Loss Assessment

During the growing and winter seasons, an estimated 254 ha of high suitability habitat will be lost at the Vault site: 126 ha of Heath Tundra and 128 ha of Lichen-Rock (see Table 7.3). This 254 ha of habitat represents approximately 69.6% of all habitats lost due to construction activities at the Vault site, 96.3% of terrestrial habitats lost at the Vault site, and 0.02% of the entire RSA. During the growing season, moderate-rated habitats represent 110 ha, or 30.1%, and low-rated habitats

represent 1 ha, or 0.4%, of habitats lost due to mine development. During the winter season, moderate-rated habitats are not represented and low-rated habitats represent 111 ha or 30.4% of habitats lost due to mine development.

7.2.4 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on raptors during the closure and post-closure phase is provided in Appendix D.

The closure and post-closure phase is the first significant opportunity to initiate major reclamation of areas lost during the construction and operations phases. Removal of project facilities, reclamation of tailings and waste rock facilities, and the deactivation of permanent roads and associated reclamation activities will result in the natural revegetation of many previously affected areas of the project.

Closure activity and noise may result in disruption of nesting birds and displacement and reduced habitat effectiveness for raptors and prey species alike; however, once decommissioning is complete and habitats have been reclaimed, recolonization of usable habitats by small mammals and birds is expected to occur.

Breaching of the dikes will cause flooding of the adjacent terrestrial habitats of small mammals, ptarmigan, and passerines but may increase the area of habitats available for shorebirds and waterfowl. The residual impacts of the waste dumps will be a loss of terrestrial small mammal habitat and nesting, foraging, and roosting habitats for birds during the construction and operation phase; however, reclamation activities during the post-closure phase will reduce this effect over time. The loss of small mammal and bird habitat from the concrete foundation and footprint of the mine plant and ancillary facilities may have a very small residual impact on raptors.

The cessation of traffic and reclamation of the Meadowbank roads and the Baker Lake access road will reduce the fragmentation of habitats and increase the availability of habitats for small mammals and foraging and roosting habitats for other breeding birds. Passerines and ptarmigan may be attracted to reclaimed roadbed areas for roosting, foraging, and possibly nesting (once vegetation has become reestablished). Raptors that prey on these species risk increased exposure to contaminant loading in birds from road materials. This risk, however, is expected to be minimal. Impacts on habitat effectiveness in areas adjacent to roads, due to noise and activity, and habitat degradation, due to dust and exhaust, would be reduced during closure and eliminated during post-closure. There will be a greatly reduced risk of mortality due to vehicle/bird collisions post-closure.

The removal and habitat reclamation of the fuel storage facilities at the plant site will reduce contaminant levels of the receiving environment in the vicinity of the discharge point. The airstrip will likely be retained in a usable condition for long-term safety and future industrial activity considerations. It will, therefore, continue to cause a loss of 5.3 ha of terrestrial small mammal habitat and roosting, foraging, and nesting habitats for passerines, ptarmigan, and shorebirds. Disturbance and mortality of birds by aircraft will be greatly reduced.

In the event that the airstrip is decommissioned near the end of the closure phase, restoration activities will strive to restore the disturbed area to its pre-development state and normal drainage

patterns will be re-established to the extent possible; however, due to the nature of the disturbance to terrain and vegetation, regeneration of plant communities will be very slow and will take many years.

Although aquatic habitats at Second Portage Lake (i.e., used for tailings impoundment) will be permanently lost to shorebirds and waterfowl, flooding of the Portage and Vault pits at closure will result in new aquatic habitats for these species.

7.3 SUMMARY OF MITIGATION MEASURES

A detailed discussion of proposed mitigation measures to reduce project interactions with raptors is provided in the Terrestrial Management Plan (Cumberland, 2005).

The principal mitigation measure for raptors is to reduce the loss, disturbance, or degradation of the habitats of their prey. Although the environmental impacts of the project on bird and small mammal populations are expected to be minor, there are measures that can be implemented to reduce or avoid impacts that might otherwise occur. For each potential impact on small mammals, breeding birds or their habitats, mitigation measures will be undertaken to ensure that residual impacts are acceptable. The nature of the disturbance to vegetation during the construction phase will be such that regeneration of plant communities will be very slow and take many years. Therefore, the most direct mitigation practice will be to minimize the size of wildlife habitats disturbed by the project's components.

Specific mitigation measures for raptors and their prey species during the construction and operation phases will include:

- minimizing noise levels generated from all mine and plant activities, particularly around active raptor nests (see Air Quality and Noise Management Plan; Cumberland, 2005)
- minimizing vehicular traffic and speeds and restricting vehicles to designated roads and trails
- minimizing air traffic and using aversive methods to discourage raptors from roosting on the runway and on road edges
- reducing the likelihood of bird collisions with overhead power lines and poles by ensuring that these components are not situated adjacent to water bodies
- deterring shorebirds and waterfowl from utilizing potentially contaminated areas such as reclaim ponds by using aversive techniques including bangers
- pumping potentially contaminated water ponds (which may attract shorebirds and waterfowl) out of pits to a settling area.

The closure and post-closure phase is the first significant opportunity to initiate major reclamation of areas lost during the construction and operations phases. Removal of project facilities, reclamation of tailings and waste rock facilities, and the deactivation of permanent roads and associated reclamation activities will result in the natural revegetation of many previously affected areas of the project. Where necessary, additional mitigation steps will be taken to facilitate revegetation by scarifying and/or re-contouring surfaces, stabilizing slopes restoring natural drainage patterns, etc. (see the Reclamation and Closure Plan; Cumberland, 2005).

Mitigation measures for small mammals, waterfowl, and other breeding birds (hence, benefiting raptors) during the closure/post-closure phase will include:

- creating habitat for shorebirds in shoreline and shallow water areas of flooded pits and for ptarmigan, passerines, and small mammals on slopes and possibly capped top of waste dump if substrate is not toxic
- ensuring that new lake waters do not contain unacceptable levels of contaminants; treating contaminated water inputs prior to discharge
- ensuring that the tailings retention area with elevated contaminant levels is inaccessible to wildlife by capping with a clean material.

7.4 SUMMARY OF RESIDUAL EFFECTS

A detailed analysis of anticipated residual effects of the proposed project on raptors during the construction, operation, and closure and post-closure phases is provided in Appendix D.

The residual effects for raptors after all mitigative measures have been completed will include minor losses of roosting, foraging, and nesting habitats, reductions in local prey populations, persistent habitat degradation, contamination adjacent to sites of former roads and mine plant facilities, and possibly elevated contaminant levels in small mammals, ptarmigan, shorebirds, passerines and waterfowl, and hence, in raptors.

Overall residual impacts on raptors are not expected to be significant on a regional basis because of the small area of impact, current absence of nesting raptors in the area, and implementation of a comprehensive mitigation and reclamation plan for minimizing losses of habitats and associated species. On a local level (i.e., raptor LSA of 1 km radius), raptors nesting in close proximity to mine development activities may be subject to significant residual impacts.

SECTION 8 • WATERFOWL

8.1 SUMMARY OF EXISTING CONDITIONS

Water is the most common of the mapped ELC units in the LSA, accounting for 3,733 ha or 40% of the area, while the most common terrestrial ELC unit is the Heath Tundra community, which accounts for 3,160 ha or 34% of the LSA (or about 56% of the terrestrial LSA). The southern section of the LSA consists mainly of Heath Tundra with patches of the Birch Seep Community and the Lichen-Rock associations. In the northern section of the LSA, Lichen-Rock Community - Boulder Association is the most abundant ELC unit with patches of Heath Tundra and Birch Seep.

During baseline surveys, 10 waterfowl species were recorded in the study areas: tundra swan, greater white-fronted goose, snow goose, Ross' goose, brant, Canada goose, mallard, northern pintail, long-tailed duck, and red-breasted merganser (Baseline Terrestrial Ecosystem Report; Cumberland, 2005). Of these, snow geese and Canada geese were observed in greater numbers than any other species. No evidence of reproduction was documented during any of the baseline surveys, although it likely occurred in the area; however, none of the waterfowl species suspected to breed in the project area has been observed in large concentrations.

Waterfowl arrive in the general area of the proposed project from mid to late May, but fall departure dates differ considerably among species. Departure dates for snow geese may be protracted throughout August and September because birds from west Hudson Bay and the central Arctic seemingly migrate through interior southern Keewatin (McLaren and McLaren, 1982). Egg laying generally occurs in June to early July, and hatching occurs from late June through late August. Summer and fall aerial surveys conducted in the RSA indicated that in terms of relative abundance, the snow goose was the most common waterfowl key wildlife species, followed by the Canada goose, and greater white-fronted goose. The snow goose was also the most frequently observed waterfowl species during the fall survey, whereas the Canada goose was most common during the summer survey. Both snow goose and Canada goose were regularly reported by camp personnel during the migratory periods.

During all seasons, waterfowl were associated primarily with aquatic habitats in the Meadowbank area although Heath Tundra and Lichen-Rock sites were also used; however, suitable foraging habitat for waterfowl is limited because the lakes in these areas are ultra-oligotrophic and the wetlands are considered to be relatively unproductive.

8.2 ENVIRONMENTAL EFFECTS

8.2.1 General

An analysis of the environmental effects of the proposed mine development on waterfowl during the construction, operations, and closure and post-closure phases is provided in Appendix H.

Mining activities can affect waterfowl by causing habitat loss or changes in habitat use, behavioural disturbances, and health or mortality risks. These in turn can result in changes in species distribution

and abundance, disruption of species movements, and changes in habitat suitability and effectiveness. Several activities associated with the Meadowbank project are predicted to result in either a direct or indirect loss of habitat for Waterfowl. Direct habitat loss occurs when vegetation or aquatic communities are physically removed or altered. Indirect habitat loss can result from the degradation of vegetation by the deposition of fugitive dust or contamination by substances such as hydraulic fluids, diesel, or gasoline.

To assess the potential impacts of habitat loss on waterfowl, two tables were developed to quantify the loss of high suitability habitats. Table 8.1 quantifies the area of low, moderate, and high suitability ELC units lost to mine development in the LSA and RSA (for the purposes of this analysis, the LSA and RSA are as defined for the baseline studies). Habitat suitability ratings for waterfowl are provided in Table 2.4 in Section 2.5. Table 8.2 summarizes the high, moderate, and low suitability habitat lost during the growing season in the LSA and RSA.

Table 8.1: Waterfowl – ELC Areas Lost to Mine Development in the LSA & RSA

	Area Lost in LSA (Growing - m^2)			
	Habitat Suitability			
Waterfowl	**Low**	**Moderate**	**High**	
Water (Deep and Shallow)			3,400,280	
Sedge			530,262	
Moss		284		
Birch Seep		505,536		
Riparian Shrub, Birch		81,161		
Heath Tundra		2,704,001		
Snowbank	58,950			
Avens		59,040		
Lichen-Rock	1,210,913			
Ridge Crest (Esker)		900		
Disturbed	61,009			
Unmapped	15,000			Total
Totals	**1,345,872**	**3,350,921**	**3,930,541**	**8,627,334**
	11.42%	**9.35%**	**8.98%**	
	Area Lost in RSA (Growing - m^2)			
Waterfowl	**Low**	**Moderate**	**High**	
Birch Seep Community		262,371		
Deep Water			2,608,381	
Disturbed Sites	33,784			
Eskers		-		
Heath Tundra Community		3,035,437		
Heath Tundra/Lichen Rock Ass'n		46,098		
Lichen-Rock Community - Bedrock Ass'n	721,420			
Lichen-Rock Community - Boulder Ass'n	1,012,686			
Riparian Shrub Community		-		
Sand/Gravel		7,200		
Sedge Community			242,533	
Shallow Water			630,371	
Unclassified	25,792			Total
Totals	**1,793,682**	**3,351,105**	**3,481,285**	**8,626,072**
	0.31%	**0.07%**	**0.11%**	

Table 8.2: Waterfowl High, Moderate & Low Suitability Habitat Loss at Main & Vault Site based on LSA & RSA Analysis

Waterfowl	Area Lost (ha) Growing Season			Waterfowl	Area Lost in RSA (ha) Growing Season		
	Main Site	Vault Site	Total		Main Site	Vault Site	Total
Avens community (M)	**2.71**	**3.20**	**5.90**	**Avens community (M)**	**N/A**	**N/A**	**N/A**
Birch seep (M)	48.48	2.07	50.55	Birch seep (M)	24.5	1.7	26.2
Disturbed features (L)	6.10	-	6.10	Disturbed features (L)	3.4	-	3.4
Heath tundra (M)	132.33	138.07	270.40	Heath tundra (M)	181.7	126.4	308.1
Lakes or ponds (H)	233.85	106.18	340.03	Lakes or ponds (H)	222.6	101.3	323.9
Lichen rock on outcrops (L)	11.87	17.67	29.54	Lichen rock on outcrops (L)	24.1	48.1	72.1
Lichen rock with boulders (L)	22.32	69.23	91.55	Lichen rock with boulders (L)	21.7	79.6	101.3
Moss community (M)	0.03	-	0.03	Moss community (M)	N/A	N/A	N/A
Riparian shrub (M)	7.11	1.01	8.12	Riparian shrub (M)	N/A	N/A	N/A
Sedge community (H)	28.28	24.75	53.03	Sedge community (H)	17.4	6.9	24.3
Snowbank community (L)	3.79	2.11	5.89	Snowbank community (L)	N/A	N/A	N/A
Unclassified (L)	-	1.50	1.50	Unclassified (L)	1.3	1.3	2.6
High	262.13	130.92	393.05	High	239.95	108.18	348.13
Moderate	190.66	144.34	335.00	Moderate	206.23	128.12	334.36
Low	44.08	90.51	134.59	Low	50.40	128.97	179.37
Total Hectares	**496.87**	**365.77**	**862.64**	**Total Hectares**	**496.58**	**365.28**	**861.85**

8.2.1.1 LSA

A total of 4,318 ha of high suitability waterfowl habitat (i.e., 46.0% of total LSA area) is present within the LSA. Of this, an anticipated 393 ha (4.2% of total LSA area), or 9.1%, of high suitability habitat is expected to be lost due to mine development activities (see Table 8.3). On an ELC unit basis, loss of high suitability habitat includes 340 ha of lakes or ponds and 53 ha of Sedge (see Table 8.1).

On a waterfowl-specific LSA basis (i.e., 1 km radius or 314 ha; Table 2.2), the 393 ha of high suitability habitat lost due to mine development represents an impact of high magnitude and significance to local nesting populations of waterfowl. On a waterfowl-specific RSA basis (i.e., 50 km radius or 785,000 ha; Table 2.2), the 393 ha of lost high suitability habitat represents approximately 0.1% of the Waterfowl RSA, an impact considered to be of low magnitude and significance (see Table 2.3 and 2.6).

Table 8.3: Waterfowl – Total High Suitability Habitat Lost in the LSA

	Main Site High Suitability Habitat Lost in LSA (ha)	Vault Site High Suitability Habitat Lost in LSA (ha)	Total of LSA Lost (ha)	Total High Suitability Habitat Available (ha) in LSA	% High Suitability Habitat Lost in LSA	Total LSA (ha)	% Total LSA Lost
Growing	262	131	393	4,318	9.1	9,385	4.19
Total	497	366	863	-	-	9,385	9.19

Note: The bottom row is for the *entire* LSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

8.2.1.2 RSA

For the growing season, a total of 270,080 ha of high suitability waterfowl habitat (i.e., 26.5% of total RSA area) is present within the RSA. Of this, an anticipated 348 ha (0.03% of total RSA area) or 0.13% of high suitability habitat is expected to be lost due to mine development activities (see Table 8.4). On an ELC unit basis, loss of high suitability habitats includes 324 ha of Lakes and Ponds and 23 ha of Sedge (see Table 8.1).

Table 8.4: Waterfowl – Total High Suitability Habitat Lost in the RSA

	Main Site High Suitability Habitat Lost in RSA (ha)	Vault High Suitability Lost in RSA (ha)	Total of LSA Lost in RSA (ha)	Total High Suitability Habitat Available (ha) in RSA	% High Suitability Habitat Lost in RSA	Total RSA (ha)	% Total RSA Lost
Growing	240	108	348	270,080	0.13	1,019,979	0.03
Total	497	365	862	-	-	1,019,979	0.08

Note: The bottom row is for the *entire* RSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

8.2.2 Construction

8.2.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on waterfowl during the construction phase is provided in Appendix H.

Most of the direct habitat losses for waterfowl caused by the mine development will occur at the main site during the construction phase. Dewatering of portions of Second Portage and Third Portage lakes will likely have the greatest impact on waterfowl; however, the construction of the plant site (footprint), dikes, dewatering facilities, waste dump, airstrip, pits, and main roads will cause a loss and disturbance of terrestrial and aquatic roosting, foraging, and nesting habitats. Apart from the direct loss of habitats due to alteration of terrain and vegetation, noise and activity during construction will result in the displacement and disruption of waterfowl and will reduce the effectiveness of their habitats. Disturbance of nesting birds can result in increased energy expenditures and stress levels, and possibly reduced reproductive success and subsequent survival of young. Residual impacts from disturbance are not expected to be significant.

8.2.2.2 Habitat Loss

The impact of development of the main site facilities and structures is discussed in this section (construction), whereas impacts associated with the Vault site, which will be developed primarily during the operation phase, are discussed in the operation section.

LSA Habitat Loss Assessment

An estimated 262 ha of high suitability habitat will be lost at the main site: 234 ha of Lakes and Ponds, and 28 ha of Sedge (see Table 8.2). This 262 ha of habitat represents approximately 52.8% of all habitats lost due to construction activities at the main site and 2.8% of the entire LSA. Moderate-rated habitats represent 191 ha, or 38.4%, and low-rated habitats represent 44 ha, or 8.9%, of habitats lost due to mine development.

RSA Habitat Loss Assessment

An estimated 240 ha of high suitability habitat will be lost at the main site: 223 ha of Lakes and Ponds, and 17 ha of Sedge (see Table 8.2). This 240 ha of habitat represents approximately 48.3% of all habitats lost due to construction activities at the main site and 0.02% of the entire RSA. Moderate-rated habitats represent 206 ha, or 41.5%, and low-rated habitats represent 50 ha, or 10.2%, of habitats lost due to mine development.

Overall habitat losses make up a relatively small portion of the LSA (<3%) and RSA (<0.1%). In addition, high suitability habitats are not limiting in the region.

8.2.2.3 Other Impacts

Aircraft traffic poses a collision hazard to waterfowl and other bird species, particularly on or in the vicinity of the airstrip; however, the probability of this hazard to waterfowl is deemed to be relatively

low, except perhaps during the migratory period when flocks of geese land to rest and forage. Aversive techniques in the vicinity of the airstrip will ensure that potential interactions are minimized. Some waterfowl mortality may occur in summer through collisions with ground vehicles but such incidents are expected to be infrequent, involving few individual birds, and therefore of minor impact to local waterfowl populations.

Mine construction and operation can result in indirect impacts to waterfowl species. Plant health and bird forage can be affected by fugitive dust deposition associated with mining activities, road use, and maintenance. Fugitive dust deposition can also lead to early snowmelt and changes in plant phenology, resulting in early flowering in some plant species (Walker and Everett, 1987; Forbes, 1995). This may provide earlier foraging and nesting opportunities for waterfowl. The impacts of fugitive dust will mainly occur downwind of operations. As the prevailing winds in the region are northwesterly, the major impacts of dust deposition will generally be on plant communities to the southeast of the facilities or other source of dust disturbance. Results from modeling, air monitoring, and snow surveys indicate that most dust particles will settle out within 100 m of the source (BHP, 2000).

The release of grey water or other nutrients from camp operations could also potentially affect plant health, and could lead to a shift in plant community structure from heath tundra to grass communities. Geese and some duck species may be attracted to these sites for grazing.

The barge-landing facility may cause some disruption of movement opportunities for waterfowl along the Baker Lake foreshore. The residual impacts are not expected to be significant.

8.2.3 Operation Phase

A comprehensive analysis of the environmental effects of the proposed mine development on waterfowl during the operation phase is provided in Appendix H.

8.2.3.1 Main Site

By the operations phase, much of the anticipated habitat loss for waterfowl will have already occurred. There will continue to be a disruption of waterfowl and other wildlife occurring in the immediate vicinity of project facilities as a result of construction noises, blasting, operations, vehicle traffic, and machinery. Both camps (north and south) will be removed during the operations phase and the habitats will be reclaimed. This will mean reduced disturbance for waterfowl and an increase in availability of 2.5 ha of potential roosting, nesting, and foraging habitat; however, it may take many years for the site to fully return to its pre-development state.

There will also be minor losses and disturbance of potential roosting, foraging, and nesting habitat where the Goose Island dikes key into the shore, and a disruption of natural movement patterns of waterfowl within the localized area of the Third Portage Arm dike.

Development of the tailings facilities (Second Portage Lake) may attract waterfowl to the tailings ponds with elevated levels of contaminated water. Ingestion of contaminants from water or emergent vegetation may have adverse effects on the health and reproductive fitness of waterfowl, and in extreme cases, may cause mortality of the birds. The health of waterfowl utilizing the mine site and

environs will be difficult to determine directly because of their migratory and transient nature and the difficulty in obtaining samples for analysis. A proactive management strategy is the best approach for avoiding these potential problems. The residual impacts of contaminant ingestion from the tailings pond will not be significant due to mitigation measures that will be implemented to minimize waterfowl exposure to contaminants.

Although there will be no additional habitat losses from roads in the operations phase, the impacts from vehicle/bird collisions, reduced habitat effectiveness, and habitat degradation from fugitive dust and exhaust will continue to a similar degree as during the construction phase. The airstrip and air traffic are not anticipated to have any extra residual impacts other than the ongoing effects of reduced habitat effectiveness, habitat degradation from dust and emissions, and potential for bird/aircraft collisions.

8.2.3.2 Vault Site

Dewatering of Vault Lake will cause a notable reduction in aquatic habitat as the lake level drops. As well, development of the waste dump will cause an ongoing loss and disturbance of potential terrestrial and aquatic roosting, nesting, and foraging habitats for waterfowl.

Most of the Vault site facilities will be developed during the operation phase of the project. Potential effects of pit and waste rock pile development, noise and activity, and other related effects will be comparable to those described for the main site. Losses of high suitability habitats for small mammals at the Vault site are described below.

LSA Habitat Loss Assessment

An estimated 131 ha of high suitability habitat will be lost at the Vault site: 106 ha of Lakes and Ponds and 25 ha of Sedge (see Table 8.2). This 131 ha of habitat represents approximately 35.8% of all habitats lost due to construction activities at the Vault site and 1.4% of the entire LSA. Moderate-rated habitats represent 144 ha, or 39.5%, and low-rated habitats represent 91 ha, or 24.8%, of habitats lost due to mine development.

The low percentage of high suitability waterfowl habitat lost within the LSA due to Vault site activities (1.4%) is not expected to result in a significant impact to waterfowl. Other issues, such as exposure to contamination, are of greater concern.

RSA Habitat Loss Assessment

An estimated 108 ha of high suitability habitat will be lost at the Vault site (see Table 8.2). This 108 ha of habitat represents approximately 29.6% of all habitats lost due to construction activities at the Vault site and 0.01% of the entire RSA. Moderate-rated habitats represent 128 ha, or 35.1%, and low-rated habitats represent 129 ha, or 35.3%, of habitats lost due to mine development.

High suitability waterfowl habitats are not limiting within the LSA or RSA, therefore residual impacts are expected to be of low significance.

8.2.4 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on waterfowl during the closure and post-closure phase is provided in Appendix H.

When the dikes are breached for the reflooding of Portage and Goose Island pits, inundation of the adjacent terrestrial habitats will result in a minor loss and disturbance of potential roosting, nesting, and foraging habitat for waterfowl; however, flooding of pits at closure will result in new aquatic habitats for these species. Aquatic habitats dewatered at Second Portage Lake (i.e., used for tailings impoundment) will be permanently lost to waterfowl.

