December 8, 2014

JoAnne Deneron, Chairperson
Mackenzie Valley Environmental Impact Review Board
Yellowknife, NT

RE: Dominion Diamond Jay Project DAR Addendum

Dear Ms. Deneron:

Attached is an Addendum to the Jay Project Developers Assessment Report. This Addendum provides a cumulative effects assessment of the Jay Project that includes the Sable pit and associated activities (e.g. access road, powerline) as a reasonably foreseeable development.

As described in the Addendum attached, mining of the Sable kimberlite pipe would be undertaken as part of the permitted operation at the Ekati Diamond Mine, but no access or development work has been undertaken to date. Dominion Diamond is re-initiating exploration work at the Sable pipe, and this makes it reasonable to now consider mining of the Sable pipe as a reasonably foreseeable project for the purpose of the environmental assessment of the Jay Project.

The Addendum attached also addresses Item 5.1 of the Review Board's Adequacy Review (November 28, 2014). As such, this Addendum forms part of the Jay Project DAR, and the assessments provided in this Addendum update the corresponding information in the DAR.

We trust that this information is clear and informative. Please contact the undersigned at 669-6107 should you have any questions.

Regards,

Richard Bargery
Manager, Permitting Jay Project
Dominion Diamond Corporation

JAY PROJECT
DEVELOPER'S ASSESSMENT REPORT
SABLE ADDENDUM

Prepared for: Dominion Diamond Ekati Corporation

Prepared by: Golder Associates Ltd.

Date December 2014

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Appendices

Appendix I 2014 Wildlife Baseline Study

Abbreviations

Abbreviation	Definition
AANDC	Aboriginal Affairs and Northern Development Canada
BHP	Broken Hill Proprietary Company
BHP Billiton	BHP Billiton Canada Inc.
CO	carbon monoxide
DAR	Developer's Assessment Report
DIAMET	DIAMET Minerals Ltd.
DIAND	Department of Indian Affairs and Northern Development Canada (now referred to as AANDC)
Diavik Mine	Diavik Diamond Mine
Dominion Diamond	Dominion Diamond Ekati Corporation
e.g.,	for example
EA	Environmental Assessment
Ekati Mine	Ekati Diamond Mine
ELC	Ecological Landscape Classification
ESA	Effects Study Area
et al.	and more than one additional author
FPK	fine processed kimberlite
GDP	Gross Domestic Product
GNWT	Government of the Northwest Territories
HSI	habitat suitability index
i.e.	that is
ICRP	Interim Closure and Reclamation Plan
IHI	Insect Harassment Index
LLCF	Long Lake Containment Facility
MDNN	mean distance to nearest neighbour
MVRB	Mackenzie Valley Review Board
NO_x	nitrogen oxides
NWT	Northwest Territories
P	probability
PM	particulate matter
Project	Jay Project
RFD	reasonably foreseeable development
RSF	resource selection function
SD	standard deviation
SO_2	sulphur dioxide
TLU	Traditional Land Use
TOR	Terms of Reference
TSP	total suspended particulates
TSS	total suspended solids
TCWR	Tibbitt to Contwoyto Winter Road
VC	valued component

Abbreviation	Definition
Water Licence	Class A Water Licence W2012L2-0001
WEMP	Wildlife Effects Monitoring Program
WLWB	Wek´èezhìi Land and Water Board
WPKMP	Wastewater and Processed Kimberlite Management Plan
WROMP	Waste Rock and Ore Storage Management Plan
WRSA	waste rock storage area
ZOI	zone of influence

Units of Measure

Unit	Definition
%	percent
<	less than
≤	less than or equal to
>	greater than
dBA	A-weighted decibel
ha	hectare
kg	kilogram
km	kilometre
km^2	square kilometres
m	metre
m^2	square metres
m^3	cubic metres
m^3/s	cubic metres per second
MJ/day	megajoules per day
Mt	million tonnes

1 INTRODUCTION

1.1 Purpose of the Developer's Assessment Report Addendum

Dominion Diamond Ekati Corporation (Dominion Diamond) proposes to develop the Jay Project (Project), which includes associated mining and transportation infrastructure, to add 10 or more years of additional mine life to the Ekati Diamond Mine (Ekati Mine). The existing Ekati Mine and its surrounding claim block are located approximately 300 kilometres (km) northeast of Yellowknife in the Northwest Territories (NWT) (Map 1.1-1).

A Developer's Assessment Report (DAR) for the Project was submitted to the Mackenzie Valley Review Board (MVRB) on November 6, 2014 (Dominion Diamond 2014). In the Terms of Reference (TOR) for the Project, issued by the MVRB on July 17, 2014, the scope of the assessment was to include all potential impacts on valued components of the biophysical and human environment from the development, by itself and in combination with other past, present, and reasonably foreseeable future development (Section 1, Appendix 1A in the DAR). In accordance with the TOR, the DAR provided an analysis and assessment of cumulative effects from the Project and previous, existing, and reasonably foreseeable developments for all valued biophysical and human environmental components, where applicable (Dominion Diamond 2014).

The Ekati Mine encompasses numerous diamond-bearing kimberlite pipes, not all of which have been mined. Mining of the Sable kimberlite pipe was fully permitted in 2002 as part of the Sable, Pigeon, and Beartooth Expansion Project. The Expansion Project underwent environmental assessment and regulatory permitting at that time.

However, the Sable pipe has not been scheduled in the Ekati Mine operating plan and no access or development work has been completed. As described in the DAR, mining of the Sable kimberlite was not included as a reasonably foreseeable development in the analysis and assessment of cumulative effects for the Jay Project (Section 6.5.2.4).

Dominion Diamond plans to conduct new exploration work (bulk sample) at the Sable pipe in winter 2015 to gather additional geological information. The initiation of this nature of work suggests that the Sable pipe could now be considered a reasonably foreseeable development for the environmental assessment of the Jay Project.

LEGEND

- JAY PROJECT
- EXISTING MINE OR PROJECT
- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- WINTER ROAD
- TIBBITT TO CONTWOYTO WINTER ROAD
- NORTHERN PORTION OF TIBBITT TO CONTWOYTO WINTER ROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY

150 0 150

SCALE 1:6,000,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

LOCATION OF THE JAY PROJECT

Golder Associates

PROJECT		13-1328-0041	FILE No. Sable_006_GIS	
DESIGN	RK	28/11/14	SCALE AS SHOWN	REV. 0
GIS	LR/AK	08/12/14		
CHECK	RK	08/12/14	MAP 1.1-1	
REVIEW	KM	08/12/14		

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Therefore, the purpose of this DAR Addendum is to provide an assessment of cumulative effects for the Jay Project that includes mining of the Sable pipe as a reasonably foreseeable development. This Addendum also utilizes updated information regarding the area disturbed at the Pigeon site, which is currently under construction. This Addendum forms part of the Jay Project DAR, and the assessments provided in this Addendum form an update to the corresponding information in the DAR.

Table 1.1-1 identifies the sections of the DAR (Dominion Diamond 2014) and specifies whether they are unchanged or updated within this DAR Addendum. If they are unchanged, the reader is directed to the DAR (Dominion Diamond 2014). If the text in the subsection required updates, the changes are provided in the sections and appendices that follow. The addition of the Sable project did not result in changes to the Baseline Annexes in the DAR.

Table 1.1-1 Updates for Sections of the Jay Project Developer's Assessment Report

Section from the DAR	Nature of Update in this Addendum
1 Introduction	-
2 Project Alternative	-
3 Project Description	-
4 Community Engagement	-
5 Traditional Knowledge	-
6 Environmental Assessment Approach	-
7 Air Quality	update provided in Residual Effects Analysis (Section 4.2.1.3)
8 Water Quality and Quantity	update provided in Residual Effects Analysis (Sections 4.1.1.3, 4.1.2.3, and 4.1.3.3)
9 Fish and Fish Habitat	update provided in Residual Effects Analysis (Section 4.1.4.2)
10 Terrain	-
11 Vegetation	update provided in Residual Effects Analysis (Sections 4.2.2.3 and 4.2.3.3)
12 Barren-Ground Caribou	update provided in Residual Effects Analysis (Section 4.2.4.3)
13 Wildlife and Wildlife Habitat	update provided in Pathway Analysis (Section 4.2.5.2) and Residual Effects Analysis (Section 4.2.5.3)
14 Socio-economics	update provided in Residual Effects Analysis (Section 4.3.1.3)
15 Culture	update provided in Residual Effects Analysis (Section 4.3.2.3)
16 Environmental Effects on the Project	-
17 Cumulative Effects Summary	Summary and Conclusion (Section 5)
18 Summary and Conclusions	Summary and Conclusion (Section 5)

- = Section is unchanged and available in the Jay Project DAR (Dominion Diamond 2014).

2 SABLE PROJECT DESCRIPTION

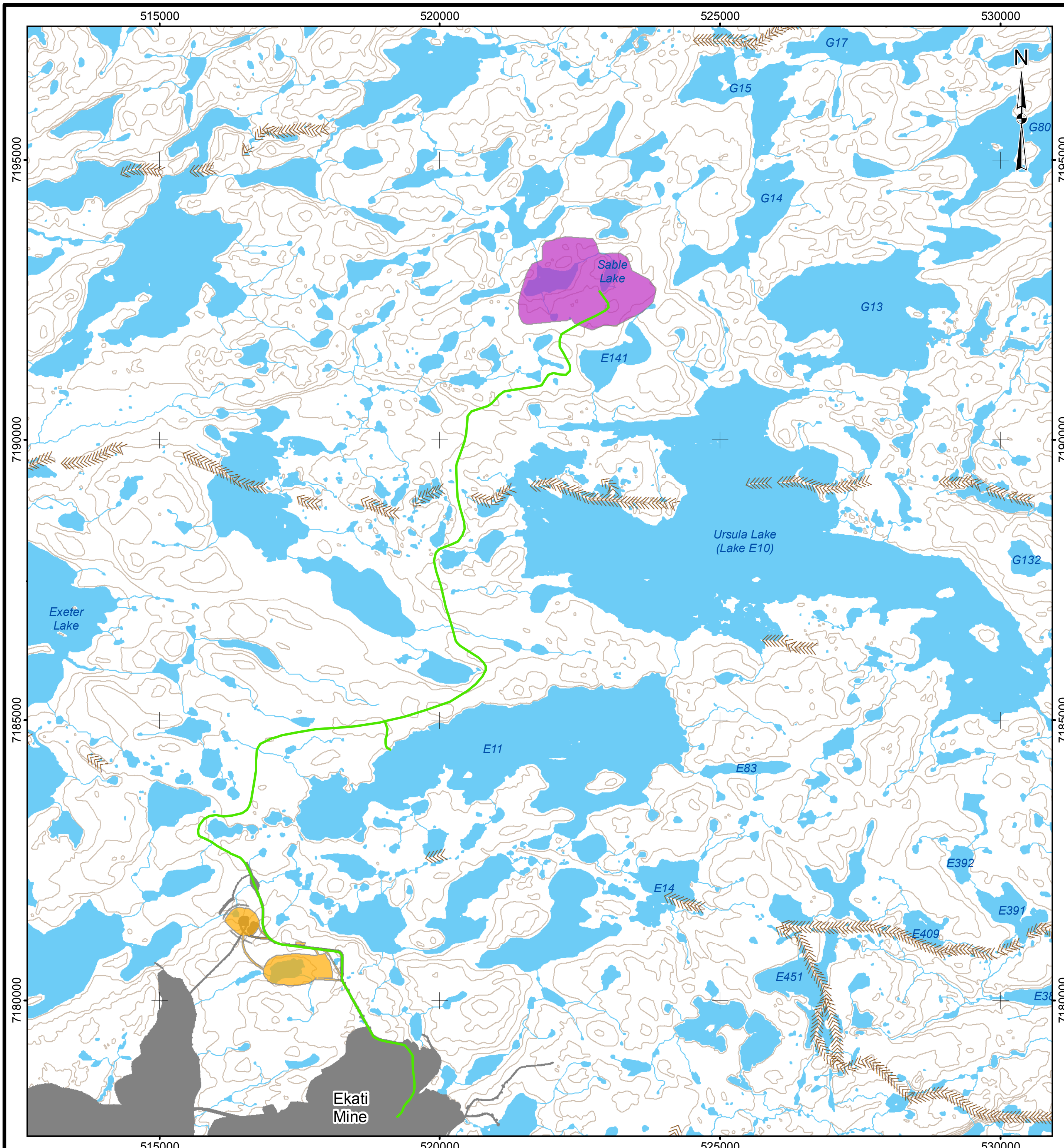
2.1 Project Overview

The Sable pipe is located approximately 16 km northeast of the Ekati Mine processing plant (Map 2.1-1). The Sable pipe is beneath Sable Lake, a headwater lake with a small catchment area and no substantial inflow. Sable Lake lies within the Exeter Lake catchment, which is a contributing watershed to the Coppermine River downstream of Desteffany Lake. To gain access to the kimberlite pipe and allow for open-pit mining of the Sable pipe, Sable Lake must be dewatered.

The Sable pipe sub-surface area is approximately 2 ha with surface dimensions of 180 m by 140 m. It has an irregular triangular outline in plan view and a steep-sided vase shape. Figure 2.1-1 is a plan view and Figure 2.1-2 is an isometric view of the Sable pipe. Past estimates suggest that the Sable pipe may contain in the order of 15 Mt of diamond-bearing kimberlite, which represents the equivalent of approximately three years of continuous feed for the Ekati processing plant. The Sable site surface lease will expire in September 2015, and the renewal of this lease will be sought from the Government of the Northwest Territories (GNWT) as a matter of routine operations. As the *Mackenzie Valley Resource Management Act* came into effect before issuance of the Sable surface lease, a land use permit issued by the Wek'éezhìi Land and Water Board (WLWB) is also required for the Sable site. Two Class A Land Use Permits (for the Sable site and the Sable access road) will expire in September 2016 and renewal or re-issuance will be sought as a matter of routine mine operations.

The Class A Ekati Mine Water Licence W2012-0001 extends to August 2021 and provides for mining at all established areas of the Ekati Mine and possible future mining of the Sable pipe. Losses to fish habitat associated with the Sable development are included in Ekati Mine *Fisheries Act* Authorization SC99037.

Closure and reclamation of the Sable development is described in Version 2.4 of the Ekati Mine Interim Closure and Reclamation Plan (ICRP) that was approved by the WLWB in November 2011 (with subsequent updates approved through the Annual Reclamation Progress Reports). Reclamation security for the Sable development is established in the Water Licence and is required at least 60 days prior to construction.



LEGEND

- EKATI MINE FOOTPRINT
- ELEVATION CONTOUR (10 m INTERVAL)
- ESKER
- WATERCOURSE
- WATERBODY
- PROPOSED PIGEON AND SABLE ALL-WEATHER ROAD ROUTE
- PIGEON PIT INFRASTRUCTURE
- SABLE PIT INFRASTRUCTURE

2 0 2

SCALE 1:100,000 KILOMETRES

REFERENCE

SABLE ROAD ROUTE PROVIDED BY DOMINION ON AUGUST 6, 2014
SABLE INFRASTRUCTURE FOOTPRINT PROVIDED BY DOMINION ON OCTOBER 4, 2014
PIGEON INFRASTRUCTURE FOOTPRINT DIGITIZED FROM THE PIGEON SITE PLAN IN DOMINION DIAMOND 2014 WASTE ROCK AND ORE STORAGE MANAGEMENT PLAN
CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

PROJECT COMPONENTS FOR THE SABLE DEVELOPMENT

Golder Associates

PROJECT		1407256	FILE No. Sable_005_GIS
DESIGN	RK	28/11/14	SCALE AS SHOWN REV. 0
GIS	LR/AK	08/12/14	MAP 2.1-1
CHECK	RK	08/12/14	
REVIEW	KM	08/12/14	

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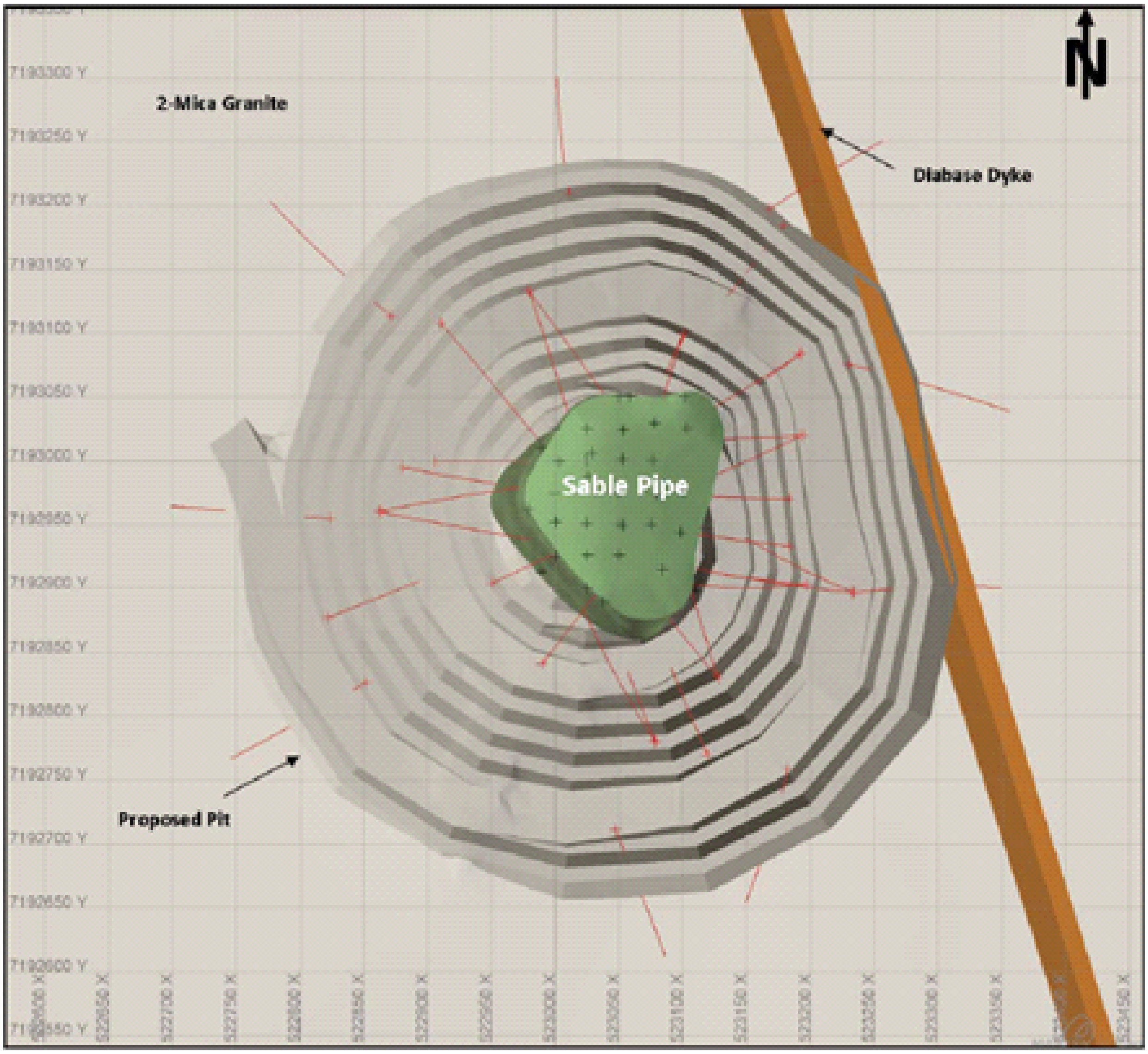

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

SABLE PIPE PLAN VIEW

PROJECT		1407256	FILE No. Sable_003_GIS	
DESIGN	RK	28/11/14	SCALE AS SHOWN	REV. 0
GIS	LR/AK	08/12/14	FIGURE 2.1-1	
CHECK	RK	08/12/14		
REVIEW	KM	08/12/14		

Golder Associates

DOCUMENT

SABLE ADDENDUM

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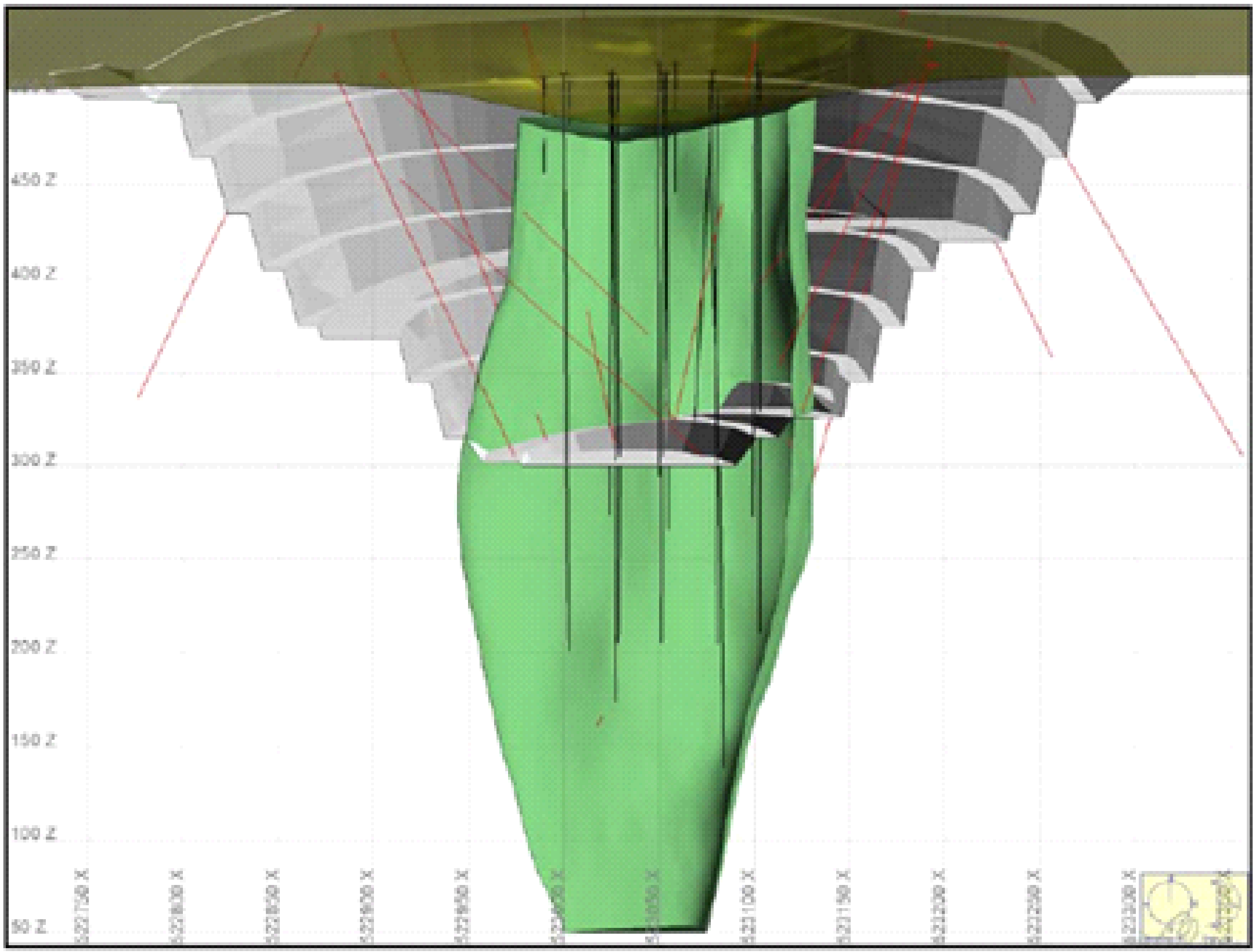

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

SABLE PIPE ISOMETRIC VIEW

Golder Associates

PROJECT		1407256	FILE No. Sable_004_GIS
DESIGN	RK	28/11/14	SCALE AS SHOWN REV. 0
GIS	LMR	08/12/14	FIGURE 2.1-2
CHECK	RK	08/12/14	
REVIEW	KM	08/12/14	

DOCUMENT
SABLE ADDENDUM

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2.2 Project Components

An all-season access road will be constructed to link the Sable site to the existing Ekati main camp (17.6 km). Design standards and criteria have been established based on operational requirements in conjunction with regulatory compliance (i.e., Northwest Territories Mine and Health and Safety Act and Regulations). The road structure will consist of continuous fill placed on the existing tundra surface, with precautions taken so that the underlying permafrost remains undisturbed. The road will be constructed in such a manner to minimize the need for safety berms, which would not only trap snow but also obstruct wildlife movement, particularly migrating caribou. In areas where occurrence of caribou is predicted to be high, caribou crossings will be established to limit effects to movement through the area and provide enhanced visibility for equipment operators. Culverts will be installed to maintain existing water flow, and where necessary, culverts will be sized and installed to allow for fish passage.