Waterfowl (e.g., Canada geese and snow geese) may be attracted to the tailings facilities (Second Portage Lake), dike areas, pits, and waste dump during migration, for roosting and foraging (once vegetation has become reestablished). Waterfowl risk exposure to potentially elevated contaminants in water, vegetation, and surficial capping materials.

The cessation of traffic and reclamation of roads will increase the availability of potential foraging and roosting habitats for waterfowl. The removal and habitat reclamation of the fuel storage facilities at the plant site will reduce contaminant levels of the receiving environment in the vicinity of the discharge point.

The airstrip will likely be retained in a usable condition for long-term safety and future industrial activity considerations. It will therefore represent a net loss of 5.3 ha of potential terrestrial roosting and foraging habitats for waterfowl. As these ELC vegetation communities are ubiquitous within the LSA and RSA and are relatively unproductive for waterfowl, these habitat losses will have a minimal effect on local waterfowl populations. Disturbance of waterfowl by aircraft will be infrequent and will also have a minimal residual impact. In the event that the airstrip is decommissioned near the end of the closure phase, restoration activities will strive to restore the disturbed area to its natural state and normal drainage patterns will be re-established to the extent possible.

8.3 SUMMARY OF MITIGATION MEASURES

A detailed discussion of proposed mitigation measures to reduce project interactions with waterfowl is provided in the Terrestrial Management Plan (Cumberland, 2005).

Although the overall environmental impacts of the project on waterfowl populations are expected to be minor, mitigation measures will be implemented to reduce or avoid impacts that might otherwise occur. For each potential impact on waterfowl or their habitats, mitigation measures will be undertaken to ensure that residual impacts are acceptable. The nature of the disturbance to vegetation during the construction phase will be such that regeneration of plant communities will be very slow and take many years. Therefore, the most direct mitigation practice will be to minimize the size of waterfowl habitats disturbed by the project's components.

Mitigation measures specific to waterfowl during the construction and operation phases will include:

- managing noise and activity around known waterfowl nest sites
- minimizing vehicular traffic and speeds and restricting vehicles to designated roads and trails

- using aversive methods to discourage birds from roosting on the runway
- reducing the likelihood of waterfowl collisions with overhead power lines and poles by ensuring that these components are not situated adjacent to water bodies of high value to waterfowl
- deterring waterfowl from utilizing potentially contaminated areas such as reclaim ponds
- pumping potentially contaminated water ponds (which may attract waterfowl) out of pits to a settling area.

The closure and post-closure phase is the first significant opportunity to initiate major reclamation of areas lost during the construction and operations phases. Removal of project facilities, reclamation of tailings and waste rock facilities, and the deactivation of permanent roads and associated reclamation activities will result in the natural revegetation of many previously affected areas of the project. Where natural revegetation is not occurring, reclamation will be undertaken. Efforts will be made to ensure that new lake waters do not contain unacceptable levels of contaminants and that contaminated water will be treated prior to discharge (see the Aquatic Effects Management Program (AEMP), 2005).

8.4 SUMMARY OF RESIDUAL EFFECTS

A detailed analysis of anticipated residual effects of the proposed project on waterfowl during the construction, operation and closure and post-closure phases is provided in Appendix H.

The residual effects for waterfowl after all mitigation measures have been completed will include: minor losses of roosting, foraging, and nesting habitats; persistent minor habitat degradation and contamination adjacent to sites of former roads, fuel storage areas, and mine plant facilities; and possibly elevated contaminant levels in mine tailings and reflooded pits. Elevated contaminant levels in waterfowl may occur, although levels that are a concern from a human or animal health perspective are extremely unlikely.

Overall residual impacts of mine development activities on waterfowl on a regional basis are not expected to be significant because of low breeding populations in the study area, the absence of recognized critical waterfowl habitats, the implementation of mitigation measures aimed a reducing project interactions, and reclamation efforts (including reflooding of pits, Vault Lake, etc.) during the closure and post-closure phases. On a local level (i.e., waterfowl LSA of 1 km radius), any waterfowl nesting in close proximity to the mine development may be subject to significant residual effects.

SECTION 9 • OTHER BREEDING BIRDS

9.1 SUMMARY OF EXISTING CONDITIONS

During baseline surveys, twelve species of birds were thought to be nesting within the LSA (Baseline Terrestrial Ecosystem Report; Cumberland, 2005). The Lapland longspur was the most commonly observed nesting passerine in the LSA, and the project area is believed to provide high habitat suitability for this species. A total of 209 breeding pairs were recorded on 26 plots (i.e., average of 8 pairs per plot) during the June 2003 breeding bird surveys. Numbers of pairs per plot (i.e., 400 x 400 m area) ranged from 3 to a maximum of 13. This maximum number of pairs represents close to 1 pair per hectare, but the average density was closer to 1 pair per 2 ha.

The horned lark was the second most frequently recorded nesting passerine species in the LSA, and the project area is believed to provide moderate-to-high habitat suitability for this species. Forty-four breeding pairs were recorded on 23 of 26 breeding bird survey plots. The maximum number of breeding pairs recorded on a plot was three pairs. The average density was 1 pair per 10 ha.

Rock ptarmigan was the third most common breeding bird species observed during June 2003 breeding bird surveys of the LSA, with 12 breeding pairs recorded in the 26 survey plots. Evidence of breeding included females with chicks, nest with eggs, pair courtship behaviour, and other breeding-related behaviours. Territory size of rock ptarmigans varies among populations and within populations between years. The average density of nesting pairs of ptarmigan observed in the Meadowbank area during June 2003 breeding bird surveys was 1 pair per 35 ha. This density falls within the normal range for the species as reported by Holder and Montgomerie (1993).

Observations of ptarmigan in the Meadowbank area during the fall were associated most often with Lichen-Rock habitats, followed by Heath Tundra, Sedge, and Esker communities. In summer, rock ptarmigan were most frequently observed in Heath Tundra and Lichen Rock - Boulder areas. On Victoria Island in the High Arctic, Schaeffer and others (1996) found ptarmigan sign was most strongly correlated with lowland vegetation communities, particularly those associated with willow-sedge meadows. This habitat is similar to the Sedge community and Riparian Shrub community ELC units, which are available only to a limited extent in the study areas (combined coverage <10%). Results of the ELC suggest that habitat suitability for ptarmigan in the LSA and RSA could be high because there is an abundance of tundra habitat associated with eskers and rocky areas, or with moist, shrubby habitats.

Although 20 species of shorebirds are known to breed in the mainland region of Nunavut with another 2 species as suspected of breeding (Richards et al, 2002), relatively few shorebirds were recorded in the Meadowbank area during baseline surveys. The most common shorebird species was the semipalmated sandpiper, which was recorded in several extensive sedge meadows during the breeding bird surveys. A total of five pairs were documented within breeding bird survey plots (i.e., approximately 1 pair per 83 ha), but others were observed incidentally between plots during the survey period. Semipalmated sandpipers recorded during breeding bird surveys were primarily associated with wet sedge meadows adjacent to small lakes and ponds. The density of pairs for the Sedge community would be a maximum of 1 pair per 6 ha. Since these habitats are relatively

common throughout the LSA and RSA, semipalmated sandpipers are expected to be relatively common breeders in the area.

Uncommon breeding birds observed during breeding bird surveys included savannah sparrow, American pipit, hoary and common redpolls, American golden plover, and sandhill crane. A nesting pair of sandhill cranes was observed approximately 1 km south of South camp during June 2003 breeding bird surveys.

9.2 ENVIRONMENTAL EFFECTS

9.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on other breeding birds during the construction, operations, and closure and post-closure phases is provided in Appendix B.

Mining activities can affect ptarmigan, shorebirds, and passerines by causing habitat loss or changes in habitat use, behavioural disturbances, and health or mortality risks. These in turn, can result in changes in species distribution and abundance, disruption of species movements, and changes in habitat suitability and effectiveness.

Several activities associated with the Meadowbank project are predicted to result in either a direct or indirect loss of habitat for other breeding birds. Direct habitat loss occurs when vegetation communities are physically removed or altered. Indirect habitat loss can result from the degradation of vegetation by the deposition of fugitive dust or contamination by substances such as hydraulic fluids, diesel, or gasoline. For each potential impact on other breeding birds or their habitats, mitigation measures will be undertaken to ensure that residual impacts are acceptable.

In order to assess the potential impacts of habitat loss on waterfowl, two tables were developed to quantify the loss of high suitability habitats. Table 9.1 quantifies the area of low, moderate, and high suitability ELC units lost to mine development in the LSA and RSA (for the purposes of this analysis, the LSA and RSA are as defined for the baseline studies). Habitat suitability ratings for waterfowl are provided in Table 2.4 in Section 2.5. Table 9.2 summarizes the high, moderate, and low suitability habitat lost during the growing season and winter in the LSA and RSA.

9.2.1.1 LSA

A total of 4,535 ha of high suitability breeding bird habitat (i.e., 48.3% of total LSA area) is present within the LSA during the growing season. Of this, an anticipated 382 ha (4.1% of total LSA area) or 8.4% of high suitability habitat is expected to be lost due to mine development activities (see Table 9.3). On an ELC unit basis, loss of high suitability habitats includes 51 ha of Birch Seep, 270 ha of Heath Tundra, 8 ha of Riparian Shrub, and 53 ha of Sedge (see Table 9.1).

On an other-breeding-bird-specific LSA basis (i.e., 500 m radius or 78.5 ha; Table 2.2), the 382 ha of high suitability habitat lost due to mine development represents an impact of high magnitude and significance to local nesting populations of breeding birds. On an other-breeding-bird-specific RSA basis (i.e., 5 km radius or 7,850 ha; Table 2.2), the 382 ha of lost high suitability habitat represents

approximately 4.9% of the other breeding bird RSA, an impact considered to be of low magnitude and significance (see Tables 2.3 and 2.6).

Table 9.1: Other Breeding Birds – ELC Areas Lost to Mine Development in the LSA & RSA

	Area Lost in LSA (Growing – m^2) Habitat Suitability			
Other Breeding Birds	**Low**	**Medium**	**High**	
Water (Deep and Shallow)	3,400,280			
Sedge			530,262	
Moss		284		
Birch Seep			505,536	
Riparian Shrub, Birch			81,161	
Heath Tundra			2,704,001	
Snowbank	58,950			
Avens		59,040		
Lichen-Rock		1,210,913		
Ridge Crest (Esker)		900		
Disturbed	61,009			
Unmapped	15,000			Total LSA
Totals	**3,535,239**	**1,271,136**	**3,820,959**	**8,627,334**
	9.17%	**11.28%**	**8.33%**	

	Area Lost in RSA (Growing - m^2) Habitat Suitability			
Other Breeding Birds	**Low**	**Medium**	**High**	
Birch Seep Community			262,371	
Deep Water	2,608,381			
Disturbed Sites	33,784			
Eskers		-		
Heath Tundra Community			3,035,437	
Heath Tundra/Lichen Rock Ass'n			46,098	
Lichen-Rock Comm'ty - Bedrock Ass'n		721,420		
Lichen-Rock Comm'ty - Boulder Ass'n		1,012,686		
Riparian Shrub Community			-	
Sand/Gravel		7,200		
Sedge Community			242,533	
Shallow Water	630,371			
Unclassified	25,792			Total RSA
Totals	**3,298,328**	**1,741,306**	**3,586,438**	**8,626,072**
	0.14%	**0.05%**	**0.10%**	

Table 9.2: Other Breeding Birds High, Moderate & Low Suitability Habitat Loss at Main & Vault Site based on LSA & RSA Analysis

Other Breeding Birds	Area Lost in LSA (ha) Growing Season			Other Breeding Birds	Area Lost in RSA (ha) Growing Season		
	Main Site	Vault Site	Total		Main Site	Vault Site	Totals
Avens community (M)	2.71	3.20	5.90	Avens community (M)	N/A	N/A	N/A
Birch seep (H)	48.48	2.07	50.55	Birch seep (H)	24.5	1.7	26.2
Disturbed features (L)	6.10	-	6.10	Disturbed features (L)	3.4	-	3.4
Heath tundra (H)	132.33	138.07	270.40	Heath tundra (H)	181.7	126.4	308.1
Lakes or ponds (L)	233.85	106.18	340.03	Lakes or ponds (L)	222.6	101.3	323.9
Lichen rock on outcrops (M)	11.87	17.67	29.54	Lichen rock on outcrops (M)	24.1	48.1	72.1
Lichen rock with boulders (M)	22.32	69.23	91.55	Lichen rock with boulders (M)	21.7	79.6	101.3
Moss community (M)	0.03	-	0.03	Moss community (M)	N/A	N/A	N/A
Riparian shrub (H)	7.11	1.01	8.12	Riparian shrub (H)	N/A	N/A	N/A
Sedge community (H)	28.28	24.75	53.03	Sedge community (H)	17.4	6.9	24.3
Snowbank community (L)	3.79	2.11	5.89	Snowbank community (L)	N/A	N/A	N/A
Unclassified (L)	-	1.50	1.50	Unclassified (L)	1.3	1.3	2.6
High	216.20	165.90	382.10	High	223.59	135.03	358.61
Moderate	36.93	90.10	127.02	Moderate	45.72	127.69	173.41
Low	243.74	109.78	353.52	Low	227.27	102.56	329.83
Hectares	496.87	365.77	862.64	Total Hectares	496.58	365.28	861.85

Table 9.3: Other Breeding Birds – Total High Suitability Habitat Lost in the LSA

	Main Site High Suitability Habitat Lost in LSA (ha)	Vault Site High Suitability Habitat Lost in LSA (ha)	Total of LSA Lost (ha)	Total High Suitability Habitat Available (ha) in LSA	% High Suitability Habitat Lost in LSA	Total LSA (ha)	% Total LSA Lost
Growing	216	166	382	4,535	8.4	9,385	4.07
Total	497	366	863	-	-	9,385	9.19

Note: The bottom row is for the *entire* LSA and does not represent the sum of the cells above it. It is presented for| comparison purposes.

9.2.1.2 RSA

A total of 375,701 ha of high suitability breeding bird habitat (i.e., 36.8% of total RSA area) is present within the RSA during the growing season. Of this, an anticipated 359 ha (0.04% of total RSA area) or 0.1% of high suitability habitat is expected to be lost due to mine development activities (see Table 9.4). On an ELC unit basis, loss of high suitability habitats includes 26 ha of Birch Seep, 308 ha of Heath Tundra, and 24 ha of Sedge (see Table 9.1).

Table 9.4: Other Breeding Birds – Total High Suitability Habitat Lost in the RSA

	Main Site High Suitability Habitat Lost in RSA (ha)	Vault High Suitability Lost in RSA (ha)	Total of LSA Lost in RSA (ha)	Total High Suitability Habitat Available (ha) in RSA	% High Suitability Habitat Lost in RSA	Total RSA (ha)	% Total RSA Lost
Growing	224	135	359	375,701	0.10	1,019,979	0.04
Total	497	365	862	-	-	1,019,979	0.08

Note: The bottom row is for the *entire* RSA and does not represent the sum of the cells above it. It is presented for comparison purposes.

9.2.2 Construction

9.2.2.1 General

A comprehensive analysis of the environmental effects of the proposed mine development on other breeding birds during the construction phase is provided in Appendix B.

Most of the direct habitat losses for breeding birds caused by the mine development will occur at the main site during the construction phase. The construction of the plant site (footprint), dikes, dewatering facilities, waste dump, airstrip, pits, and main roads will cause a loss and disturbance of terrestrial and aquatic roosting, foraging, and nesting habitats.

Densities of breeding bird species observed during the June 2003 breeding bird surveys indicate that the loss of a total of 522 ha of ELC vegetation communities will displace approximately 250 to 270 (1 pair per 2 ha) pairs of Lapland longspurs, 40 to 60 (1 pair per 10 ha) pairs of horned larks, 4 to 6 (1 pair per 104 ha) pairs of American pipits, 10 to 20 (1 pair per 35 ha) pairs of rock ptarmigan, 5 to 10 pairs of semipalmated sandpipers, and minor numbers of other passerine species. Since the

habitats for these species are widespread within the LSA and RSA, the effects on the total regional populations can be expected to be minimal.

9.2.2.2 Habitat Loss

This section discusses the impact of developing the main site facilities and structures (construction phase). Impacts associated with the Vault site, which will be developed primarily during the operation phase, are discussed in Section 9.2.3, "Operation Phase."

LSA Habitat Loss Assessment

An estimated 216 ha of high suitability habitat will be lost at the main site: 48 ha of Birch Seep, 132 ha of Heath Tundra, 7 ha of Riparian Shrub, and 28 ha of Sedge (see Table 9.2). This 216 ha of habitat represents approximately 43.5% of all habitats lost due to construction activities at the main site, 82.2% of terrestrial habitats lost, and 2.3% of the entire LSA. Moderate-rated habitats represent 37 ha, or 7.4%, and low-rated habitats represent 244 ha, or 49.1%, of habitats lost due to mine development.

RSA Habitat Loss Assessment

An estimated 224 ha of high suitability habitat will be lost at the main site: 25 ha of Birch Seep, 182 ha of Heath Tundra, and 17 ha of Sedge (see Table 9.2). This 224 ha of habitat represents approximately 45.0% of all habitats lost due to construction activities at the main site and 0.02% of the entire RSA. Moderate-rated habitats represent 46 ha, or 9.2%, and low-rated habitats represent 227 ha, or 45.8%, of habitats lost due to mine development.

Overall high suitability breeding bird habitat losses make up a relatively small portion of the LSA (<3%) and RSA (<0.1%). In addition, high suitability habitats are not limiting in the region.

9.2.2.3 Other Impacts

Apart from the direct loss of habitats due to alteration of terrain and vegetation, noise and activity during construction will result in the displacement and disruption of other breeding birds and will reduce the effectiveness of their habitats. Disturbance of nesting birds can result in increased energy expenditures and stress levels, and possibly reduced reproductive success and subsequent survival of young. Ptarmigan, however, are often quite tolerant of human presence and several pairs were observed in the vicinity of the Meadowbank camp in June 2003. When sitting on a clutch of eggs, they can be very broody, often allowing humans to approach extremely close to the nest. Nevertheless, they may exhibit startle and flight responses to sudden noises (e.g., from blasting or low-flying aircraft). They may also avoid areas in which frequent, intense, or prolonged disturbances occur (AXYS, 1998).

Air traffic also poses a collision hazard to all bird species, particularly on or in the vicinity of the airstrip; however, this hazard is deemed to be moderate, infrequent, of short duration, and of potentially minor impact to birds. Some bird mortality may occur in summer through collisions with

ground vehicles but such incidents are expected to be infrequent, involving few individual birds, and therefore of minor impact to local bird populations.

Mine construction and operation can result in indirect impacts to breeding bird species. Plant health and bird forage can be affected by fugitive dust deposition associated with mining activities, road use, and maintenance. These activities can lead to reduced plant photosynthesis and reproduction (Eller, 1977; Forbes, 1995), retarded growth (Spatt and Miller, 1981), and altered respiration processes (Svoboda, 1997). Fugitive dust deposition can also lead to early snowmelt and changes in plant phenology, resulting in early flowering in some plant species (Walker and Everett, 1987; Forbes, 1995). Although this may provide earlier foraging and nesting opportunities for breeding birds, dust deposition on vegetation may have a negative effect on the birds, in that berry-producing species may be reduced. Early green-up in the vicinity of roads may attract species such as ptarmigan, increasing the likelihood of collisions with vehicles. The impacts of fugitive dust will mainly occur downwind of operations. As the prevailing winds in the region are northwesterly, the major impacts of dust deposition will generally be on plant communities to the southeast of the facilities or other sources of dust disturbance. Results from modeling, air monitoring, and snow surveys indicate that most dust particles will settle out within 100 m of the source (BHP, 2000). The effects of dust generated by project mining activities on the productivity of vegetation communities and, hence, on bird populations are not expected to be significant.

9.2.3 Operation Phase

A comprehensive analysis of the environmental effects of the proposed mine development on other breeding birds during the operation phase is provided in Appendix B.

9.2.3.1 Main Site

By the operations phase, much of the anticipated habitat loss for other breeding birds will have already occurred. There will continue to be a disruption of birds occurring in the immediate vicinity of project facilities as a result of construction noises, blasting, operations, vehicle traffic, and machinery. Both camps (North and South) will be removed during the operations phase and the habitats will be reclaimed. This will mean an increase in 2.5 ha of potential roosting, nesting, and foraging habitat for breeding birds.

Although there will be no additional habitat losses from roads in the operations phase, the impacts from vehicle/bird collisions, reduced habitat effectiveness, and habitat degradation from fugitive dust and exhaust will continue to a similar degree as during the construction phase. The airstrip and air traffic are not anticipated to have any extra residual impacts other than the ongoing effects of reduced habitat effectiveness, habitat degradation from dust and emissions, and potential for bird/aircraft collisions.

There will also be minor losses and disturbance of potential roosting, foraging, and nesting habitat where the Goose Island dikes key into the shore, and development of the tailings facilities (Second Portage Lake) will result in a loss and disturbance of nesting and foraging habitat for other breeding birds around the lake perimeter to 4 m above the current lake level.

9.2.3.2 Vault Site

Most of the Vault site facilities will be developed during the operation phase of the project. Potential effects of pit and waste rock pile development, noise and activity, and other related effects will be comparable to those described for the main site. Losses of high suitability habitats for other breeding birds at the Vault site are described below.

LSA Habitat Loss Assessment

An estimated 166 ha of high suitability habitat will be lost at the Vault site: 2 ha of Birch Seep, 138 ha of Heath Tundra, 1 ha of Riparian Shrub, and 25 ha of Sedge (see Table 9.2). This 166 ha of habitat represents approximately 45.4% of all habitats lost due to construction activities at the Vault site, 63.9% of terrestrial habitats lost, and 1.8% of the entire LSA. Moderate-rated habitats represent 90 ha, or 24.6%, and low-rated habitats represent 110 ha, or 30.0%, of habitats lost due to mine development.

The low percentage of high suitability breeding bird habitat lost within the LSA due to Vault site activities (i.e., 1.8%) is not expected to result in a significant impact to other breeding birds.

RSA Habitat Loss Assessment

An estimated 135 ha of high suitability habitat will be lost at the Vault dike (see Table 9.2). This 135 ha of habitat represents approximately 37.0% of all habitats lost due to construction activities at the Vault dike, 51.2% of terrestrial habitats lost, and 0.01% of the entire RSA. Moderate-rated habitats represent 128 ha, or 35.0%, and low-rated habitats represent 103 ha, or 28.1%, of habitats lost due to mine development.

High suitability breeding bird habitats are not limiting within the LSA or RSA, therefore residual impacts are expected to be of low significance.

9.2.4 Closure / Post-Closure

A comprehensive analysis of the environmental effects of the proposed mine development on other breeding birds during the closure and post-closure phase is provided in Appendix B.

The cessation of traffic and reclamation of roads will increase the availability of foraging and roosting habitats for other breeding birds. Passerines and ptarmigan may be attracted to reclaimed roadbed areas for roosting, foraging, and possibly nesting (once vegetation has become reestablished). In doing so, they risk increased exposure to contaminants in road materials. This risk however, is expected to be minimal but will be monitored. The removal and habitat reclamation of the fuel storage facilities at the plant site will reduce contaminant levels of the receiving environment in the vicinity of the discharge point.

The airstrip will likely be retained in a usable condition for long-term safety and future industrial activity considerations. It will therefore continue to cause a loss of 5.3 ha of terrestrial roosting, foraging, and nesting habitats for passerines, ptarmigan, and shorebirds. Based on densities of

breeding pairs of birds observed during the June 2003 breeding bird surveys and the ubiquity of these ELC vegetation communities within the LSA and RSA, these habitat losses will have a minimal effect on the local bird populations. Disturbance of birds by aircraft will be infrequent and will also have a minimal impact.

9.3 SUMMARY OF MITIGATION MEASURES

A detailed discussion of proposed mitigation measures to reduce project interactions with other breeding birds is provided in the Terrestrial Management Plan (Cumberland, 2005).

Although the environmental impacts of the project on passerines, shorebirds, ptarmigan, and other breeding birds populations are expected to be minor to moderate, there are measures that can be implemented to reduce or avoid impacts that might otherwise occur. For each potential impact on breeding birds or their habitats, mitigation measures will be undertaken to ensure that residual impacts are acceptable.

Mitigation measures specific to other breeding birds that will be implemented during the construction and operation phases will include:

- managing noise and activity around known nest sites
- minimizing vehicular traffic and speeds and restricting vehicles to designated roads and trails
- minimizing air traffic and using aversive methods to discourage birds from roosting on the runway
- reducing the likelihood of shorebird collisions with overhead power lines and poles by ensuring that these components are not situated adjacent to water bodies
- deterring birds (e.g., shorebirds) from utilizing potentially contaminated areas such as reclaim ponds
- pumping potentially contaminated water ponds (which may attract shorebirds) out of pits to a settling area.

The closure and post-closure phase is the first significant opportunity to initiate major reclamation of areas lost during the construction and operations phases. Reclamation may include creating habitat for shorebirds in shoreline and shallow water areas of flooded pits and for ptarmigan and passerines on slopes and possibly capped top of waste dump if substrate is not toxic to birds.

9.4 SUMMARY OF RESIDUAL EFFECTS

A detailed analysis of anticipated residual effects of the proposed project on other breeding birds during the construction, operation, and closure and post-closure phases is provided in Appendix B.

The residual effects for other breeding birds after all mitigation measures have been completed will include minor losses of roosting, foraging, and nesting habitats, persistent habitat degradation, and contamination adjacent to sites of former roads, fuel storage areas, mine plant facilities, elevated contaminant levels in mine tailings, and possibly elevated contaminant levels in ptarmigan, shorebirds, and passerines.

Overall residual impacts are not expected to be significant on a regional level; however, on a local level (i.e., other-breeding-bird-specific LSA of 500 m radius), the declines in the number of breeding birds observed is considered to be of high magnitude and significance. These reductions will slowly be reversed during the post-closure phase as disturbed areas become naturally revegetated or are reclaimed.

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APPENDIX A

Glossary

Abandonment and Restoration – Upon mine closure, the minimization of surface area disturbance through recontouring of disturbed areas to be consistent with the surrounding topography and to stabilize slopes but encourage runoff, encourage or establish revegetation, and return the land to post-mining uses for traditional pursuits and wildlife habitat.

Adaptive Management – A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

Closure and Post-Closure Phase – The stage in mine development when exploitable ore reserves have been exhausted, and the decommissioning of mine structures, buildings and equipment begins. Abandonment and restoration also begin at this stage.

Construction Phase – The stage in mine development (referring to the Meadowbank Gold project) when the major mine structures, such as processing plant and ancillary facilities, open pit, waste rock storage facility, and tailings impoundment, are developed.

Cumberland – Cumberland Resources Ltd., the company proposing to develop the Meadowbank Gold project.

Cumulative Impact – Changes to the environment that are caused by an action in combination with other past, present and future actions.

COSEWIC – Committee on the Status of Endangered Wildlife in Canada

DSD – Department of Sustainable Development

Ecology – The study of the interactions between organisms and their environment.

Ecosystem – A community of interacting organisms considered together with the chemical and physical factors that make up their environment.

EIA – Environmental impact assessment

EIS – Environmental impact statement, a documented evaluation of the project proposal that provides detailed information regarding the proposal's environmental and socioeconomic impacts.

ELC – Ecological land classification, a land classification system based on terrain, soils and vegetation in which areas of similar ecology are identified and mapped within a hierarchy of ecosystems where broad to specific levels of detail are presented on a series of maps.

INAC – Indian and Northern Affairs Canada.

Lagomorph – any of an order (Lagomorpha) of gnawing herbivorous mammals having fully furred feet and two pairs of incisors in the upper jaw one behind the other and comprising the rabbits, hares, and pikas.

LSA – Local study area. Local spatial boundaries determined for each VEC based on their respective characteristics and interactions with project components. LSA for the baseline studies for this report was a 5 km radius circle around the main mine facilities and a 2 km wide circle around the Vault facilities.

MVEIRB – Mackenzie Valley Environmental Impact Review Board.

Microtine Rodent – A vole or lemming.

Mitigation – An action taken against an impact in order to control its effect.

Monitoring – The assessment of mitigation in order to determine its effectiveness.

NIRB – Nunavut Impact Review Board

NWB – Nunavut Water Board

NWMB – Nunavut Wildlife Management Board

Oligotrophic – Relating to water bodies with low nutrient inputs and low organic production.

Operations Phase – The stage in mine development when major facilities have been developed, and ore is being extracted from the ground and either processed on site or shipped off-site for processing.

PAHs – Polynuclear aromatic hydrocarbons (example source: degraded petroleum)

Passerine – Perching birds that are mostly small and living near the ground with feet having four toes arranged to allow for gripping a perch; most are songbirds.

PCBs – Polychlorinated biphenyls (example source: transformer)

Permafrost – Permanently frozen ground.

Predatory Mammal – Mammals that survive by catching living prey or opportunistically scavenging on the prey of other animals.

Raptor – A bird that hunts by snatching its prey.

Residual Effect – An effect that persists after mitigation measures have been implemented.

RSA – Regional study area. Regional spatial boundaries determined for each VEC based on their respective characteristics and interactions with project components. RSA for the baseline studies for this report = 100 km x 100 km = 10,000 km2

Shutdown, Temporary and Long-Term – The cessation of mining activities for an arbitrary length of time that may vary from days to years.

Subnivean – Beneath the snow.

Tailings – Ground waste material and water (slurry) rejected from a mill or process plant after most of the valuable minerals have been extracted.

Traditional Knowledge – The knowledge people have gained over the years from the environment and the world around them. Traditional knowledge is gained both by personal experience and by passing on information from one generation to the next.

Ungulate – A wide taxonomic group of hoofed mammals (e.g., caribou).

VEC, Valued Ecosystem Component – Environmental attributes or components selected through consultation with regulatory and governmental authorities, discussions with members of the local community, and a review of VECs identified in other northern mine projects. This selection process can be further refined through the application of one or more of the following criteria: conservation status, relative abundance within the project area, importance in subsistence lifestyle and economy, importance in predator-prey systems, habitat requirement size and sensitivity, and contribution to local area concerns. Other considerations include scientific and aesthetic values.

Waste Rock – Barren rock or rock too low in grade to be mined or processed economically.

Waterfowl – Freshwater dependent, swimming aquatic birds.

WMP – Wildlife Management Plan

APPENDIX B

Other Breeding Birds Impact Matrices

Construction B.1
Operations B.2
Closure / Post-Closure B.3

Table B.1: Other Breeding Birds Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Contin	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active nest sites of songbirds, shorebirds and ptarmigan; monitor response of nesting birds to noise and activity; implement employee awareness programs
Dikes												
East Dike	Minor loss and disturbance of nesting and foraging habitat on islands and where dikes key into shorelines	Low	Local	Contin	Medium	Summer	No	Minimize area of shorelines encroached by dikes; don't build dikes during the active nesting period or ensure that birds are not nesting in areas that will be disturbed	Small area of terrestrial impact may affect some local breeding pairs of birds, but overall residual effect is considered to be low	No	Certain	Identify and monitor active nest sites of songbirds, shorebirds and ptarmigan
West Dike	Minor loss and disturbance of nesting and foraging habitat on islands and where dikes key into shorelines	Low	Local	Contin	Medium	Summer	No	Minimize area of shorelines encroached by dikes; don't build dikes during the active nesting period or ensure that birds are not nesting in areas that will be disturbed	Small area of terrestrial impact may affect some local breeding pairs of birds, but overall residual effect is considered to be low	No	Certain	Identify and monitor active nest sites of songbirds, shorebirds and ptarmigan

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Portage South Dike	Minor loss and disturbance of nesting and foraging habitat on islands and where dikes key into shorelines	Low	Local	Contin	Medium	Summer	No	Minimize area of shorelines encroached by dikes; don't build dikes during the active nesting period or ensure that birds are not nesting in areas that will be disturbed	Small area of terrestrial impact may affect some local breeding pairs of birds, but overall residual effect is considered to be low	No	Certain	Identify and monitor active nest sites of songbirds, shorebirds and ptarmigan
Goose Island and 3rd Portage Arm Dikes	NA – dikes are not constructed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	Minor loss and disturbance of terrestrial foraging and nesting habitat	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small	No	High	None specific to birds recommended; revegetate on an as-required basis
Goose Island (3rd Portage Lake)	NA since activity does not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Loss and disturbance of terrestrial foraging habitat due to overburden stripping	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss; avoid breeding bird window during construction; identify nest sites	Loss of some terrestrial habitat is permanent but considered to be low	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis
Goose Island Pit	NA since pit is not developed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; avoid overburden stripping during breeding bird season; identify nest sites	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries					Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects					
Tailings Facilities (2nd Portage Lake)	NA since activity not until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions; avoid construction of roads during breeding bird season; identify active nests	Minor alteration and loss of foraging habitat	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries					Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects					
Airstrip and Air Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required airstrip size; avoid construction during breeding bird season; identify active nests	Minor alteration and loss of foraging habitat	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan in the vicinity of the airstrip; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to air traffic/bird collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings	The potential for a plane/bird collision is considered to be low	No	Moderate	Pilots are required to report all bird/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting songbirds, shorebirds, and ptarmigan
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting songbirds, shorebirds and ptarmigan
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident birds are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Mine Plant and Associated Facilities	Loss of foraging and nesting habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of mine facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent foraging habitat loss on a local level	No	Certain	Revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	All Year	No	Use dust suppressant techniques on an as-needed basis; maintain vehicles in good operating condition	Potential for exposure to contaminated prey is low	No	High	Monitor contaminant levels in vegetation and possible other indicators
Freshwater Intake and Pipeline	Minor loss and disturbance of nesting and foraging habitat	Low	Local	Continuous	Medium	Summer	No	Construct pipeline in a manner to minimize impact to terrestrial environment; avoid construction during the breeding bird season; identify active nests	Small areas of impact may effect a few breeding pairs but impact is not evident over a wide area	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan in the vicinity
Discharge Facilities and Pipeline(s)	Minor loss and disturbance of nesting and foraging habitat	Low	Local	Continuous	Medium	Summer	No	Construct pipeline in a manner to minimize impact to terrestrial environment; avoid construction during the breeding bird season; identify active nests	Small areas of impact may effect a few breeding pairs but impact is not evident over a wide area	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan in the vicinity
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Power Lines and Poles	Potential for collision resulting in mortality	Low	Local	Infrequent	Short	All Year	No	Consideration may be given to marking power lines to increase visibility, particularly in poor or low light conditions	The potential residual effects (i.e., bird mortality) are expected to be very low.	No	Moderate	Report all bird strikes or mortalities related to power lines
	Improved perching opportunities for raptors may result in increased depredation rates on birds in a localized area	Low	Local	Infrequent	Long	All Year	No	None recommended	Potential for increased depredation rates is low and then only at a localized level	No	Moderate	Report all raptors perching on power poles, lines and other mine facilities
	POSITIVE - Improved perching opportunities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Camps (North and South)	Minor loss and disturbance of nesting and foraging habitat; sensory disturbance may result in reduced habitat effectiveness	Low	Local	Continuous	Medium	Summer	No	Designate tent sites and walking trails; use pallets or raised walkways in areas with heath, sedge or other vegetation sensitive to trampling	Small area of impact and proposed mitigation measures will ensure that residual effects are low	No	Certain	Regular maintenance of designated trail system; monitor development of 'bandit' trails; identify and monitor active nest sites
Sewage and Solid Waste Disposal	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active nest sites of songbirds, shorebirds and ptarmigan; monitor response of nesting birds to noise and activity; implement employee awareness programs
Dike	Minor loss and disturbance of nesting and foraging habitat on islands and where dikes key into shorelines	Low	Local	Continuous	Medium	Summer	No	Minimize area of shorelines encroached by dikes; don't build dikes during the active nesting period or ensure that birds are not nesting in areas that will be disturbed	Small area of terrestrial impact may affect some local breeding pairs of birds, but overall residual effect is considered to be low	No	Certain	Identify and monitor active nest sites of songbirds, shorebirds and ptarmigan
Dewatering	NA since activity does not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	NA since pit construction will occur during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Waste Dump	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; avoid overburden stripping during breeding bird season; identify nest sites	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions; avoid construction of roads during breeding bird season; identify active nests	Minor alteration and loss of foraging habitat	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Roads and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	Minor loss and disturbance of nesting and foraging habitat	Low	Local	Continuous	Medium	Summer	No	Minimize footprint; avoid construction during breeding bird season; identify active nests	Small habitat loss is expected to have a low residual effect on local bird populations	No	Certain	Identify and monitor active bird nests
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is expected to be very low because only ptarmigan is present during the winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; ptarmigan have the right-of-way	Potential for vehicle/ptarmigan collisions in winter is expected to be low	No	Low	Drivers will report any collisions and near misses with ptarmigan

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Baker Lake Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions; avoid construction of roads during breeding bird season; identify active nests	Minor alteration and loss of foraging habitat	No	Certain	Identify and monitor active nests of songbirds, shorebirds and ptarmigan; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	Loss of foraging and nesting habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent foraging habitat loss on a local level	No	Certain	Revegetate areas disturbed during construction
Explosives Magazine	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B.2: Other Breeding Birds Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active nest sites of songbirds, shorebirds and ptarmigan; monitor response of nesting birds to noise and activity; implement employee awareness programs
Dikes												
East, West and Portage South Dikes	No additional habitat loss anticipated during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	Minor loss and disturbance of nesting and foraging habitat on islands and where dikes key into shorelines	Low	Local	Continuous	Medium	Summer	No	Minimize area of shorelines encroached by dikes; don't build dikes during the active nesting period or ensure that birds are not nesting in areas that will be disturbed	Small area of terrestrial impact may affect some local breeding pairs of birds, but overall residual effect is considered to be low	No	Certain	Identify and monitor active nest sites of songbirds, shorebirds and ptarmigan
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island (3rd Portage Lake)	Minor loss and disturbance of terrestrial foraging and nesting habitat	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small	No	High	None specific to birds recommended; revegetate on an as-required basis
Pits												
Portage Pit	No additional measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Goose Island Pit	Loss and disturbance of terrestrial foraging habitat due to overburden stripping	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss; avoid breeding bird window during construction; identify nest sites	Loss of some terrestrial habitat is permanent but considered to be low	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis
Waste Dump (Portage/Goose)	Continued loss and disturbance of nesting and foraging habitat as waste dump expands	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; avoid overburden stripping during breeding bird season; identify nest sites	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis
Tailings Facilities (2nd Portage Lake)	Loss and disturbance of terrestrial foraging habitat around edge of lake to four metres above current lake elevation	Low	Local	Continuous	Permanent	All Year	No	Minimize encroachment of tailings into shoreline areas of 2nd Portage Lake; berm edges if necessary	Residual effect includes permanent loss of vegetation around the shoreline of 2nd Portage Lake	No	Certain	Environmental monitoring to ensure that only designated areas are impacted by the tailings beach
	Natural revegetation of potentially contaminated tailings beach may occur; birds may be exposed to elevated contaminant levels	Low	Local	Continuous	Permanent	All Year	No	Cap facility with appropriate clean material; undertake progressive reclamation activities to improve habitats on areas of tailings deposit that has reached its maximum height	With adequate measures, the potential for contamination is very low	No	Low	Monitor contaminant levels in vegetation on tailings beach; adjust capping material composition and distribution as appropriate

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/bird collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings	The potential for a plane/bird collision is considered to be low	No	Moderate	Pilots are required to report all bird/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting songbirds, shorebirds, and ptarmigan
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting songbirds, shorebirds and ptarmigan
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident birds are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may cause habitat degradation and increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor bird nest locations; monitor contaminant levels in vegetation adjacent to mine site
	POSITIVE - Possible increased nesting and perching opportunities for birds on mine structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Freshwater Intake and Pipeline	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Power Lines and Poles	Potential for collision resulting in mortality	Low	Local	Infrequent	Short	All Year	No	Consideration may be given to marking power lines to increase visibility, particularly in poor or low light conditions	The potential residual effects (i.e., bird mortality) are expected to be very low.	No	Moderate	Report all bird strikes or mortalities related to power lines
	Improved perching opportunities for raptors may result in increased depredation rates on birds in a localized area	Low	Local	Infrequent	Long	All Year	No	None recommended	Potential for increased depredation rates is low and then only at a localized level	No	Moderate	Report all raptors perching on power poles, lines and other mine facilities
	POSITIVE - Improved perching opportunities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Fuel Storage (at Plant site)	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow spill contingency guidelines	Potential for contaminatio n is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow spill contingency guidelines	Potential for contaminatio n is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	POSITIVE - Increased habitat availability and reduced disturbance as camps are removed and habitat reclamation is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active nest sites of songbirds, shorebirds and ptarmigan; monitor response of nesting birds to noise and activity; implement employee awareness programs
Dike	No additional habitat loss anticipated during operation phase	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Dewatering	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Loss and disturbance of terrestrial foraging habitat due to overburden stripping	Low	Local	Continuous	Permane nt	All Year	No	Minimize width of pits and overall habitat loss; avoid breeding bird window during construction; identify nest sites	Loss of some terrestrial habitat is permanent but considered to be low	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump	Continued loss and disturbance of nesting and foraging habitat as waste dump expands	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; avoid overburden stripping during breeding bird season; identify nest sites	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Identify and monitor bird nests in proposed overburden stripping area; revegetate on an as-required basis
Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	No additional loss or disturbance of terrestrial foraging habitat anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is expected to be very low because only ptarmigan is present during the winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; ptarmigan have the right-of-way	Potential for vehicle/ptarmigan collisions in winter is expected to be low	No	Low	Drivers will report any collisions and near misses with ptarmigan
Baker Lake Access Road and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may cause habitat degradation and increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor bird nest locations; monitor contaminant levels in vegetation adjacent to facilities
	POSITIVE - Possible increased nesting and perching opportunities for birds on mine structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow spill contingency guidelines	Potential for contamination is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tank Farm	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow spill contingency guidelines	Potential for contamination is low and potential for birds to consume contaminated prey is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table B.3: Other Breeding Birds Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas; minimal effects once mine is fully closed	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active nest sites of songbirds, shorebirds and ptarmigan; monitor response of nesting birds to noise and activity; implement employee awareness programs
Dikes												
East, West, Portage South, Goose Island and 3rd Portage Arm Dikes Dikes	Dikes will be breached, any terrestrial habitat created by them will be inundated	Low	Local	Continuous	Permanent	All Year	No	Minimize terrestrial habitat lost to breaching of dikes, do not breach dikes during prime nesting periods	Residual impact will be small since marginal terrestrial habitat lost was only available during the operation phase	No	Certain	Locate and monitor active bird nests
	POSITIVE - Vegetation will naturally become established on dikes providing living areas for small mammals and small birds and foraging opportunities for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake, Portage Pit (3rd Portage Lake) and Goose Island (3rd Portage Lake)	NA since dewatering completed during construction and operation phases	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pits												
Portage and Goose Island Pits	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for raptors	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases local bird populations	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pits providing living and nesting opportunities for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living and nesting opportunities for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailings Facilities (2nd Portage Lake)	POSITIVE – Native vegetation will naturally become reestablished on the tailings beach providing improved living conditions for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on tailings may be contaminated leading to elevated contaminant levels in birds	Medium	Local	Continuous	Permanent	All year	Yes	Ensure that tailings deposit is capped with clean material	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude	Low	High	Monitor contaminant levels in vegetation and possibly other indicators

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Passerines and ptarmigan may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/bird collisions; risk of this effect will decline substantially after mine closure	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings	The potential for a plane/bird collision is considered to be low	No	Moderate	Pilots are required to report all bird/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting songbirds, shorebirds, and ptarmigan
	Reduced habitat effectiveness in adjacent areas due to noise and activity; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting songbirds, shorebirds and ptarmigan
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident birds are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent habitat loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Freshwater Intake and Pipeline	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss; potential for spills is substantially reduced	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss; no further potential for spills	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas; minimal effects once mine is fully closed	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active nest sites of songbirds, shorebirds and ptarmigan; monitor response of nesting birds to noise and activity; implement employee awareness programs
Dike	Dikes will be breached, any terrestrial habitat created by them will be inundated	Low	Local	Continuous	Permanent	All Year	No	Minimize terrestrial habitat lost to breaching of dikes, do not breach dikes during prime nesting periods	Residual impact will be small since marginal terrestrial habitat lost was only available during the operation phase	No	Certain	Locate and monitor active bird nests
Dewatering	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for raptors	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in small mammal and bird prey for raptors	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pits providing living and nesting opportunities for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living and nesting opportunities for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic Non-contact Diversion Facilities Mine Shop/ Office OTHER FACILITIES Winter Road and Traffic Baker Lake Access Road and Traffic	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Passerines and ptarmigan may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic Non-contact Diversion Facilities Mine Shop/ Office OTHER FACILITIES Winter Road and Traffic Baker Lake Access Road and Traffic	The probability of mortality due to vehicle/bird collisions is expected to be very low because only ptarmigan is present during the winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; ptarmigan have the right-of-way	Potential for vehicle/ptarmigan collisions in winter is expected to be low	No	Low	Drivers will report any collisions and near misses with ptarmigan
	Mortality due to vehicle/bird collisions; the potential for this effect is expected to decline after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; birds have right-of-way	Potential for vehicle/bird collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with birds
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect is expected to decline after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of birds to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect is expected to decline after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident birds will likely be low; potential exposure is seasonal for most bird species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
In-town Staging Facility	No further habitat loss or disturbance anticipated; facility will likely not be decommissioned	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Possible increased nesting and perching opportunities for birds on structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

APPENDIX C

Predatory Mammals Impact Matrices

Construction C.1
Operations C.2
Closure / Post-Closure C.3

Table C.1: Predatory Mammals Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs; disturbance of denning animals	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give predatory mammals right-of-way; minimize activities off access roads; manage noise and activity around active den sites	With mitigation, the magnitude of potential effects is low; as well, potential for denning predatory mammals in vicinity of mine site is very low and no dens have been located during baseline surveys	No	High	Daily logs of predatory mammal locations, numbers, and direction of travel; monitor locations of active den sites; monitor response of denning predatory mammals to noise and activity
Dikes												
East, West and Portage South Dikes	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
2nd Portage Lake and Portage Pit (3rd Portage Lake)	Minor habitat loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located; potential decline in prey populations	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of habitat	Minor residual effects anticipated to foraging opportunities for predatory mammals as potentially disturbed areas will return to pre-development conditions rapidly and prey populations are not expected to be impacted	No	High	Revegetate on an as-needed basis
Goose Island (3rd Portage Lake)	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Habitat loss and associated decline in prey populations and disturbance from stripping activities	Low	Local	Continuous	Long	All Year	No	Minimize width of pits to reduce overall foraging habitat loss	Permanent habitat loss on local level with potential declines in prey populations	No	Certain	None recommended
Goose Island Pit	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Habitat loss and associated decline in prey populations and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent habitat alteration and loss on a local level with possible reductions in local prey populations	No	Certain	Monitor success of reclamation activities; monitor prey populations
Tailings Facilities (2nd Portage Lake)	NA – Tailings will not be deposited until the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and avoidance of habitat and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions	Residual effect expected to be minor	No	Certain	Monitor predatory mammal movements; revegetate areas disturbed during construction
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation and other indicators adjacent to roads