Support facilities to be developed at the Sable site will be a field office complex, complete with lunchroom, washrooms, first aid room, and emergency accommodations. Fuel storage with secondary containment will be provided adjacent to the laydown and truck ready areas. Additional support infrastructure to be constructed at the Sable site consist of: a small, standalone diesel power plant; warehouse; two-bay truck shop; and, an explosive magazine to house primers, detonators, and other blasting supplies that will be established a safe distance from the pit. Mine employees will be housed at the existing Ekati main camp and transported by bus to and from the Sable site each day.

Sable Lake has a volume of 393,300 cubic metres (m^3), surface area of 8.9 ha, mean depth of 4.8 m, a watershed area of 0.66 square kilometres (km^2), and mean calculated discharge of 0.008 cubic metres per second (m^3/s) (BHP and DIAMET 2000). A fish-out of Sable and Two Rock Lake was completed in 2001 and 2002 (BHP Billiton 2004); however, additional fish-out work may be required prior to dewatering.

During dewatering, the clean water pumped from Sable Lake will initially be discharged to the outlet stream from Two Rock Lake, which is immediately downstream of Sable Lake in the Yamba/Exeter watershed. Two Rock Lake will serve as a sedimentation pond for water with higher levels of total suspended solids (TSS) pumped during the later stage of dewatering. Operational minewater that is collected in the Sable Pit will also be managed in Two Rock Lake and then discharged into Horseshoe Lake eventually going into Exeter Lake. The Two Rock Sedimentation Pond will be established through the installation of a water retention dam (rock-filled dam with a frozen core), which will isolate Two Rock Lake from downstream areas and provide a controlled discharge point. The Two Rock Sedimentation Pond will consist of two cells established by the construction of a semi-pervious filter dike, which will divide the lake in half. The water with higher levels of TSS will be pumped into the upstream cell; residency time will allow suspended solids to settle, and the dike will act as a filter as water seeps through into the downstream cell. Water from the downstream cell that meets Water Licence discharge criteria will be pumped over the retention dam for release to the environment (into Horseshoe Lake). The completed Sable open pit may have a volume of 34 million m^3. The majority of the Sable waste rock will be granite (95 percent [%]), with a small contribution of diabase (5%). Waste rock from the Sable development will be placed on the Sable waste rock storage areas (Sable WRSAs) to the north and west of the Sable Pit. The WRSA will be constructed in accordance with the existing Ekati Mine Waste Rock and Ore Storage Management Plan (WROMP).

Kimberlite will be processed at the existing Ekati Mine processing plant, with process water from the plant being directed to the LLCF. The processing plant will continue at the current capacity; kimberlite processing through the plant typically averages 12,500 tonnes per day as a continuous operation (i.e., 24 hours a day, 365 days a year). Processed kimberlite will be directed to the LLCF, the exhausted Beartooth Pit, and the coarse reject storage area. The Wastewater and Processed Kimberlite Management Plan (WPKMP) addresses the specific requirements of the Water Licence, and describes the placement of processed kimberlite within the LLCF and Beartooth Pit. Water discharged from the LLCF will meet Water Licence discharge criteria; discharge from the LLCF will flow to Slipper Bay of Lac de Gras via the numerous small lakes in the Koala watershed.

2.3 Closure and Reclamation

The Ekati Mine is required under its Water Licence and Environmental Agreement to have a closure plan. Version 2.4 of the Ekati Mine ICRP (BHP Billiton 2011) was approved by the WLWB in November 2011 and various updates are approved through the Annual Reclamation Progress Reports. The Water Licence requires that a final closure plan be prepared two years before mine closure. The ICRP includes all of the closure and reclamation measures that would be required for the Sable development.

The reclamation of the Sable roads, pads, and WRSA (refer to Tables 5.7-3 to 5.7-9 and Table 5.4-9 in the ICRP), as well as Two Rock dam and dike (refer to Table 5.6-2 and 5.6-3 in the ICRP) will be carried out following procedures described in the existing ICRP. Roads will be decommissioned once they are no longer required for post-closure monitoring and maintenance. Access roads and pads will be re-graded to promote natural drainage, and culverts and safety berms will be removed. The WRSA reclamation will focus on monitoring permafrost aggradation, and providing a relatively flat upper surface that discourages snow accumulation, and provides for wildlife safety through caribou ramps.

The reclamation of the Sable pit will be carried out following procedures described in the existing ICRP (refer to Table 5.2-10 in the ICRP). The pit will be back-flooded with fresh water. The back-flooding source for the Sable Pit will be Ursula Lake (surface area of 23 km^2, a recharge catchment basin area of 94.6 km^2, and a planned annual extraction volume of 2.5 million m^3). It is estimated that the pit can be filled over 14 years by pumping at a mean rate of 0.2 m^3/s during the open water season (June to October) (Dominion Diamond 2013b).

The pumping rates will be chosen to limit effects on the hydrological regime and fish and fish habitat in Ursula Lake, as well as the neighbouring downstream area. Once Sable Pit is full, and water quality in the back-flooded pit meets Water Licence criteria, it will be allowed to spill over to the Yamba/Exeter watershed through the re-establishment of local drainage patterns.

2.4 Project Schedule

For the purpose of this assessment, construction of the Sable road and mining of the Sable pipe is assumed to take place from 2017 to 2025. Following completion of mining of the Sable Pit, initial reclamation activities would be conducted over 1.5 years. Three months into initial reclamation activities, the back-flooding of Sable Pit would commence through controlled pumping from Ursula Lake during the open-water season, which is estimated to take approximately 14 years to complete (Dominion Diamond 2013b). Following back-flooding, final reclamation activities are anticipated to take another 9 months. Environmental monitoring is anticipated to continue for an additional 10 years following the back-flooding of the pit, or until it has been shown that closure objectives have been met.

3 ENVIRONMENTAL ASSESSMENT APPROACH

Section 6 of the DAR describes the assessment approach for the Project. The following bullets provide the overall approach and method for analyzing and assessing the incremental and cumulative effects from the Project and other developments on the biophysical and human environments (Dominion Diamond 2014).

- Define VCs of the biophysical, economic, social, heritage, and health aspects of the environment potentially affected by the Project, and associated assessment endpoints and measurement indicators (Section 6.2).
- Define spatial and temporal boundaries of the assessment (Section 6.3).
- Summarize the information on previous (where possible) and existing conditions from comprehensive baseline reports (annexes) that is pertinent to the assessment of Project effects.
- Provide the definition of pathways, environmental design features and mitigation, and approach and methods for evaluating relevant effects pathways (interactions) between the Project and the biophysical, economic, social, heritage, and health VCs (Section 6.4).
- Present the approach to analyzing Project-specific and cumulative effects for biophysical and socio-economic VCs after implementing environmental design features and mitigation (Section 6.5).
- Identify and manage the uncertainty associated with the analysis of residual effects (Section 6.6).
- Define residual impact criteria and the approach and method for determining environmental significance of predicted residual effects (Section 6.7).
- Identify follow-up and monitoring programs to test predicted residual effects, evaluate success of planned mitigation designs, policies, and practices, and address key sources of uncertainty (Section 6.8).

Section 6.5 of the DAR defines the assessment cases used to analyze effects from the Project, and in combination with previous, existing, and reasonably foreseeable developments (Table 3.1-1). The Base Case provides the cumulative effects from all previous and existing developments prior to application of the Project. Approved and planned but not yet completed developments, such as the Lynx (Dominion Diamond 2013c), Gahcho Kué (De Beers 2010), NICO (Fortune 2011), and Nechalacho (Avalon 2014) projects were also identified for inclusion in the Base Case. The Application Case represents predictions of the cumulative effects of the developments in the Base Case combined with the effects from the Project. This case was also used to identify the incremental changes from the Project that are predicted to occur between the Base and Application cases. The Reasonably Foreseeable Development (RFD) Case includes the Application Case plus the cumulative effects of future projects.

Table 3.1-1 Contents of Each Assessment Case

Base Case	Application Case	Reasonably Foreseeable Development Case
Range of conditions from little or no development to previous and existing developments[a] before the Project	Base Case plus the Project	Application Case plus reasonably foreseeable developments

a) Includes approved and planned projects.

A list of reasonably foreseeable developments were identified and described in the DAR (Section 6.5.2.4). Development of the Sable kimberlite pipe was not scheduled and was not included as an RFD Case in the DAR.

This DAR Addendum provides an assessment of the RFD Case that includes mining of the Sable pipe.

The assessment approach used in this DAR Addendum to determine the cumulative effects from previous, existing, and reasonably foreseeable developments consistent with the approach implemented in the DAR (Dominion Diamond 2014).

4 ENVIRONMENTAL ASSESSMENT

4.1 Aquatic Environment

4.1.1 Hydrogeology

4.1.1.1 Overview of Changes

The purpose of Section 4.1.1 is to assess the effects of the addition of the Sable project to the RFD Case for hydrogeology. In the DAR, the hydrogeologic effects of the Project were assessed to be limited to the local scale study area for hydrogeology and all effects pathways from the Project on hydrogeology were assessed as no linkage or secondary. Information and modelling results from hydrogeologic analyses were incorporated into the residual effects analysis for surface hydrology and water quality. The EA for the Sable Projects (BHP and DIAMET 2000) concluded that these projects would have no residual effects to hydrogeology; therefore, all sections in the DAR related to hydrogeology remain unchanged with the addition of the Sable project to the RFD Case.

4.1.1.2 Pathway Analysis

Potential pathways leading to effects on hydrogeology include both direct and indirect effects. In the DAR, Project activities with no linkage pathways or secondary pathways (after application of environmental design features or mitigation) were discussed in Sections 8.4.2.4.1 and 8.4.2.4.2, respectively.

Because of the large distance between the Project and the Sable project (more than 28 km) and the presence of several large lakes (i.e., Ursula Lake and Paul Lake) between the two projects, no cumulative effects for hydrogeology are anticipated. Pathway analysis for the Project to identify and assess the potential for linkages between Project components or activities and effects on hydrogeology after consideration of environmental design features and mitigation was presented in the DAR Section 8.4.2. This analysis concluded that no primary pathways for hydrogeology exist for the Project. Environmental design, mitigation, and management practices have been assessed and are in place for the Sable project. Consequently, there are no predicted changes to the no linkage and secondary pathways for hydrogeology from the addition of the Sable project to the RFD Case.

4.1.1.3 Residual Effects Analysis

As stated in Section 8.5.2 of the DAR, there are no primary pathways identified for hydrogeology. No changes to the assessment for the groundwater VC occur as a result of the inclusion of the Sable pit development into the RFD Case.

4.1.2 Hydrology

4.1.2.1 Overview of Changes

The purpose of Section 4.1.2 is to assess the effects of the addition of the Sable project to hydrology. Addition of the Sable project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on surface hydrology.

4.1.2.2 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to surface hydrology. Potential pathways leading to effects on surface hydrology from Project activities were discussed in Section 8.4.2.4 of the DAR and were classified as no linkage, secondary, or primary pathways. Project activities with no linkage pathways were discussed in Section 8.4.2.4.1 and activities with secondary pathways (after application of environmental design features or mitigation) were discussed in Section 8.4.2.4.2. For this addendum, potential overlapping residual effects (i.e., potential cumulative effects) between the Project and the development of the Sable Pit are reviewed.

For the analysis of Sable Pit activities, primary pathways from the DAR, with potential effects to surface hydrology, grouped by Project activity and effects statements, are provided in Table 4.1-1. In addition to all primary pathways, one secondary pathway (as indicated in Table 4.1-1 footnote) was included in the pathways that have cumulative interaction with Sable in the RFD Case. Due to the overlapping activities, this pathway is included in the Residual Effects Analysis section below.

Similar to Section 8.5.3.3 of the DAR, the pit back-flooding closure activities of Ekati and Diavik mines, which include water transfers within the Lac de Gras watershed, are described under a separate pathway. An additional pathway has, therefore, been identified:

- Pumping water from source lakes to back-flood the Sable Pit in combination with Jay closure activities may cause changes to water levels, flows, and channel/bank stability in downstream waterbodies.

Table 4.1-1 Surface Hydrology Pathways and Interactions with the Sable Project in the Reasonably Foreseeable Development Case

Project Activity/Component	DAR Pathway	DAR Effects Statements	Cumulative Interaction with the Sable Project in the RFD Case?
Construction and mining activity during construction and operations; development of Project infrastructure (i.e., roads, dikes, waste rock, support buildings)	• changes to local hydrology (subsurface water flows, drainage, lake levels, sediment yield) from surface disturbances may cause changes to water levels, flows and channel/bank stability in downstream waterbodies. • displacement of Lac du Sauvage water by dike material during construction may cause changes to water levels, flows and channel/bank stability in Lac du Sauvage and downstream waterbodies	effects of Project Infrastructure and dike construction to flows, water levels, and channel/bank stability in downstream waterbodies	**Yes** potential for cumulative effects to flows and water levels within Lac du Sauvage and downstream waterbodies due to Sable infrastructure.
Site water management: dewatering within the diked area of Lac du Sauvage into main body of Lac du Sauvage	• dewatering discharges may cause changes to water levels, flows and channel/bank stability in Lac du Sauvage and downstream waterbodies	effects of dewatering to flows, water levels, and channel/bank stability in downstream waterbodies	
Operations: pit development, site water management, surface infrastructure and support facilities	• alteration to groundwater flow rates from and to nearby lakes may cause changes in water levels, surface water discharges, and water quality in nearby lakes • saline groundwater stored in the Misery Pit may flow to Lac de Gras once the water level in the pit is above the surface water level of Lac de Gras, and may cause changes to water levels and flows in Lac de Gras and downstream waterbodies • operational discharges from the Misery Pit may cause changes to water levels, flows, and channel/bank stability in Lac du Sauvage and downstream waterbodies • altered site drainage and runoff from facilities, including the waste rock storage area, may cause changes to water levels, flows, and channel/bank stability in local and downstream waterbodies	effects of operations to flows, water levels, and channel/bank stability in downstream waterbodies	**Yes** potential for cumulative effects to flows and water levels within Lac du Sauvage and downstream waterbodies due to Sable infrastructure, management of Sable process water and fine processed kimberlite (FPK) in the LLCF and the back-flooding of Sable Pit from Ursula Lake (Lake E10)
Back-flooding of the Jay Pit and dewatered area of Lac du Sauvage	• pumping water from Lac du Sauvage to back-flood the Jay Pit and dewatered diked area of Lac du Sauvage may cause changes to water levels, flows, and channel/bank stability in Lac du Sauvage and downstream waterbodies	effects of back-flooding to flows, water levels, and channel/bank stability in downstream waterbodies	**Yes** potential for cumulative effects to flows and water levels within Lac du Sauvage and downstream waterbodies due to Sable infrastructure, management of Sable process water and FPK in the LLCF, and the back-flooding of Sable Pit from Ursula Lake (Lake E10)

Table 4.1-1 Surface Hydrology Pathways and Interactions with the Sable Project in the Reasonably Foreseeable Development Case

Project Activity/Component	DAR Pathway	DAR Effects Statements	Cumulative Interaction with the Sable Project in the RFD Case?
Post-closure, reconnection of the diked area with Lac du Sauvage	• reconnection of the back-flooded area of Lac du Sauvage to the remaining watershed and drainage conditions at closure may change long-term hydrology in local waterbodies, Lac du Sauvage, Lac de Gras, and downstream • *modification to Panda and Koala Pit closure may cause changes to flows, water levels, and channel/bank stability in downstream waterbodies*[a]	effects of post-closure to flows, water levels, and channel/bank stability in downstream waterbodies and streams	**Yes** potential for cumulative effects to flows and water levels within Lac du Sauvage and downstream waterbodies due to Sable infrastructure, management of Sable process water and FPK in the LLCF, and the back-flooding of Sable Pit from Ursula Lake (Lake E10)

a) This pathway is a secondary pathway in the DAR, but is included because of potential cumulative effects from the Sable project and management of process water and FPK in the LLCF (within the Koala watershed)

FPK = fine processed kimberlite; LLCF = Long Lake Containment Facility.

4.1.2.3 Residual Effects Analysis

4.1.2.3.1 Methods

The approach used to determine the residual effects from the addition of the Sable project to the RFD Case is consistent with the method described to determine the residual effects of the Jay Project in the DAR (Section 8.5.3). However, in the DAR, there was no RFD Case assessed for hydrology.

For this DAR Addendum, the residual effects for each effect statement or grouping of effect statements were assessed qualitatively or quantitatively for each measurement indicator (flows, water levels, and channel/bank stability) for Lac du Sauvage, Lac de Gras, and Desteffany Lake. The methods for each effect statement or group of effect statements are provided below.

Effects of Project Infrastructure and dike construction to flows, water levels, and channel/bank stability in downstream waterbodies

Effects of dewatering to flows, water levels, and channel/bank stability in downstream waterbodies

For the assessment of the above Project effect statements, overlapping Sable Pit activities are expected to include infrastructure development, pre-stripping, and Sable Lake dewatering. Pre-stripping and dewatering activities are located outside of the Lac du Sauvage watershed and the effects study area, and therefore, do not have the potential for cumulative effects. Infrastructure development is expected to occur with the effects study area, and therefore, the potential cumulative effects to the above statements are discussed.

Development of the Sable Pit requires construction, maintenance, and removal of infrastructure within sub-basin E catchment and specifically the Ursula Lake (Lake E10) sub-basin, which are within the Lac du Sauvage watershed. Infrastructure within sub-basin E includes a portion of the Sable Road, Sable WRSAs, and general infrastructure (BHP and DIAMET 2000), as shown in Map 2.1-1. In addition, it is expected that a total of three minor headwater streams within sub-basin E will be crossed by the Sable Road.

Development of the Sable Pit infrastructure within the Lac du Sauvage watershed has the potential to alter drainage paths, surface runoff coefficients, headwater lake levels and flows, and surface hydrology within local waterbodies and downstream waterbodies including Lac du Sauvage and Lac de Gras.

The Sable Pit footprint and all construction and operational water management transfers will be designed to be located outside of the Lac du Sauvage watershed, where possible, and the location of the Sable Road and minor infrastructure within the Lac du Sauvage watershed will be designed to minimize stream crossings and avoid waterbodies. Culverts will be installed along the Sable Road, as necessary, to maintain drainage. In addition, runoff from Sable Pit facilities will be managed, where appropriate, to avoid adverse environmental effects in downstream waterbodies.

The potential cumulative effects due to the development of Sable infrastructure is based on a qualitative assessment of the percentage of surface area within the Lac du Sauvage watershed that will have altered drainage conditions.

Effects of operations to flows, water levels, and channel/bank stability in downstream waterbodies

Effects of back-flooding to flows, water levels, and channel/bank stability in downstream waterbodies

Effects of post-closure to flows, water levels, and channel/bank stability in downstream waterbodies and streams

Fine processed kimberlite and process water management in the LLCF during operations may cause cumulative effects to the water levels, flows, and channel/bank stability in downstream waterbodies in the Koala watershed (including Slipper Lake), and Lac de Gras

The Koala watershed is the area surrounding the main Ekati Mine site and the watershed that receives mine discharge from the main Ekati Mine site (ERM Rescan 2014b). The LLCF, which is located in this watershed, stores the process water, and water released from the LLCF flows through a series of small lakes in the lower portion of the watershed before entering Slipper Lake (terminal lake in the Koala watershed) and then into Lac de Gras. As a waste management strategy of the Project (Jay operations beginning 2019), fine processed kimberlite (FPK) will be stored in the Panda and Koala pits, and operational water associated with the management of FPK in the Panda and Koala pits will be managed through the LLCF, which will supplement inputs associated with the Ekati Mine operation in the Koala watershed. At closure, the LLCF will be reclaimed and the Panda and Koala pits will be back-flooded. The spillover from the LLCF and the pits will be directed to natural downstream channels (i.e., through the Koala watershed to Slipper Bay of Lac de Gras). This source of mine-influenced water, associated with the Ekati Mine and Project effects, was included in the Base Case, and the Application Case into post-closure.

In the Jay Project DAR, a secondary pathway was identified for water quantity changes within the Koala watershed due to Project activities affecting hydrology in the Koala watershed starting in 2019 when FPK from the Jay Project is used for filling of the Koala and Panda pits. This secondary pathway is discussed in the DAR Section 8.4.2.4.2. The RFD Case with the inclusion of the Sable project includes the management of Sable FPK, and associated kimberlite waste and wastewater, through the LLCF.

In the DAR, discharge water quantity from the LLCF (Koala watershed), and effects to downstream water quantity at the Slipper Lake outlet, were predicted with the Koala Watershed Model (ERM Rescan 2014a). This model included Project activities and Ekati Mine activities but not the Sable Pit. Results from this model were incorporated into the regional water balance model and were used to assess Project effects from the Base Case.

The water transfers associated with the management of the FPK from Sable Pit within the LLCF have the potential to modify the discharges from the LLCF, and the hydrology in downstream waterbodies at Slipper Lake and Lac de Gras. The potential cumulative effects on surface hydrology from the use of the LLCF during the processing of Sable kimberlite are qualitatively assessed based on the expected changes from the Application Case and discussed in context with the changes in the Koala watershed discussed in the DAR.

Pumping water from source lakes to back-flood the Sable Pit in combination with Jay closure activities may cause changes to water levels, flows, and channel/bank stability in downstream waterbodies

All water transfers associated with the dewatering of Sable Lake and operational water management for the Sable Pit are planned to be completed outside of the Lac de Gras and Lac du Sauvage watersheds. Therefore, these transfers do not have the potential for cumulative effects within the effects study area. However, the current approved closure plan for the back-flooding of the planned Sable Pit (from the 2013 Closure and Reclamation Progress Report [Dominion Diamond 2013b]), indicates that the Sable Pit is currently scheduled to be back-flooded from Ursula Lake (Lake E10), which is within the Lac du Sauvage watershed. For this reason, the cumulative effects to surface hydrology in Lac du Sauvage, Lac de Gras, and Desteffany Lake from closure of the Sable Pit were assessed.

The current schedule for back-flooding indicates overlap of Sable Pit back-flooding with the Project operations and closure phases. The following assessment is based on concurrent back-flooding of the Sable and Jay pits; however, a potential mitigation of suspending or reducing back-flooding rates to the Sable or Jay pits could reduce potential cumulative effects on the hydrological regime. Existing plans for back-flooding the Sable Pit are to annually pump 2.5 million m^3 of freshwater from Ursula Lake (Lake E10) during the open water season (June 1 to October 15) at an average withdrawal rate of 0.2 m^3/s over 14 years (Dominion Diamond 2013b). The acceptable withdrawal rate was determined based on water balance modelling and effects analysis as part of the 2011 ICRP. Water balance modelling completed for Ursula Lake indicates that the annual cumulative discharge from Ursula Lake is expected to decrease by 21.5% due to the back-flooding of the Sable Pit (BHP Billiton 2011). The Ursula Lake watershed is approximately 95 square kilometres (km^2) (or 6.5%) of the total Lac du Sauvage watershed, which has an area of 1,461 km^2.

A complete analysis of the effects to annual water levels and discharges at Lac du Sauvage, Lac de Gras and Desteffany Lake due to planned Jay Project water transfers, Diavik Diamond Mine (Diavik Mine) water transfers, and Ekati Mine water transfers (not including Sable Pit) is included in the DAR (Section 8.5.3.3).

A regional water balance analysis was completed to quantify the effects for the RFD Case. Annual water transfers for the Sable Pit, as discussed above, were applied on a daily time step over the open water season to the Application Case hydrological model described in DAR Appendix 8D. As the regional water balance model used average meteorological data from the derived period of record (1959 to 2013), predicted effects are for average climate conditions.

4.1.2.3.2 Results

Effects of Project Infrastructure and dike construction to flows, water levels, and channel/bank stability in downstream waterbodies

Effects of dewatering to flows, water levels, and channel/bank stability in downstream waterbodies

The change to surface hydrology in Lac du Sauvage and downstream waterbodies as a result of surface disturbances related to the Sable Pit is expected to be limited in headwater lakes and non-measurable in

Lac du Sauvage and downstream waterbodies. The total surface disturbance area related to the Sable Pit within the Lac du Sauvage watershed is less than 0.01% of the watershed area of Lac du Sauvage.

As such, the addition of Sable to the RFD Case for the Project is expected to result in negligible cumulative effects to flows, water levels, and downstream channel/bank stability in Lac du Sauvage and downstream waterbodies.

Effects of operations to flows, water levels, and channel/bank stability in downstream waterbodies

Effects of back-flooding to flows, water levels, and channel/bank stability in downstream waterbodies

Effects of post-closure to flows, water levels, and channel/bank stability in downstream waterbodies and streams

Fine processed kimberlite and process water management in the LLCF during operations may cause cumulative effects to the water levels, flows, and channel/bank stability in downstream waterbodies in the Koala watershed (including Slipper Lake), and Lac de Gras

The water transfers associated with the management of the FPK from the Sable Pit within the LLCF have the potential to modify the discharges from the LLCF, and the hydrology in downstream waterbodies at Slipper Lake and Lac de Gras. However, the processing plant/LLCF has a limited capacity for production and storage; as a result, there is a maximum daily outflow from the LLCF, and therefore, a maximum load to the Koala watershed. Additional mining can occur at the Sable and Jay locations to develop a consistent supply of kimberlite for the processing plant, but the output of process water will be dependent upon production capacity and the flow regime of the LLCF. Therefore, the modelled quantity of discharge from the LLCF for the DAR is not expected to change with the Sable project, but may change the duration of loading to the LLCF. Additionally, if processing of kimberlite from the Sable pipe took place or extended beyond the completion of underground mining in the Koala pipe, then FPK and process water would be pumped to the Panda and Koala pits and not to the LLCF.

The effects to cumulative annual discharge at Slipper Lake from the Application Case relative to Base Case (without Sable), were estimated as a 0.2% increase during Project operations and a 7% decrease during post-closure. At Lac de Gras, the effects to cumulative annual inflow from the Project relative to Base Case (without Sable), were estimated as a 0.008% increase during Project operations and a 0.3% decrease during post-closure (DAR Section 8.4.2.4.2). Minor changes within the Koala watershed in the RFD Case with the inclusion of the Sable Pit, are not expected to significantly change the cumulative effects to flows, water levels, and channel/bank stability within Slipper Lake or downstream Lac de Gras.

Because the Sable project will be operated by Dominion Diamond, it will be possible to phase the projects to meet the conditions of the existing water licence and to minimize environmental effects. Furthermore, the Ekati Mine Wastewater and Processed Kimberlite Management Plan will be updated to incorporate the Sable Pit and the Project activities.

Pumping water from source lakes to back-flood the Sable Pit in combination with Jay closure activities may cause changes to water levels, flows, and channel/bank stability in downstream waterbodies

The following analysis includes the incremental changes to surface hydrology for all measurement indicators due to Sable Pit back-flooding activities and a discussion of the RFD Case cumulative effects for the greatest changes. Table 4.1-2 provides the incremental annual changes due to the inclusion of Sable Pit in the regional water balance model.

Table 4.1-2 Changes to Mean Annual Discharges and Water Levels due to Sable Pit Back-Flooding in Lac du Sauvage and Lac de Gras

Year	Change in Mean Annual Discharge (%)[a]			Change in Mean Annual Lake Level (m)[b]		
	Lac du Sauvage	Lac de Gras	Desteffany Lake	Lac du Sauvage	Lac de Gras	Desteffany Lake
First Year of Sable Pit back-flooding	-0.4	(negligible)	(negligible)	(negligible)	(negligible)	(negligible)
Second year of Sable Pit back-flooding	-1.0	-0.2	-0.1	-0.002	-0.002	-0.001
Third to last year of Sable Pit back-flooding	-1.1	-0.4	-0.2	-0.002	-0.003	-0.001
Year after Sable Pit back-flooding complete	-0.7	-0.3	-0.2	-0.002	-0.003	-0.001
Second year after Sable Pit back-flooding complete	(negligible)	-0.2	-0.1	(negligible)	-0.001	-0.001
Third year after Sable Pit back-flooding complete	(negligible)	(negligible)	(negligible)	(negligible)	(negligible)	(negligible)

a) If discharge changes are less than +/- 0.05%, changes are reported as [negligible].
b) If water level changes are less than +/- 0.001 m, changes are reported as [negligible].
m^3/d = cubic metres per day; m = metre.

A discussion of the RFD Case modelling results for each assessment indicator (using incremental changes due to Sable activities as presented in Table 4.1-2 and results from the DAR Section 8.5.3.3) is provided below. After the completion of the Sable Pit back-flooding, it is estimated to take one year for Lac du Sauvage and two years for Lac de Gras and Desteffany Lake to return to the Application Case water level and discharge regime.

Lac du Sauvage Outlet

Lac du Sauvage Outlet Flows: The largest decrease from baseline conditions would be due to back-flooding the Jay Pit and diked area during closure and back-flooding of the Sable Pit , and would result in a cumulative 15.4% reduction in the mean annual discharge (14.3% without Sable Pit).

Lac du Sauvage Outlet Water Levels: The largest decrease from baseline conditions would be due to Project back-flooding of the Jay Pit and diked area during closure and back-flooding of the Sable Pit, and would result in a cumulative 0.048 m reduction in the mean annual water levels (0.045 m without Sable Pit).

Lac du Sauvage Outlet Channel/Bank Stability: No bank stability effects from the inclusion of Sable in the RFD Case are expected because all Sable activities overlapping with the Project are net withdrawals, and therefore, flood magnitudes will be reduced from Application Case assessments or baseline values.

Lac de Gras Outlet

Lac de Gras Outlet Flows: The largest decrease from baseline conditions would be due to back-flooding the Jay Pit and diked area during closure and back-flooding of the Sable Pit, and would result in a cumulative 5.4% reduction in the mean annual discharge (5.0% without Sable Pit).

Lac de Gras Outlet Water Levels: The largest decrease from baseline conditions would be due to Project back-flooding of the Jay Pit and diked area during closure and back-flooding of the Sable Pit, and would result in a cumulative 0.041 m reduction in the mean annual water levels (0.038 m without Sable Pit).

Lac de Gras Outlet Channel/Bank Stability: No bank stability effects from the inclusion of Sable in the RFD Case are expected because all Sable activities overlapping with the Project are net withdrawals, and therefore, flood magnitudes will be reduced from Project Application Case assessments or baseline values.

Desteffany Lake Outlet

Desteffany Lake Outlet Flows: The largest decrease from baseline conditions would be due to back-flooding of the Jay Pit and diked area during closure and back-flooding of the Sable Pit, and would result in a cumulative 3.5% reduction in the mean annual discharge (3.2% without Sable Pit).

Desteffany Lake Outlet Water Levels: The largest decrease from baseline conditions would be due to back-flooding of the Jay Pit and diked area during closure and back-flooding of the Sable Pit, and would result in a cumulative 0.019 m reduction in the mean annual water levels (0.017 m without Sable Pit).

Desteffany Lake Outlet Channel/Bank Stability: No bank stability effects from the inclusion of Sable in the RFD Case are expected because all Sable activities overlapping with the Project are net withdrawals, and therefore, flood magnitudes will be reduced from Project Application Case assessments or baseline values.

4.1.3 Water Quality

4.1.3.1 Overview of Changes

The purpose of Section 4.1.3 is to assess the effects of the addition of the Sable project to water quality. Addition of the Sable project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on water quality.

4.1.3.2 Pathway Analysis

Project activities with no linkage pathways or secondary pathways (after application of environmental design features or mitigation) are discussed in Sections 8.4.2.4.1 and 8.4.2.4.2, respectively). For this DAR Addendum, potential overlapping residual effects (i.e., potential cumulative effects) between the Project and the Sable project are reviewed.

There is a potential for cumulative effects between the Project and the development of the Sable Pit, from activities such as the generation of air emissions and the management of process water, as these activities link to potential effects to water quality. Potential pathways to effects to water quality include:

- potential effects to water quality from air emissions includes acidification, and dust and metals deposition to waterbodies from activities such as plant processing of Sable kimberlite at the Ekati Mine, as well as localized emissions and dust generation from the pit development and haul road traffic; and,
- potential effects to water quality in lakes and streams in the Koala watershed downstream of the LLCF, through to Slipper Bay in Lac de Gras, through the management of FPK from the Sable Pit within the LLCF. The updated Koala watershed model used in the DAR (ERM Rescan 2014a) did not include the management of FPK from Sable Pit and its potential to modify the discharges from the LLCF.

The primary pathways to water quality effects associated with potential cumulative interactions with the Sable Project in the RFD Case are summarized in Table 4.1-3, including linkages to applicable pathways and effects statements presented in the DAR.

Table 4.1-3 Water Quality Primary Pathways and Interactions with the Sable Project in the Reasonably Foreseeable Development Case

DAR Pathway	Water Quality Effects Statements	Cumulative Interaction with Sable Project in RFD Case?
• Air and dust emissions (including sulphur dioxide, nitrogen oxides, and particulate matter) and subsequent deposition may cause a change in water quality	**Section 8.5.4.2.1 of DAR** Effects of acidifying air emissions and the deposition of dust and metals from air emissions to water quality and lake bed sediments in waterbodies within the Lac du Sauvage and Lac de Gras watersheds	**Yes** There is the potential for cumulative effects to water quality due to generation of air emissions and deposition of dust and metals.
• Saline groundwater inflow to the open pit during pit development may potentially affect surface water quality if this water is released to downstream environments • Discharge of treated domestic wastewater may cause a change in surface water quality • Altered site drainage and runoff from facilities, including waste rock storage areas, pit inflows, dike seepage, release of nitrogen compounds from blasting residues, and release of minewater may cause a change in surface water quality • The deposition of fine processed kimberlite in the Panda and Koala Pits may affect water quality in Lac de Gras	**Section 8.5.4.2.2 and 8.5.4.2.3 of DAR** Effects of Project activities to water quality and in the Lac du Sauvage and Lac de Gras during operations and post-closure.	**Yes** There is the potential for cumulative effects to water quality due to processing of kimberlite and release of water in the Koala watershed.
• Saline groundwater stored in the Misery Pit may flow to Lac de Gras once the water level in the pit is above the surface water level of Lac de Gras, affecting groundwater and surface water quality and also may cause changes to water levels and flows, and water quality in Lac de Gras • Closure of the Panda and Koala pits (including seepage from fine processed kimberlite in pits) may cause a change in water quality		

Table 4.1-3 Water Quality Primary Pathways and Interactions with the Sable Project in the Reasonably Foreseeable Development Case

DAR Pathway	Water Quality Effects Statements	Cumulative Interaction with Sable Project in RFD Case?
• Reconnection of the back-flooded area of Lac du Sauvage to the remaining watershed may cause a change in water quality in Lac du Sauvage, Lac de Gras, and downstream • After closure of the Misery Pit, outflow will drain to Lac de Gras, which may cause a change in water quality		

4.1.3.3 Residual Effects Analysis

4.1.3.3.1 Methods

The approach used to determine the residual effects from the addition of the Sable project to the RFD Case is consistent with the methods described in the DAR (Section 8.5.4). However, in the DAR, there was no RFD Case assessed for water quality.

Air Emissions and Dust Deposition

In the DAR, effects of aerial deposition of acids, metals, and dust on the surface water chemistry of lakes was completed (Section 8.5.4.1.1 and 8.5.4.2.1). The potential cumulative effects between the Project and the Sable project are limited to air emissions near the processing plant. Air emissions near the Sable Pit will be limited in spatial extent, and thus, will not interact with the Project (see Section 4.2.1).

For the lake acidification and dust deposition assessment in the DAR, deposition inputs to water quality were provided by the air quality assessment. For purposes of assessing the Sable RFD Case, the air quality assessment assumed that the processing plant at the Ekati Mine would be operating at maximum capacity with or without the Sable-mined kimberlite (Section 4.2.1). It was also assumed that the vehicle fleet (both numbers and types of vehicles) would be the same with or without Sable (i.e., they would spread out the fleet between Project areas as required). Thus, there would be no change in vehicle emissions or total road dust emissions between the Application Case and the RFD Case.

Release of Water from the Long Lake Containment Facility

In the DAR, quantitative estimates of the effects of discharge water quantity and quality on the surface water chemistry of lakes was completed (Sections 8.5.4.1.2 and 8.5.4.2.2 in the DAR). The potential cumulative effects between the Project and the Sable project were limited to release of water from the LLCF to the Koala watershed, which drains to Lac de Gras. A specific model was developed to predict water quality in the Koala watershed, which included LLCF releases (ERM Rescan 2014a). Water quality in Lac de Gras was predicted using an additional hydrodynamic model (Section 8.5.4; Appendix 8F), which included inputs from the Koala watershed model.

The Koala watershed is the area surrounding the main Ekati Mine site that receives minewater releases from the main Ekati Mine (ERM Rescan 2014b). The LLCF, which is located in this watershed, stores process water and FPK, and provides process water for the processing plant (Section 3.4.1.5 in the DAR). Water released from the LLCF flows through a series of small lakes in the lower portion of the Koala watershed before entering Lac de Gras. The water quality and quantity model for the Koala watershed (ERM Rescan 2014a) included source inputs from the LLCF, the Project, but not the Sable development.

For the DAR Application Case, it was assumed that water released from the LLCF would meet Water Licence discharge limits and that the processing plant was operating at full capacity. For purposes of assessing the Sable RFD Case, it is assumed that: processing kimberlite from the Sable project will not alter the processing conditions or operational capacity at the Ekati processing plant; water quality and water management requirements will be similar to that for the Application Case; and, any releases from the LLCF will meet Water Licence discharge criteria.

4.1.3.3.2 Results

Air Emissions and Dust Deposition

Based on the results of the air quality assessment (Section 4.2.1), there will be no cumulative interaction between the Project and the Sable project for the pathway of acidifying air emissions and deposition of dust and metals. The addition of the Sable project does not incrementally change the air quality predictions because the Application Case is considered more conservative than the RFD Case (Section 4.2.1); that is, emissions associated with the Sable project are accounted for within the conservatism applied in the air effects modelling under the Application Case. Thus, the addition of Sable to the RFD Case is not anticipated to change the water quality predictions due to the potential for acidifying air emissions and deposition of dust and metals.

Release of Water from the Long Lake Containment Facility

Predictions of water quality in the Koala watershed (including the LLCF and Slipper Lake) and Slipper Lake Bay of Lac de Gras account for cumulative effects of existing Ekati mining operations and the Project. Predictions for the Sable project are not assumed to be different than, nor incrementally change, predictions presented in the DAR because water released from the LLCF, including Sable inputs, will be required to meet Water Licence discharge criteria.

Kimberlite from the Sable Pit is expected to be generally similar in geochemical properties to the kimberlite from the Project processed at the Ekati Mine. Therefore, water quality in the LLCF through water managed during the processing of the Sable kimberlite (e.g., from recycling process water) will remain consistent with that used in the Koala watershed model (ERM Rescan 2014a). Additionally, if processing of kimberlite from the Sable pipe took place or extended beyond the completion of underground mining in the Koala pipe, then FPK and process water would be pumped to the Panda and Koala pits and not to the LLCF.

The processing plant has a specific capacity for production, so there is a maximum daily outflow from the processing plant to the LLCF. Additional mining can occur at the Sable and Jay project locations to develop a consistent feedstock for the mill, but the output of process water and rate of recycling between the processing plant and LLCF are not anticipated to change. Therefore, the modelled quality of discharge from the LLCF for the DAR is not expected to change with the Sable project.

4.1.3.4 Residual Impact Classification and Significance

The inclusion of the Sable project to the assessment of cumulative effects from the Project and other developments is not predicted to alter the Project's influence on the *maintenance or suitability of surface water quality for healthy and sustainable aquatic ecosystems* in the effects study area. Primary pathways influencing measurement indicators for the suitability of surface water quality to support healthy and sustainable ecosystems were re-assessed based on the inclusion of the Sable project footprint and activities, with the conclusion that residual effects would remain of low magnitude and local to regional in geographic extent (Section 8.7.2 in the DAR). The incremental and cumulative effects from the Project and previous, existing, and future developments, with the inclusion of the Sable project to the RFD Case, are expected to remain the same, that is, not result in a significant adverse effect on water quality. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to the water quality VC (Table 4.1-4; Section 8.7.2 in the DAR).

In the DAR, levels of conservatism were applied to the various assessment models used in the assessment so as to not underestimate predicted concentrations (Section 8.6.3 in the DAR). Given the assumptions, data sources, professional judgement, and best practices followed, there is high level of confidence in the predicted concentrations, and thus conclusions, but with the caveat that monitoring is required to verify.

Table 4.1-4 Summary of Residual Impact Classification of Effects Statements and Predicted Significance of Cumulative Effects on Surface Water Quality

Effects Statements[a]	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance for Assessment Endpoint[b]
Effects of Acidifying Air Emissions and Dust and Metals from Air Emissions	Low	Local	Short-term	Continuous	Reversible	Likely	*Not Significant*
Effects to Water Quality in Lac du Sauvage	Low	Local	Permanent	Continuous	Irreversible	Highly likely	
Effects to Water Quality in Lac de Gras	Low	Local to Regional	Permanent	Continuous	Irreversible	Highly likely	

a) Each effect statement comprises a series of linked effects pathways (Table 8.5-6 of the DAR).

b) Maintenance or suitability of surface water quality for healthy and sustainable aquatic and terrestrial ecosystems.