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Loss and avoidance of habitat and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize width and length of runway	Residual effects are expected to be minor	No	Certain	Monitor predatory mammal movements; revegetate areas disturbed during construction
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; monitor predatory mammal occurrence in the vicinity of airstrip; use scare tactics to move predatory mammals away from airstrip and approaches	Mortality due to collisions is extremely unlikely	No	Moderate	Pilots required to report all predatory mammal/plane near misses and predatory mammals sighted in the area; maintain a wildlife sighting log book
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize number of take-offs and landings; use defined flight corridors; establish minimum altitude and no harassment policies	Avoidance of areas adjacent to airstrip are not expected due to the low frequency of flights	No	Moderate	Monitor predatory mammal distribution and behaviour in Local Study Area
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	Summer	No	Minimize number of take-offs and landings; use dust suppressants if necessary	Any residual effects will be restricted to habitats in close proximity to the airstrip	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip
Mine Plant and Associated Facilities	Loss and avoidance of habitat and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize footprint of mine plant site and ancillary facilities; comply with construction plan and schedule; minimize degradation of surrounding area	Residual effects limited to a localized area	No	Certain	Monitor predatory mammal distribution and abundance in Local Study Area; revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor predatory mammal distribution and abundance; monitor contaminant levels in vegetation adjacent to mine site

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Freshwater Intake and Pipeline	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to fuel spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Emulsion/AN Storage/ Explosives Magazines	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	Loss and avoidance of habitats and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Medium	All Year	No	Ecological awareness programs for all employees; walkways or designated trails between tents; minimize disturbance to surrounding area when dismantling camp	Minor residual effects are limited to a very localized areas	No	Certain	Enforce use of designated trail system; maintain trail system; monitor development of 'bandit' trails; revegetate camp areas no longer in use

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Sewage and Solid Waste Disposal	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Food and other camp wastes attract scavengers including Grizzly Bear and Wolverine, increasing risk to human safety; mortality of animals may occur if they are deemed to be problem.	High	Local	Continuous	Permanent	All Year	Yes	Incinerate all garbage and food wastes; maintain a clean camp and mine site; facility is attached to main mine building to facilitate transfer of wastes; facility has apron to ground to prevent animals from crawling underneath; implement camp bear safety procedures and train staff	With mitigation measures, probability of attracting large scavengers is low, therefore magnitude is low	No	High	Monitor success of food and garbage handling procedures; monitor predatory mammals occurrence in the vicinity of mine facilities; enforce protocols to reduce potential for attracting predatory mammals; implement employee awareness programs
VAULT FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs; disturbance of denning animals	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give predatory mammals right-of-way; minimize activities off access roads; manage noise and activity around active den sites	With mitigation, the magnitude of potential effects is low; as well, potential for denning predatory mammals in vicinity of mine site is very low and no dens have been located during baseline surveys	No	High	Daily logs of predatory mammal locations, numbers, and direction of travel; monitor locations of active den sites; monitor response of denning predatory mammals to noise and activity
Dike	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since no terrestrial activity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pit	NA - Not until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Habitat loss and associated decline in prey populations and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent habitat alteration and loss on a local level with possible reductions in local prey populations	No	Certain	Monitor success of reclamation activities; monitor prey populations
Roads and Traffic	Loss and avoidance of habitat and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions	Residual effect expected to be minor	No	Certain	Monitor predatory mammal movements; revegetate areas disturbed during construction
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation and other indicators adjacent to roads

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Non-contact Diversion Facilities	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	Small area of habitat alteration not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Increased hunting pressure; mortality from vehicles	Medium	Regional	Frequent	Long	Winter	Yes	Limit use of winter road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to predatory mammals and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderate	Report all predatory mammal/vehicle collisions; enforcement of no-hunting policy along winter road

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Loss and avoidance of habitat and associated prey populations; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions	Residual effect expected to be minor	No	Certain	Monitor predatory mammal movements; revegetate areas disturbed during construction
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation and other indicators adjacent to roads
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
In-town Staging Facility	Loss and avoidance of habitat; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize footprint of staging facilities; comply with construction plan and schedule; minimize degradation of surrounding area	Residual effects limited to a localized area	No	Certain	Monitor predatory mammal distribution and abundance in Local Study Area; revegetate areas disturbed during construction
Explosives Magazine	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table C.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Predatory mammals such as Wolverine may be attracted to fuel spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table C.2: Predatory Mammals Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs; disturbance of denning animals	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give predatory mammals right-of-way; minimize activities off access roads; manage noise and activity around active den sites	With mitigation, the magnitude of potential effects is low; as well, potential for denning predatory mammals in vicinity of mine site is very low and no dens have been located during baseline surveys	No	High	Daily logs of predatory mammal locations, numbers, and direction of travel; monitor locations of active den sites; monitor response of denning predatory mammals to noise and activity
Dikes												
East, West and Portage South Dikes	No further habitat loss during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Goose Island (3rd Portage Lake)	Minor habitat loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located; potential decline in prey populations	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of habitat	Minor residual effects anticipated to foraging opportunities for predatory mammals as potentially disturbed areas will return to pre-development conditions rapidly and prey populations are not expected to be impacted	No	High	Revegetate on an as-needed basis
Pits												
Portage and Goose Island Pits	No obvious effects anticipated with the exception of noise and activity above	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Ongoing habitat loss and associated decline in prey populations and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent habitat alteration and loss on a local level with possible reductions in local prey populations	No	Certain	Monitor success of reclamation activities; monitor prey populations
Tailings Disposal (Facilities & Pond)	Exposure to contaminants if water is drunk from tailings pond; potential for occurrence is low because very few predatory mammals are present in the vicinity of the mine site for most of the ice-free season; exposure in the fall is the most likely	Medium	Local	Infrequent	Long	Summer	No	Use aversive techniques to prevent animals accessing tailings ponds	Mitigation measures will reduce the potential magnitude of the effect to Low; residual effects are expected to be very low	No	Moderate	Wildlife logs; monitor predatory mammal occurrence and distribution; report all interactions and take further mitigation action (e.g., more regular monitoring) to reduce potential effects
	Trauma or death resulting from animals getting stuck in soft tailings; thawed tailings will only be available for a short time during the growing season	Low	Local	Infrequent	Long	Summer	No	Use aversive techniques to prevent animals from accessing tailings ponds	Residual effects (i.e., animal mortality) is very unlikely to occur	No	Low	Wildlife logs; monitor predatory mammal occurrence and distribution; report all interactions and take further mitigation action (e.g., more regular monitoring) to reduce potential effects

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated during the operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation and other indicators adjacent to roads

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated during the operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; monitor predatory mammal occurrence in the vicinity of airstrip; use scare tactics to move predatory mammals away from airstrip and approaches	Mortality due to collisions is extremely unlikely	No	Moderate	Pilots required to report all predatory mammal/plane near misses and predatory mammals sighted in the area; maintain a wildlife sighting log book
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize number of take-offs and landings; use defined flight corridors; establish minimum altitude and no harassment policies	Avoidance of areas adjacent to airstrip are not expected due to the low frequency of flights	No	Moderate	Monitor predatory mammal distribution and behaviour in Local Study Area
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	Summer	No	Minimize number of take-offs and landings; use dust suppressants if necessary	Any residual effects will be restricted to habitats in close proximity to the airstrip	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip
Mine Plant and Associated Facilities	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor predatory mammal distribution and abundance; monitor contaminant levels in vegetation adjacent to mine site

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Freshwater Intake and Pipeline	No further habitat loss anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No further habitat loss anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Non-contact Diversion Facilities	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	Potential fuel spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to fuel spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Emulsion/AN Storage/ Explosives Magazines	Potential spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	POSITIVE - Increased habitat availability and reduced disturbance as camps are removed and habitat reclamation is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	Food and other camp wastes attract scavengers including Grizzly Bear and Wolverine, increasing risk to human safety; mortality of animals may occur if they are deemed to be problem.	High	Local	Continuous	Permanent	All Year	Yes	Incinerate all garbage and food wastes; maintain a clean camp and mine site; facility is attached to main mine building to facilitate transfer of wastes; facility has apron to ground to prevent animals from crawling underneath; implement camp bear safety procedures and train staff	With mitigation measures, probability of attracting large scavengers is low, therefore magnitude is low	No	High	Monitor success of food and garbage handling procedures; monitor predatory mammals occurrence in the vicinity of mine facilities; enforce protocols to reduce potential for attracting predatory mammals; implement employee awareness programs

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
VAULT FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs; disturbance of denning animals	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give predatory mammals right-of-way; minimize activities off access roads; manage noise and activity around active den sites	With mitigation, the magnitude of potential effects is low; as well, potential for denning predatory mammals in vicinity of mine site is very low and no dens have been located during baseline surveys	No	High	Daily logs of predatory mammal locations, numbers, and direction of travel; monitor locations of active den sites; monitor response of denning predatory mammals to noise and activity
Dike	No further habitat loss during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	No obvious effects anticipated with the exception of noise and activity above	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Ongoing habitat loss and associated decline in prey populations and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent habitat alteration and loss on a local level with possible reductions in local prey populations	No	Certain	Monitor success of reclamation activities; monitor prey populations

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated during the operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation and other indicators adjacent to roads
Non-contact Diversion Facilities	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	No additional loss or disturbance of terrestrial foraging habitat anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	Small area of habitat alteration not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Increased hunting pressure; mortality from vehicles	Medium	Regional	Frequent	Long	Winter	Yes	Limit use of winter road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to predatory mammals and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderate	Report all predatory mammal/vehicle collisions; enforcement of no-hunting policy along winter road; follow up on all reports of illegal hunting
Baker Lake Access Road and Traffic	No additional habitat loss or disturbance anticipated during the operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/predatory mammal collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor predatory mammal movements; drivers need to report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way at all times	Animals are expected to become somewhat habituated to noise or occur at very low densities in the project area, therefore residual impacts are expected to be minor	No	High	Daily logs of predatory mammals, locations, numbers, and direction of travel

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since predatory mammals are very wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation and other indicators adjacent to roads
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor predatory mammal distribution and abundance; monitor contaminant levels in vegetation adjacent to mine site
Explosives Magazine	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table C.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Predatory mammals such as Wolverine may be attracted to spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	Small area of habitat loss not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to fuel spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table C.3: Predatory Mammals Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
MAIN FACILITIES												
Noise and Activity	Closure activity and noise may result in avoidance of the area and deflection; behavioural changes, followed by re-use of the area after closure	Medium	Local	Continuous	Medium	All Year	No	Minimize engine noises and noises associated with dismantling buildings and infrastructure, maintain and ensure vehicles are properly muffled, establish speed limits, expedite decommissioning	With mitigation, magnitude of potential effects is low	No	High	Daily logs of predatory mammal locations, numbers, and direction of travel
Dikes												
East, West, South Portage, Goose Island and 3rd Portage Arm Dikes	Dikes will be breached, any terrestrial habitat created by them will be flooded	Low	Local	Continuous	Permanent	All Year	Low	Minimize terrestrial habitat lost to breaching of dikes	Residual impact will be small since marginal terrestrial habitat lost was only available during the operation phase	No	Moderate	Avoid breaching dams during times of active denning in areas to be flooded, if any exist; monitor locations of active den sites
	POSITIVE - Vegetation will naturally become established providing foraging opportunities for prey species	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake, Portage Pit (3rd Portage Lake) and Goose Island (3rd Portage Lake)	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Pits												
Portage Pit	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for raptors	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in prey populations	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pits; riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits; these changes will provide living and nesting opportunities for prey species of predatory mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for prey of predatory mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Tailings Facilities (2nd Portage Lake)	POSITIVE – Native vegetation will naturally become reestablished on the tailings beach providing improved living conditions for prey of predatory mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on tailings may be contaminated leading to elevated contaminant levels in prey of predatory mammals	Low	Local	Continuous	Permanent	All year	No	Ensure that tailings deposit is capped with clean material	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude; predatory mammals are widely dispersed and are unlikely to take a large number of prey from contaminated areas	Low	High	Monitor contaminant levels in vegetation and possibly other indicators

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Roads and Traffic	Mortality due to vehicle/predatory mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way	Potential for vehicle/predatory mammal collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of predatory mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of predatory mammals will likely be low; potential exposure is seasonal for most predatory mammal species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/predatory mammal collisions; risk of this effect will decline substantially after mine closure	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; monitor predatory mammal occurrence in the vicinity of airstrip; use scare tactics to move predatory mammals away from airstrip and approaches	Mortality due to collisions is extremely unlikely	No	Moderate	Pilots required to report all predatory mammal/plane near misses and predatory mammals sighted in the area; maintain a wildlife sighting log book
	Reduced habitat effectiveness in adjacent areas due to noise and activity; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Long	All Year	No	Minimize number of take-offs and landings; use defined flight corridors; establish minimum altitude and no harassment policies	Avoidance of areas adjacent to airstrip are not expected due to the low frequency of flights	No	Moderate	Monitor predatory mammal distribution and behaviour in Local Study Area
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Long	Summer	No	Minimize number of take-offs and landings; use dust suppressants if necessary	Any residual effects will be restricted to habitats in close proximity to the airstrip	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent habitat loss and disturbance with some potential effect on prey populations	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & restoration Plan
	POSITIVE - With closure of the mine, risks and disturbances to predatory mammals will decrease (e.g., avoidance of foraging habitat, deflection from normal travel routes, energetic costs)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Freshwater Intake and Pipeline	POSITIVE – Small gain in habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Small gain in habitat	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved habitat and prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	Small degree of habitat loss due to erosion and permafrost degradation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss; potential for spills is substantially reduced	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss; no further potential for spills	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	Food and other camp wastes attract scavengers including grizzly bear and wolverine, increasing risk to human safety; mortality of animals may occur if they are deemed to be problem; the potential for effects is reduced greatly once the mine has been fully closed	High	Local	Continuous	Permanent	All Year	Yes	Incinerate all garbage and food wastes; maintain a clean camp and mine site; facility is attached to main mine building to facilitate transfer of wastes; facility has apron to ground to prevent animals from crawling underneath; implement camp bear safety procedures and train staff	With mitigation measures, probability of attracting large scavengers is low, therefore magnitude is low	No	High	Monitor success of food and garbage handling procedures; monitor predatory mammals occurrence in the vicinity of mine facilities; enforce protocols to reduce potential for attracting predatory mammals; implement employee awareness programs
VAULT FACILITIES												
Noise and Activity	Closure activity and noise may result in avoidance of the area and deflection; behavioural changes, followed by re-use of the area after closure	Medium	Local	Continuous	Medium	All Year	No	Minimize engine noises and noises associated with dismantling buildings and infrastructure, maintain and ensure vehicles are properly muffled, establish speed limits, expedite decommissioning	With mitigation, magnitude of potential effects is low	No	High	Daily logs of predatory mammal locations, numbers, and direction of travel
Dike	Dikes will be breached, any terrestrial habitat created by them will be flooded	Low	Local	Continuous	Permanent	All Year	Low	Minimize terrestrial habitat lost to breaching of dikes	Residual impact will be small since marginal terrestrial habitat lost was only available during the operation phase	No	Moderate	Avoid breaching dams during times of active denning in areas to be flooded, if any exist; monitor locations of active den sites

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	POSITIVE - Vegetation will naturally become established providing foraging opportunities for prey species	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Dike will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for raptors	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in prey populations	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pit; riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pit; these changes will provide living and nesting opportunities for prey species of predatory mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for prey of predatory mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Roads and Traffic	Mortality due to vehicle/predatory mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way	Potential for vehicle/predatory mammal collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of predatory mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of predatory mammals will likely be low; potential exposure is seasonal for most predatory mammal species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Non-contact Diversion Facilities	Small degree of habitat loss due to erosion and permafrost degradation	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	Small gain in reclaimed habitat	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
OTHER FACILITIES												
Winter Road and Traffic	Small area of habitat alteration not expected to result in measurable effect on prey populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Increased hunting pressure; mortality from vehicles; no risk of vehicle collisions post-closure	Medium	Regional	Frequent	Long	Winter	Yes	Limit use of winter road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to predatory mammals and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderate	Report all predatory mammal/vehicle collisions; enforcement of no-hunting policy along winter road; follow up on all reports of illegal hunting

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Baker Lake Access Road and Traffic	Mortality due to vehicle/predatory mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; predatory mammals have right-of-way	Potential for vehicle/predatory mammal collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with predatory mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of predatory mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment;	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of predatory mammals will likely be low; potential exposure is seasonal for most predatory mammal species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
In-town Staging Facility	NA since no additional habitat loss or disturbance anticipated – permanent facility	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table C.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Explosives Magazine	No further habitat loss anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No further habitat loss anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
	Predatory mammals such as Wolverine may be attracted to fuel spills	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

APPENDIX D

Raptors Impact Matrices

Table D.1: Raptors Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active raptor nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active raptor nest sites; monitor response of nesting raptors to noise and activity; implement employee awareness programs
Dikes												
East Dike	No measurable effect anticipated from small area of habitat loss; see Small Mammals and Vegetation Cover matrices for more information	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
West Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portage South Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	NA – dikes are not constructed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	Minor loss and disturbance of terrestrial foraging habitat; loss of wetland foraging habitat, however, waterbird (i.e., prey) productivity is low	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted and low prey productivity of dewatered lakes, residual effects are considered to be small	No	High	None specific to raptors recommended; revegetate on an as-required basis
Goose Island (3rd Portage Lake)	NA since activity does not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Loss and disturbance of terrestrial foraging habitat due to overburden stripping	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss	Loss of some terrestrial habitat is permanent but considered to be low because habitat is not limiting and nesting raptors have not been documented in the area	No	Certain	None specific to raptors recommended; revegetate on an as-required basis

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Goose Island Pit	NA since pit is not developed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	None specific to raptors recommended; revegetate on an as-required basis
Tailings Facilities (2nd Portage Lake)	NA since activity not until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	None specific to raptors recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required airstrip size	Minor alteration and loss of foraging habitat	No	Certain	None specific to raptors recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to air traffic/bird collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; report all raptors observed in area to pilots	Due to low densities of raptors in the area and no known active nests, the likelihood of a plane/raptor collisions is considered extremely unlikely	No	Moderate	Pilots are required to report all raptor/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting raptors
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and raptors have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting raptors
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident raptors are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities	Loss of foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of mine facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent foraging habitat loss on a local level	No	Certain	Revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	All Year	No	Use dust suppressant techniques on an as-needed basis; maintain vehicles in good operating condition	Potential for exposure to contaminated prey is very low because of low raptor densities in the area and the unlikely event that resident raptors will be supported by a high percentage of prey from contaminated areas	No	High	Monitor contaminant levels in vegetation and possible other indicators
Freshwater Intake and Pipeline	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Power Lines and Poles	Potential for electrocution and collision resulting in mortality	Low	Local	Infrequent	Short	All Year	No	Powerlines will be built in such a way that (e.g., placement of electric wires) that the potential for electrocution is minimized; consideration may be given to marking power lines to increase visibility to raptors, particularly in poor light conditions	With mitigation and because of low densities of raptors in the vicinity of the proposed mine, the potential residual effects (i.e., raptor mortality) is very low.	No	Moderate	Report all bird strikes or mortalities related to power lines
	POSITIVE - Improved perching opportunities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active raptor nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active raptor nest sites; monitor response of nesting raptors to noise and activity; implement employee awareness programs
Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since dewatering will not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	NA since pit construction will occur during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	None specific to raptors recommended; revegetate on an as-required basis
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	None specific to raptors recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is expected to be very low because of the extremely low densities of raptors occurring in winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; Raptors have the right-of-way	Potential for vehicle/raptor collisions in winter is expected to be very low	No	Improb	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
Baker Lake Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	None specific to raptors recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
In-town Staging Facility	Minor loss and disturbance of terrestrial foraging and possible nesting (Parasitic Jaeger) habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent foraging habitat loss on a local level	No	Certain	Revegetate areas disturbed during construction; monitor the locations of nesting raptors (including jaegers) in the area
Explosives Magazine	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table D.2: Raptors Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active raptor nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active raptor nest sites; monitor response of nesting raptors to noise and activity; implement employee awareness programs
Dikes												
East, West and Portage South Dikes	No measurable effect anticipated due to small loss of terrestrial habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – natural revegetation of dike areas may provide living opportunities for prey and foraging opportunities for raptors; dikes may also provide roosting locations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake	NA since dewatering completed prior to operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island (3rd Portage Lake)	Minor loss and disturbance of terrestrial foraging habitat; loss of wetland foraging habitat, however, waterbirds (i.e., prey) productivity is low	Low	Local	Infrequent	Short	Summer	No	None recommended	Due to small amount of terrestrial habitat impacted and low prey productivity of dewatered lakes, residual effects are considered to be small	No	High	None specific to raptors recommended; revegetate on an as-required basis
Pits												
Portage and Goose Island Pits	No obvious effects anticipated with the exception of noise and activity above	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Possible increased nesting and perching opportunities for raptors on pit walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump (Portage/Goose)	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	None specific to raptors recommended; revegetate on an as-required basis
Tailings Facilities (2nd Portage Lake)	Loss and disturbance of terrestrial foraging habitat around edge of lake to four metres above current lake elevation	Low	Local	Continuous	Permanent	All Year	No	Minimize encroachment of tailings into shoreline areas of 2nd Portage Lake; berm edges if necessary	Residual effect includes permanent loss of vegetation around the shoreline of 2nd Portage Lake	No	Certain	Environmental monitoring to ensure that only designated areas are impacted by the tailings beach
	Natural revegetation of potentially contaminated tailings beach may occur; prey attracted to these habitats may have elevated contaminant levels	Low	Local	Continuous	Permanent	All Year	No	Cap facility with appropriate clean material; undertake progressive reclamation activities to improve habitats on areas of tailings deposit that has reached its maximum height	With adequate measures, the potential for raptor contamination is very low	No	Low	Monitor contaminant levels in vegetation on tailings beach; adjust capping material composition and distribution as appropriate

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/bird collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; report all raptors observed in area to pilots	Due to low densities of raptors in the area and no known active nests, the likelihood of a plane/raptor collisions is considered extremely unlikely	No	Moderate	Pilots are required to report all raptor/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting raptors
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and raptors have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting raptors
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident raptors are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may cause habitat degradation and increased contaminant loading in prey	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor raptor nest locations; monitor contaminant levels in vegetation adjacent to mine site
	POSITIVE - Possible increased nesting and perching opportunities for raptors on mine structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Freshwater Intake and Pipeline	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Power Lines and Poles	Potential for electrocution and collision resulting in mortality	Low	Local	Infrequent	Short	All Year	No	Powerlines will be built in such a way that (e.g., placement of electric wires) that the potential for electrocution is minimized; consideration may be given to marking power lines to increase visibility to raptors, particularly in poor light conditions	With mitigation and because of low densities of raptors in the vicinity of the proposed mine, the potential residual effects (i.e., raptor mortality) is very low.	No	Moderate	Report all bird strikes or mortalities related to power lines
	POSITIVE - Improved perching opportunities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Fuel Storage (at Plant site)	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	POSITIVE - Increased habitat availability and reduced disturbance as camps are removed and habitat reclamation is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active raptor nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active raptor nest sites; monitor response of nesting raptors to noise and activity; implement employee awareness programs
Dike(s)	No further disturbance of terrestrial habitat anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dewatering	Minor loss and disturbance of terrestrial foraging habitat; loss of wetland foraging habitat, however, waterbird (i.e., prey) productivity is low	Low	Local	Infrequent	Short	Summer	No	None recommended	Due to small amount of terrestrial habitat impacted and low prey productivity of dewatered lakes, residual effects are considered to be small	No	High	None specific to raptors recommended; revegetate on an as-required basis
Pit	Minor loss and disturbance of terrestrial foraging habitat; loss of wetland foraging habitat, however, waterbird (i.e., prey) productivity is low	Low	Local	Infrequent	Short	Summer	No	None recommended	Due to small amount of terrestrial habitat impacted and low prey productivity of dewatered lakes, residual effects are considered to be small	No	High	None specific to raptors recommended; revegetate on an as-required basis
	POSITIVE - Possible increased nesting and perching opportunities for raptors on pit walls	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation activities	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	None specific to raptors recommended; revegetate progressively and on an as-required basis