4.1.4 Fish and Fish Habitat

4.1.4.1 Overview of Changes

The purpose of Section 4.1.4 is to assess the effects of the addition of the Sable project to fish and fish habitat. Addition of the Sable project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on fish and fish habitat.

4.1.4.1 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to fish and fish habitat. In the DAR, 28 effects pathways from the Project on fish and fish habitat were determined to be no linkage or secondary (Section 9.3.2.2.1 and 9.3.2.2.2). There are no predicted changes in the pathways analysis for fish and fish habitat with the addition of the Sable project, in part, because applicable mitigation and management practices for the Ekati Mine will also be used for the development of the Sable project. Furthermore, the project lies outside of the Lac du Sauvage watershed. The primary and secondary pathways described in the surface hydrology section above (Section 4.1.2) do not change the pathway analysis or the outcome of the assessment for fish and fish habitat.

Seven primary pathways were identified and assessed in the DAR for fish and other aquatic life, which were combined under three subsections in Section 9.4 (Residual Effects Analysis) of the DAR (Table 4.1-5). The scale of the effects study area for the primary pathways is Lac du Sauvage, Lac de Gras, and selected tributary streams (i.e., ESA-1).

Table 4.1-5 Primary Pathways and Interactions with the Sable Project in the Reasonably Foreseeable Development Case

Subsections in Section 9.4.3	Primary Pathways	Cumulative Interaction with the Sable Project in the RFD Case?
Direct Effects to Fish (Section 9.4.3.1)	• The construction of the horseshoe dike and Jay Pit within Lac du Sauvage will result in the direct loss or alteration of habitat, affecting fish and other aquatic life within Lac du Sauvage and Lac de Gras. • The dewatering of the diked area will result in the direct loss or alteration of habitat in Lac du Sauvage, affecting fish and other aquatic life within Lac du Sauvage and Lac de Gras. • Dewatering Lac du Sauvage within the diked area will require removal of fish from the area. • The construction of the horseshoe dike and diversion channel may alter access to tributary stream habitats to Lac du Sauvage, resulting in habitat loss for Arctic Grayling, Lake Trout, and Lake Whitefish.	**No** Pathways are related to changes to habitat in Lac du Sauvage and tributaries from the Project footprint, and removal of fish from the diked area - would not interact cumulatively with the addition of the Sable project to the RFD Case, as the Sable Pit is outside of the effects study area for fish and other aquatic life.
Changes to Water Quality and Effects to Lake Ecosystem Productivity (Section 9.4.3.2)	• Operational activities and discharge (e.g., discharge of treated domestic wastewater, altered drainage, runoff from facilities, including waste rock storage areas, pit inflows, dike seepage, release of nitrogen compounds from blasting residues, fine processed kimberlite management) may change surface water quality and affect fish and other aquatic life in Lac du Sauvage and Lac de Gras. • Reconnection of the back-flooded area of Lac du Sauvage to the remaining watershed and post-closure releases of water (e.g., Misery Pit overflow and seepage, waste rock storage area runoff, Long Lake Containment Facility discharge) may change long-term water quality in Lac du Sauvage and Lac de Gras and affect fish and other aquatic life.	**Yes** Potential for cumulative effects to water quality in Lac de Gras that may affect fish and other aquatic life.

Table 4.1-5 Primary Pathways and Interactions with the Sable Project in the Reasonably Foreseeable Development Case

Subsections in Section 9.4.3	Primary Pathways	Cumulative Interaction with the Sable Project in the RFD Case?
Downstream Changes to Habitat During Back-Flooding (Section 9.4.3.3)	• Pumping water to back-flood the Jay Pit and diked area of Lac du Sauvage may affect water levels and riparian habitat in Lac du Sauvage and Lac de Gras, and water levels, flows, and riparian habitat in the Lac du Sauvage-Lac de Gras Narrows, affecting fish and other aquatic life.	**No** Pathway is related to changes in water levels and habitat in Lac du Sauvage and Lac de Gras - would not interact cumulatively with the addition of the Sable project to the RFD Case, as the Sable Pit is not in the Lac du Sauvage/Lac de Gras watershed.

RFD = Reasonably Foreseeable Development.

Pathways relating to potential changes to water quality and effects to lake ecosystem productivity were assessed for cumulative effects in Lac de Gras from previous and existing developments, and the Jay and Sable projects. Cumulative effects to water quality in Lac de Gras in the RFD Case may occur from continued use of the LLCF for the Sable project. The LLCF, which is located in Koala watershed, stores process water, and water released from the LLCF flows through a series of small lakes in the lower portion of the Koala watershed before entering Lac de Gras. No cumulative effects would occur in Lac du Sauvage, as the Sable project would not interact with this waterbody.

4.1.4.2 Residual Effects Analysis

4.1.4.2.1 Methods

Methods for assessing changes to water quality and effects to lake ecosystem productivity are described in Section 9.4.2.2. However, in the DAR, there was no RFD Case assessed for fish and fish habitat. The changes to water quality in Lac de Gras in operations and closure phases (Application Case) are described in Section 8.5.4 of the DAR. The analysis of potential effects related to predicted changes in water quality in Lac de Gras considered the following components of fish and other aquatic life:

- lower trophic communities, including phytoplankton, zooplankton, and benthic invertebrates;
- food base changes for fish production;
- changes to physical habitat, including the availability of spawning habitat; and,
- changes to fish health (from Section 8.5.6 of the DAR).

Methods for assessing cumulative effects to water quality with the inclusion of the Sable project into the RFD Case are in Section 4.1.3.3.1 of this Addendum. Effects on fish and aquatic life in Lac de Gras were assessed based on the results of the water quality assessment.

4.1.4.2.2 Results

As described in Section 4.1.3.3.2, potential cumulative changes to water quality in Lac de Gras from the Project and the Sable project in the RFD Case are expected to be similar to those assessed in the DAR. Predictions for the Sable project are not assumed to be different than nor incrementally change the current version of DAR predictions because discharge water from the LLCF (including Sable inputs) will meet Ekati Mine Water Licence discharge quality criteria. Additionally, the processing plant has a maximum capacity for production and storage, so there is a maximum daily outflow from the processing plant to the LLCF.

As a result, potential effects on fish and other aquatic life that may occur from cumulative changes to water quality and lake ecosystem productivity during the early operations, closure, and closure phases are expected to be as assessed and described in Section 9.4.3.2 of the DAR.

4.1.4.3 Residual Impact Classification and Significance

The inclusion of the Sable project to the assessment of cumulative effects from the Project and other developments will not change the impact classification and significance for fish and other aquatic life VCs. In Section 9.6.2 of the DAR, primary pathways influencing measurement indicators of ongoing fisheries productivity and ongoing support for fisheries productivity were determined to be of low magnitude with a geographic extent of local to regional (i.e., measurable in Lac du Sauvage and Lac de Gras, and possibly for a short distance past the outlet of Lac de Gras). The addition of the Sable project to the RFD Case does not change the classification impact criteria (Table 4.1-6; Section 9.6.2 of the DAR). The incremental and cumulative effects from the Project and previous, existing, and reasonably foreseeable developments, with the inclusion of the Sable project to the RFD Case, are expected to remain as not resulting in a significant adverse effect on fish and other aquatic life VCs.

Cumulative effects from the Project in combination with previous, existing, and reasonably foreseeable developments are predicted to not have a significant adverse impact on the ability of Arctic Grayling, Lake Trout, and Lake Whitefish populations to be self-sustaining and ecologically effective, where self-sustaining and ecologically effective populations of fish VCs are the foundation for ongoing fisheries productivity. Cumulative effects from development on aquatic life other than fish are also predicted to not have a significant adverse impact on the ongoing support of fisheries productivity.

Prediction confidence and uncertainty are as described in Section 9.5 of the DAR and the addition of the Sable project to the RFD Case does not change the confidence in the predictions of significance for fish and other aquatic life VCs.

Table 4.1-6 Summary of Residual Impact Classification of Primary Pathways and Predicted Significance of Cumulative Effects on Fish and Other Aquatic Life Valued Components

Pathway	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance for Assessment Endpoint[a]
The construction of the horseshoe dike and Jay Pit within Lac du Sauvage will result in the direct loss or alteration of habitat, affecting fish and other aquatic life within Lac du Sauvage and Lac de Gras	Low	Local	Permanent	Continuous	Irreversible	Likely	*Not Significant*
The dewatering of the diked area will result in the direct loss or alteration of habitat in Lac du Sauvage, affecting fish and other aquatic life within Lac du Sauvage and Lac de Gras	Low	Regional	Long-Term	Continuous	Reversible	Likely	
Dewatering Lac du Sauvage within the diked area will require removal of fish from the area	Low	Regional	Medium-Term	Infrequent	Reversible	Highly Likely	
The construction of the horseshoe dike and diversion channel may alter access to tributary stream habitats to Lac du Sauvage, resulting in habitat loss for Arctic Grayling, Lake Trout, and Lake Whitefish	Low	Local	Medium-Term	Continuous	Reversible	Likely	
Operational activities and discharge (e.g., discharge of treated domestic wastewater, altered drainage, runoff from facilities, including waste rock storage areas, pit inflows, dike seepage, release of nitrogen compounds from blasting residues, fine processed kimberlite management) may change surface water quality and affect fish and other aquatic life in Lac du Sauvage and Lac de Gras	Low	Regional	Long-Term	Frequent	Reversible	Likely	
Pumping water to back-flood the Jay Pit and diked area of Lac du Sauvage may affect water levels and riparian habitat in Lac du Sauvage and Lac de Gras, and water levels, flows, and riparian habitat in the Lac du Sauvage-Lac de Gras Narrows, affecting fish and other aquatic life	Low	Regional	Short-Term	Continuous	Reversible	Likely	
Reconnection of the back-flooded area of Lac du Sauvage to the remaining watershed and post-closure releases of water (e.g., Misery Pit overflow and seepage, waste rock storage area runoff, Long Lake Containment Facility discharge) may change long-term water quality in Lac du Sauvage and Lac de Gras and affect fish and other aquatic life	Low	Regional	Long-Term	Continuous	Reversible	Likely	

a) Self-sustaining and ecologically effective fish populations (ongoing fishery productivity).

4.1.5 Follow-up and Monitoring

Monitoring and follow-up programs are recommended for the Jay Project (Sections 8.8 and 9.7 in the DAR). Monitoring and follow-up programs for the Sable project have been established through its environmental assessment and permitting processes. Monitoring will be conducted under several programs that will be requirements of the Project's Type A Water Licence, and include a Surveillance Network Program, which will require monitoring within the Project boundary and Project discharges, and an Aquatic Effects Monitoring Program, which will require monitoring in the receiving environment and will also involve aquatic components, such as plankton, benthic invertebrates, and fish.

If monitoring or follow-up detect effects that are different from predicted effects, or the need for improved or modified design features and mitigation, adaptive management will be implemented. This may include increased monitoring, changes in monitoring plans, and additional mitigation. Monitoring for fish habitat compensation (i.e., offsetting) measures associated with the Sable Pit are included in the Ekati Mine *Fisheries Act* Authorization SC99037.

4.2 Terrestrial Environment

4.2.1 Air Quality

4.2.1.1 Overview of Changes

The purpose of Section 4.2.1 is to assess the effects of the addition of the Sable project to air quality. Addition of the Sable project to the RFD Case for the Project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project as a reasonably foreseeable development in the analysis and assessment of cumulative effects on air quality.

4.2.1.2 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to air quality. In the DAR, all interactions were considered primary pathways for effects to the air quality VC and were carried through the effects assessment (Section 7; Table 7.3-1). The following primary pathways identified in the DAR were assessed for cumulative effects from previous and existing developments, and the Jay and Sable projects:

- emissions of sulphur dioxide (SO_2), oxides of nitrogen (NO_X), carbon monoxide (CO), and particulate matter ($PM_{2.5}$, total suspended particulates [TSP]) from construction equipment, mining operations and processing equipment, and vehicle fleet; and,
- fugitive dust emissions from mining activities, material movement and storage, drained lakebed, and haul roads.

4.2.1.3 Residual Effects Analysis

4.2.1.3.1 Methods

The methods used to determine the residual cumulative effects from previous and existing developments, and the Jay and Sable projects on air quality are the same as described in the DAR (Section 7.4), with one exception. In the DAR, there was no RFD Case assessed for air quality; the RFD Case is qualitatively assessed in this DAR Addendum.

For the purpose of this assessment, the Sable development is assumed to produce 130 Mt of waste rock and kimberlite over its lifetime, with eight years of use of the Sable Road. Peak kimberlite and waste rock production would occur in the sixth year. In terms of both relative tonnage and haul road length, the Sable Pit is approximately half the scale of the Jay Pit.

4.2.1.3.2 Results

Emissions from the Sable project would come from the following sources:

- stack emissions from power generators and diesel heaters;
- drilling and blasting;
- mine fleet exhaust emissions from the mobile and portable diesel combustion equipment;
- fugitive particulate emissions from all mining and material handling activities that result in fugitive dust emissions;
- road dust emissions caused by mine vehicle travel on roads;
- wind erosion from the storage of waste rock, kimberlite, and processed kimberlite; and,
- vehicle emissions related to vehicle travel on the Tibbitt to Contwoyto Winter Road (TCWR).

Contaminants emitted during the RFD Case and the RFD Case – Construction Phase will be similar to those emitted during the Jay Project Base Case, Application Case, and Application Case - Construction Phase (Section 7.4 in the DAR). During the RFD Case and RFD Case – Construction Phase, total kimberlite processing at the Ekati Mine processing plant would not increase from the Jay Project Base Case, Application Case, or Application Case – Construction Phase estimates. This is because the processing plant was assumed to be operating at capacity in all cases.

Annual vehicle traffic volumes on the TCWR in the RFD Case are likely to be similar to the traffic volumes during the Application Case. As such, no effective net changes in emissions are anticipated from the traffic on the TCWR from the Application Case to the RFD Case.

Total mine fleet exhaust emissions during the RFD Case should be similar to the Application Case. The locations of the fleet traffic and the associated exhaust emissions may differ from the Application Case to the RFD Case, but the magnitude of total emissions should remain the same, as the total fleet size will be similar in both cases. There may be some differences based on the volume of haulage on specific haul roads, but these would not be expected to be substantial.

Total road dust emissions during the RFD Case and RFD Case – Construction Phase should also be similar to the Application Case. The sources of emissions may be located differently depending on fleet allocation on the Sable or Misery/Jay roads, but total emissions are expected to remain similar. However, as the haul distance on the Sable Road is shorter than the Misery Road, dust emissions related to traffic on the Sable Road may be lower.

Emissions from drilling and blasting during the RFD Case and RFD Case – Construction Phase should be similar to the Application Case, as this is determined mainly by processing plant throughput capacity. The spatial distribution of emissions in the RFD Case will likely be different from the Application Case, but magnitude should be similar.

Fugitive particulate matter (PM) emissions should be similar during the Application and RFD Cases and RFD Case – Construction Phase. There would be additional waste rock piles at Sable, but facilities such as the LLCF are expected to have approximately the same beach head. There would be some net increase in fugitive emissions due to wind erosion on these rock piles. However, materials handling fugitive emission totals would not be expected to increase during the RFD Case and RFD Case – Construction Phase because of the limiting factors related to the vehicle fleet, although the spatial distribution of fugitive PM emission sources would be different from the Application Case.

Stack emissions at the Ekati Mine would be expected to remain similar during the Application and RFD cases, and the RFD Case – Construction Phase because of the fixed processing plant capacity. The small diesel power plant at Sable Pit would be a minor source of emissions, as noted in Section 4.3.1.2 of the EA Report for Sable, Pigeon, and Beartooth (BHP and DIAMET 2000). There may be diesel heaters at the support facilities at the Sable Pit, but the facilities will be small, so emissions from heating requirements should be minimal. Additionally, it is possible that a powerline for the central Ekati Mine power generating station would be constructed to the Sable site as is being done for the Misery site and as is proposed for the Jay site. This wold eliminate additional emissions from a local diesel generator at the Sable site.

The Sable Pit and Jay Pit are located approximately 32 km apart. The dispersion modelling discussed in Section 7.4 of the DAR indicated that maximum ground-level concentrations in the Application Case were located at or near to the edge of the disturbance boundaries of either the Jay Pit facilities and infrastructure, or the Diavik Mine facilities and infrastructure. The dispersion modelling also indicated that ground-level concentrations of emitted compounds diminish rapidly with increasing distance from the disturbance boundaries.

Because of the distance between the Sable and Jay projects, it is expected that any change to ground-level concentrations at the Jay Project site from emissions from the Sable project will be very low. The total emissions from the Ekati Mine and Jay and Sable projects should remain relatively fixed, and the distribution of activities at these locations determines the emissions at the other locations. Predicted ground-level concentrations at or near the Ekati Mine in the RFD Case and RFD Case – Construction Phase should remain similar to the Application Case predictions, as the plant production rate and associated activities will remain the same during both assessment cases.

To summarize, the spatial distribution of emissions in the RFD Case and RFD Case – Construction Phase may be different from the Application Case, but would be very similar in magnitude. This would be true regardless of production rates being performed at Jay Pit and Sable Pit, as long as the processing plant is running at the desired operating capacity (as was assumed in the Application Case; Section 7.4 in the DAR).

4.2.1.4 Residual Impact Classification and Significance

The DAR predicted that there would be no significant incremental and cumulative effects from the Jay Project and other developments on air quality. The residual impact classification and environmental significance findings for the Sable RFD Case and Sable RFD Case – Construction Phase remain unchanged from that presented in the DAR (Section 7.6.2; Table 7.6-3). The Jay and Sable projects are not anticipated to have a significant effect on air quality. Note that magnitude classifications for significance as defined in the DAR are based on modelled values (Section 7.6.1). The magnitude of total emissions are not expected to change in the Sable RFD Case and Sable RFD Case – Construction Phase from the Application Case, so the magnitude classifications in Table 4.2-1 are qualitative, and not specifically quantified. Geographic extent, duration, frequency, reversibility, and likelihood will remain the same as for the Application Case (Table 4.2-1; Section 7.6.2 in the DAR).

Table 4.2-1 Summary of Residual Impact Classification of Primary Pathways and Predicted Significance of Cumulative Effects on Air Quality

Pathway	Effects Statement	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance for Assessment Endpoint[(a)]
Mine equipment, processing, and fleet exhaust emissions during construction, operations, and closure	SO_2 Concentration – 1-Hour Averaging Period	Negligible	Local	Medium-term	Frequent	Reversible	Likely	*Not Significant*
	SO_2 Concentration – 24-Hour Averaging Period	Negligible	Local	Medium-term	Frequent	Reversible	Likely	
	SO_2 Concentration – Annual Averaging Period	Negligible	Local	Medium-term	Infrequent	Reversible	Likely	
	NO_2 Concentration – 1-Hour Averaging Period	High	Local	Medium-term	Frequent	Reversible	Likely	
	NO_2 Concentration – 24-Hour Averaging Period	High	Local	Medium-term	Frequent	Reversible	Likely	
	NO_2 Concentration – Annual Averaging Period	High	Local	Medium-term	Infrequent	Reversible	Likely	
	CO Concentration – 1-Hour Averaging Period	Low	Local	Medium-term	Frequent	Reversible	Likely	
	CO Concentration – 8-Hour Averaging Period	Moderate	Local	Medium-term	Frequent	Reversible	Likely	
	$PM_{2.5}$ Concentration – 24-Hour Averaging Period	High	Local	Medium-term	Frequent	Reversible	Unlikely	
	$PM_{2.5}$ Concentration – Annual Averaging Period	High	Local	Medium-term	Infrequent	Reversible	Unlikely	
Fugitive emissions (e.g., dust), and equipment and fleet exhaust	TSP Concentration – 24-Hour Averaging Period	High	Local	Medium-term	Frequent	Reversible	Unlikely	
	TSP Concentration – Annual Averaging Period	High	Local	Medium-term	Infrequent	Reversible	Unlikely	

a) Compliance with the NWT ambient air quality standards, expressed qualitatively.

SO_2 = sulphur dioxide; NO_2 = nitrogen dioxide; CO = carbon monoxide; $PM_{2.5}$ = particulate matter of mean aerodynamic diameter less than 2.5 microns; TSP = total suspended particulates.

4.2.1.5 Follow-up and Monitoring

Monitoring and follow-up programs are recommended for the Jay Project (Section 7.7 in the DAR). Monitoring and follow-up programs for the Sable project have been established through its environmental assessment and permitting processes. These programs form part of the environmental management system for the Project. If monitoring or follow-up detect effects that are different from predicted effects, or the need for improved or modified design features and mitigation, adaptive management will be implemented. This may include increased monitoring, changes in monitoring plans, and additional mitigation.

4.2.2 Soils

4.2.2.1 Overview of Changes

The purpose of Section 4.2.2 is to assess the effects of the addition of the Sable project to soils. Addition of the Sable project to the RFD Case for the Project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project as a reasonably foreseeable development in the analysis and assessment of cumulative effects on soils.

4.2.2.2 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to soils and eskers. In the DAR, all effects pathways from the Project on soil quality and permafrost were determined to be no linkage or secondary (Appendix 11A, Section 11A1.3.2.2; Table 11A1.3-1). Environmental design, mitigation, and management practices have been assessed and are in place for the Sable project. There are no predicted changes in the pathways analysis for soil quality and permafrost with the addition of the Sable project.

The following primary pathway identified in the DAR was assessed for cumulative effects from previous and existing developments, and the Jay and Sable projects:

- direct loss or alteration of soils and eskers.

4.2.2.3 Residual Effects Analysis

4.2.2.3.1 Methods

The Effects Study Area (ESA) for soils increased from that presented in the DAR to include the Sable project. The soils ESA is approximately 168 km^2 (16,836 ha), and includes the existing Ekati Mine, Jay Project, Sable Road, and Sable Pit and a 500 m buffer (Map 4.2-1).

Development of the Project is expected to change soil and esker quantity and distribution. These changes can affect other VCs such as vegetation and wildlife. The methods used for analyzing residual changes to soil and esker abundance and distribution from the Sable project are the same as described in the DAR (Appendix 11A, Section 11A1.4.2.1). However, in the DAR, there was no RFD Case assessed for soils and eskers. In this DAR Addendum, the absolute changes in soil map units from the Project and previous, existing, and reasonably foreseeable developments (i.e., Sable) on soils and eskers were calculated from 2014 baseline condition (Base Case) to the RFD Case. In addition, the numerical changes between the Application Case (i.e., Jay Project) and the RFD Case (Jay Project plus Sable) are presented to illustrate the incremental effects to soils and eskers from the addition of the Sable project.