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	No additional loss or disturbance of terrestrial foraging habitat anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is expected to be very low because of the extremely low densities of raptors occurring in winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; Raptors have the right-of-way	Potential for vehicle/raptor collisions in winter is expected to be very low	No	Improb	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
Baker Lake Access Road and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table D.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Barge Landing Facility	Potential disruption of raptors (e.g., Parasitic Jaeger) that may be nesting in area	Low	Local	Continuous	Short	Summer	No	Streamline unloading and loading activities to minimize amount of time barge is beached	Low probability that parasitic jaegers or other raptors will nest in proximity to facilities	No	Moderate	Monitor the locations of nesting raptors (including jaegers) in the area
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Possible increased nesting and perching opportunities for raptors on structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	Potential spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for raptors to consume contaminated prey is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table D.3: Raptors Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas; minimal effects once mine is fully closed	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active raptor nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active raptor nest sites; monitor response of nesting raptors to noise and activity; implement employee awareness programs
Dikes												
East, West, Portage South, Goose Island and 3rd Portage Arm Dikes	POSITIVE - Vegetation will naturally become established on dikes providing living areas for small mammals and small birds and foraging opportunities for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake, Portage Pit (3rd Portage Lake) and Goose Island (3rd Portage Lake)	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage and Goose Pits	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for raptors	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in small mammal and bird prey for raptors	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	Pits walls used for nesting or perching by raptors will be inundated with water	High	Local	Rare	Permanent	All Year	Yes	Ensure that raptors are discouraged from nesting on pit walls during operations phase	If no nesting raptors are present, magnitude of impacts is low	No	Certain	See Abandonment & Restoration Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits providing living and nesting opportunities for small mammals and birds, potential prey for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living and nesting opportunities for small mammals and birds, potential prey for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for raptor prey such as small mammals and small birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailings Facilities (2nd Portage Lake)	POSITIVE – Native vegetation will naturally become reestablished on the tailings beach providing improved living conditions for raptor prey such as small mammals and small birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on tailings may be contaminated leading to elevated contaminant levels in small mammals and birds and possibly raptors	Medium	Local	Continuous	Permanent	All year	Yes	Ensure that tailings deposit is capped with clean material	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude	Low	High	Monitor contaminant levels in vegetation and possibly other indicators

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if they utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Prey species (e.g., passerines and ptarmigan) may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/bird collisions; risk of this effect will decline substantially after mine closure	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; report all raptors observed in area to pilots	Due to low densities of raptors in the area and no known active nests, the likelihood of a plane/raptor collision is considered extremely unlikely	No	Moderate	Pilots are required to report all raptor/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting raptors
	Reduced habitat effectiveness in adjacent areas due to noise and activity; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and raptors have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting raptors
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident raptors are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent habitat loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Freshwater Intake and Pipeline	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss; potential for spills is substantially reduced	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss; no further potential for spills	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas; minimal effects once mine is fully closed	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active raptor nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active raptor nest sites; monitor response of nesting raptors to noise and activity; implement employee awareness programs

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dike	POSITIVE - Vegetation will naturally become established on dike providing living areas for small mammals and small birds and foraging opportunities for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Dike will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for raptors	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in small mammal and bird prey for raptors	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	Pits walls used for nesting or perching by raptors will be inundated with water	High	Local	Rare	Permanent	All Year	Yes	Ensure that raptors are discouraged from nesting on pit walls during operations phase	If no nesting raptors are present, magnitude of impacts is low	No	Certain	See Abandonment & Restoration Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits providing living and nesting opportunities for small mammals and birds, potential prey for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living and nesting opportunities for small mammals and birds, potential prey for raptors	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for raptor prey such as small mammals and small birds	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	**No additional habitat loss or disturbance anticipated during operations**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect will reduce substantially after mine closure; some potential contamination if reclaimed road surfaces are utilized (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Prey species (e.g., passerines and ptarmigan) may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	The probability of mortality due to vehicle/bird collisions is expected to be very low because of the extremely low densities of raptors occurring in winter, and reduce use following mine closure	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; Raptors have the right-of-way	Potential for vehicle/raptor collisions in winter is expected to be very low	No	Improb	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
Baker Lake Access Road and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect is expected to decline after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; raptors have right-of-way	Potential for vehicle/raptor collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with raptors; a wildlife log will be maintained to document raptor sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect is expected to decline after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document raptor sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey; the potential for this effect is expected to decline after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey within diet of locally resident raptors is very low; potential exposure is seasonal for most raptor species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table D.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
In-town Staging Facility	No further habitat loss or disturbance anticipated; facility will likely not be decommissioned	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Possible increased nesting and perching opportunities for raptors on structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

APPENDIX E

Small Mammals Impact Matrices

Construction E.1
Operations E.2
Closure / Post-Closure E.3

Table E.1: Small Mammals Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of small mammals if present in close proximity to development areas	Medium	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity	With mitigation, magnitude of impacts is considered to be low; small mammals are readily habituated to noise and activity	No	Moderate	Monitor population levels of small mammals; implement employee awareness programs
Dikes												
East, West and Portage South Dikes	Minor loss and disturbance of living and foraging habitat on islands and where dikes key into shorelines	Low	Local	Continuous	Medium	Summer	No	Minimize area of shorelines encroached by dikes	Small area of terrestrial impact may affect some local small mammal populations, but overall residual effect is considered to be low	No	Certain	Monitor population levels of small mammals
	POSITIVE - Improved wildlife movement and dispersal opportunities along dikes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	NA – dikes are not constructed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	Minor loss and disturbance of terrestrial living and foraging habitat; disruption of movement and dispersal; reduced habitat effectiveness	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small; raised pipelines will permit small mammal dispersal	No	High	None specific to small mammals recommended; revegetate on an as-required basis

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Goose Island (3rd Portage Lake)	NA since activity does not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Loss and disturbance of terrestrial living and foraging habitat due to overburden stripping; disruption of movement and dispersal	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss	Loss of some terrestrial habitat is permanent but considered to be low	No	Certain	Monitor small mammal populations; revegetate on an as-required basis
Goose Island Pit	NA since pit is not developed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Loss and disturbance of terrestrial living and foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Monitor small mammal populations; revegetate on an as-required basis
Tailings Facilities (2nd Portage Lake)	NA since activity not until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat; disruption of movement and dispersal	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	Monitor small mammal populations; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/small mammal collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderate	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Airstrip and Air Traffic	Loss and disturbance of terrestrial foraging habitat; disruption of movement and dispersal	Low	Local	Continuous	Permanent	All Year	No	Minimize required airstrip size	Minor alteration and loss of foraging habitat; some disruption of small mammal movement and dispersal	No	Certain	None specific to small mammals recommended
	Mortality due to air traffic/small mammal collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings	The potential for a plane/small mammal collision is considered to be relatively low	No	Moderate	Pilots are required to report all small mammal/plane collisions and near misses
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent, therefore noise and activity will be intermittent	No	High	None specific to small mammals recommended

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident small mammals are not likely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on airstrip edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Plant and Associated Facilities	Loss of foraging and nesting habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of mine facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent foraging and living habitat loss on a local level	No	Certain	Revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	All Year	No	Use dust suppressant techniques on an as-needed basis; maintain vehicles in good operating condition	Potential for exposure to contaminated prey or forage species is low	No	High	Monitor contaminant levels in vegetation and possible other indicators
Freshwater Intake and Pipeline	Minor loss and disturbance of nesting and foraging habitat; possible disruption of movement and dispersal	Low	Local	Continuous	Medium	Summer	No	Construct pipeline in a manner to minimize impact to terrestrial environment and avoid disruption of wildlife movement and dispersal	Small areas of impact may effect a few small mammals but impact is not evident over a wide area	No	Certain	None specific to small mammals recommended

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Discharge Facilities and Pipeline(s)	Minor loss and disturbance of nesting and foraging habitat; possible disruption of movement and dispersal	Low	Local	Continuous	Medium	Summer	No	Construct pipeline in a manner to minimize impact to terrestrial environment and avoid disruption of wildlife movement and dispersal	Small areas of impact may effect a few small mammals but impact is not evident over a wide area	No	Certain	None specific to small mammals recommended
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss; disruption of small mammal movement and dispersal unlikely	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Power Lines and Poles	Improved perching opportunities for raptors may result in increased depredation rates on small mammals in a localized area	Low	Local	Infrequent	Long	All Year	No	None recommended	Potential for increased depredation rates is low and then only at a localized level	No	Moderate	Report all raptors perching on power poles, lines and other mine facilities
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Camps (North and South)	Minor loss and disturbance of living and foraging habitat; sensory disturbance may result in reduced habitat effectiveness	Low	Local	Continuous	Medium	Summer	No	Designate tent sites and walking trails; use pallets or raised walkways in areas with heath, sedge or other vegetation sensitive to trampling	Small area of impact and proposed mitigation measures will ensure that residual effects are low	No	Certain	Regular maintenance of designated trail system; monitor development of 'bandit' trails
Sewage and Solid Waste Disposal	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Food and other camp wastes attract small mammals such as voles, lemmings and ground squirrels; mortality of animals may occur if they are deemed to be problem.	Medium	Local	Continuous	Permanent	All Year	Yes	Incinerate all garbage and food wastes; maintain a clean camp and mine site; facility is attached to main mine building to facilitate transfer of wastes	With mitigation measures, probability of attracting small mammals is low, therefore magnitude is low	No	High	Monitor success of food and garbage handling procedures; enforce protocols to reduce potential for attracting small mammals; implement employee awareness programs
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of small mammals if present in close proximity to development areas	Medium	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity	With mitigation, magnitude of impacts is considered to be low; small mammals are readily habituated to noise and activity	No	Moderate	Monitor population levels of small mammals; implement employee awareness programs

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dike	Minor loss and disturbance of living and foraging habitat on islands and where dikes key into shorelines	Low	Local	Continuous	Medium	Summer	No	Minimize area of shorelines encroached by dikes	Small area of terrestrial impact may affect some local small mammal populations, but overall residual effect is considered to be low	No	Certain	Monitor population levels of small mammals
	POSITIVE - Improved wildlife movement and dispersal opportunities along dikes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	Minor loss and disturbance of terrestrial living and foraging habitat; disruption of movement and dispersal; reduced habitat effectiveness	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small; raised pipelines will permit small mammal dispersal	No	High	None specific to small mammals recommended; revegetate on an as-required basis
Pit	NA since pit construction will occur during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Loss and disturbance of terrestrial foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Monitor small mammal populations; revegetate on an as-required basis

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat; disruption of movement and dispersal	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	Monitor small mammal populations; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/small mammal collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderate	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Shop/ Office	Minor loss and disturbance of living and foraging habitat	Low	Local	Continuous	Medium	Summer	No	Minimize footprint	Small habitat loss is expected to have a low residual effect on local small mammal populations	No	Certain	None specific to small mammals recommended
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/small mammals collisions is expected to be very low because only Arctic hare is present above the snow during the winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; Arctic hare have the right-of-way	Potential for vehicle/Arctic hare collisions in winter is expected to be low	No	Low	Drivers will report any collisions and near misses with Arctic hare
Baker Lake Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat; disruption of movement and dispersal	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging habitat	No	Certain	Monitor small mammal populations; see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/small mammal collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderate	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barge Landing Facility	Limited habitat suitability for small mammals; some disruption of movement and dispersal along lakeshore possible	Low	Local	Continuous	Short	Summer	No	Streamline unloading and loading activities to minimize the amount of time barge is beached	Residual effects are very low	No	Moderate	None recommended
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	Loss of foraging and living habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent foraging and living habitat loss on a local level	No	Certain	Revegetate areas disturbed during construction
Explosives Magazine	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tank Farm	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.2: Small Mammals Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of small mammals if present in close proximity to development areas	Medium	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity	With mitigation, magnitude of impacts is considered to be low; small mammals are readily habituated to noise and activity	No	Moderate	Monitor population levels of small mammals; implement employee awareness programs
Dikes												
East, West and Portage South Dikes	No additional habitat loss anticipated during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	Minor loss and disturbance of living and foraging habitat on islands and where dikes key into shorelines	Low	Local	Continuous	Medium	Summer	No	Minimize area of shorelines encroached by dikes	Small area of terrestrial impact may affect some local small mammal populations, but overall residual effect is considered to be low	No	Certain	Monitor population levels of small mammals
	POSITIVE - Improved wildlife movement and dispersal opportunities along dikes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Increased terrestrial habitat in dewatered areas may provide a temporary improvement in food availability for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Goose Island (3rd Portage Lake)	Minor loss and disturbance of terrestrial living and foraging habitat; disruption of movement and dispersal; reduced habitat effectiveness	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small; raised pipelines will permit small mammal dispersal	No	High	None specific to small mammals recommended; revegetate on an as-required basis
	POSITIVE – Increased terrestrial habitat in dewatered areas may provide a temporary improvement in food availability for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	No additional measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island Pit	Loss and disturbance of terrestrial living and foraging habitat due to overburden stripping; disruption of movement and dispersal	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss	Loss of some terrestrial habitat is permanent but considered to be low	No	Certain	Monitor small mammal populations; revegetate on an as-required basis
Waste Dump (Portage/Goose)	Continued loss and disturbance of terrestrial living and foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; create small mammal habitat on slopes of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Monitor small mammal populations; revegetate on an as-required basis
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) in rock pile areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tailings Facilities (2nd Portage Lake)	Loss and disturbance of terrestrial foraging habitat around edge of lake to four metres above current lake elevation	Low	Local	Continuous	Permanent	All Year	No	Minimize encroachment of tailings into shoreline areas of 2nd Portage Lake; berm edges if necessary; create small mammal habitat on slopes of tailings deposit	Residual effect includes permanent loss of vegetation around the shoreline of 2nd Portage Lake	No	Certain	Environmental monitoring to ensure that only designated areas are impacted by the tailings beach
	Natural revegetation of potentially contaminated tailings beach may occur; small mammals may be exposed to elevated contaminant levels	Low	Local	Continuous	Permanent	All Year	No	Cap facility with appropriate clean material; undertake progressive reclamation activities to improve habitats on areas of tailings deposit that has reached its maximum height	With adequate measures, the potential for contamination is very low	No	Low	Monitor contaminant levels in vegetation on tailings beach; adjust capping material composition and distribution as appropriate
Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/small mammal collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderate	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/small mammal collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings	The potential for a plane/small mammal collision is considered to be relatively low	No	Moderate	Pilots are required to report all small mammal/plane collisions and near misses
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent, therefore noise and activity will be intermittent	No	High	None specific to small mammals recommended

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident small mammals are not likely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on airstrip edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Plant and Associated Facilities	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	All Year	No	Use dust suppressant techniques on an as-needed basis; maintain vehicles in good operating condition	Potential for exposure to contaminated prey or forage species is low	No	High	Monitor contaminant levels in vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) in or under mine structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Small mammals (e.g., Arctic Hare) may find refuge from predators under buildings and structures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Freshwater Intake and Pipeline	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss; disruption of small mammal movement and dispersal unlikely	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	Minor loss and disturbance of nesting and foraging habitat; possible disruption of movement and dispersal	Low	Local	Continuous	Medium	Summer	No	Construct pipeline in a manner to minimize impact to terrestrial environment and avoid disruption of wildlife movement and dispersal	Small areas of impact may effect a few small mammals but impact is not evident over a wide area	No	Certain	None specific to small mammals recommended
Power Lines and Poles	Improved perching opportunities for raptors may result in increased depredation rates on small mammals in a localized area	Low	Local	Infrequent	Long	All Year	No	None recommended	Potential for increased depredation rates is low and then only at a localized level	No	Moderate	Report all raptors perching on power poles, lines and other mine facilities
Fuel Storage (at Plant site)	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Emulsion/AN Storage/ Explosives Magazines	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	POSITIVE – Increased habitat availability and reduced disturbance as camps are removed and habitat reclamation is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	Food and other camp wastes attract small mammals such as voles, lemmings and ground squirrels; mortality of animals may occur if they are deemed to be problem.	Medium	Local	Continuous	Permanent	All Year	Yes	Incinerate all garbage and food wastes; maintain a clean camp and mine site; facility is attached to main mine building to facilitate transfer of wastes	With mitigation measures, probability of attracting small mammals is low, therefore magnitude is low	No	High	Monitor success of food and garbage handling procedures; enforce protocols to reduce potential for attracting small mammals; implement employee awareness programs
Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic	Airstrip and Air Traffic
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of small mammals if present in close proximity to development areas	Medium	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity	With mitigation, magnitude of impacts is considered to be low; small mammals are readily habituated to noise and activity	No	Moderate	Monitor population levels of small mammals; implement employee awareness programs
Dike	No additional habitat loss anticipated during operation phase	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dewatering	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Increased terrestrial habitat in dewatered areas may provide a temporary improvement in food availability for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Loss and disturbance of terrestrial living and foraging habitat due to overburden stripping	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss	Loss of some terrestrial habitat is permanent but considered to be low	No	Certain	Monitor population levels of small mammals; revegetate on an as-required basis
Waste Dump	Continued loss and disturbance of terrestrial living and foraging habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump; create small mammal habitat on slopes of waste dump	Residual effect is permanent loss of some terrestrial habitat types	No	Certain	Monitor small mammal populations; revegetate on an as-required basis
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) in rock pile areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/small mammal collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderate	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Access Road Culverts (Turn Lake)	POSITIVE – Some improved wildlife movement opportunities across Turn Lake in summer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss; disruption of small mammal movement and dispersal unlikely	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	No additional loss or disturbance of terrestrial foraging or living habitat anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Small mammals (e.g., Arctic Hare) may find refuge from predators under buildings and structures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/small mammals collisions is expected to be very low because only Arctic hare is present above the snow during the winter	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; Arctic hare have the right-of-way	Potential for vehicle/Arctic hare collisions in winter is expected to be low	No	Low	Drivers will report any collisions and near misses with Arctic hare

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/small mammal collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way; convoy shipments whenever possible; limit random traffic	Potential for vehicle/small mammal collisions is expected to be low	No	Moderate	Drivers will report any collisions and near misses with small mammals; a wildlife sighting log book will be maintained
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Barge Landing Facility	Limited habitat suitability for small mammals; some disruption of movement and dispersal along lakeshore possible	Low	Local	Continuous	Short	Summer	No	Streamline unloading and loading activities to minimize the amount of time barge is beached	Residual effects are very low	No	Moderate	None recommended
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	All Year	No	Use dust suppressant techniques on an as-needed basis; maintain vehicles in good operating condition	Potential for exposure to contaminated prey or forage species is low	No	High	Monitor contaminant levels in vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) in or under facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Small mammals (e.g., Arctic Hare) may find refuge from predators under buildings and structures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tank Farm	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.3: Small Mammals Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of small mammals if present in close proximity to development areas; minimal effects once mine is fully closed	Medium	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity	With mitigation, magnitude of impacts is considered to be low; small mammals are readily habituated to noise and activity	No	Moderate	Monitor population levels of small mammals; implement employee awareness programs
Dikes												
East, West, Portage South, Goose Island and 3rd Portage Arm Dikes Dikes	Dikes will be breached, any terrestrial habitat created by them (i.e., dewatered areas) will be inundated	Low	Local	Continuous	Permanent	All Year	No	Minimize terrestrial habitat lost to breaching of dikes	Residual impact will be small since marginal terrestrial habitat lost was only available during the operation phase	No	Certain	None specific to small mammals recommended
	POSITIVE - Vegetation will naturally become established on dikes providing living areas for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake, Portage Pit (3rd Portage Lake) and Goose Island (3rd Portage Lake)	NA since dewatering completed during construction or operation phases; see loss of terrestrial habitat above with dike breaching	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Pits												
Portage and Goose Island Pits	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging and living habitat	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases local small mammal populations	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pits providing living opportunities for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living opportunities for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – habitat created on slopes of waste rock piles (e.g., rock piles providing security cover and living areas) will benefit small mammal populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailings Facilities (2nd Portage Lake)	POSITIVE – Native vegetation will naturally become reestablished on the tailings beach providing improved living conditions for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – habitat created on slopes of tailings facility (e.g., rock piles providing security cover and living areas) will benefit small mammal populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on tailings may be contaminated leading to elevated contaminant levels in small mammals	Medium	Local	Continuous	Permanent	All year	Yes	Ensure that tailings deposit is capped with clean material	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude	Low	High	Monitor contaminant levels in vegetation and possibly other indicators

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Roads and Traffic	Mortality due to vehicle/small mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way	Potential for vehicle/small mammal collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with small mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None specific to small mammals recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species; the potential for this effect will reduce substantially after mine closure; some potential contamination if small mammals utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	POSITIVE – Small mammals may be attracted to reclaimed road bed areas for living and foraging once vegetation has become reestablished; reclaim activities will involve scarifying roads, restoring drainage, suppressing dust, and considering rehabilitation of roads as esker-like habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/small mammal collisions; risk of this effect will decline substantially after mine closure	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings	The potential for a plane/small mammal collision is considered to be low	No	Moderate	Pilots are required to report all small mammal/plane collisions and near misses
	Reduced habitat effectiveness in adjacent areas due to noise and activity; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent	No	High	None specific to small mammals recommended
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident small mammals are unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on airstrip edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent habitat loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes; consider creation of small mammal habitats	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) in or under mine structures and facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Freshwater Intake and Pipeline	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging and living habitat; removal of potential obstructions to movement and dispersal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging and living habitat; removal of potential obstructions to movement and dispersal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss; disruption of small mammal movement and dispersal unlikely	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat; removal of potential obstructions to movement and dispersal	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	Potential for spills is substantially reduced; no effects once mine is fully shut down	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Recontouring and revegetation of disturbed area, removal of contaminated soil and creation of small mammal habitat will be beneficial	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Emulsion/AN Storage/ Explosives Magazines	Potential for spills is substantially reduced; no effects once mine is fully shut down	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Recontouring and revegetation of disturbed area, removal of contaminated soil and creation of small mammal habitat will be beneficial	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Food and other camp wastes attract small mammals such as voles, lemmings and ground squirrels; mortality of animals may occur if they are deemed to be problem; potential effects will not occur after the mine is fully closed	Medium	Local	Continuous	Permanent	All Year	Yes	Incinerate all garbage and food wastes; maintain a clean camp and mine site; facility is attached to main mine building to facilitate transfer of wastes	With mitigation measures, probability of attracting small mammals is low, therefore magnitude is low	No	High	Monitor success of food and garbage handling procedures; enforce protocols to reduce potential for attracting small mammals; implement employee awareness programs
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of small mammals if present in close proximity to development areas; minimal effects once mine is fully closed	Medium	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity	With mitigation, magnitude of impacts is considered to be low; small mammals are readily habituated to noise and activity	No	Moderate	Monitor population levels of small mammals; implement employee awareness programs
Dike	Dike will be breached, any terrestrial habitat created by them (i.e., dewatered areas) will be inundated	Low	Local	Continuous	Permanent	All Year	No	Minimize terrestrial habitat lost to breaching of dikes	Residual impact will be small since marginal terrestrial habitat lost was only available during the operation phase	No	Certain	None specific to small mammals recommended

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	POSITIVE - Vegetation will naturally become established on dikes providing living areas for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since dewatering completed during construction or operation phases; see loss of terrestrial habitat above with dike breaching	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging and living habitat	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases local small mammal populations	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pits providing living opportunities for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living opportunities for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved living conditions for small mammals	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – habitat created on slopes of waste rock piles (e.g., rock piles providing security cover and living areas) will benefit small mammal populations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Roads and Traffic	Mortality due to vehicle/small mammal collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way	Potential for vehicle/small mammal collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with small mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None specific to small mammals recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species; the potential for this effect will reduce substantially after mine closure; some potential contamination if small mammals utilize reclaimed road surfaces (see below)	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
	POSITIVE – Small mammals may be attracted to reclaimed road bed areas for living and foraging once vegetation has become reestablished; reclaim activities will involve scarifying roads, restoring drainage, suppressing dust, and considering rehabilitation of roads as esker-like habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Access Road Culverts (Turn Lake)	POSITIVE – Culverts will be removed and the land recontoured, drainage patterns restored, and animal movement patterns reduced but restored to original configurations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss; disruption of small mammal movement and dispersal unlikely	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/small mammals collisions is expected to be very low because only Arctic hare is present above the snow during the winter; potential effects will not occur once mine is closed and winter road is no longer in operation	Low	Regional	Continuous	Short	Winter	No	Minimize vehicular traffic and speeds; Arctic hare have the right-of-way	Potential for vehicle/Arctic hare collisions in winter is expected to be low	No	Low	Drivers will report any collisions and near misses with Arctic hare