Following closure of projects, there will be a net change to these soil map units relative to the ESA, but it is unknown what soil map units these areas will become in the future. As such, the changes from the developments are considered permanent.

4.2.2.3.2 Results

During the 2014 baseline condition (Base Case), the soils ESA is dominated by the Mineral-1 map unit (5,321 ha; 31.6% of the soils ESA). Existing disturbance on the landscape covers 3,674 ha, and represents anthropogenic features including the existing Ekati Mine (Appendix 11A, Section 11A1.4.2.2). Although mapped as disturbance in the baseline condition, progressive reclamation has been completed at locations no longer needed for operations. Reclamation programs have included exploration camps, exploration drill and adit sites, slope stabilization at the Panda Diversion Channel, Panda open pit, and the Airport Esker quarry site (BHP Billiton 2012). The Esker Complex covers 132 ha (0.8% of the ESA) at baseline.

Changes from reasonably foreseeable developments (i.e., Sable) on soil quantity and distribution and the distribution of eskers will be confined to the project footprints. The soil map unit that will likely experience the greatest absolute change from reasonably foreseeable developments is the Mineral-1 map unit (Table 4.2-2; Map 4.2-2), which consists of dominant Turbic Cryosol and cryroturbated Orthic Dystric Brunisol upland soil types (see Table 11A1.2-1 in Appendix 11A of the DAR). A total of 686 ha of the Mineral-1 soil map unit will be disturbed from Base Case to RFD Case, which is an increase of 228 ha from the Application Case (i.e., Jay Project). The dewatering activities associated with projects in the RFD Case will decrease the Open Water (deep water) map unit by 58 ha relative to the Application Case, and 462 ha relative to the Base Case.

Approximately 12 ha of the Esker Complex will be disturbed (0.7% of the soils ESA) from Base Case to RFD Case, and represents the disturbance associated with the single crossing location of the Jay access road, pipelines, and power line, and the single crossing location of the Sable access road. The RFD Case results in an incremental loss of 1 ha of Esker Complex. Wetland soils represent inclusions (i.e., less than 15% of a mapped polygon) in all soil map units.

LEGEND

- EKATI MINE FOOTPRINT
- DIAVIK MINE FOOTPRINT
- PROPOSED JAY FOOTPRINT
- PROPOSED SABLE PIT AND ROAD FOOTPRINT
- PROPOSED PIGEON PIT FOOTPRINT
- WINTER ROAD
- TIBBITT TO CONTWOYTO WINTER ROAD
- NORTHERN PORTION OF TIBBITT TO CONTWOYTO WINTER ROAD
- ELEVATION CONTOUR (10 m INTERVAL)
- ESKER
- WATERCOURSE
- WATERBODY
- EFFECTS STUDY AREA

REFERENCE

CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

5 0 5

SCALE 1:200,000 KILOMETRES

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

LOCATION OF THE SOILS EFFECTS STUDY AREA

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Soils_001_GIS	
DESIGN	DB	14/01/14	SCALE AS SHOWN	REV 0
GIS	UW	27/11/14	MAP 4.2-1	
CHECK	JLF	27/11/14		
REVIEW	JV	27/11/14		

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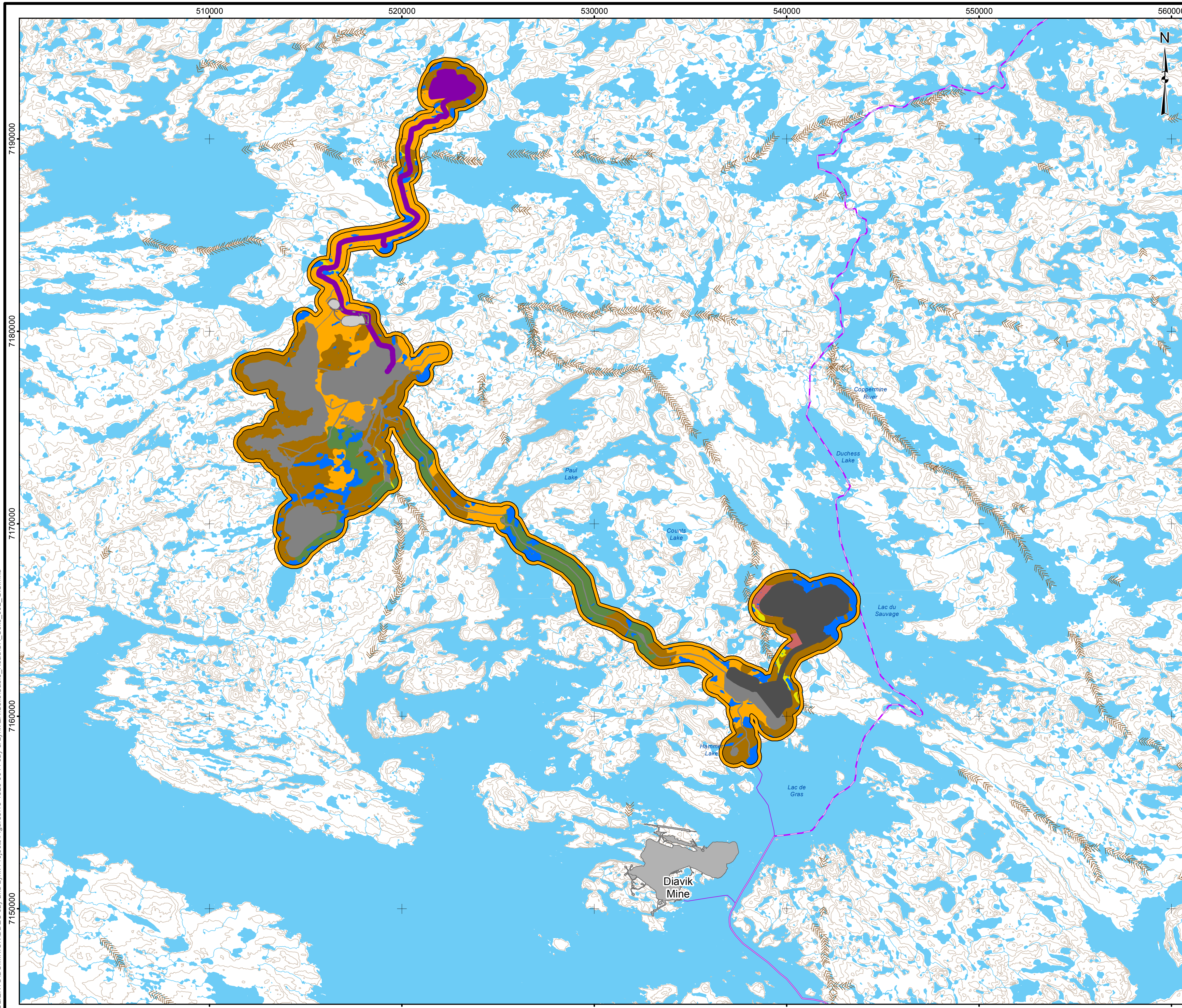
Table 4.2-2 Comparison of Soil Map Unit Distribution Between the 2014 Baseline Condition and Reasonably Foreseeable Development Case

Map Unit Name	Map Unit Symbol	2014 Baseline Condition (ha)	RFD Case (ha)	Change from 2014 Baseline Condition to Application Case (ha)	Change from 2014 Baseline Condition to RFD Case (ha)	Change from Application Case to RFD Case (ha)
Esker Complex	E1	132	120	-11	-12	-1
Mineral-1	M1	5,321	4,634	-458	-686	-228
Mineral-2	M2	3,576	3,356	-62	-220	-158
Mineral-3	M3	280	114	-166	-166	0
Mineral-4	M4	1,585	1,585	0	0	0
Existing Disturbance	EDIS	3,674	5,219	1,101	1,546	445
Open (Deep) Water	Zw	2,269	1,807	-404	-462	58

ha = hectare; RFD = Reasonably Foreseeable Development.



LEGEND

- EKATI MINE FOOTPRINT
- DIAVIK MINE FOOTPRINT
- WINTER ROAD
- TIBBITT TO CONTWOYTO WINTER ROAD
- NORTHERN PORTION OF TIBBITT TO CONTWOYTO WINTER ROAD
- ELEVATION CONTOUR (10 m INTERVAL)
- ESKER
- WATERCOURSE
- WATERBODY

SOIL MAP UNIT

- EDIS - EXISTING DISTURBANCE
- E1 - ESKER COMPLEX
- M1 - MINERAL-1
- M2 - MINERAL-2
- M3 - MINERAL-3
- M4 - MINERAL-4
- ZW - OPEN WATER
- PROPOSED PROJECT FOOTPRINT
- PROPOSED SABLE PIT AND ROAD FOOTPRINT
- PROPOSED PIGEON PIT FOOTPRINT

REFERENCE

CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

5 0 5
SCALE 1:200,000 KILOMETRES

PROJECT
DOMINION DIAMOND
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
SOIL DISTRIBUTION DURING THE REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Soils_002_GIS
DESIGN	DB	14/01/14	SCALE AS SHOWN REV 0
GIS	UW	27/11/14	
CHECK	JLF	27/11/14	MAP 4.2-2
REVIEW	JV	07/10/14	

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4.2.2.4 Follow-up and Monitoring

Monitoring programs implemented during the Jay Project include a combination of environmental monitoring to track conditions and implement further mitigation as required (e.g., monitoring for soil erosion during construction), and follow-up monitoring to verify the accuracy of effect predictions and adaptively manage and implement further mitigation as required. Monitoring and follow-up programs for the Sable project have been established through its environmental assessment and permitting processes.

Similar to the Jay Project, dewatering plans will be developed prior to dewatering under the Water Licence for Sable Lake and will include a description of specific operational erosion monitoring and mitigation programs that will be applied to each project.

4.2.3 Vegetation

4.2.3.1 Overview of Changes

The purpose of Section 4.2.3 is to assess the effects of the addition of the Sable project to vegetation. Addition of the Sable project to the RFD Case for the Project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on vegetation.

4.2.3.2 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to vegetation. In the DAR, all effects pathways from the Project on vegetation that were related to changes in permafrost, soil quality, air and dust deposition, and surface water (i.e., indirect effects) were determined to be no linkage or secondary (Section 11.3.2.2; Table 11.3-1). Environmental design features, mitigation, and management practices have been assessed and are in place for the Sable project. There are no predicted changes in the pathways analysis related to indirect effects on vegetation with the addition of the Sable project.

The following primary pathway identified in the DAR was assessed for cumulative effects from previous and existing developments, and the Jay and Sable projects:

- direct loss, alteration, and fragmentation of vegetation.

4.2.3.3 Residual Effects Analysis

4.2.3.3.1 Methods

The methods used to determine the residual effects from the Sable project on vegetation VCs are the same as described in the DAR (Section 11.4), with one exception. In the DAR there was no RFD Case assessed for vegetation VCs. In this DAR Addendum, the changes from the Project and previous, existing, and reasonably foreseeable developments (i.e., Sable) on vegetation were estimated by calculating the relative difference or net change in that map unit between the reference condition and the RFD Case as follows:

100 × (RFD Case value – reference condition value) / reference condition value.

In addition, the numerical and qualitative changes between the Application Case (i.e., Base Case plus Jay Project) and the RFD Case (Application Case plus Sable) are presented to illustrate the incremental effects to vegetation VCs from the addition of Sable project.

4.2.3.3.2 Results

Changes in Abundance and Distribution of Plant Communities

Under the reference condition, the vegetation ESA (593,274 ha) is dominated by Health Tundra (37.7%), and Deep Water (28.9%) Ecological Landscape Classification (ELC) map units. Heath Tundra 30% to 80% Bedrock, Heath Tundra 30% to 80% Boulder, Tussock/Hummock, Sedge Wetland, and Shallow Water map units each account for from 2.5% to 12.8% of the vegetation ESA. Esker Complex, Bedrock Complex (>80% rock), Boulder Complex (>80% rock), Riparian Tall Shrub, and Birch Seep and Riparian Shoreline Shrub map units each comprise 1% or less of the ESA. Unclassified units (representing less than 1%) consisted of areas that could not be classified as a vegetation map unit.

The cumulative reduction in vegetation from the reference condition to the RFD Case is predicted to be 7,128 ha or approximately 1.2% of the mapped ELC units in the ESA (Map 4.2-3). The largest cumulative areas of vegetation lost are predicted to be 2,910 ha (1.3%) of Heath Tundra, 1,550 ha (0.9%) of Deep Water, and 1,001 ha (1.3%) of Heath Tundra 30-80% Boulder ELC units (Table 4.2-3). These changes represent an increase of 819 ha (0.4%) of Heath Tundra, 90 ha (0.1%) of Deep Water, and 30 ha (less than 0.1%) of Heath Tundra 30-80% Boulder ELC units removed, relative to the Application Case (i.e., Jay Project). Cumulative reduction of Heath Tundra 30-80% Bedrock (179 ha), Birch Seep and Riparian Shoreline Shrub (60 ha), Bedrock Complex (23 ha), Tussock/Hummock (596 ha), Sedge Wetland (211 ha), Riparian Tall Shrub (5 ha), and Shallow Water (262 ha) are predicted to be 1.8% or less of each map unit, relative to the reference condition in the ESA.

The incremental reduction of Heath Tundra 30-80% Bedrock (20 ha), Birch Seep and Riparian Shoreline Shrub (6 ha), Bedrock Complex (6 ha), Tussock/Hummock (18 ha), Sedge Wetland (36 ha), Riparian Tall Shrub (1 ha), and Shallow Water (37 ha) are predicted to be 0.5% or less of each map unit, relative to the Application Case in the ESA. The largest magnitudes of cumulative reductions of vegetation are predicted to be 265 ha (4.8%) of Esker Complex and 64 ha (3.0%) of Boulder Complex (>80% rock) removed in the RFD Case. The RFD Case results in an incremental loss of 62 ha (1.2%) of Esker Complex and 15 ha (0.7%) of Boulder Complex (>80% rock). The majority of plant communities (ELC map units) expected to be affected during the RFD Case are widely distributed and not unique to areas to be disturbed. Those ELC map units that are restricted in distribution within the ESA at baseline, including Esker Complex, Bedrock Complex (>80% rock), Boulder Complex (>80% rock), Riparian Tall Shrub, and Birch Seep and Riparian Shoreline Shrub, are present elsewhere within the ESA (Map 4.2-3).

LEGEND

ECOLOGICAL LANDSCAPE CLASSIFICATION MAP UNITS

- ESKER COMPLEX
- BEDROCK COMPLEX (>80% ROCK)
- BOULDER COMPLEX (>80% ROCK)
- HEATH TUNDRA 30% TO 80% BEDROCK
- HEATH TUNDRA 30% TO 80% BOULDERS
- HEATH TUNDRA
- RIPARIAN TALL SHRUB
- BIRCH SEEP AND RIPARIAN SHORELINE SHRUB
- TUSSOCK/HUMMOCK
- SEDGE WETLAND
- SHALLOW WATER
- DEEP WATER
- EXISTING DISTURBANCE
- UNCLASSIFIED
- PROPOSED PROJECT FOOTPRINT
- PROPOSED SABLE PIT AND ROAD FOOTPRINT
- PROPOSED PIGEON PIT FOOTPRINT

REFERENCE

VEGETATION CLASSIFICATION DATA: DIAVIK LANDSAT CLASSIFICATION 1997; WEST KITIKMEOT CLASSIFICATION 2001; MODIFIED BY GOLDER ASSOCIATES 2014
NATIONAL TOPOGRAPHIC BASE DATA (NTDB) 1:250,000
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

5 0 5

SCALE 1:200,000 KILOMETRES

PROJECT

DOMINION DIAMOND™

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

ECOLOGICAL LANDSCAPE CLASSIFICATION MAP UNIT DISTRIBUTION FOR THE REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT	13-1328-0041		FILE No. SR_Veg_001_GIS
DESIGN	LD	24/02/14	SCALE AS SHOWN REV 0
GIS	UW	27/11/14	MAP 4.2-3
CHECK	JLF	27/11/14	
REVIEW	JV	27/11/14	

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Table 4.2-3 Change in Area of Ecological Landscape Classification Map Units from the Reference Condition to Reasonably Foreseeable Development Case within the Vegetation Effects Study Area

Ecological Landscape Classification (ELC) Map Units	Reference Condition (ha)	RFD Case (ha)	Change (% unit) from Reference Condition to Application Case	Cumulative Change (% unit) from Reference to RFD Case	Change (% unit) from Application Case to RFD Case
Upland ELC Map Units					
Esker Complex	5,522	5,257	-3.7	-4.8	-1.2
Bedrock Complex (>80% rock)	1,316	1,293	-1.3	-1.8	-0.5
Boulder Complex (>80% rock)	2,140	2,076	-2.3	-3.0	-0.7
Heath Tundra 30% to 80% Bedrock	14,946	14,767	-1.1	-1.2	-0.1
Heath Tundra 30% to 80% Boulder	76,041	75,040	-1.4	-1.3	<-0.1
Heath Tundra	223,417	220,507	-0.9	-1.3	-0.4
Wetland ELC Map Units					
Riparian Tall Shrub	452	447	-0.8	-1.0	-0.2
Birch Seep and Riparian Shoreline Shrub	6,428	6,368	-0.8	-0.9	-0.1
Tussock/Hummock	50,994	50,398	-1.1	-1.2	<-0.1
Sedge Wetland	16,440	16,229	-1.1	-1.3	-0.2
Non-Vegetated ELC Map Units					
Shallow Water	24,185	23,923	-0.9	-1.1	-0.2
Deep Water	171,237	169,687	-0.9	-0.9	-0.1
Unclassified ELC Map Unit					
Unclassified	156	154	-1.2	-1.2	0

Note: the vegetation ESA is 593,274 ha.

ha = hectares; % = percent; >= greater than; RFD = reasonably foreseeable development; ELC = ecological landscape classification.

In addition to direct loss of vegetation, human developments result in the fragmentation of the landscape. The cumulative change in the number of patches from previous, existing, and reasonably foreseeable disturbance is a decrease of 1,905 patches (0.7% change from reference conditions). This represents an incremental decrease in number of 490 patches removed during the Application Case (i.e., Jay Project). A decrease in mean patch size of 1.3 ha (2.8% change from reference conditions) is predicted, an incremental change of less than 0.1 ha, relative to the Application Case. The number of patches of Esker Complex, Heath Tundra and Deep Water ELC units (habitats) increases between the reference condition and the RFD Case (Table 4.2-4). The mean Esker Complex patch size decreases by 0.8 ha and represents a 14.8% change during the RFD Case. The incremental change is a decrease by <0.1 ha, relative to the Application Case. The largest changes in patch number during the RFD Case are Tussock/Hummock (loss of 643 patches), Heath Tundra 30% to 80% Boulder (loss of 461 patches), and Shallow Water (loss of 333 patches), incremental changes of 42 patches, 30 patches, and 33 patches, respectively.

During the RFD Case, there is predicted to be a 0.7% (27.7 m) cumulative decrease in the mean distance to nearest neighbour (MDNN) (Table 4.2-5), relative to the reference condition and is a less than 0.1% (less than 1 m) incremental change relative to the Application Case. The largest change in MDNN between the reference condition and the RFD Case occurs in Esker Complex (decrease of 32.6 m between patches [-10.8% change]; 0.1% incremental change between Application Case and RFD Case). This is a result of an increase in patch number (121 patch cumulative change; 1 patch incremental change) and a slight decrease in patch size (0.8% relative to the reference condition; less than 0.1%). The MDNN among Riparian Tall Shrub and Boulder Complex (>80% rock) patches is predicted to increase by 6.4 m (0.9%) and 1.7 m (0.6%), respectively during the RFD Case. Changes to the MDNN for all other ELC units are predicted to be less 1 m (≤0.3% change). The incremental changes in MDNN for both Riparian Tall Shrub and Boulder Complex (>80% rock) patches is predicted to increase by less than 0.1%.

The MDNN for Riparian Tall Shrub, Boulder Complex (>80% rock), Bedrock Complex (>80% rock), and Birch Seep and Riparian Shoreline Shrub and are predicted to increase by 0.9%, 0.6%, 0.1%, and 0.1%, respectively during the RFD Case (less than 0.1% in all units relative to the Application Case). All of these units are predicted to experience a cumulative decrease in patch number (1.6% or less), and patch size during the RFD Case. The incremental change to the MDNN of map units with restricted distribution are predicted to be all less than 0.1%, relative to the Application Case. The loss and fragmentation of vegetation types that are restricted in distribution can increase the isolation of individual plant species or populations within these map units and individual plant species will respond differently to loss or fragmentation effects. Although there is a potential increase in isolation in these map units, as described in the Jay Project DAR, it is likely that the plant species present in isolated units are already adapted to the patchy nature of their habitats, which may increase their resilience to fragmentation effects.

Table 4.2-4 Change in Patch Number and Mean Patch Size of Ecological Landscape Classification Map Units from the Reference Condition to Reasonably Foreseeable Development Case within the Vegetation Effects Study Area

Ecological Landscape Classification (ELC) Map Units	Reference Condition	RFD Case	Change (% unit) from Reference Condition to Application Case	Cumulative Change (% unit) from Reference to RFD Case	Change (% unit) from Application Case to RFD Case
			Number of Patches		
Upland ELC Map Units					
Esker Complex	1,028	1,149	11.7	11.8	0.1
Bedrock Complex (>80% rock)	3,082	3,043	-1.3	-1.3	0
Boulder Complex (>80% rock)	4,200	4,131	-1.6	-1.6	0
Heath Tundra 30% to 80% Bedrock	20,313	20,107	-1.0	-1.0	<-0.1
Heath Tundra 30% to 80% Boulder	55,118	54,657	-0.8	-0.8	-0.1
Heath Tundra	22,816	22,891	0.2	0.3	0.1
Wetland ELC Map Units					
Riparian Tall Shrub	1,109	1,098	-1.0	-1.0	0
Birch Seep and Riparian Shoreline Shrub	10,027	9,949	-0.7	-0.8	-0.1
Tussock/Hummock	69,036	68,393	-0.9	-0.9	-0.1
Sedge Wetland	30,849	30,566	-0.9	-0.9	-0.1
Non-Vegetated ELC Map Units					
Shallow Water	40,514	40,181	-0.7	-0.8	-0.1
Deep Water	6,347	6,376	0.5	0.5	-0.1
Unclassified ELC Map Unit					
Unclassified	435	428	-1.6	-1.6	0
			Mean Patch Area (ha)		
Upland ELC Map Units					
Esker Complex	5.4	4.6	-14.7	-14.8	-0.1
Bedrock Complex (>80% rock)	0.4	0.4	-0.3	-0.3	0
Boulder Complex (>80% rock)	0.5	0.5	-1.3	-1.3	0
Heath Tundra 30% to 80% Bedrock	0.7	0.7	-0.2	-0.3	<-0.1
Heath Tundra 30% to 80% Boulder	1.4	1.4	-0.7	-0.7	<-0.1
Heath Tundra	9.8	9.6	-1.2	-1.5	-0.3

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Table 4.2-4 Change in Patch Number and Mean Patch Size of Ecological Landscape Classification Map Units from the Reference Condition to Reasonably Foreseeable Development Case within the Vegetation Effects Study Area

Ecological Landscape Classification (ELC) Map Units	Reference Condition	RFD Case	Change (% unit) from Reference Condition to Application Case	Cumulative Change (% unit) from Reference to RFD Case	Change (% unit) from Application Case to RFD Case
Wetland ELC Map Units					
Riparian Tall Shrub	0.4	0.4	0.1	0.1	0
Birch Seep and Riparian Shoreline Shrub	0.6	0.6	-0.3	-0.3	0
Tussock/Hummock	0.7	0.7	-0.4	-0.4	<0.1
Sedge Wetland	0.5	0.5	-0.3	-0.3	<-0.1
Non-Vegetated ELC Map Units					
Shallow Water	0.6	0.6	-0.4	-0.3	<0.1
Deep Water	27.0	26.6	-1.4	-1.4	<0.1
Unclassified ELC Map Unit					
Unclassified	0.4	0.4	-0.3	-0.3	0

Note: values of less than -0.1 or 0.1 approach 0.

ha = hectare; % = percent; m = metre; <= less than; >= greater than; RFD = reasonably foreseeable development; ELC = ecological landscape classification.

Table 4.2-5 Change in Mean Distance to Nearest Neighbour of Ecological Landscape Classification Map Units from Development within the Vegetation Effects Study Area

Ecological Landscape Classification (ELC) Map Units	Mean Distance to Nearest Neighbour (m)				
	Reference Condition	RFD Case	Change (% unit) from Reference Condition to Application Case	Cumulative Change (% unit) from Reference to RFD Case	Change (% unit) from Application Case to RFD Case
Upland ELC Map Units					
Esker Complex	302.9	270.3	-10.7	-10.8	-0.1
Bedrock Complex (>80% rock)	246.0	246.2	0.1	0.1	0
Boulder Complex (>80% rock)	280.4	282.1	0.6	0.6	<0.1
Heath Tundra 30% to 80% Bedrock	148.8	149.2	0.3	0.3	<0.1
Heath Tundra 30% to 80% Boulder	94.2	94.4	0.2	0.2	<0.1
Heath Tundra	81.7	81.6	-0.1	-0.1	<-0.1
Wetland ELC Map Units					
Riparian Tall Shrub	742.5	748.9	0.9	0.9	0
Birch Seep and Riparian Shoreline Shrub	227.5	227.6	<0.1	0.1	<0.1
Tussock/Hummock	96.2	96.3	0.1	0.1	<-0.1
Sedge Wetland	145.0	145.2	0.1	0.1	<0.1
Non-Vegetated ELC Map Units					
Shallow Water	108.6	108.7	0.1	0.1	<0.1
Deep Water	215.0	214.2	-0.4	-0.3	<0.1
Unclassified ELC Map Unit					
Unclassified	1,376	1,372	-0.3	-0.3	0

Note: values of less than -0.1 approach 0.0.

ha = hectare; % = percent; m = metre; <= less than; >= greater than; RFD = reasonably foreseeable development; ELC = ecological landscape classification.

Changes to Listed Plant Species and Listed Plant Habitat Potential

As described in Section 11.4.2.2.2 of the Jay Project DAR, two territorial listed vascular plant species and five non-vascular plants species were documented during the 2014 field program. All of these observations were in Shallow Water, Sedge Wetland, and microsites including rocky crevices and ecotones (i.e., transition areas between two vegetation types). All of these species are listed as Sensitive, a status rank that is assigned to species that are not believed to be at risk of extirpation or extinction, but may require special attention or protection to prevent them from becoming At Risk (NWT Infobase 2012). None of these plant species are listed by COSEWIC (2014) or *SARA* (2013).

The ELC map unit rankings for potential of ELC map units to support listed plant species are presented in the Jay Project DAR (Annex VI, Section 2.3.2). Briefly, Riparian Tall Shrub and Shallow Water map units were considered to have a high potential to support listed plants species. Esker Complex and Sedge Wetland were considered moderate. Deep Water, Existing Disturbance, and Unclassified map units were not ranked. The remainder of the ELC map units were considered to have a low potential to support listed plant species.

A total of 266 ha of ELC units with high listed plant habitat potential will be disturbed during the RFD Case, resulting in a decrease of 1.1% relative to reference conditions (Table 4.2-6). Habitat units with moderate listed plant habitat potential will decrease by approximately 476 ha (2.2%) from the reference condition to the RFD Case. These changes represent a decrease of 38 ha (0.2%) of high plant habitat and 98 ha (0.5%) of moderate listed plant habitat, relative to the Application Case (i.e., Jay Project).

Table 4.2-6 Change in Area of Listed Plant Habitat Potential during the Reasonably Foreseeable Development Case within the Vegetation Effects Study Area

Listed Plant Habitat Potential	Reference Condition (ha)	RFD Case (ha)	Change (% unit) from Reference Condition to Application Case	Cumulative Change (% unit) from Reference to RFD Case	Change (% unit) from Application Case to RFD Case
High Potential ELC Map Units	24,637	24,371	-0.9	-1.1	-0.2
Moderate Potential ELC Map Units	21,962	21,486	-1.7	-2.2	-0.5
Low Potential ELC Map Units	375,282	370,448	-1.1	-1.3	-0.2
Non-ranked ELC Map Units	171,393	176,971	2.7	3.3	0.6

ha = hectares; % = percent; RFD = reasonably foreseeable development; ELC = ecological landscape classification.

As described in Section 11.4.2.2.2 of the Jay Project DAR, the listed plant species that prefer habitats in Riparian Tall Shrub and Esker Complex are likely uncommon because of the restricted spatial distributions in these habitats. In addition, it is likely that the plant species present in these units are already adapted to the patchy nature of their habitats within the ESA.

Changes to Traditional Use Plant Species and Traditional Use Plant Habitat Potential

Traditional use plant species, associated habitats, and ELC map unit rankings for potential of ELC map units to support traditional use plant species are summarized in the Vegetation Existing Environment section of the DAR (Section 11.2.1.4.). Relative to the reference condition, previous, existing, and reasonably foreseeable developments have removed approximately 4,151 ha (1.3%) of the high potential ELC units and 1,077 ha (1.5%) of moderate potential units within the ESA (Table 4.2-7). The incremental change to the high and moderate potential units are predicted to be 0.3% or less, relative to the Application Case

Table 4.2-7 Change in Area of Traditional Use Plant Habitat Potential from the Reference Condition to the Reasonably Foreseeable Development Case in the Vegetation Effects Study Area

Traditional Use Plant Habitat Potential	Reference Condition (ha)	RFD Case (ha)	Change (% unit) from Reference Condition to Application Case	Cumulative Change (% unit) from Reference to RFD Case	Change (% unit) from Application Case to RFD Case
High Potential ELC Map Units	320,832	316,681	-1.0	-1.3	-0.3
Moderate Potential ELC Map Units	73,408	72,331	-1.3	-1.5	-0.2
Low Potential ELC Map Units	27,641	27,292	-1.1	-1.3	-0.2
Very Low Potential ELC Map Units	171,237	176,817	2.7	3.3	0.6
Non-ranked ELC Map Units	156	154	-1.2	-1.4	-0.2

Note: High potential units are Heath Tundra 30% to 80% Bedrock, Heath Tundra 30% to 80% Boulder, Heath Tundra, and Birch Seep and Riparian Shoreline Shrub. Moderate potential units are Esker Complex, Riparian Tall Shrub, Tussock/Hummock, and Sedge Wetland. Low potential units are Bedrock Complex (>80% rock), Boulder Complex (>80% rock), and Shallow Water. Very low potential units are Deep Water and Existing Disturbance; non-ranked map units are Unclassified habitat.

ha = hectare; % = percent; ELC = ecological landscape classification; RFD = reasonably foreseeable development.

The terrestrial area disturbed by human developments is considered permanent because it is not known what the landscape will look like in the future once re-vegetated. Although the future re-vegetated landscape is unknown, traditional use species such as willow, dwarf birch, hair cap moss (*Polytrichum piliferum*), and lichen (specifically *Cladonia cariosa* [a club-lichen] and *Stereocaulon tomentosum* [a wooly lichen]) have been observed to successfully colonize disturbed areas throughout Arctic environments (Kershaw and Kershaw 1987; Bishop and Chapin 1989).

4.2.3.4 Residual Impact Classification and Significance

The DAR predicted that there would be no significant incremental and cumulative effects from the Jay Project and other developments on the ability of vegetation VCs to be self-sustaining and ecologically effective (Section 11.6.2; Table 11.6-2). The addition of the Sable project to the RFD Case represents an overall incremental change of -0.2% for the abundance and distribution of plant communities (including listed and traditional use plants), and <0.1% for number of patches, mean patch area, and MDNN. The addition of the RFD Case represents small incremental contributions to the cumulative changes predicted in the DAR. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to vegetation VCs (Table 4.2-8; Section 11.6.2 in the DAR).

Table 4.2-8 Summary of Residual Impact Classification of Primary Pathways and Predicted Significance of Cumulative Effects on Vegetation Valued Components

Pathway	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Like-lihood	Significance for Assessment Endpoint[(a)]
Direct loss, alteration, and fragmentation of vegetation from the Project footprint	Low for plant communities and traditional use plant species Moderate for listed plant populations	Regional	Permanent	Continuous	Irreversible	Highly Likely	*Not Significant*

a) self-sustaining and ecologically effective plant populations and communities

4.2.3.5 Follow-up and Monitoring

Monitoring and follow-up programs are recommended for the Jay Project (Section 11.7 in the DAR). Monitoring and follow-up programs for the Sable project have been established through its environmental assessment and permitting processes. These programs form part of the environmental management system for the Ekati Mine. If monitoring or follow-up detect effects that are different from predicted effects, or the need for improved or modified design features and mitigation, adaptive management will be implemented. This may include increased monitoring, changes in monitoring plans, and additional mitigation.

4.2.4 Caribou

4.2.4.1 Overview of Changes

The purpose of Section 4.2.4 is to assess the effects of the addition of the Sable project to caribou. Addition of the Sable project to the RFD Case for the Project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on caribou.

4.2.4.2 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to barren-ground caribou. In the DAR, all effects pathways from the Project on caribou that were related to changes in soil and vegetation quality from air and dust deposition and alterations in surface water, and direct mine-related mortality were determined to be no linkage or secondary (Section 12.3.2.2; Table 12.3-1). Environmental design features, mitigation, and management practices have been assessed and are in place for the Sable project. There are no predicted changes in the no linkage and secondary pathways analysis related to caribou with the addition of the Sable project.

The following primary pathways identified in the DAR were assessed for cumulative effects from previous existing, and reasonably foreseeable developments (including the Sable project) and the Jay Project:

- Direct loss and fragmentation of habitat from the Project footprint causes changes in caribou abundance and distribution.
- Sensory disturbance (lights, smells, noise, dust, viewscape) and barriers to movement causes changes to caribou distribution and behaviour, and changes to energetics and reproduction.
- Increased traffic on the Misery Road and Jay Road and the above-ground power line along these roads may create barriers to caribou movement, change migration routes, and reduce population connectivity.

4.2.4.3 Residual Effects Analysis

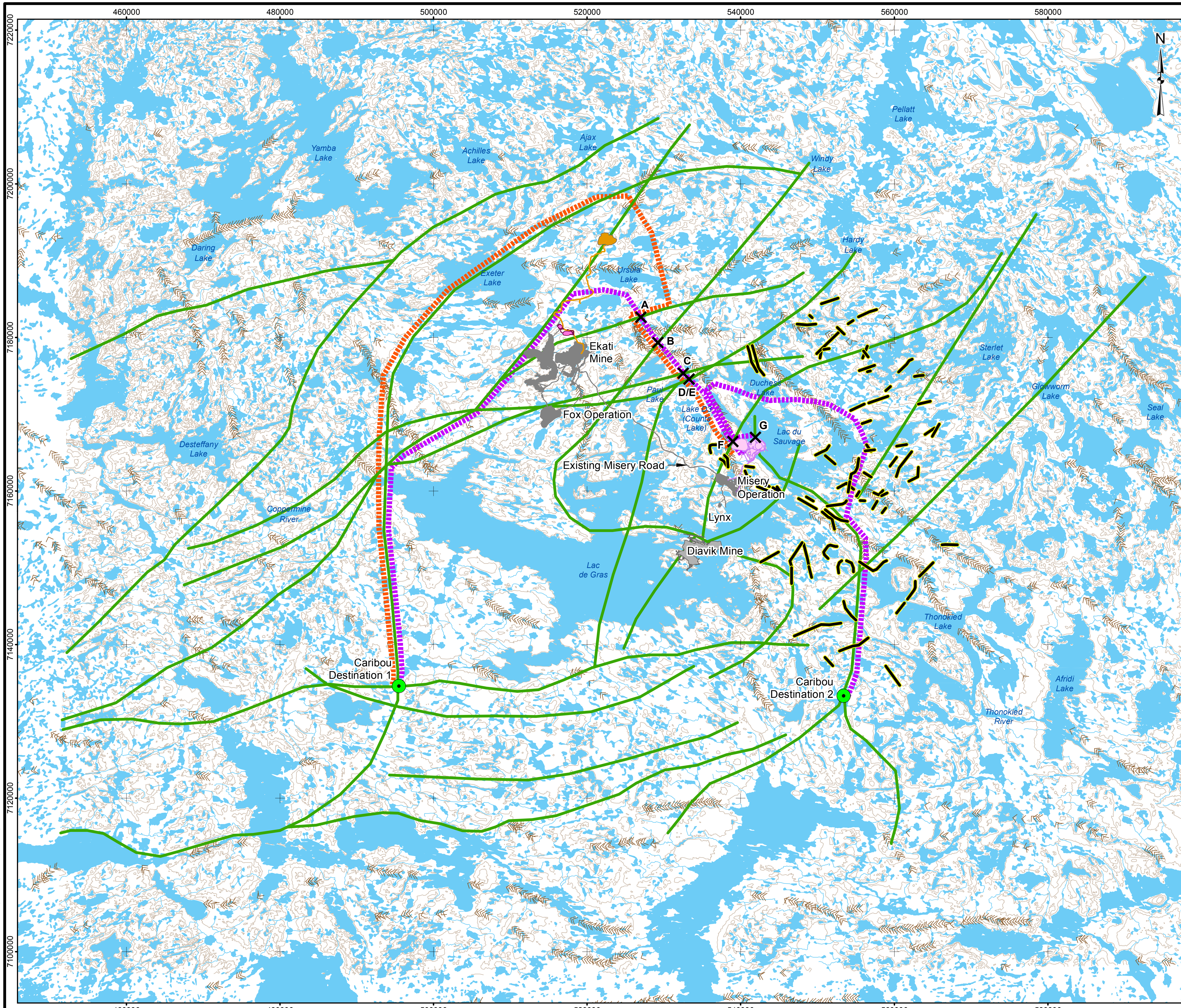
4.2.4.3.1 Methods

The methods used to determine the residual effects from the Sable project on barren-ground caribou are largely the same as described in the DAR (Section 12.4). In this DAR Addendum, the changes from the Project and previous, existing, and reasonably foreseeable developments (including the Sable project) on caribou seasonal ranges were estimated by calculating the relative difference or net change in that map unit between the reference condition and the RFD Case as follows:

$$100 \times (\text{RFD Case value} - \text{reference condition value}) / \text{reference condition value}.$$

In addition, the numerical and qualitative changes between the reference condition and the RFD Case (with Sable) and the RFD Case used in the DAR (i.e., without Sable) are presented to illustrate the incremental effects to caribou habitat from the addition of the Sable project. Results are not provided for the winter range as the Sable project is located outside the winter range and would not change the results in the DAR (Section 12.1.4.3).

Exceptions from the DAR included comparison of caribou migration identified by Traditional Knowledge and the results of caribou trails observed during 2014 baseline studies (Appendix I) and an additional alternate deflection route for the energetics model. The caribou trails observed during a 2013 aerial survey around the Lac du Sauvage area represent finer scale caribou movements in a limited area and they support the migration routes determined by Traditional Knowledge. Both show movements by caribou through the narrows between Lac de Gras and Lac du Sauvage and surrounding area (Map 4.2-4). An alternate deflection route was identified and applied to the energetics model. As a continuation of the conservative approach taken in the DAR, the alternate deflection route assumed caribou were deflected around the Sable open pit and all-season access road, the Jay Project and Misery roads, and the Ekati Mine infrastructure. This new alternate deflection route resulted in a net maximum additional distance of 59.8 km relative to travel routes identified through Traditional Knowledge (Table 4.2-9). This distance was applied to the cost for each disturbance event, which increased the loss of body mass for each encounter across females in the population (2.11 km + [59.8 km / maximum mean annual encounters] = 2.11 km + 3.10 km = 5.21 km) (see Section 12.4.2.3.2 in the Jay Project DAR for encounter rates). Adjusting for a Bathurst herd adult female body mass of 100 kg and a required movement of 5.21 km yields an average movement cost of 1.38 megajoules per day (MJ/day). In the DAR, a maximum net deflection distance of 29.6 km was applied to the energetics model resulting in an average movement cost of 0.97 MJ/day. Thus, the movement cost associated with the new deflection route around the Sable open pit and road is 1.4 times larger.



LEGEND

- EKATI MINE FOOTPRINT
- DIAVIK MINE FOOTPRINT
- PROPOSED JAY FOOTPRINT
- PROPOSED SABLE PIT FOOTPRINT
- PROPOSED PIGEON PIT FOOTPRINT
- ELEVATION CONTOUR (20 m INTERVAL)
- ESKER
- WATERCOURSE
- WATERBODY
- CARIBOU DESTINATION
- CARIBOU PATH DEFLECTION POINT
- 2013 CARIBOU TRAILS
- JAY CARIBOU DEFLECTION PATH
- SABLE CARIBOU DEFLECTION PATH
- TRADITIONAL KNOWLEDGE CARIBOU PATH
- PROPOSED SABLE ALL-WEATHER ROAD ROUTE

REFERENCE

NATIONAL TOPOGRAPHIC BASE DATA (NTDB) 1:250,000
CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

10 0 10
SCALE 1:500,000 KILOMETRES

PROJECT
DOMINION DIAMOND
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
TRADITIONAL KNOWLEDGE-BASED CARIBOU MIGRATION ROUTES AND PROJECT-RELATED DEFLECTION PATHS IN THE LAC DE GRAS AREA

Golder Associates

PROJECT	13-1328-0041	FILE No. SR_Wild_022_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV 0
GIS	JE	28/11/14	MAP 4.2-4
CHECK	JLF	28/11/14	
REVIEW	JV	28/11/14	

G:\CLIENTS\DOMINION\DDEC Jay and Lynx Projects\Figures\13-1328-0041 Jay & Lynx EA\Wildlife\SABLE_ROAD\SR_Wild_022_GIS.mxd

Table 4.2-9 Distances of Traditional Knowledge-Based Caribou Migration Routes and Deflection Paths

TK Path	Path Destination	TK-Based Migration Route Distance (km)	Total Deflection Distance (km) without Sable Project	Net Difference (km) of Deflection without Sable Project[a]	Total Deflection Distance (km) with Sable Project	Net Difference (km) of Deflection with Sable Project[a]
A	1	118	76.6	-41.4	105.0	-13.0
B	1	67.8	72.5	4.7	101.0	33.2
C	1	70.4	82.5	12.1	111.0	40.6
D	1	66.6	82.5	15.9	112.5	45.9
E	1	69.1	82	12.9	112.0	42.9
F	1	63.2	92.8	29.6	123.0	59.8
G	2	40.6	67.6	27.0	NA	NA

a) Net Difference (km) = Deflection Distance (km) – TK-based Migration Route Distance (km).

TK = Traditional Knowledge; km = kilometre; NA = not applicable.

4.2.4.3.2 Results

Habitat Quantity and Fragmentation

As described in Section 12.4.2.1.2 of the DAR, under reference conditions, the spring range was dominated by heath tundra/heath rock (42%), forest (23%), and water habitats (22%) (Table 4.2-10). The reference condition post-calving range had the highest dominance of heath tundra/heath rock (68%), followed by unvegetated (19%) and lichen veneer (6%) (Table 4.2-11). Reference conditions on the autumn range was 53% heath tundra/heath rock, 23% water, and 13% forest (Table 4.2-12).