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Baker Lake Access Road and Traffic	Mortality due to vehicle/small mammal collisions; the potential for this effect is expected to decline after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; small mammals have right-of-way	Potential for vehicle/small mammal collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with small mammals
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect is expected to decline after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and tendency of small mammals to become habituated to noise and activity	No	High	None specific to small mammals recommended
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in prey and forage species; the potential for this effect is expected to decline after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition; ensure that road materials are inert and do not contribute unacceptable contaminant levels into the environment	Potential area of contamination is very small; proportion of potentially contaminated prey or forage species within diet of locally resident small mammals will likely be low	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE – Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) on road edges and rock fill areas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Barge Landing Facility	Limited habitat suitability for small mammals; some disruption of movement and dispersal along lakeshore possible; reduced effects once mine is closed	Low	Local	Continuous	Short	Summer	No	Streamline unloading and loading activities to minimize the amount of time barge is beached	Residual effects are very low	No	Moderate	None recommended
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No further habitat loss or disturbance anticipated; facility will likely not be decommissioned	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in prey and forage species	Low	Local	Continuous	Permanent	All Year	No	Use dust suppressant techniques on an as-needed basis; maintain vehicles in good operating condition	Potential for exposure to contaminated prey or forage species is low	No	High	Monitor contaminant levels in vegetation and possible other indicators
	POSITIVE - Possible increased living opportunities for small mammals (e.g., Arctic ground squirrel) in or under facilities	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Small mammals (e.g., Arctic Hare) may find refuge from predators under buildings and structures	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table E.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries								
		Magnitude	Spatial Extent	Frequency	Duration	Timing	Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
Tank Farm	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in prey and forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for small mammals to consume contaminated prey or forage species is even lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

APPENDIX F

Ungulates Impact Matrices

Construction F.1
Operations F.2
Closure / Post-Closure F.3

Table F.1: Ungulates Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give ungulates right-of-way; minimize activities off access roads	With mitigation, the magnitude of potential effects is low	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
Dikes												
East Dike	Minor habitat loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Alteration of foraging habitats on a local level	No	Certain	Revegetate disturbed areas if necessary
West Dike	Minor habitat loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Minor loss and alteration of vegetation communities	No	Certain	Revegetate disturbed areas if necessary
Portage South Dike	Minor habitat loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Minor loss and alteration of vegetation communities	No	Certain	Revegetate disturbed areas if necessary
Goose Island and 3rd Portage Arm Dikes	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake	Minor habitat loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of habitat	Minor residual effects anticipated to foraging habitat for ungulates as potentially disturbed areas will return to pre-development conditions rapidly.	No	High	Revegetate on an as-needed basis

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Portage Pit (3rd Portage Lake)	Minor habitat loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of habitat	Minor residual effects anticipated to foraging habitats for ungulates as potentially disturbed areas will return to pre-development conditions rapidly.	No	High	Revegetate on an as-needed basis
Goose Island (3rd Portage Lake)	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Habitat loss and disturbance from stripping activities	Low	Local	Continuous	Long	All Year	No	Minimize width of pits to reduce overall foraging habitat loss	Permanent habitat loss on local level	No	Certain	None recommended
Goose Island Pit	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Habitat loss and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent foraging habitat alteration and loss on a local level	No	Certain	Monitor success of reclamation activities
Tailings Facilities (2nd Portage Lake)	NA – Tailings will not be deposited until the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Airstrip and Air Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize width and length of runway	Residual effects are expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to air traffic/ungulate collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; monitor ungulate occurrence and aggregations in the vicinity of airstrip; use scare tactics to move ungulates off airstrip and approaches	Mortality due to collisions is extremely unlikely	No	Moderate	Pilots required to report all ungulate/plane near misses and caribou and muskox sighted in the area; maintain a wildlife sighting log book

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize number of take-offs and landings; use defined flight corridors; establish minimum altitude and no harassment policies	Avoidance of areas adjacent to airstrip are not expected due to the low frequency of flights	No	Moderate	Monitor ungulate distribution and behaviour in Local Study Area
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	Summer	No	Minimize number of take-offs and landings; use dust suppressants if necessary	Any residual effects will be restricted to habitats in close proximity to the airstrip	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip
Mine Plant and Associated Facilities	Loss and avoidance of foraging habitat; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize footprint of mine plant site and ancillary facilities; comply with construction plan and schedule; minimize degradation of surrounding area	Residual effects limited to a localized area	No	Certain	Monitor ungulate distribution and abundance in Local Study Area; revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor ungulate distribution and abundance; monitor contaminant levels in vegetation adjacent to mine site
Freshwater Intake and Pipeline	Minor loss of habitat; deflection of normal movement patterns	Low	Local	Continuous	Long	All Year	No	Construct pipeline to minimize impact to terrestrial environment	Minor alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
Discharge Facilities and Pipeline(s)	Minor loss or habitat; deflection of normal movement patterns	Low	Local	Continuous	Long	All Year	No	Construct pipeline to minimize impact to terrestrial environment	Minor alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
Non-contact Diversion Facilities	Minor habitat loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor foraging habitat loss and alteration	No	Certain	Revegetate areas disturbed during construction; natural revegetation will likely occur

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Fuel Storage (at Plant site)	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize size of fuel storage area	Negligible residual effects anticipated	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize storage areas	Negligible residual effects on ungulates	No	Certain	Revegetate areas disturbed during construction
	Potential spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Medium	All Year	No	Ecological awareness programs for all employees; walkways or designated trails between tents; minimize disturbance to surrounding area when dismantling camp	Minor residual effects are limited to a very localized areas	No	Certain	Enforce use of designated trail system; maintain trail system; monitor development of 'bandit' trails; revegetate camp areas no longer in use

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Sewage and Solid Waste Disposal	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize storage areas	Negligible residual effects on ungulates	No	Certain	Revegetate areas disturbed during construction
	May attract predators with potential increased local depredation rates on ungulates	Low	Local	Continuous	Long	All Year	No	Incinerate all garbage and food waste; minimize potential for predators to be attracted to the area through various mitigation measures (see Wildlife Management Plan)	An increase in predator populations is unlikely to occur	No	Moderate	Monitor predator populations within camp; conduct quality control assessments of effectiveness of incineration process
VAULT FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give ungulates right-of-way; minimize activities off access roads	With mitigation, the magnitude of potential effects is low	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since no terrestrial activity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	NA - Not until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Habitat loss and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent foraging habitat alteration and loss on a local level	No	Certain	Monitor success of reclamation activities

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Non-contact Diversion Facilities	Minor habitat loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor foraging habitat loss and alteration	No	Certain	Revegetate areas disturbed during construction; natural revegetation will likely occur
Mine Shop/ Office	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize footprint area	Negligible residual effects on ungulates	No	Certain	Revegetate areas disturbed during construction

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	Ungulates may use roads as travel corridors resulting in increased mortality from predators	Low	Local	Frequent	Long	Winter	No	Do not berm roads to reduce crossing barriers	Negligible residual effects anticipated	No	Moderate	Winter road drivers must report ungulate sightings; maintain wildlife log of all wildlife sightings
	Increased hunting pressure; mortality from vehicles	Low	Regional	Frequent	Long	Winter	Yes	Limit use of winter road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to ungulates and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderate	Report all ungulate/vehicle collisions; enforcement of no-hunting policy along winter road
Baker Lake Access Road and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities

Table B7.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Barge Landing Facility	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize footprint area	Negligible residual effects on ungulates	No	Certain	Revegetate areas disturbed during construction
Barge Traffic	NA since no terrestrial component	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
In-town Staging Facility	Loss and avoidance of foraging habitat; deflection from normal travel routes; energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize footprint of staging facilities; comply with construction plan and schedule; minimize degradation of surrounding area	Residual effects limited to a localized area	No	Certain	Monitor ungulate distribution and abundance in Local Study Area; revegetate areas disturbed during construction
Explosives Magazine	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize storage areas	Negligible residual effects on ungulates	No	Certain	Revegetate areas disturbed during construction
	Potential spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize size of fuel storage area	Negligible residual effects anticipated	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table F.2: Ungulates Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give ungulates right-of-way; minimize activities off access roads	With mitigation, the magnitude of potential effects is low	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
Dikes												
East, West and Portage South Dikes	No additional habitat loss anticipated during Operation phase	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	POSITIVE - Dike may be used as refuge area from predators	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	Minor habitat loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Alteration of foraging habitats on a local level	No	Certain	Revegetate disturbed areas if necessary
Dewatering												
2nd Portage Lake	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island (3rd Portage Lake)	Minor habitat loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of habitat	Minor residual effects anticipated to foraging habitats for ungulates as potentially disturbed areas will return to pre-development conditions rapidly.	No	High	Revegetate on an as-needed basis

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pits												
Portage and Goose Island Pits	Disruption of normal travel routes	Low	Local	Continuous	Long	All Year	No	No mitigation recommended	Low residual effects	No	High	Wildlife logs; monitor ungulate distribution, abundance and aggregations
	Possible injury or mortality from encounters with pits	Low	Local	Continuous	Long	All Year	No	Fences, berms or other barriers to caribou movement are not acceptable to Baker Lake residents	Potential for residual effects is very low	No	Moderate	As above
Waste Dump (Portage/Goose)	Habitat loss and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent foraging habitat alteration and loss on a local level	No	Certain	Monitor success of reclamation activities
Tailings Facilities (2nd Portage Lake)	Exposure to contaminants if water is drunk from tailings pond; potential for occurrence is low because few ungulates are present in the vicinity of the mine site for most of the ice-free season; exposure in the fall is the most likely	Medium	Local	Infrequent	Long	Summer	No	Use aversive techniques to prevent animals accessing tailings ponds	Mitigation measures will reduce the potential magnitude of the effect to Low; residual effects are expected to be very low	No	Moderate	Wildlife logs; monitor ungulate distribution, abundance and aggregations; report all interactions and take further mitigation action (e.g., more regular monitoring of ungulate distribution) to reduce potential effects
	Trauma or death resulting from animals getting stuck in soft tailings; thawed tailings will only be available for a short time during the growing season which is also a time when few ungulates are in the area	Low	Local	Infrequent	Long	Summer	No	Use aversive techniques to prevent animals from accessing tailings ponds	Residual effects (i.e., animal mortality) is very unlikely to occur	No	Low	Wildlife logs; monitor ungulate distribution, abundance and aggregations; report all interactions and take further mitigation action (e.g., more regular monitoring of ungulate distribution) to reduce potential effects

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize width and length of runway	Residual effects are expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to air traffic/ungulate collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; monitor ungulate occurrence and aggregations in the vicinity of airstrip; use scare tactics to move ungulates off airstrip and approaches	Mortality due to collisions is extremely unlikely	No	Moderate	Pilots required to report all ungulate/plane near misses and caribou and muskox sighted in the area; maintain a wildlife sighting log book
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize number of take-offs and landings; use defined flight corridors; establish minimum altitude and no harassment policies	Avoidance of areas adjacent to airstrip are not expected due to the low frequency of flights	No	Moderate	Monitor ungulate distribution and behaviour in Local Study Area
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	Summer	No	Minimize number of take-offs and landings; use dust suppressants if necessary	Any residual effects will be restricted to habitats in close proximity to the airstrip	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip
Mine Plant and Associated Facilities	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor ungulate distribution and abundance; monitor contaminant levels in vegetation adjacent to mine site
Freshwater Intake and Pipeline	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	Minor habitat loss and disturbance associated with short reclaim pipeline	Low	Local	Continuous	Long	All Year	No	Construct pipeline in a manner to minimize impacts to vegetation	Minor alteration of habitat	No	Certain	Revegetate disturbed areas
Non-contact Diversion Facilities	Minor habitat loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor foraging habitat loss and alteration	No	Certain	Maintain diversion ditches on a regular basis; natural revegetation will likely occur
Fuel Storage (at Plant site)	Potential fuel spills may degrade surrounding habitat and increase contaminant levels; ungulates may eat contaminated vegetation	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines ; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Potential spills may degrade surrounding habitat and increase contaminant levels; ungulates may eat contaminated vegetation	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines ; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	POSITIVE - Increased habitat availability and reduced disturbance as camps are removed and habitat reclamation is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	May attract predators with potential increased local depredation rates on ungulates	Low	Local	Continuous	Long	All Year	No	Incinerate all garbage and food waste; minimize potential for predators to be attracted to the area through various mitigation measures (see Wildlife Management Plan)	An increase in predator populations is unlikely to occur	No	Moderate	Monitor predator populations within camp; conduct quality control assessments of effectiveness of incineration process

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
VAULT FACILITIES												
Noise and Activity	Avoidance of foraging habitat (reduced habitat effectiveness); deflection from normal travel routes; energetic costs	Medium	Local	Continuous	Medium	All Year	Yes	Minimize blast and engine noises; maintain and ensure vehicles are properly muffled; establish speed limits, establish blasting windows if possible; give ungulates right-of-way; minimize activities off access roads	With mitigation, the magnitude of potential effects is low	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
Dike(s)	POSITIVE - Dike may be used as refuge area from predators	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Dewatering	NA since no terrestrial activity	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Pit	Habitat loss and disturbance from stripping activities	Low	Local	Continuous	Long	All Year	No	Minimize width of pits to reduce overall foraging habitat loss	Permanent habitat loss on local level	No	Certain	None recommended
Waste Dump	Habitat loss and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent foraging habitat alteration and loss on a local level	No	Certain	Monitor success of reclamation activities

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Long	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Non-contact Diversion Facilities	Minor habitat loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor foraging habitat loss and alteration	No	Certain	Maintain diversion ditches on a regular basis; natural revegetation will likely occur
Mine Shop/ Office	No additional loss or disturbance of terrestrial foraging habitat anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	Ungulates may use roads as travel corridors resulting in increased mortality from predators	Low	Local	Frequent	Long	Winter	No	Do not berm roads to reduce crossing barriers	Negligible residual effects anticipated	No	Moderate	Winter road drivers must report ungulate sightings; maintain wildlife log of all wildlife sightings
	Increased hunting pressure; mortality from vehicles	Low	Regional	Frequent	Long	Winter	Yes	Limit use of winter road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to ungulates and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderate	Report all ungulate/vehicle collisions; enforcement of no-hunting policy along winter road
Baker Lake Access Road and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions; do not use obstructive berms along road edges	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities

Table F.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Barge Landing Facility	Small area of habitat loss	Low	Local	Continuous	Long	All Year	No	Minimize footprint area	Negligible residual effects on ungulates	No	Certain	Revegetate areas disturbed during construction
Barge Traffic	NA since no terrestrial effects	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
In-town Staging Facility	No additional habitat loss or disturbance anticipated during operation phase	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Explosives Magazine	Potential spills may degrade surrounding habitat and increase contaminant levels; ungulates may eat contaminated vegetation	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines ; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	Potential fuel spills may degrade surrounding habitat and increase contaminant levels; ungulates may eat contaminated vegetation	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines ; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table F.3: Ungulates Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Closure activity and noise may result in avoidance of the area and deflection; behavioural changes, followed by re-use of the area after closure	Medium	Local	Continuous	Medium	All Year	No	Minimize engine noises and noises associated with dismantling buildings and infrastructure, maintain and ensure vehicles are properly muffled, establish speed limits, expedite decommissioning	With mitigation, magnitude of potential effects is low	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
Dikes	Erosion and dike removal activities may lead to further habitat loss	Low	Local	Continuous	Permanent	Summer	No	Stabilize/contour terrestrial area(s) created by dikes to minimize erosion by wind and water; provide natural drainage patterns	Low likelihood of residual effects; most effects are POSITIVE	No	Certain	Undertake reclamation activities as outlined in Wildlife Management Plan (WMP) and integrate with Abandonment and Restoration Plan (A&R)
	POSITIVE - Vegetation will naturally become established providing foraging opportunities for ungulates	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Dikes will be used as a refugia from insects during the summer	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake, Portage Pit (3rd Portage Lake) and Goose Island (3rd Portage Lake)	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pits												
Portage and Goose Pits	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in a loss of foraging habitat for ungulates	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increased foraging opportunities for ungulates	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	Possible injury or mortality from encounters with pits	Low	Local	Continuous	Permanent	All Year	No	If possible, slope nearshore areas of flooded pits at a low gradient to prevent accidental drowning once pits have been filled	The likelihood of this event is extremely low	No	Moderate	Wildlife Management Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Habitat loss and disturbance due to erosion and sedimentation	Low	Local	Continuous	Long	Summer	No	Stabilize slopes, cap with finer material, suppress dust if an issue; recontour and revegetate with local plant species	Minor vegetation loss is possible on an ongoing basis	No	Moderate	Reclamation activities as outlined in WMP and A&R
	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing increased foraging opportunities for ungulates	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tailings Facilities (2nd Portage Lake)	Habitat loss and disturbance due to erosion and sedimentation	Low	Local	Continuous	Long	Summer	No	Stabilize slopes, cap with finer material, suppress dust if an issue; recontour and revegetate with local plant species	Minor vegetation loss is possible on an ongoing basis	No	Moderate	Reclamation activities as outlined in WMP and A&R
	POSITIVE – Native vegetation will naturally become reestablished on the tailings beach	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs; risks and disturbances to ungulates from traffic during closure and post-closure will decrease and ultimately become minimal	Low	Local	Continuous	Long	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent habitat alteration likely	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction; reclamation activities as outlined in WMP and A&R
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity; reduced potential for effect as site is decommissioned	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Habitat loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Airstrip may remain; not likely suitable esker habitat due to potential risk to aircraft and wildlife; efforts made to ensure drainage interferes as little as possible with local drainage patterns; determine allowable growth boundaries for recolonizing vegetation; utilize dust dispersion techniques as needed	Some permanent but localized loss of vegetation cover	No	Certain	Reclamation activities as outlined in WMP and A&R
	Dust and emissions may result in potential habitat degradation and increased contaminant levels	Low	Local	Continuous	Permanent	All Year	No	Maintain airstrip in usable condition; minimize use of runway; confine ground traffic to minimal areas around airstrip.	Low occurrence of impacts from dust and emissions on vegetation adjacent to airstrip	No	Moderate	Reclamation activities as outlined in WMP and A&R
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent habitat loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in WMP and A&R
	POSITIVE - With closure of the mine, risks and disturbances to ungulates will decrease (e.g., avoidance of foraging habitat, deflection from normal travel routes, energetic costs)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Freshwater Intake and Pipeline	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	Habitat loss due to erosion and permafrost degradation	Low	Local	Continuous	Permanent	Summer	No	Maintain diversion facilities in such a way as to minimize potential for erosion	Minor habitat loss and alteration	No	Moderate	Maintain integrity of diversion facilities; undertake reclamation activities on an as-needed basis
Fuel Storage (at Plant site)	Concrete foundation will remain resulting in permanent habitat loss	Low	Local	Continuous	Permanent	All Year	No	Remove all contaminated soil and recontour around foundation to encourage regrowth of natural vegetation and improve habitat	Minor permanent habitat loss	No	Certain	Reclamation activities as outlined in WMP and A&R
Emulsion/AN Storage/ Explosives Magazines (assuming only minor leaks, no major spills, fires or explosions)	Permanent habitat loss and disturbance associated with concrete foundation; minor spot contamination	Low	Local	Continuous	Long	All Year	No	Remove all contaminated soil and recontour around foundation to encourage regrowth of natural vegetation and improve habitat	Minor permanent habitat loss	No	Certain	Reclamation activities as outlined in WMP and A&R
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
VAULT FACILITIES												
Noise and Activity	Closure activity and noise may result in avoidance of the area and deflection; behavioural changes, followed by re-use of the area after closure	Medium	Local	Continuous	Medium	All Year	No	Minimize engine noises and noises associated with dismantling buildings and infrastructure, maintain and ensure vehicles are properly muffled, establish speed limits, expedite decommissioning	With mitigation, magnitude of potential effects is low	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
Dike	Erosion and dike removal activities may lead to further habitat loss	Low	Local	Continuous	Permanent	Summer	No	Stabilize/contour terrestrial area(s) created by dikes to minimize erosion by wind and water; provide natural drainage patterns	Low likelihood of residual effects; most effects are POSITIVE	No	Certain	Undertake reclamation activities as outlined in Wildlife Management Plan (WMP) and integrate with Abandonment and Restoration Plan (A&R)
	POSITIVE - Vegetation will naturally become established providing limited foraging opportunities for ungulates	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since activity occurred during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pit	Dike will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in a loss of foraging habitat for ungulates	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increased foraging opportunities for ungulates	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	Possible injury or mortality from encounters with pits	Low	Local	Continuous	Permanent	All Year	No	If possible, slope nearshore areas of flooded pits at a low gradient to prevent accidental drowning once pits have been filled	The likelihood of this event is extremely low	No	Moderate	Wildlife Management Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Habitat loss and disturbance due to erosion and sedimentation	Low	Local	Continuous	Long	Summer	No	Stabilize slopes, cap with finer material, suppress dust if an issue; recontour and revegetate with local plant species	Minor vegetation loss is possible on an ongoing basis	No	Moderate	Reclamation activities as outlined in WMP and A&R
	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing increased foraging opportunities for ungulates	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs; risks and disturbances to ungulates from traffic during closure and post-closure will decrease and ultimately become minimal	Low	Local	Continuous	Long	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent habitat alteration likely	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction; reclamation activities as outlined in WMP and A&R
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures and eventual complete decommissioning of roads	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity; reduced potential for effect as site is decommissioned	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor; site decommissioned during closure	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species; reduced potential for effect as site is decommissioned	Low	Local	Continuous	Long	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Non-contact Diversion Facilities	Habitat loss due to erosion and permafrost degradation	Low	Local	Continuous	Permanent	Summer	No	Maintain diversion facilities in such a way as to minimize potential for erosion	Minor habitat loss and alteration	No	Moderate	Maintain integrity of diversion facilities; undertake reclamation activities on an as-needed basis

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Shop/ Office	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	Some compaction of vegetation cover possible, particularly in wind swept areas; no effect once winter road is no longer used	Low	Local	Continuous	Long	Winter	No	Build up windswept areas with snow and ice to avoid disturbance of underlying vegetation communities	Impact of winter road on underlying vegetation communities is minimized	No	High	Regular monitoring of winter/ice road conditions
	Ungulates may use roads as travel corridors resulting in increased mortality from predators; no effect once winter road is no longer used	Low	Local	Frequent	Long	Winter	No	Do not berm roads to reduce crossing barriers	Negligible residual effects anticipated	No	Moderate	Winter road drivers must report ungulate sightings; maintain wildlife log of all wildlife sightings
	Increased hunting pressure; mortality from vehicles; reducing threat as need for winter road decreases	Low	Regional	Frequent	Long	Winter	Yes	Limit use of winter road to mine employees; prohibit mine employees from hunting; enforce speed limits; yield right of way to ungulates and all wildlife; confine traffic to winter road	Reduced potential for mortality with change in frequency of impact to Infrequent	No	Moderate	Report all ungulate/vehicle collisions; enforcement of no-hunting policy along winter road
	POSITIVE - Natural reclamation of habitat degraded by compaction with closing of winter road	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Ongoing loss and avoidance of foraging habitat, deflection from normal travel routes, energetic costs	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Residual effect expected to be minor	No	Certain	Monitor ungulate movements and aggregations; revegetate areas disturbed during construction
	Mortality due to vehicle/ungulate collisions	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Mortality due to collisions is unlikely given various mitigation measures	No	Moderate	Monitor ungulate movements and aggregations; drivers need to report any collisions and near misses with ungulates
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; ungulates have right-of-way at all times	Animals are expected to become habituated to noise therefore residual impacts are expected to be minor	No	High	Daily logs of ungulates, locations, numbers, sex and direction of travel; reports of aggregations along roads and near facilities
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds; use dust suppressants; maintain vehicles in good operating condition	Residual impacts limited to habitats near roads; since ungulates are wide ranging, exposure to contamination is expected to be very limited	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Barge Traffic	NA since no terrestrial effects	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
In-town Staging Facility	NA since no additional habitat loss or disturbance anticipated – permanent facility	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