Table 4.2-10 Change (Percent) in Area and Configuration of Habitat Types Within the Bathurst Caribou Herd Spring Range During Reference Condition and Reasonably Foreseeable Development Case

Habitat Type	Reference Condition	RFD Case with Sable Project	Cumulative Change (%) Reference Condition to RFD Case without Sable Project	Cumulative Change (%) Reference Condition to RFD Case with Sable Project
		Total Area (ha)		
Lichen Veneer	733,650	731,644	-0.27	-0.27
Water	4,371,638	4,357,981	-0.31	-0.31
Esker	136,888	135,600	-0.94	-0.94
Riparian Shrub	24,713	24,625	-0.36	-0.36
Sedge Association	724,119	721,719	-0.32	-0.33
Heath Tundra / Heath Rock	8,318,456	8,281,919	-0.43	-0.44
Forest	4,514,175	4,497,225	-0.38	-0.38
Rock Association	61,906	58,513	-5.48	-5.48

Table 4.2-10 Change (Percent) in Area and Configuration of Habitat Types Within the Bathurst Caribou Herd Spring Range During Reference Condition and Reasonably Foreseeable Development Case

Habitat Type	Reference Condition	RFD Case with Sable Project	Cumulative Change (%) Reference Condition to RFD Case without Sable Project	Cumulative Change (%) Reference Condition to RFD Case with Sable Project
Peat Bog	204,819	204,275	-0.27	-0.27
Old Burn	48,375	48,169	-0.43	-0.43
Young Burn	865,844	862,925	-0.34	-0.34
Number of Patches				
Lichen Veneer	12,389	12,343	-0.37	-0.37
Water	59,757	59,703	-0.08	-0.09
Esker	2,897	2,897	0.00	0.00
Riparian Shrub	2,811	2,804	-0.25	-0.25
Sedge Association	28,786	28,722	-0.21	-0.22
Heath Tundra / Heath Rock	16,521	16,585	0.37	0.39
Forest	21,936	21,961	0.11	0.11
Rock Association	4,104	4,072	-0.78	-0.78
Peat Bog	12,980	12,962	-0.14	-0.14
Old Burn	1,890	1,881	-0.48	-0.48
Young Burn	4,803	4,811	0.17	0.17
Mean Distance to Nearest Neighbour (m)				
Lichen Veneer	951	953	0.21	0.21
Water	692	693	0.14	0.14
Esker	1,542	1,539	-0.19	-0.19
Riparian Shrub	1,909	1,909	0.00	0.00
Sedge Association	837	839	0.24	0.24
Heath Tundra / Heath Rock	625	625	0.00	0.00
Forest	602	602	0.00	0.00
Rock Association	1,671	1,669	-0.12	-0.12
Peat Bog	1,082	1,082	0.00	0.00
Old Burn	1,693	1,689	-0.24	-0.24
Young Burn	998	997	-0.10	-0.10

Values of 0.00 represent values greater than, less than or equal to zero, but less than 0.005.
ha = hectare; % = percent; m = metre; RFD = reasonably foreseeable development.

Table 4.2-11 Change (Percent) in Area and Configuration of Habitat Types Within the Bathurst Caribou Herd Post-Calving Range During Reference Condition and Reasonably Foreseeable Development Case

Habitat Type	Reference Condition	RFD Case with Sable Project	Cumulative Change (%) Reference Condition to RFD Case without Sable Project	Cumulative Change (%) Reference Condition to RFD Case with Sable Project
Total Area (ha)				
Lichen Veneer	530,038	527,638	-0.45	-0.45
Water	1,730,306	1,722,469	-0.44	-0.45
Esker	72,794	71,656	-1.55	-1.56
Riparian Shrub	19,844	19,756	-0.44	-0.44
Sedge Association	314,250	312,725	-0.46	-0.49
Heath Tundra / Heath Rock	6,030,963	5,997,488	-0.54	-0.56
Forest	154,313	154,188	-0.08	-0.08
Rock Association	20,881	17,694	-15.26	-15.26
Peat Bog	26,919	26,919	0.00	0.00
Old Burn	369	369	0.00	0.00
Young Burn	188	188	0.00	0.00
Number of Patches				
Lichen Veneer	10,164	10,124	-0.39	-0.39
Water	24,045	23,991	-0.20	-0.22
Esker	1,557	1,558	0.06	0.06
Riparian Shrub	2,185	2,178	-0.32	-0.32
Sedge Association	17,101	17,040	-0.33	-0.36
Heath Tundra / Heath Rock	3,561	3,620	1.57	1.66
Forest	5,006	5,007	0.02	0.02
Rock Association	1,323	1,294	-2.19	-2.19
Peat Bog	2,018	2,018	0.00	0.00
Old Burn	47	47	0.00	0.00
Young Burn	22	22	0.00	0.00
Mean Distance to Nearest Neighbour (m)				
Lichen Veneer	922	925	0.33	0.33
Water	733	734	0.14	0.14
Esker	1,499	1,508	0.60	0.60
Riparian Shrub	1,682	1,682	0.00	0.00
Sedge Association	813	815	0.25	0.25
Heath Tundra / Heath Rock	568	569	0.18	0.18
Forest	632	633	0.16	0.16
Rock Association	2,117	2,117	0.00	0.00
Peat Bog	1,024	1,024	0.00	0.00
Old Burn	5,994	5,994	0.00	0.00
Young Burn	7,728	7,728	0.00	0.00

Values of 0.00 represent values greater than, less than, or equal to zero, but less than 0.005.

ha = hectare; % = percent; m = metre; RFD = reasonably foreseeable development.

Table 4.2-12 Change (Percent) in Area and Configuration of Habitat Types Within the Bathurst Caribou Herd Autumn Range During Reference Condition and Reasonably Foreseeable Development Case

Habitat Type	Reference Condition	RFD Case with Sable Project	Cumulative Change (%) Reference Condition to RFD Case without Sable Project	Cumulative Change (%) Reference Condition to RFD Case with Sable Project
Total Area (ha)				
Lichen Veneer	318,175	316,094	-0.65	-0.65
Water	3,204,094	3,192,475	-0.36	-0.36
Esker	117,488	116,263	-1.04	-1.04
Riparian Shrub	22,538	22,450	-0.39	-0.39
Sedge Association	571,363	569,006	-0.40	-0.41
Heath Tundra / Heath Rock	7,402,375	7,367,938	-0.45	-0.47
Forest	1,846,856	1,839,913	-0.38	-0.38
Rock Association	21,325	18,013	-15.53	-15.53
Peat Bog	174,663	174,231	-0.25	-0.25
Old Burn	11,738	11,613	-1.06	-1.06
Young Burn	213,644	213,456	-0.09	-0.09
Habitat Type				
Number of Patches				
Lichen Veneer	8,043	8,003	-0.50	-0.50
Water	42,519	42,477	-0.08	-0.10
Esker	2,568	2,568	0.00	0.00
Riparian Shrub	2,510	2,503	-0.28	-0.28
Sedge Association	27,182	27,120	-0.21	-0.23
Heath Tundra / Heath Rock	11,794	11,861	0.54	0.57
Forest	19,248	19,263	0.08	0.08
Rock Association	1,377	1,346	-2.25	-2.25
Peat Bog	10,576	10,561	-0.14	-0.14
Old Burn	542	539	-0.55	-0.55
Young Burn	1,219	1,222	0.25	0.25
Habitat Type				
Mean Distance to Nearest Neighbour (m)				
Lichen Veneer	1,091	1,094	0.27	0.27
Water	686	687	0.15	0.15
Esker	1,458	1,467	0.62	0.62
Riparian Shrub	1,696	1,702	0.35	0.35
Sedge Association	820	822	0.24	0.24
Heath Tundra / Heath Rock	605	605	0.00	0.00
Forest	605	605	0.00	0.00
Rock Association	2,479	2,491	0.48	0.48
Peat Bog	979	979	0.00	0.00
Old Burn	2,614	2,622	0.31	0.31
Young Burn	1,096	1,095	-0.09	-0.09

Values of 0.00 represent values greater than, less than or equal to zero, but less than 0.005.

ha = hectare; % = percent; m = metre; RFD = reasonably foreseeable development.

In the reference condition, spring and autumn ranges each had 0.01% of the range classified as disturbance, while there were no disturbances in the post-calving range.

Considering the cumulative changes from reference condition to the RFD Case (with Sable project), rock association (exposed bedrock or boulder fields; with very little vegetative cover) was reduced by 5% in the spring range, 15% in the post-calving range, and by 16% in the autumn range. Eskers decreased by 0.9%, 1.6%, and 1.0% in spring, post-calving, and autumn ranges, respectively. Heath tundra/heath rock was reduced by 0.6% in the post-calving range and lichen veneer decreased by 0.7% in the autumn range. In all other habitats, in all seasonal ranges, there was less than a 0.5% decrease in any habitat type between reference conditions and the RFD Case. The disturbance footprint increased from reference condition to RFD Case by approximately 80,000 ha in spring range, 50,000 ha in post-calving range, and 63,000 ha in autumn range. The cumulative direct disturbance from the Project and all previous, existing, and reasonably foreseeable future developments is predicted to be less than 0.6% of the total area in each seasonal range.

In addition to direct loss of habitat, human developments result in the fragmentation of the landscape. The number of habitat patches removed by previous and existing developments in the post-calving, spring, and autumn ranges were from 0 to 64 (sedge association habitat, spring range) patches. The largest negative relative change in the number of patches in the spring, post-calving, and autumn ranges from reference to RFD Case occurred in rock association habitat (-0.78% change in spring range, -2.19% change in post-calving range, and -2.25% change in autumn range). The largest positive relative change in the number of patches in the spring, autumn, and post-calving ranges from reference to RFD Case occurred in heath tundra/heath rock habitat (0.39% change in spring range, 1.66% in post-calving range, and 0.57% change in autumn range).

The largest absolute increase in the mean distance between nearest neighbour between the reference condition and the RFD Case occurs in rock association habitat in the autumn range (increase of 12 m) followed by esker habitat in the post-calving and autumn ranges (increases of 9 m in each). The largest relative increases in mean distance to nearest neighbour from reference conditions to RFD Case occur in esker habitat in autumn and post-calving ranges (increases of 0.62% and 0.60% respectively). All other nearest neighbour distances are expected to change by less than 0.5% for any habitat in any season.

The addition of the Sable project to the RFD Case represents less than 0.001% incremental reduction of the total area of caribou spring, post-calving, or autumn ranges. Water, sedge association, and heath tundra/heath rock were the habitat types most affected by the Sable project. The incremental reductions in total area of different habitat types ranged from 0.00% to 0.03% across the spring, post-calving, and autumn seasonal ranges. Incremental changes to the number of patches of different habitat types ranged from -0.02% to 0.09% from the application of the Sable project to the landscape in the RFD Case. Changes to the mean nearest neighbour distance between patches of similar habitat type were less than 0.01% for all habitats in all seasonal ranges.

Habitat Quality, Behaviour, and Movement

The amount of habitat in poor, low, good, and high quality categories varied with the seasonal responses of caribou to different land cover attributes. As reported in Section 12.4.2.2.2 of the DAR, under reference conditions, the approximate amount of preferred habitat (high and good quality habitat) was 39% of the spring range, 66% of the post-calving range, and 49% of the autumn range (Tables 4.2-13 to 4.2-15). The spring range also contained 15% low-quality habitat, 18% poor habitat, and 28% nil habitat. Reference conditions in the post-calving range included 12% poor habitat and 22% nil habitat. Beyond preferred habitat, autumn range reference conditions included 11% low-quality habitat, 16% poor habitat, and 25% nil habitat.

The cumulative changes from human developments on caribou habitat quality from reference conditions through to the RFD Case (with and without the Sable project) are presented in Tables 4.2-13 to 4.2-15, and illustrated in Maps 4.2-5 to 4.2-7. Preferred habitat in the spring range is expected to decline by 1.7%, a combination of a high-quality habitat decline predicted to reach 11% and good-quality habitat increase of 165%. The expected change in post-calving habitat is a loss of 14% of preferred habitat and the autumn range is expected to lose 12% of preferred habitat. The addition of the Sable project to the RFD Case is predicted to result in additional losses of preferred habitat of 0.0%, 0.4%, and 0.4% in spring, post-calving, and autumn seasons, respectively (Tables 4.2-13 to 4.2-15).

Table 4.2-13 Relative Changes in Amount of Different Quality Habitats on the Spring Range of the Bathurst Caribou Herd from Reference Conditions to Reasonably Foreseeable Development Case

Habitat Quality	Reference Condition (ha)	RFD Case with Sable Project (ha)	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
High	7,463,463	6,634,088	-10.8	-11.1
Good	420,038	1,112,794	160.2	164.9
Low	3,060,619	2,881,981	-5.7	-5.8
Poor	3,554,138	3,869,394	8.7	8.9
Nil (Water)	5,508,038	5,508,038	0.0	0.0
Total	20,006,294	20,006,294	0.0	0.0
Preferred[(a)]	**7,883,500**	**7,746,881**	**-1.7**	**-1.7**

a) Preferred habitat = High quality + Good quality.

RFD = reasonably foreseeable development; ha = hectare; % = percent

Table 4.2-14 Relative Changes in Amount of Different Quality Habitats on the Post-Calving Range of the Bathurst Caribou Herd from Reference Conditions to Reasonably Foreseeable Development Case

Habitat Quality	Reference Condition (ha)	RFD Case with Sable Project (ha)	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
High	5,898,563	5,088,463	-13.3	-13.7
Good	0.0	0.0	0.0	0.0
Low	0.0	690,869	NA	NA
Poor	1,081,994	1,201,225	10.7	11.0
Nil (Water)	1,920,306	1,920,306	0.0	0.0
Total	8,900,862	8,900,863	0.0	0.0
Preferred[(a)]	**5,898,563**	**5,088,463**	**-13.3**	**-13.7**

a) Preferred habitat = High quality + Good quality.

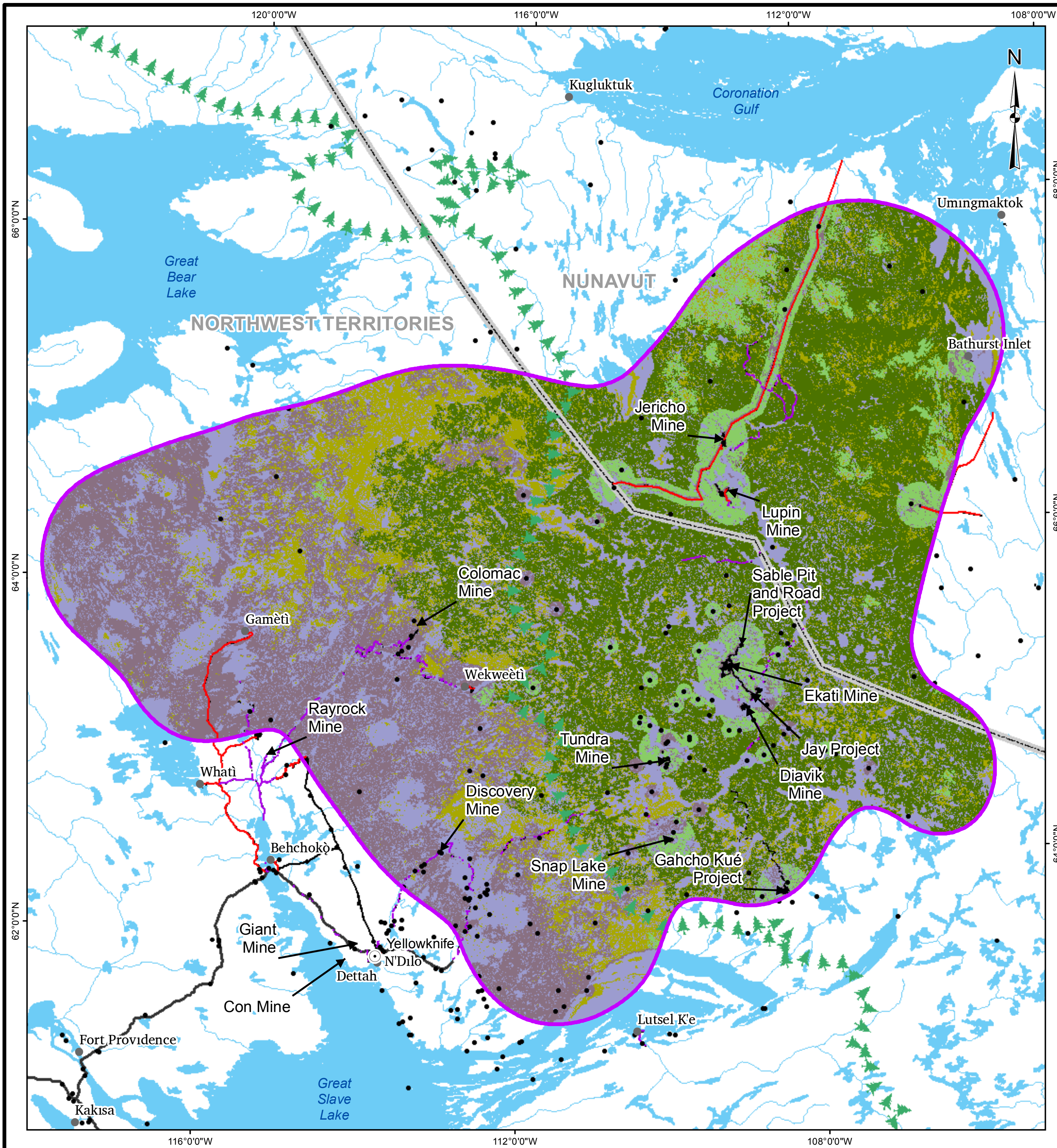
NA = not applicable; RFD = reasonably foreseeable development; ha = hectare; % = percent

Table 4.2-15 Relative Changes in Amount of Different Quality Habitats on the Autumn Range of the Bathurst Caribou Herd from Reference Conditions to Reasonably Foreseeable Development Case

Habitat Quality	Reference Condition (ha)	RFD Case with Sable Project (ha)	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
High	6,771,713	5,932,894	-12.0	-12.4
Good	0.0	0.0	0.0	0.0
Low	1,485,850	2,078,394	38.7	39.9
Poor	2,214,506	2,460,781	10.8	11.1
Nil (Water)	3,433,356	3,433,356	0.0	0.0
Total	13,905,425	13,905,425	0.0	0.0
Preferred[(a)]	**6,771,713**	**5,932,894**	**-12.0**	**-12.4**

a) Preferred habitat = High quality + Good quality.

RFD = reasonably foreseeable development; ha = hectare; % = percent



LEGEND

- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- CARIBOU EFFECTS STUDY AREA (SPRING RANGE)

HABITAT QUALITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,750,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT QUALITY FOR CARIBOU IN THE SPRING RANGE: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_018_GIS
DESIGN	LD	15/07/14	SCALE AS SHOWN REV. 0
GIS	JE	27/11/14	
CHECK	JLF	27/11/14	MAP 4.2-5
REVIEW	JV	27/11/14	

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LEGEND

- POPULATED PLACE
- ALL-SEASON ROAD
- PORTAGE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- CARIBOU EFFECTS STUDY AREA (POST-CALVING RANGE)

HABITAT QUALITY

- HIGH
- LOW
- POOR
- NIL

75 0 75

SCALE 1:2,500,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT QUALITY FOR CARIBOU IN THE POST-CALVING RANGE: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_019_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	JE	27/11/14	MAP 4.2-6	
CHECK	JLF	27/11/14		
REVIEW	JV	27/11/14		

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LEGEND

- ⊙ TERRITORIAL CAPITAL
- ● POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- • DEVELOPMENT
- ■ DEVELOPMENT
- CARIBOU EFFECTS STUDY AREA (AUTUMN MIGRATION RANGE)

HABITAT QUALITY

- HIGH
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,000,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT QUALITY FOR CARIBOU IN THE AUTUMN RANGE: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_020_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	JE	27/11/14	MAP 4.2-7	
CHECK	JLF	27/11/14		
REVIEW	JV	27/11/14		

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Regulators and local communities have concerns that increased traffic on the Misery Road may act as a barrier to caribou movement. Traffic on the Sable Road may also act as a barrier to caribou movement. The initial response of caribou to roads is avoidance, although in time, caribou may become habituated to the presence of roads and traffic (see Section 12.4.2.2.2 in the DAR). From 2011 to 2012, motion detection wildlife cameras were used to investigate caribou interactions with the Misery Road and other mine site roads. The overall rate of deflections was observed at approximately 2% of road interactions, meaning that 98% of the caribou-road interactions photographed did not show clear observations to suggest that the Misery Road impeded movement. Deflections did not appear to be affected by changing traffic levels on the Misery Road over the duration of the study. However, the effective range of the cameras is likely limited to less than 500 m, meaning that caribou reactions to the road beyond this distance would be difficult to discern from the data.

Traffic volumes on the Misery and Jay roads are anticipated to be 56 trips per day by road trains during operation of the Jay Project. A road train consists of one truck pulling three trailers. There are expected to be seven road trains making eight trips per day. There will be approximately 12.3 minutes between each road train. The traffic volume predicted for the Sable Road ranges from 15 to 99 vehicles per day (BHP and DIAMET 2000). Traffic volumes are predicted to be less than or equal to 35 vehicles per day for 5 of the 8 years the Sable Pit is anticipated to be in operation (BHP and DIAMET 2000). Modified traffic patterns and road closures will be used as necessary to mitigate barrier effects to caribou from the Misery, Jay, and Sable roads.

Behaviour, Energy Balance, and Calf Production

In total, 269 individual female caribou paths comprised of 36,682 partial paths or segments from the Bathurst herd were created from 7 to 22 animals per year from 1996 to 2013. On average, location data were obtained every 3.2 days per animal and year, with shorter intervals between successive locations for the latter years of the study. For example, since 2009, the mean number of days between successive location data has been approximately 0.5 days (n = 86 collared animals). In addition, the average duration of the total movement path (sum of all linear segments) was over 113 days and extended 1,068 km per animal and year (approximately 9.5 km per day). The overall mean speed of caribou movement was 480.1 m per hour (standard deviation [SD] = 117.9), and was variable across years.

Residency

From 1996 to 2013 (Base Case), Bathurst caribou resided in zones of influence (ZOIs) for an average of 8.9 days (SD = 5.2 days) or 6.4% of their time during the post-calving to autumn period (n = 269 paths). The amount of time spent by female caribou in zones of influence has ranged from 0.5% in 1996 to 13.8% in 2004 (Table 4.2-16). The results suggest that residency time in zones of influence have increased by 0.3% annually from 1996 to 2013 (DAR Section 12.4.2.3.2).