Table F.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Explosives Magazine	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

APPENDIX G

Vegetation Cover Impact Matrices

Construction G.1
Operations G.2
Closure / Post-Closure G.3

Table G.1: Vegetation Cover Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	NA to Vegetation Cover	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dikes												
East Dike	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Minor loss and alteration of vegetation communities	No	Certain	Revegetate disturbed areas if necessary
West Dike	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Minor loss and alteration of vegetation communities	No	Certain	Revegetate disturbed areas if necessary
Portage South Dike	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dikes	Minor loss and alteration of vegetation communities	No	Certain	Revegetate disturbed areas if necessary
Goose Island and 3rd Portage Arm Dikes	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake	Minor vegetation loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of vegetation	Minor residual effects anticipated as potentially disturbed areas will return to pre-development conditions rapidly.	No	High	Revegetate on an as-needed basis
Portage Pit (3rd Portage Lake)	Minor vegetation loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of vegetation	Minor residual effects anticipated as potentially disturbed areas will return to pre-development conditions rapidly.	No	High	Revegetate on an as-needed basis
Goose Island (3rd Portage Lake)	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table G.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pits												
Portage Pit	Vegetation loss and disturbance from stripping activities	Low	Local	Continuous	Long	All Year	No	Minimize width of pits to reduce overall vegetation loss	Permanent vegetation loss on local level	No	Certain	None recommended
Goose Island Pit	NA – Activity occurs during the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump (Portage/Goose)	Vegetation loss and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent vegetation alteration and loss on a local level	No	Certain	Monitor success of reclamation activities
Tailings Facilities (2nd Portage Lake)	NA – Tailings will not be deposited until the Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Minimize number of required roads and road dimensions	Permanent vegetation loss at local level	No	Certain	Revegetation activities along road edges
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Airstrip and Air Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	Moderate	Minimize width and length of runway, and number of flights	Limited and local habitat degradation	No	Certain	Revegetation activities along airstrip edges
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize number of air flights; implement dust control measures	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip roads; continue phenology studies
Mine Plant and Associated Facilities	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of mine facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent vegetation loss on a local level	No	Certain	Revegetate areas disturbed during construction

Table G.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Freshwater Intake and Pipeline	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Construct pipeline in manner to minimize impact to vegetation (e.g., elevate above ground)	Minor alteration in vegetation communities	No	Certain	Revegetate areas disturbed during construction
Discharge Facilities and Pipeline(s)	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Construct pipeline in manner to minimize impact to vegetation	Minor alteration in vegetation communities	No	Certain	Revegetate areas disturbed during construction
Non-contact Diversion Facilities	Minor vegetation loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor vegetation loss and alteration	No	Certain	Revegetate areas disturbed during construction; natural revegetation will likely occur
Fuel Storage (at Plant site)	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of fuel storage area and associated containment berm	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of facilities and associated containment berm	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table G.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Camps (North and South)	Minor vegetation loss and disturbance	Low	Local	Continuous	Medium	All Year	No	Designate tent sites and walking trails; use pallets or raised walkways in areas with heath, sedge or other vegetation sensitive to trampling	Minor vegetation loss or alteration	No	Certain	Regular maintenance of designated trail system; monitor development of 'bandit' trails; revegetate camp areas that are no longer in use
	POSITIVE – Reclamation of camp areas as more permanent facilities are built	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal Facility	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize footprint of facilities	Minor vegetation loss or alteration	No	Certain	Revegetate areas disturbed during construction
VAULT FACILITIES												
Noise and Activity	NA to Vegetation Cover	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dike	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize shoreline areas impacted by dike construction	Alteration of vegetation communities	No	Certain	Revegetation of disturbed areas if necessary; monitor success of reclamation efforts
Dewatering	NA - since no terrestrial component	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vault Pit	NA – Activity occurs during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Vegetation loss and disturbance from overburden stripping	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent vegetation alteration and loss on a local level	No	Certain	Monitor success of reclamation activities

Table G.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Minimize number of required roads and road dimensions	Permanent vegetation loss at local level	No	Certain	Revegetation activities along road edges
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Access Road Culvert (Turn Lake)	NA since no terrestrial component	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	Minor vegetation loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor vegetation loss and alteration	No	Certain	Revegetate areas disturbed during construction; natural revegetation will likely occur
Mine Shop/ Office	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of facilities	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
OTHER FACILITIES												
Winter Road and Traffic	Some compaction of vegetation cover possible, particularly in wind swept areas	Low	Local	Continuous	Long	Winter	No	Build up windswept areas with snow and ice to avoid disturbance of underlying vegetation communities	Impact of winter road on underlying vegetation communities is minimized	No	High	Regular monitoring of winter/ice road conditions

Table G.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Minimize number of required roads and road dimensions	Permanent vegetation loss at local level	No	Certain	Revegetation activities along road edges
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Barge Landing Facility	Minor loss and disturbance of beach vegetation	Low	Local	Continuous	Long	Summer	No	Provide facilities to restrict beach landing activities to one area to minimize vegetation disturbance over a larger area	Minor disturbance and alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
Barge Traffic	NA since no terrestrial effects	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Minimize footprint of facilities; clearly delineate footprint to reduce habitat degradation in surrounding areas	Permanent vegetation loss on a local level	No	Certain	Revegetate areas disturbed during construction
Explosives Magazine	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of facilities and associated containment berm	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table G.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tank Farm	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of tank farm area and associated containment berm	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table G.2: Vegetation Cover Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dikes												
East, West and Portage South Dike	Low likelihood of continued vegetation loss and disturbance during operations since dikes already built	Low	Local	Continuous	Long	All Year	No	Minimize expansion of toe of dikes	Minor vegetation loss	No	Certain	Revegetate disturbed areas if necessary
	POSITIVE - Vegetation will become established on sediments exposed by 2nd Portage drawdown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	Minor vegetation loss and disturbance associated with construction of dike	Low	Local	Continuous	Long	All Year	No	Minimize area of shorelines encroached by dike	Alteration of vegetation communities	No	Certain	Revegetation of disturbed areas if necessary
Dewatering												
2nd Portage Lake	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island (3rd Portage Lake)	Minor vegetation loss and/or disturbance in shoreline areas, and areas where pumps and pipelines are located	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduce disturbance of vegetation	Minor residual effects anticipated as potentially disturbed areas will return to pre-development conditions rapidly.	No	High	Revegetate on an as-needed basis
Pits												
Portage Pit	No further vegetation loss and disturbance anticipated	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
Goose Island Pit	Vegetation loss and disturbance from stripping activities	Low	Local	Continuous	Long	All Year	No	Minimize width of pits to reduce overall vegetation loss	Permanent vegetation loss on local level	No	Certain	None recommended

Table G.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump (Portage/Goose)	Continued vegetation loss and disturbance as waste rock dump expands during operation	Medium	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent vegetation loss and alteration at local level	No	Certain	Reclamation undertaken on completed areas of waste rock dump; monitor success of reclamation activities
Tailings Facilities (2nd Portage Lake)	Possible wind erosion resulting in dispersion of potentially contaminated dust	Low	Regional	Cont	Permanent	All Year	Yes	Cap facility with appropriate clean material; undertake a comprehensive revegetation plan; utilize dust suppression methods	Potential dust dispersion impacts reduced to local level; some minor contamination of vegetation downwind of tailings facility is possible	No	Certain	Monitor dust dispersion (modelling); monitor contaminant levels in vegetation
	POSITIVE - Vegetation will become established on sediments exposed by 2nd Portage drawdown, but eventually covered with tailings. Vegetation growth will occur on capped tailings	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Airstrip and Air Traffic	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize number of air flights; implement dust control measures	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to airstrip roads; continue phenology studies
Mine Plant and Associated Facilities	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table G.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Freshwater Intake and Pipeline	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	Minor vegetation loss and disturbance associated with short reclaim pipeline	Low	Local	Continuous	Long	All Year	No	Construct pipeline in a manner to minimize impacts to vegetation	Minor alteration of vegetation communities	No	Certain	Revegetate disturbed areas
Non-contact Diversion Facilities	Vegetation loss due to erosion and permafrost degradation	Low	Local	Continuous	Permanent	Summer	No	Construct diversion facilities in such a way as to minimize potential for erosion	Minor vegetation loss and alteration	No	Moderate	Maintain integrity of diversion facilities on a regular basis' undertake reclamation activities on an as-needed basis
Fuel Storage (at Plant site)	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize overall footprint of fuel storage area and associated containment berm	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Minor vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Minimize area of facilities and associated containment berm	Minor vegetation loss	No	Certain	Revegetate areas disturbed during construction
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table G.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Camps (North and South)	POSITIVE - Increased vegetation growth and reduced disturbance as camps are removed and reclamation work is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dike(s)	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	POSITIVE - Vegetation will become established on sediments exposed by Vault Lake drawdown	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	Vegetation loss and disturbance from stripping activities	Low	Local	Continuous	Long	All Year	No	Minimize width of pits to reduce overall vegetation loss	Permanent vegetation loss on local level	No	Certain	None recommended
Waste Dump	Continued vegetation loss and disturbance as waste rock dump expands during operation	Medium	Local	Continuous	Long	All Year	No	Minimize overall footprint of waste dump; undertake progressive reclamation	Permanent vegetation loss and alteration at local level	No	Certain	Reclamation undertaken on completed areas of waste rock dump; monitor success of reclamation activities
Roads and Traffic	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Access Road Culverts (Turn Lake)	NA since no terrestrial component)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities												

Table G.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Shop/ Office	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	Some compaction of vegetation cover possible, particularly in wind swept areas	Low	Local	Continuous	Long	Winter	No	Build up windswept areas with snow and ice to avoid disturbance of underlying vegetation communities	Impact of winter road on underlying vegetation communities is minimized	No	High	Regular monitoring of winter/ice road conditions
Baker Lake Access Road and Traffic	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Barge Landing Facility	Minor loss and disturbance of beach vegetation	Low	Local	Continuous	Long	Summer	No	Provide facilities to restrict beach landing activities to one area to minimize vegetation disturbance over a larger area	Minor disturbance and alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
Barge Traffic	NA - No terrestrial effects	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table G.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tank Farm	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table G.3: Vegetation Cover Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dikes												
East, West, Portage South, Goose Island and 3rd Portage Arm Dike	Erosion and dike removal activities may lead to further vegetation loss	Low	Local	Continuous	Permanent	Summer	No	Stabilize/contour terrestrial area(s) created by dikes to minimize erosion by wind and water; provide natural drainage patterns	Low likelihood of residual effects; most effects are POSITIVE	No	Certain	Undertake reclamation activities as outlined in Wildlife Management Plan (WMP) and integrate with Abandonment and Restoration Plan (A&R)
	POSITIVE - Vegetation will naturally become established	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering												
2nd Portage Lake	NA since dewatering completed prior to closure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to closure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island (3rd Portage Lake)	NA since dewatering completed prior to closure	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage and Goose Pits	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation	Minor loss of vegetation cover in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table G.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump (Portage/Goose)	Vegetation loss and disturbance due to erosion and sedimentation	Low	Local	Continuous	Long	Summer	No	Stabilize slopes, cap with finer material, suppress dust if an issue; recontour and revegetate with local plant species	Minor vegetation loss is possible on an ongoing basis	No	Moderate	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	POSITIVE - Natural revegetation of waste dump will occur	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tailings Facilities (2nd Portage Lake)	Possible wind erosion resulting in dispersion of potentially contaminated dust	Low	Regional	Cont	Permanent	All Year	Yes	Cap facility with appropriate clean material; undertake a comprehensive revegetation plan; utilize dust suppression methods	Potential dust dispersion impacts reduced to local level; some minor contamination of vegetation downwind of tailings facility is possible	No	Certain	Monitor dust dispersion (modelling); monitor contaminant levels in vegetation
	POSITIVE – Vegetation may naturally recolonize the tailings deposit	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent alteration of vegetation cover likely	No	High	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Low potential for ongoing impacts to roadside vegetation	No	Moderate	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan

Table G.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Airstrip may remain; not likely suitable esker habitat due to potential risk to aircraft and wildlife; efforts made to ensure drainage interferes as little as possible with local drainage patterns; determine allowable growth boundaries for recolonizing vegetation; utilize dust dispersion techniques as needed	Some permanent but localized loss of vegetation cover	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Permanent	All Year	No	Maintain airstrip in usable condition	Low occurrence of impacts from dust and emissions on vegetation adjacent to airstrip	No	Moderate	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent vegetation loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Freshwater Intake and Pipeline	POSITIVE – Natural revegetation of previously disturbed area	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Natural revegetation of previously disturbed area	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table G.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	POSITIVE – Natural revegetation of previously disturbed area	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	Vegetation loss due to erosion and permafrost degradation	Low	Local	Continuous	Permanent	Summer	No	Maintain diversion facilities in such a way as to minimize potential for erosion	Minor vegetation loss and alteration	No	Moderate	Maintain integrity of diversion facilities; undertake reclamation activities on an as-needed basis
Fuel Storage (at Plant site)	Concrete foundation will remain resulting in permanent vegetation loss	Low	Local	Continuous	Permanent	All Year	No	Remove all contaminated soil and recontour around foundation to encourage regrowth of natural vegetation	Minor permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Emulsion/AN Storage/ Explosives Magazines (assuming only minor leaks, no major spills, fires or explosions)	Permanent vegetation loss and disturbance associated with concrete foundation; minor spot contamination	Low	Local	Continuous	Long	All Year	No	Remove all contaminated soil and recontour around foundation to encourage regrowth of natural vegetation	Minor permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dike	Erosion and dike removal activities may lead to further vegetation loss	Low	Local	Continuous	Permanent	Summer	No	Stabilize/contour terrestrial area(s) created by dikes to minimize erosion by wind and water; provide natural drainage patterns	Low likelihood of residual effects; most effects are POSITIVE	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Dewatering	NA - Dewatering activities undertaken prior to Closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table G.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pit	Dike will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation	Minor loss of vegetation cover in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Waste Dump	Vegetation loss and disturbance due to erosion and sedimentation	Low	Local	Continuous	Long	Summer	No	Stabilize slopes, cap with finer material, suppress dust if an issue; recontour and revegetate with local plant species	Minor vegetation loss is possible on an ongoing basis	No	Moderate	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	POSITIVE - Natural revegetation of waste dump will occur	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Vegetation loss and disturbance	Low	Local	Continuous	Long	All Year	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Some permanent alteration of vegetation cover likely	No	High	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Scarify roads, remove culverts, restore drainage patterns, stabilize slopes, consider rehabilitation as esker habitat, suppress dust during reclamation	Low potential for ongoing impacts to roadside vegetation	No	Moderate	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Access Road Culvert (Turn Lake)	Possible disturbance to riparian vegetation during removal	Low	Local	Continuous	Long	Summer	No	Minimize disturbance to nearshore vegetation during removal of culverts	Minor amount of vegetation loss	No	Moderate	As per Abandonment & Restoration Plan

Table G.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Non-contact Diversion Facilities	Vegetation loss due to erosion and permafrost degradation	Low	Local	Continuous	Permanent	Summer	No	Maintain diversion facilities in such a way as to minimize potential for erosion	Minor vegetation loss and alteration	No	Moderate	Maintain integrity of diversion facilities; undertake reclamation activities on an as-needed basis
Mine Shop/ Office	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	Some compaction of vegetation cover possible, particularly in wind swept areas; reduced impact once winter road is no longer used	Low	Local	Continuous	Long	Winter	No	Build up windswept areas with snow and ice to avoid disturbance of underlying vegetation communities	Impact of winter road on underlying vegetation communities is minimized	No	High	Regular monitoring of winter/ice road conditions
Baker Lake Access Road and Traffic	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may result in potential vegetation degradation and increased contaminant levels	Low	Local	Continuous	Long	Summer	No	Minimize vehicular traffic and speeds; implement dust control measures; restrict off-road access and use	Limited and local habitat degradation	No	Moderate	Monitor contaminant levels in vegetation adjacent to roads; continue phenology studies
	Introduction of non-native plant species	Low	Local	Infrequent	Long	All Year	No	Ensure vehicles are washed and clean before being used on site	Low likelihood of occurrence due to hostile environment for non-native species	No	Moderate	Monitor plant species composition
Barge Landing Facility	Minor loss and disturbance of beach vegetation	Low	Local	Continuous	Long	Summer	No	Provide facilities to restrict beach landing activities to one area to minimize vegetation disturbance over a larger area	Minor disturbance and alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
Barge Traffic	NA - No terrestrial effects	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table G.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Potential Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Explosives Magazine	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No further vegetation loss and disturbance	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	Potential fuel spills may degrade surrounding vegetation and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

APPENDIX H

Waterfowl Impact Matrices

Construction H.1
Operations H.2
Closure / Post-Closure H.3

Table H.1: Waterfowl Impact Matrix – Construction

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active waterfowl nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active waterfowl nest sites; monitor response of nesting waterfowl to noise and activity; implement employee awareness programs
Dikes												
East Dike	No measurable effect anticipated from small area of habitat loss; see Small Mammals and Vegetation Cover matrices for more information	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
West Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
Portage South Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
Goose Island and 3rd Portage Arm Dikes	NA – dikes are not constructed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dewatering												
2nd Portage Lake and Portage Pit (3rd Portage Lake)	Major loss of wetland foraging and roosting habitat	High	Local	Infrequent	Permanent	Summer	Yes	Ensure that nesting waterfowl are not directly impacted by drawdown	Because of low breeding densities of waterfowl in the study area, it is unlikely that significant residual effect swill occur, therefore magnitude and residual effects will likely be low	No	High	Undertake waterfowl nest surveys to reduce possibility that nesting birds are impacted by dewatering activities
	Minor loss and disturbance of terrestrial foraging, roosting and nesting habitat	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small	No	High	None specific to waterfowl recommended; revegetate on an as-required basis
Goose Island (3rd Portage Lake)	NA since activity does not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Loss and disturbance of terrestrial foraging, roosting and nesting habitat due to overburden stripping	Low	Local	Continuous	Permanent	All Year	No	Minimize width of pits and overall habitat loss	Loss of some terrestrial habitat is permanent but considered to be low because habitat is not limiting and nesting waterfowl have not been documented in the area	No	Certain	None specific to waterfowl recommended; revegetate on an as-required basis
Goose Island Pit	NA since pit is not developed until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump (Portage/Goose)	Loss and disturbance of terrestrial foraging, roosting and nesting habitat and a small amount of wetland habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial and wetland habitat types	No	Certain	None specific to waterfowl recommended; revegetate on an as-required basis
Tailings Facilities (2nd Portage Lake)	NA since activity not until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required airstrip size	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to air traffic/bird collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; report all waterfowl (e.g., congregations of Canada and snow geese) observed in area to pilots; use aversive techniques to move roosting flocks of geese away from the runway area	Due to low densities of waterfowl in the area and no known active nests, the likelihood of plane/waterfowl collisions during the breeding seasons is unlikely; potential collisions during the migratory period (particularly in the fall) is somewhat more likely but will be mitigated by using aversive techniques when geese are observed in the area	No	Moderate	Pilots are required to report all waterfowl/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting or roosting waterfowl
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and waterfowl have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting waterfowl
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities Freshwater Intake and Pipeline Discharge Facilities and Pipeline(s) Non-contact Diversion Facilities Power Lines and Poles	Loss and avoidance of foraging and roosting habitat	Low	Local	Continuous	Long	All Year	No	Minimize footprint of mine plant site and ancillary facilities; comply with construction plan and schedule; minimize degradation of surrounding area	Residual effects limited to a localized area	No	Certain	None specific to waterfowl recommended; revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	None specific to waterfowl recommended; monitor contaminant levels in vegetation adjacent to mine site
	Minor loss of foraging and roosting habitat	Low	Local	Continuous	Long	All Year	No	Construct pipeline to minimize impact to terrestrial environment	Minor alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
	Minor loss of foraging and roosting habitat	Low	Local	Continuous	Long	All Year	No	Construct pipeline to minimize impact to terrestrial environment	Minor alteration of vegetation communities	No	Certain	Revegetate areas disturbed during construction
	Minor habitat loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor foraging habitat loss and alteration	No	Certain	Revegetate areas disturbed during construction; natural revegetation will likely occur

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities Freshwater Intake and Pipeline Discharge Facilities and Pipeline(s) Non-contact Diversion Facilities Power Lines and Poles	Potential for electrocution and collision resulting in mortality particularly where lines are situated in close proximity to lakes and ponds	Low	Local	Infrequent	Long	All Year	No	Powerlines will be built in such a way that (e.g., placement of electric wires) that the potential for electrocution is minimized; consideration may be given to marking power lines to increase visibility to waterfowl, particularly in poor light conditions	With mitigation and because of low densities of waterfowl in the vicinity of the proposed mine, the potential residual effects (i.e., waterfowl mortality) is very low.	No	Moderate	Report all bird strikes or mortalities related to power lines
	Improved perching opportunities for raptors may result in increased depredation rates on waterfowl in a localized area	Low	Local	Infrequent	Long	All Year	No	None recommended	Potential for increased depredation rates is low and then only at a localized level	No	Moderate	Report all raptors perching on power poles, lines and other mine facilities
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss and low quality of habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss and low quality of habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	No measurable effect anticipated from small area of habitat loss and low quality of habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	No measurable effect anticipated from small area of habitat loss and low quality of habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active waterfowl nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active waterfowl nest sites; monitor response of nesting waterfowl to noise and activity; implement employee awareness programs
Dike	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
Dewatering	NA since dewatering will not occur until operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pit	NA since pit construction will occur during operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump	Loss and disturbance of terrestrial foraging, roosting and nesting habitat and a small amount of wetland habitat from overburden stripping	Low	Local	Continuous	Permanent	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial and wetland habitat types	No	Certain	None specific to waterfowl recommended; revegetate on an as-required basis
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Access Road Culverts (Turn Lake)	Disruption of movement opportunities for waterfowl	Low	Local	Continuous	Medium	Summer	No	None recommended	Residual effects are considered to be low due to low waterfowl densities and ability for waterfowl to fly around obstructions	No	Certain	None recommended

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Non-contact Diversion Facilities	Minor habitat loss and disturbance associated with diversion ditches and associated structures	Low	Local	Continuous	Permanent	Summer	No	Construct diversion ditches in such a way as to minimize potential for erosion	Minor foraging habitat loss and alteration	No	Certain	Revegetate areas disturbed during construction; natural revegetation will likely occur
Mine Shop/ Office	No measurable effect anticipated from small area of habitat loss and low quality of habitat affected	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is nil due to the absence of waterfowl in the area during winter	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Baker Lake Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	Disruption of movement opportunities for waterfowl moving along Baker Lake foreshore	Low	Local	Continuous	Medium	Summer	No	None recommended	Barge landings are very infrequent, therefore potential for disruption of waterfowl movement is considered to be very low	No	Moderate	None recommended
Barge Traffic	Displacement of waterfowl roosting in marine areas and on Baker Lake	Low	Regional	Infrequent	Short	Summer	No	None recommended	Potential for interactions between waterfowl and barges is expected to be extremely low	No	Low	None recommended

Table H.1 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
In-town Staging Facility	Loss and avoidance of foraging and roosting habitat	Low	Local	Continuous	Long	All Year	No	Minimize footprint of facilities; comply with construction plan and schedule; minimize degradation of surrounding area	Residual effects limited to a localized area	No	Certain	None specific to waterfowl recommended; revegetate areas disturbed during construction
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in food sources	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	None specific to waterfowl recommended; monitor contaminant levels in vegetation adjacent to mine site
Explosives Magazine	No measurable effect anticipated from small area of habitat loss and low quality foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table H.2: Waterfowl Impact Matrix – Operation

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active waterfowl nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active waterfowl nest sites; monitor response of nesting waterfowl to noise and activity; implement employee awareness programs
Dikes												
East, West and Portage South Dikes	No measurable effect anticipated due to small loss of terrestrial habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
	POSITIVE – natural revegetation of dike areas may provide foraging and roosting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Goose Island and 3rd Portage Arm Dikes	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
Dewatering												
2nd Portage Lake	NA since dewatering completed prior to operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Portage Pit (3rd Portage Lake)	NA since dewatering completed prior to operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Goose Island (3rd Portage Lake)	Loss of wetland foraging and roosting habitat	Medium	Local	Infrequent	Permanent	Summer	No	Ensure that nesting waterfowl are not directly impacted by drawdown	Because of low breeding densities of waterfowl in the study area, it is unlikely that significant residual effects will occur, therefore magnitude and residual effects will likely be low	No	High	Undertake waterfowl nest surveys to reduce possibility that nesting birds are impacted by dewatering activities
	Minor loss and disturbance of terrestrial foraging, roosting and nesting habitat	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small	No	High	None specific to waterfowl recommended; revegetate on an as-required basis
Pits												

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Portage and Goose Island Pit	Waterfowl may be attracted to ponded and potentially contaminated water at the bottom of pits	High	Local	Continuous	Short	Summer	Yes	Pump water out of pits to tailings pond; use aversive techniques to keep waterfowl away from potentially contaminated water	Due to low waterfowl densities in the study area and the presence of abundant habitat outside the impact area, waterfowl are unlikely to utilize ponded areas at the bottom of pits; for birds that do, aversive techniques will minimize waterfowl exposure to potential contaminatio n; with mitigation, magnitude is low	No	Moderate	Monitor use of pit ponds by waterfowl; use sirens or other noise device to scare waterfowl away
Waste Dump (Portage/Goose)	Ongoing loss and disturbance of terrestrial foraging, roosting and nesting habitat and a small amount of wetland habitat	Low	Local	Continuous	Permane nt	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial and wetland habitat types	No	Certain	None specific to waterfowl recommended; revegetate on an as-required basis

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Tailings Facilities (2nd Portage Lake)	Waterfowl may be attracted to tailings pond with elevated levels of contaminated water	High	Local	Continuous	Short	Summer	Yes	Use aversive techniques to keep waterfowl away from potentially contaminated water	Due to low waterfowl densities in the study area and the presence of abundant habitat outside the impact area, waterfowl are not expected to congregate on the tailings pond; for birds that attempt to, aversive techniques will minimize waterfowl exposure to potential contamination; with mitigation, magnitude is low	No	Moderate	Monitor use of tailing ponds by waterfowl; use sirens or other noise device to scare waterfowl away
	Loss and disturbance of terrestrial foraging and roosting habitat around edge of lake to four metres above current lake elevation	Low	Local	Continuous	Permanent	All Year	No	Minimize encroachment of tailings into shoreline areas of 2nd Portage Lake; berm edges if necessary	Residual effect includes permanent loss of vegetation around the shoreline of 2nd Portage Lake	No	Certain	Environmental monitoring to ensure that only designated areas are impacted by the tailings beach

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Natural revegetation of potentially contaminated tailings beach may occur; waterfowl may be exposed to contamination if contaminants are elevated in plant species	Low	Local	Continuous	Permanent	All Year	No	Cap facility with appropriate clean material; undertake progressive reclamation activities to improve habitats on areas of tailings deposit that has reached its maximum height	With adequate measures, the potential for waterfowl contamination is very low	No	Low	Monitor contaminant levels in vegetation on tailings beach; adjust capping material composition and distribution as appropriate
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required airstrip size	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to air traffic/bird collisions	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; report all waterfowl (e.g., congregations of Canada and snow geese) observed in area to pilots; use aversive techniques to move roosting flocks of geese away from the runway area	Due to low densities of waterfowl in the area and no known active nests, the likelihood of plane/waterfowl collisions during the breeding seasons is unlikely; potential collisions during the migratory period (particularly in the fall) is somewhat more likely but will be mitigated by using aversive techniques when geese are observed in the area	No	Moderate	Pilots are required to report all waterfowl/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting or roosting waterfowl

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and waterfowl have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting waterfowl
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip
Mine Plant and Associated Facilities	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Dust and emissions may cause habitat degradation and increased contaminant loading in forage species	Low	Local	Continuous	Long	All Year	No	Dust suppression techniques; controlled blasting techniques; monitoring of air emissions	Residual effects expected to be minor and restricted to local area	No	High	Monitor waterfowl nest locations; monitor contaminant levels in vegetation adjacent to mine site
Freshwater Intake and Pipeline	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Discharge Facilities and Pipeline(s)	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Contaminant levels may be elevated in receiving environment in vicinity of discharge point and may impact waterfowl using the area	Low	Local	Continuous	Long	Summer	No	Discharge will be treated to ensure that contaminant levels meet regulatory guidelines (see Mine Waste and Water Management Plan)	Low likelihood of waterfowl presence in the vicinity of the discharge point and treatment of discharge effluent will ensure that residual impacts are very low	No	Moderate	Mine Waste and Water Management Plan
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	Waterfowl may be attracted to reclaim pond with elevated levels of contaminated water	High	Local	Continuous	Short	Summer	Yes	Use aversive techniques to keep waterfowl away from potentially contaminated water	Due to low waterfowl densities in the study area and the presence of abundant habitat outside the impact area, waterfowl are not expected to congregate on the reclaim pond; for birds that attempt to, aversive techniques will minimize waterfowl exposure to potential contaminatio n; with mitigation, magnitude is low	No	Moderate	Monitor use of reclaim pond by waterfowl; use sirens or other noise device to scare waterfowl away

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Power Lines and Poles	Potential for electrocution and collision resulting in mortality particularly where lines are situated in close proximity to lakes and ponds	Low	Local	Infrequent	Long	All Year	No	Powerlines will be built in such a way that (e.g., placement of electric wires) that the potential for electrocution is minimized; consideration may be given to marking power lines to increase visibility to waterfowl, particularly in poor light conditions	With mitigation and because of low densities of waterfowl in the vicinity of the proposed mine, the potential residual effects (i.e., waterfowl mortality) is very low.	No	Moderate	Report all bird strikes or mortalities related to power lines
	Improved perching opportunities for raptors may result in increased depredation rates on waterfowl in a localized area	Low	Local	Infrequent	Long	All Year	No	None recommended	Potential for increased depredation rates is low and then only at a localized level	No	Moderate	Report all raptors perching on power poles, lines and other mine facilities
Fuel Storage (at Plant site)	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contaminatio n is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Emulsion/AN Storage/ Explosives Magazines	Potential spills may degrade surrounding habitats and increase contaminant loading in forage specie	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contaminatio n is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Camps (North and South)	POSITIVE - Increased habitat availability and reduced disturbance as camps are removed and habitat reclamation is undertaken	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Sewage and Solid Waste Disposal	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active waterfowl nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active waterfowl nest sites; monitor response of nesting waterfowl to noise and activity; implement employee awareness programs
Dike	No measurable effect anticipated due to small loss of terrestrial habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Disruption of natural movement patterns along lakeshores and across lakes	Low	Local	Continuous	Short	Summer	No	None recommended	Some disruption of waterfowl movement, however, waterfowl populations are at low densities in the study area	No	High	None recommended
	POSITIVE – natural revegetation of dike areas may provide foraging and roosting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dewatering	Major loss of wetland foraging and roosting habitat	High	Local	Infrequent	Permanent	Summer	Yes	Ensure that nesting waterfowl are not directly impacted by drawdown	Because of low breeding densities of waterfowl in the study area, it is unlikely that significant residual effects will occur, therefore magnitude and residual effects will likely be low	No	High	Undertake waterfowl nest surveys to reduce possibility that nesting birds are impacted by dewatering activities
	Minor loss and disturbance of terrestrial foraging, roosting and nesting habitat	Low	Local	Infrequent	Short	Summer	No	Aerial transport of pumps, pipe and other equipment to reduce need for road access; placement of pipeline on pallets which reduces habitat disturbance	Due to small amount of terrestrial habitat impacted, residual effects are considered to be small	No	High	None specific to waterfowl recommended; revegetate on an as-required basis

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pit	Waterfowl may be attracted to ponded and potentially contaminated water at the bottom of pit	High	Local	Continuous	Short	Summer	Yes	Use aversive techniques to keep waterfowl away from potentially contaminated water	Due to low waterfowl densities in the study area and the presence of abundant habitat outside the impact area, waterfowl are unlikely to utilize ponded areas at the bottom of the pit; for birds that do, aversive techniques will minimize waterfowl exposure to potential contaminatio n; with mitigation, magnitude is low	No	Moderate	Monitor use of pit pond by waterfowl; use sirens or other noise device to scare waterfowl away
Waste Dump	Ongoing loss and disturbance of terrestrial foraging, roosting and nesting habitat and a small amount of wetland habitat	Low	Local	Continuous	Permane nt	All Year	No	Minimize overall footprint of waste dump	Residual effect is permanent loss of some terrestrial and wetland habitat types	No	Certain	None specific to waterfowl recommended; revegetate on an as-required basis

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Access Road Culverts (Turn Lake)	Disruption of movement opportunities for waterfowl	Low	Local	Continuous	Medium	Summer	No	None recommended	Residual effects are considered to be low due to low waterfowl densities and ability for waterfowl to fly around obstructions	No	Certain	None recommended
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	No additional loss or disturbance of terrestrial foraging habitat anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is nil due to the absence of waterfowl in the area during winter	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Baker Lake Access Road and Traffic	Loss and disturbance of terrestrial foraging habitat	Low	Local	Continuous	Permanent	All Year	No	Minimize required roads and reduce road dimensions	Minor alteration and loss of foraging and roosting habitat	No	Certain	None specific to waterfowl recommended (see Vegetation Cover matrices for more habitat-specific recommendations
	Mortality due to vehicle/bird collisions	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators

Table H.2 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Barge Landing Facility	Disruption of movement opportunities for waterfowl moving along Baker Lake foreshore	Low	Local	Continuous	Medium	Summer	No	None recommended	Barge landings are very infrequent, therefore potential for disruption of waterfowl movement is considered to be very low	No	Moderate	None recommended
Barge Traffic	Displacement of waterfowl roosting in marine areas and on Baker Lake	Low	Regional	Infrequent	Short	Summer	No	None recommended	Potential for interactions between waterfowl and barges is expected to be extremely low	No	Low	None recommended
In-town Staging Facility	No additional habitat loss or disturbance anticipated during operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	Potential spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	Potential fuel spills may degrade surrounding habitats and increase contaminant loading in forage species	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around fuel storage area; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	Potential for contamination is low and potential for waterfowl to consume contaminated forage species is much lower	No	Low	Regular maintenance checks; follow Hazardous Materials Handling Guidelines

Table H.3: Waterfowl Impact Matrix – Closure & Post-Closure

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
MAIN FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas; minimal effects once mine is fully closed	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active waterfowl nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active waterfowl nest sites; monitor response of nesting waterfowl to noise and activity; implement employee awareness programs
Dikes												
East, West, Portage South, Goose Island and 3rd Portage Arm Dikes	Waterfowl (e.g. Canada Goose and Snow Goose) may be attracted to dike areas during migration for roosting and foraging; risk of exposure to elevated contaminants in dike materials	Low	Local	Continuous	Permanent	Summer	No	Ensure that dike materials are inert and do not contribute unacceptable contaminant levels into the environment; see Mine Waste and Water Management Plan.	Elevated contaminant levels are not expected in vegetation growing on dikes, therefore residual effects are considered to be low	No	High	Sample vegetation on dike areas to determine contaminant levels; see Wildlife Management Plan
	Minor loss and disturbance of potential roosting and nesting habitat on dikes when dikes are breached for reflooding of Portage and Goose Island pits	Low	Local	Infrequent	Medium	Summer	No	Do not breach dikes in areas identified during operations as providing high quality nesting habitat for waterfowl; do not breach dikes during the nesting period if nesting waterfowl are identified in the area	Due to low densities of breeding waterfowl in the study area, residual effects of dike breaching are expected to be low	No	Moderate	Monitor waterfowl nest locations
	POSITIVE - Vegetation will naturally become established on dikes providing living areas waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Creation of natural movement patterns within localized area (i.e., in areas once isolated by dikes)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dewatering												
2nd Portage Lake, Portage Pit (3rd Portage Lake) and Goose Island (3rd Portage Lake)	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pits												
Portage Pit	Waterfowl will be attracted to lakes formed after reflooding of Portage and Goose pit and may be exposed to potentially contaminated water	Medium	Local	Continuous	Permanent	Summer	Yes	Ensure new lake waters do not contain unacceptable levels of contaminants; treat contaminated water inputs prior to discharge; see Aquatic Environmental Management Plan and Mine Waste and Water Management Plan	Residual impacts are expected to be low if mitigation measures are implemented and because waterfowl densities are low in the study area	No	High	Monitor use of lakes by waterfowl
	Dikes will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for waterfowl	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in waterfowl use	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE - Emergent vegetation may grow if a littoral zone is established around edges of pits providing living and nesting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living and nesting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump (Portage/Goose)	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved foraging and roosting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on waste rock piles may be contaminated leading to elevated contaminant levels in waterfowl	Medium	Local	Continuous	Permanent	All year	Yes	Ensure that capping materials are inert and do not contribute unacceptable contaminant levels into the environment	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude	Low	High	Monitor contaminant levels in vegetation and possibly other indicators
Tailings Facilities (2nd Portage Lake)	POSITIVE – Native vegetation will naturally become reestablished on the tailings providing improved foraging and roosting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on tailings may be contaminated leading to elevated contaminant levels in waterfowl	Medium	Local	Continuous	Permanent	All year	Yes	Ensure that capping materials are inert and do not contribute unacceptable contaminant levels into the environment	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude	Low	High	Monitor contaminant levels in vegetation and possibly other indicators

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated forage species within diet of locally resident waterfowl is likely low; potential exposure is very seasonal for most waterfowl species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE – Waterfowl may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Airstrip and Air Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to air traffic/bird collisions; risk of this effect will decline substantially after mine closure	Low	Local	Infrequent	Short	All Year	No	Minimize number of take-offs and landings; report all waterfowl observed in area to pilots	Due to low densities of waterfowl in the area and no known active nests, the likelihood of a plane/waterfowl collision is considered extremely unlikely	No	Moderate	Pilots are required to report all waterfowl/plane collisions and near misses; habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting waterfowl
	Reduced habitat effectiveness in adjacent areas due to noise and activity; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize number of take-offs and landings; pilots will be required to observe approach height guidelines	Air plane arrivals and departures are expected to be infrequent and waterfowl have not been observed nesting in the vicinity of the airstrip	No	High	Habitats in the vicinity of the airstrip will be surveyed on a regular basis for the presence of nesting waterfowl
	Potential habitat degradation due to dust and emissions and potential for increased contaminant loading in forage species; risk of this effect will decline substantially after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize number of take-offs and landings	Low utilization of the airstrip is not expected to result in notable contamination of adjacent habitats, and resident waterfowl are extremely unlikely to have a high percentage of their diet coming from potentially contaminated areas	No	Moderate	Monitor contaminant levels in vegetation and possible other indicators adjacent to the airstrip

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Mine Plant and Associated Facilities	Concrete foundation and footprint of other ancillary facilities will result in permanent habitat loss and disturbance	Low	Local	Continuous	Permanent	All Year	No	Remove any contamination sources from around the plant; recontour surrounding area and restore original drainage patterns to the extent possible; stabilize slopes	Some permanent vegetation loss	No	Certain	Reclamation activities as outlined in Wildlife Management Plan and Abandonment & Restoration Plan
Freshwater Intake and Pipeline	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Discharge Facilities and Pipeline(s)	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Reduction in contaminant levels in receiving environment in vicinity of discharge point	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3rd Portage Arm Tailings Attenuation Pond & Associated Reclaim Pipeline (yr 6+)	Waterfowl may be attracted to reclaim pond with elevated levels of contaminated water, although levels of contamination are expected to decline significantly following closure	High	Local	Continuous	Short	Summer	Yes	Use aversive techniques to keep waterfowl away from potentially contaminated water	Due to low waterfowl densities in the study area and the presence of abundant habitat outside the impact area, waterfowl are not expected to congregate on the reclaim pond; for birds that attempt to, aversive techniques will minimize waterfowl exposure to potential contamination; with mitigation, magnitude is low	No	Moderate	Monitor use of reclaim pond by waterfowl; use sirens or other noise device to scare waterfowl away

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
	POSITIVE – Natural revegetation of previously disturbed area resulting in improved foraging habitat	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fuel Storage (at Plant site)	No measurable effect anticipated from small area of habitat loss; potential for spills is substantially reduced	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Emulsion/AN Storage/ Explosives Magazines	No measurable effect anticipated from small area of habitat loss; no further potential for spills	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Camps (North and South)	NA – Reclamation activities undertaken during Operation phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sewage and Solid Waste Disposal	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VAULT FACILITIES												
Noise and Activity	Activity and noise result in displacement and reduced habitat effectiveness; disruption of nesting birds if present in close proximity to development areas; minimal effects once mine is fully closed	High	Local	Continuous	Medium	All Year	Yes	Minimize noise levels; manage noise and activity around active waterfowl nest sites	With mitigation, magnitude of impacts is considered to be low	No	Moderate	Monitor locations of active waterfowl nest sites; monitor response of nesting waterfowl to noise and activity; implement employee awareness programs

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Dike	Waterfowl (e.g. Canada Goose and Snow Goose) may be attracted to dike areas during migration for roosting and foraging; risk of exposure to elevated contaminants in dike materials	Low	Local	Continuous	Permanent	Summer	No	Ensure that dike materials are inert and do not contribute unacceptable contaminant levels into the environment; see Mine Waste and Water Management Plan	Elevated contaminant levels are not expected in vegetation growing on dikes, therefore residual effects are considered to be low	No	High	Sample vegetation on dike areas to determine contaminant levels; see Wildlife Management Plan
	Minor loss and disturbance of potential roosting and nesting habitat on dike when dike are breached for reflooding of Vault pit	Low	Local	Infrequent	Medium	Summer	No	Do not breach dike in areas identified during operations as providing high quality nesting habitat for waterfowl; do not breach dike during the nesting period if nesting waterfowl are identified in the area	Due to low densities of breeding waterfowl in the study area, residual effects of dike breaching are expected to be low	No	Moderate	Monitor waterfowl nest locations
	POSITIVE - Vegetation will naturally become established on dike providing living areas for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE - Creation of natural movement patterns within localized area (i.e., in areas once isolated by dikes)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dewatering	NA since dewatering completed prior to closure phase	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Pit	Waterfowl will be attracted to lakes formed after reflooding of Vault pit and may be exposed to potentially contaminated water	Medium	Local	Continuous	Permanent	Summer	Yes	Ensure new lake waters do not contain unacceptable levels of contaminants; treat contaminated water inputs prior to discharge; see Aquatic Environmental Management Plan and Mine Waste and Water Management Plan	Residual impacts are expected to be low if mitigation measures are implemented and because waterfowl densities are low in the study area	No	High	Monitor use of lakes by waterfowl
	Dike will be breached and pit allowed to fill with water; terrestrial areas where vegetation has become established during the operation phase will be inundated resulting in minor loss of foraging habitat for waterfowl	Low	Local	Continuous	Permanent	All Year	No	Establish littoral zone around pit edge to encourage establishment of emergent vegetation and increases in waterfowl use	Minor loss of habitat in disturbed areas	No	Certain	See Abandonment & Restoration Plan
	POSITIVE – Emergent vegetation may grow if a littoral zone is established around edges of pits providing living and nesting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	POSITIVE – Riparian and nearshore vegetation may colonize sorted substrates near edges of flooded pits providing living and nesting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Waste Dump	POSITIVE – Native vegetation will naturally become reestablished on the waste dump providing improved foraging and roosting opportunities for waterfowl	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Vegetation growing on waste rock piles may be contaminated leading to elevated contaminant levels in waterfowl	Medium	Local	Continuous	Permanent	All year	Yes	Ensure that capping materials are inert and do not contribute unacceptable contaminant levels into the environment	With reduced contaminant uptake in vegetation, potential impacts are considered to be of low magnitude	Low	High	Monitor contaminant levels in vegetation and possibly other indicators

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Roads and Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect will reduce substantially after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species; the potential for this effect will reduce substantially after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated forage species within diet of locally resident waterfowl is likely low; potential exposure is very seasonal for most waterfowl species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
	POSITIVE – Waterfowl may be attracted to reclaimed road bed areas for roosting, foraging and possibly nesting once vegetation has become reestablished	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Non-contact Diversion Facilities	No measurable effect anticipated from small area of habitat loss	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mine Shop/ Office	POSITIVE – Natural revegetation of disturbed habitats	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
OTHER FACILITIES												
Winter Road and Traffic	No measurable effect anticipated from small area of habitat alteration	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	The probability of mortality due to vehicle/bird collisions is nil due to the absence of waterfowl in the area during winter	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Baker Lake Access Road and Traffic	No additional habitat loss or disturbance anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Mortality due to vehicle/bird collisions; the potential for this effect will decline after mine closure	Low	Local	Infrequent	Short	Summer	No	Minimize vehicular traffic and speeds; waterfowl have right-of-way	Potential for vehicle/waterfowl collisions is expected to be very low	No	Moderate	Drivers will report any collisions and near misses with waterfowl; a wildlife log will be maintained to document waterfowl sightings
	Reduced habitat effectiveness in adjacent areas due to noise and activity; the potential for this effect will decline after mine closure	Low	Local	Continuous	Permanent	All Year	No	Minimize vehicular traffic and speeds	Reduced habitat effectiveness is expected to be minimal due to small area of impact and absence of nesting birds in the area	No	High	A wildlife log will be maintained to document waterfowl sightings
	Habitat degradation due to dust and exhaust and potential for increased contaminant loading in forage species; the potential for this effect will decline after mine closure	Low	Local	Continuous	Permanent	Summer	No	Minimize vehicular traffic and speeds; use dust suppressant techniques on an as-needed basis; maintain vehicle in good running condition	Potential area of contamination is very small; proportion of potentially contaminated forage species within diet of locally resident waterfowl is likely low; potential exposure is very seasonal for most waterfowl species	No	Moderate	Monitor contaminant levels in road side vegetation and possible other indicators
Barge Landing Facility	No measurable effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table H.3 Continued

Project Components	Potential Effects	Assessment of Unmitigated Effects						Proposed Mitigation	Assessment of Residual Effects			Wildlife Management and Monitoring Plan
		Spatial Boundaries		Temporal Boundaries			Significance of Unmitigated Effects		Residual Effects/ Influence of Mitigation	Significance of Residual Impacts	Probability	
		Magnitude	Spatial Extent	Frequency	Duration	Timing						
Barge Traffic	No effects anticipated	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
In-town Staging Facility	No further habitat loss or disturbance anticipated; facility will likely not be decommissioned	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Explosives Magazine	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines
Tank Farm	No further habitat loss and disturbance	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	Potential fuel spills may degrade surrounding habitat and increase contaminant levels	Low	Local	Infrequent	Short	All Year	No	Provide containment berm around explosives magazine; follow Hazardous Materials Handling Guidelines; follow Spill Contingency Guidelines	No residual effects anticipated	No	Moderate	Regular maintenance checks; follow Hazardous Materials Handling Guidelines