Simulations with the RFD Case (with Sable project) predicted that caribou may reside in ZOIs for an average of 18.9 days (SD = 4.7) or 13.7% of their time during this period. Residency time in ZOIs ranged from 7.4% to 19.9% of the post-calving to autumn period using movement data from 1996 to 2013 (Table 4.2-16). Relative to the Base Case, the RFD Case with the Sable project is predicted to increase ZOI residency time by 7.2% or 9.9 days of the 138-day post-calving to autumn range. The addition of the

Sable project to the RFD Case is predicted to increase the mean residency in the ZOI by 0.7 days or 0.5% (Table 4.2-16).

Table 4.2-16 Cumulative Changes in Residency Time and Rates of Encounter of Bathurst Herd caribou with Zones of Influence (ZOIs) around developments from June 15 to October 31 annually from Base Case to Reasonably Foreseeable Development Case

Parameter	Base Case	RFD Case with Sable Project	RFD Case without Sable Project	Cumulative Change from Base Case to RFD Case with Sable Project
Mean number of days in ZOI annually (1996-2013)	8.9	18.9	18.2	9.9
Mean percent of time in ZOI annually (1996-2013)	6.4%	13.7%	13.2%	7.2%
Mean annual number of encounters with ZOI	8.9	20.0	16.1	11.0
Maximum annual number of encounters with ZOI	18.6	33.6	28.2	15.0

RFD = reasonably foreseeable development; ZOI = zone of influence; % = percent

Encounter Rates

As described in Section 12.4.2.3.2 of the DAR, caribou paths from 1996 to 2013 were used to calculate the number of caribou encounters with zones of influence. During Base Case conditions, mean annual encounter rates have ranged from 2.4 encounters per 138 days in 2000 to 18.6 encounters per 138 days in 2009 (Table 4.2-16). The anticipated encounter rate with ZOIs on the post-calving to autumn range through the RFD Case (with Sable project) was higher than the Base Case (Table 4.2-16). The number of mean annual encounters ranged from 9.3 to 33.6 using movement data from 1996 to 2013. Across all years combined, the mean annual encounter rate was 20.0 encounters per 138 days (SD = 6.3). Relative to the Base Case, the RFD Case with Sable project is predicted to result in an average of 11.0 more encounters per 138 (SD = 3.8) days during the post-calving to autumn period. The addition of the Sable project to the RFD Case is predicted to increase the number of encounters with the ZOI by 3.9 in an average year or 5.2 in a peak year (Table 4.2-16).

Energetic Costs from Development and Insect Harassment

Total energetic costs of insect harassment and development encounters were presented in the DAR (Section 12.4.2.3.2). Assuming that caribou are exposed to one major disturbance event per day when residing within a ZOI, then residency times from 1996 to 2013 suggest that caribou encounter an average of 8.9 disturbance events during post-calving and autumn movements. Under the Base Case, residency time with ZOIs predict that caribou can encounter up to 16.6 disturbance events. In contrast, the analysis of caribou paths entering zones of influence predicted that the mean number of disturbance events was 8.9 from 1996 to 2013. Under the Base Case, encounter rates predict that female caribou may be influenced by 18.6 disturbance events. For both analyses, it was assumed that when an animal entered or resided in a ZOI, the animal experienced a disturbance event regardless of how close it was to the development or activity.

For energetics modelling and analyses, the estimated ZOI encounter rates (Table 4.2-16) were used to predict the number of disturbance events that female caribou may experience under different landscape scenarios. Encounter rates typically generated a higher number of disturbance events than residency time. Using maximum mean annual values (Table 4.2-16) it was predicted that female caribou encounter 28 (RFD Case without Sable project) and 34 (RFD Case with Sable project) disturbance events, respectively, during the post-calving to autumn (Table 4.2-17). Under reference conditions, the number of disturbance events encountered was set at zero.

Table 4.2-17 Modelled Effects of Various Landscape Developments and Insect Harassment Intensities on Fecundity Rates of Caribou

Scenario	Insect Harassment Index	Disturbance Encounters[(a)]	% Decrease in Parturition/ Fecundity[(b)]	Parturition Rate for Females at Prime Age[(c)]
Reference, low IHI	15	0	0.0	1.000[(d)]
Reference, average IHI	26	0	10.2	0.898
Reference, high IHI	44	0	26.8	0.732
RFD Case (without Sable Project), low IHI	15	28	5.3	0.947
RFD Case (without Sable Project), average IHI	26	28	15.5	0.845
RFD (without Sable Project), high IHI	44	28	32.2	0.678
RFD Case (with Sable Project), low IHI	15	34	7.5	0.925
RFD Case (with Sable Project), average IHI	26	34	17.7	0.823
RFD Case (with Sable Project), high IHI	44	34	34.4	0.656

a) Cause caribou to increase movement, run, become excited and metabolize stored energy (=mean residency time in ZOIs x 138 days). Maximum encounter rates were used for RFD Cases.
b) Proportional Reduction = [((IHI – 15) x 0.185 kg) + (disturbance events x 0.55 x 0.081 kg] / 20 kg (see equation in Section12.4.2.3.1 in the Jay DAR).
c) Reference value – (percent decrease (b) x reference value).
d) Assumed reference parturition rate.
IHI = Insect Harassment Index; % = percent; RFD = reasonably foreseeable development; ZOIs = zones of influence; kg = kilogram.

In a landscape with negligible disturbance from insects and development (i.e., ideal conditions), the fecundity rate in the population may theoretically approach 1.0 or 100%. For the assessment, it was assumed that fecundity was maximum (i.e., 1.0) under reference conditions. Reference conditions provide a null model for determining the independent effects from development and insects on caribou fecundity. With low insect harassment and no development, the model predicts a 0.0% decrease in fecundity for some females and in some years (i.e., parturition rate = 1.0; Table 4.2-17) relative to ideal conditions. In a year with severe insect harassment and no development on the landscape, fecundity may be reduced by 26.8%.

With cumulative encounters carried through the RFD Case (with Sable project), fecundity may decrease by 7.5%, 17.7%, or 34.4%, respectively under low, medium, or high levels of insect harassment relative to reference conditions. The energetic model predicts that insect levels have the largest influence on fecundity. For those summers when insect harassment is low, female encounters with disturbance would be required to exceed 452 disturbance events so that there is an expenditure of 20% of 100 kg (i.e., 20 kg), and no calf production the following year. If considering the effects from severe insect harassment and disturbance encounters, then approximately 331 disturbance events per individual would be required to reduce parturition to zero, resulting in no calf production.

Based on the expected number of disturbance encounters for current landscape conditions with the Project and future developments without Sable project (approximately 28), female caribou would have to increase their encounter rate per day by approximately 14 to 19 times to result in no calf production the following spring. The addition of the Sable project to the RFD Case is predicted to increase the number of encounters with the ZOI by 3.9 in an average year or 5.2 in a peak year (Table 4.2-16) resulting in an additional reduction in annual fecundity rate of 2.2% (Table 4.2-17).

4.2.4.4 Residual Impact Classification and Significance

The DAR predicted that there would be no significant incremental and cumulative effects from the Jay Project and other developments on the ability of Bathurst caribou herd (and the Ahiak and Beverly herds) to be self-sustaining and ecologically effective (Section 12.6.2; Table 12.6-2). The addition of the Sable project to the RFD Case represents less than 0.001% incremental reduction of the total area of caribou spring, post-calving, or autumn ranges. Water, sedge association, and heath tundra/heath rock were the habitat types most affected by the Sable project. The incremental reductions in total area of different habitat types ranged from 0.00% to 0.03% across the spring, post-calving, and autumn seasonal ranges. Incremental changes to the number of patches of different habitat types ranged from -0.02% to 0.09% from application of the Sable project to the landscape in the RFD Case. Changes to the mean nearest neighbour distance between patches of similar habitat type were less than 0.01% for all habitats in all seasonal ranges.

The addition of the Sable project to the RFD Case is predicted to result in additional losses of preferred habitat of 0.0%, 0.4%, and 0.4% in spring, post-calving, and autumn seasons, respectively. Based on the expected number of disturbance encounters for current landscape conditions with the Project and future developments without the Sable project (approximately 28), female caribou would have to increase their encounter rate per day by approximately 14 to 19 times to result in no calf production the following spring. The addition of the Sable project to the RFD Case is predicted to increase the number of encounters with the ZOI by 3.9 in an average year or 5.2 in a peak year resulting in an additional reduction in annual fecundity rate of 2.2%.

Deflections in animal movement from increased traffic on the Sable Road could adversely affect migration and connectivity of the Bathurst caribou herd in the same manner as traffic on the Jay and Misery roads. The expansion of the Ekati Mine monitoring program during migration periods will identify concentrations and movements of animals that may interact with the roads. As with the Jay Project, stockpiling of ore, modifications to traffic patterns, and the implementation of road closures are expected to provide opportunities for caribou to move across Sable Road, and limit effects to migration and maintain population connectivity.

As discussed in the DAR, extending the assessment into the future (RFD Case) decreases confidence in effects predictions, which is largely due the uncertainty in the actual timing (e.g., amount of overlap in time among the Sable and Jay Projects as well as future developments), location and size of developments, and the variability inherent in making long-term predictions in ecological systems (Section 12.6.2). The present structure and inputs of habitat and energetic models may not be applicable to future environments and caribou behavioural responses and population characteristics, which increases the uncertainty in cumulative effects from physical habitat loss and sensory disturbance on caribou abundance and distribution. Still, confidence in the predictions for the RFD Case is based on the consistent low effect sizes (i.e., magnitudes of change) that were determined from the incremental and cumulative changes from the Jay Project and other developments for habitat quantity and habitat quality, and energetics. Although each development likely influences the local movement and distribution of caribou across their seasonal ranges, there is no strong mechanism causing an adverse and long-term or permanent change in population survival and reproduction rates. The implementation of temporary modifications to traffic patterns and road closures is predicted to mitigate effects to migration and maintain connectivity for self-sustaining and ecologically effective barren-ground caribou populations.

In summary, the addition of the Sable project to the RFD case represents small incremental contributions to the cumulative changes predicted in the DAR. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to caribou (Table 4.2-18; Section 12.6.2 in the DAR).

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Table 4.2-18 Summary of Residual Impact Classification of Primary Pathways and Predicted Significance of Cumulative Effects on Barren-Ground Caribou

Pathway	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance for Assessment Endpoint[(a)]
Direct loss and fragmentation of habitat from the Jay Project footprint leading to changes in caribou abundance and distribution	Low	Regional	Permanent	Continuous	Irreversible	Highly likely	*Not Significant*
Sensory disturbance (lights, smells, noise, viewscape) leading to changes to movement and behaviour	Moderate	Regional	Long-term	Continuous	Reversible	Highly likely	
Increased traffic on the Misery Road and Jay Road, as well as and the above-ground power line along these roads, may create barriers to caribou movement, change migration routes, and reduce population connectivity	Moderate	Regional	Long-term	Periodic	Reversible	Highly likely	

a) Self-sustaining and ecologically effective caribou populations.

4.2.4.5 Follow-up and Monitoring

Follow-up and monitoring activities for barren-ground caribou currently are within the scope of the Ekati Mine Wildlife Effects Monitoring Program (WEMP) (Section 12.7 in the DAR) and will be applied to the Jay and Sable projects (including construction, operations, and closure). The existing Ekati Mine WEMP is consistent with wildlife and wildlife habitat monitoring guidelines prepared by the GNWT. Wildlife monitoring completed as part of the existing Ekati Mine WEMP includes measuring habitat loss, mine-related wildlife mortalities and interactions with site (including roads), mitigation and waste management effectiveness, and changes to behaviour. Caribou are included in these programs.

There is uncertainty regarding the magnitude of effects on caribou migration and movement from increased traffic on the Misery, Jay, and Sable roads. Dominion Diamond will implement monitoring of the Bathurst caribou herd to track migratory movements with the use of (i) satellite radiocollars (i.e., data requested from GNWT), (ii) reconnaissance surveys near the roads, and (iii) road surveys. The data collected during these monitoring activities will be used to test effects predictions and the success of proposed mitigation to limit effects to caribou from increased traffic on the roads.

4.2.5 Wildlife and Wildlife Habitat

4.2.5.1 Overview of Changes

The purpose of Section 4.2.5 is to assess the effects of the addition of the Sable project to wildlife and wildlife habitat. Addition of the Sable project to the RFD Case for the Project resulted in changes to the Pathway Analysis and Residual Effects Analysis sections. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on wildlife and wildlife habitat.

4.2.5.2 Pathway Analysis

Pathway analysis identifies and assesses the linkages between project components or activities, and the correspondent changes to the environment and potential residual effects (after mitigation) to wildlife. In the DAR, all effects pathways from the Project on wildlife that were related to changes in soil and vegetation quality from air and dust deposition and alterations in surface water, and direct mine-related mortality were determined to be no linkage or secondary (Section 13.3.2.2; Table 13.3-1). Environmental design features, mitigation, and management practices have been assessed and are in place for the Sable project. Consequently, there are no predicted changes in the no linkage and secondary pathways analysis related to wildlife with the addition of the Sable project.

4.2.5.2.1 Gray Wolf and Upland Breeding Birds

In the DAR, effects to gray wolf and upland breeding birds from pathways related to habitat loss and fragmentation, and changes to habitat quality, movement, behaviour, and population connectivity were determined to be secondary (Section 13.3.2.2.2). These pathways are assessed below with the addition of the Sable project.

- Direct loss and fragmentation of habitat may cause changes in gray wolf abundance and distribution.

Wolves are considered habitat generalists but eskers provide important denning habitat (Cluff et al. 2002; McLoughlin et al. 2004; Johnson et al. 2005). According to the Kitikmeot Inuit Association, wolves can be caught by trapping on eskers, and can be found around creeks and rivers and on lakes (Banci et al. 2006). Eskers may be a limiting factor for wolf populations in the NWT because eskers cover less than 3% of the Arctic tundra ecosystem (Cluff et al. 2002; McLoughlin et al. 2004). Cumulative loss of esker habitat from the reference condition compared to the RFD Case (with Sable project) is predicted to be 4.8% (262 ha).

Habitat loss and fragmentation from the Jay Project are predicted to result in a minor and local change in wolf abundance and distribution. Additional field investigations of the eskers around the Jay Project identified one active wolf den and one inactive den in 2013, but no dens in 2014 (Appendix I). The Jay Project is predicted to remove approximately 4 ha of esker habitat (1.5% of the total 265 ha loss of esker predicted for the RFD Case (with Sable project), and will create a negligible increase in esker fragmentation (see Tables 13.4-5 and 13.4-6 in Section 13 of the DAR). As such, the contribution to cumulative effects from the Jay Project on the gray wolf population is predicted to be small.

- Direct loss and fragmentation of upland bird habitat from the Project footprint may cause changes in abundance and distribution.
- Sensory disturbance (lights, smells, noise, dust, viewscape) may cause changes to upland bird habitat quality and movement and behaviour.

To determine direct changes to upland breeding bird populations from the Project and other previous, existing, and reasonably foreseeable developments in the birds ESA, the area of all terrestrial habitat disturbed by development footprints was assumed to be unavailable for upland breeding birds. For indirect changes from sensory disturbance, a 300 m buffer area was applied around the Project and previous or existing development footprints, and was also assumed to be unavailable. The buffer distance was based on a sensory disturbance distance described for passerines by Bayne et al. (2008). The assumption of no use by upland breeding birds is expected to overestimate the reduction to occupancy due to sensory disturbance because habitat that is not completely removed may continue to be used (Male and Nol 2005). Direct and indirect effects from previous and existing human developments were estimated using hypothetical development footprints when actual disturbance footprints were unavailable (Table 4.2-19).

Table 4.2-19 Hypothetical Footprints for Previous, Existing Developments in the Birds Effects Study Areas

Type of Development	Feature Type	Footprint Extent (m)
Lodge (outfitters, tourism)	Point	200
Mine	Polygon	Actual[(a)]
Mineral exploration	Point	500
Staging area (equipment or material storage)	Point	200
Winter road portages	Line	200
All-season road segments	Line	200

Note: Point features were buffered with a circular footprint. Linear features were buffered with a corridor (e.g., 200 m right-of-way).

a) Delineated and digitized from remote sensing imagery.
m = metre

Data from Smith et al. (2005) were used to determine effects from habitat loss and fragmentation (direct effects) on upland breeding bird populations. From 1996 to 2003, Smith et al. (2005) surveyed sedge wetland and heath tundra plots near the Ekati Mine to record the density and diversity of upland breeding birds (i.e., upland game birds, shorebirds, and songbirds) near and far from the Ekati Mine. The maximum density of birds recorded in the study was 109.5 birds/0.25 km^2 (438.0 birds/km^2).

Most upland habitat in the birds ESA is comprised of habitats surveyed by Smith et al. (2005) (i.e., heath tundra habitat types and sedge wetland). Upland habitat covers 3,976 km^2 of the birds ESA under reference conditions. Using the maximum bird density from Smith et al. (2005) of 438 birds/km^2, there were approximately 1,741,772 bird territories in the ESA under the reference condition. Cumulatively, human developments are predicted to remove 23,140 bird territories in the ESA from the reference condition to the RFD Case (with Sable Project [change of 1.3%]).

In addition to direct habitat effects, changes to habitat quality from the Project have the potential to indirectly affect the population size and distribution of upland birds through altered movement and behaviour of individuals. Most studies have found that birds avoid human disturbance by less than or equal to 1 km. Studies at the Ekati Mine found few effects on the upland bird community within 1 km of the Ekati Mine (Smith et al. 2005), and no measurable effect on the reproductive success of Lapland longspurs nesting adjacent to roads (Male and Nol 2005). Bayne et al. (2008) detected changes in abundance within 300 m of a gas compressor station (75 to 90 A-weighted decibels [dBA]) for approximately 33% of the boreal songbirds monitored. Benitez-Lopez et al. (2010) found that most birds have lower abundance within 1 km of human infrastructure.

Cumulatively, the area of upland habitats within 300 m of the Jay Project and previous, existing, and reasonably foreseeable developments in the birds ESA is 111 km^2. Therefore, conservatively, approximately 48,558 birds are predicted to be removed due to the cumulative sensory effects from the previous, existing, and reasonably foreseeable human developments (a 2.8% change from the reference condition relative to the RFD Case [with Sable project]). This estimate used the maximum density estimate from Smith et al. (2005) and assumed all areas within 300 m of any disturbance are not used by birds.

Cumulative direct and indirect effects from previous, existing, and reasonably foreseeable developments and the Project are anticipated to remove territories for 71,698 upland birds. This is a cumulative 4.1% decrease in the number of upland breeding territories relative to the reference condition.

In conclusion, previous, existing, and reasonably foreseeable developments along with the Project are predicted to result in relatively minor and local changes in the number of upland breeding nesting territories in the birds ESA. As such, incremental and cumulative changes from the Project and other developments are predicted to have negligible effects on self-sustaining and ecologically effective upland breeding bird populations.

- Sensory disturbance (lights, smells, noise, dust, viewscape) may cause changes in gray wolf habitat quality and movement and behaviour (and subsequent effect on den occupancy and productivity).
- Increased traffic on the Misery Road and Jay Road and the above-ground power line along these roads, may create barriers to gray wolf and caribou movement, and reduce gray wolf population connectivity, abundance, and distribution.

Wolves vary in their response to human disturbance near den sites and pups. For example, the probability of occupancy of a gray wolf den increased with decreasing distance to the Ekati Mine (BHP Billiton 2004). Conversely, in open tundra habitat in northern Alaska some wolves did not tolerate humans approaching within 800 m of a den and moved their pups to a secondary location (Thiel et al. 1998). Wolves generally move from their natal dens to rendezvous sites in August (Walton et al. 2001). However, wolves that have been undisturbed have successfully relocated their pups as early as June (Frame 2005). Therefore, even if wolves are disturbed soon after denning, relocation to a new site may not necessarily result in mortality of pups. Also, although wolves show den site fidelity, new dens may be established within 25 km of previous dens (Walton et al. 2001).

In the central Canadian Arctic, prey abundance may be a more important factor influencing wolf productivity than human development (Frame 2005). The Bathurst caribou herd is the main source of prey for wolves in the gray wolf ESA (Walton et al. 2001) and this herd has declined in recent years (GNWT-ENR 2014). The decline of the Bathurst caribou herd, along with declines in other caribou herds, may have negatively affected gray wolf populations throughout the NWT (Cluff and Klaczek 2014; Nesbitt and Adamczweski 2013). From 2005 to 2009, the number of active wolf dens in the southern portion of the Bathurst caribou herd range decreased from 17 to 1 (Nesbitt and Adamczweski 2013). This decrease coincides with the decline of the Bathurst caribou herd from 186,000 individuals in 2003 to 32,000 individuals in 2009 (GNWT-ENR 2014). Studies in other regions have found similar trends. In Quebec and Labrador, the population of wolves that relied on the George River caribou herd declined substantially when the herd had low numbers in the 1940s (Bergerud et al. 2008).

The caribou energetics model conservatively assumed caribou would not cross the Misery and Jay roads (i.e., that the roads were a complete barrier to movement) and be required to travel using longer alternate routes to continue migration through the Lac de Gras area (Section 12.4.2.3.1 in the DAR). However, observations through 16 years of operations at the Ekati Mine, including camera monitoring, confirm that caribou do cross the Misery Road and other site roads. Therefore, mine roads (such as the Misery, Jay, and Sable roads) are not likely to act as complete barriers to caribou (and carnivore) movements (ERM Rescan 2014c). Dominion Diamond will implement staged monitoring of the Bathurst caribou herd to track migratory movements via (i) satellite radiocollars, (ii) aerial reconnaissance surveys for caribou approaching the roads, and (iii) road surveys. The data collected during these monitoring activities will be used to test effects predictions and the success of proposed mitigation for increased traffic on the Misery, Jay, and Sable roads. Effects to wolf (and other carnivores and caribou) movement from traffic on the Misery, Jay, and Sable roads will be mitigated by the following:

- modified traffic patterns and road closures will be used as necessary to protect caribou and people; and,
- stockpiling ore to provide supply for processing during road closures.

Mitigation activities are anticipated to reduce effects to caribou and wolf movements and population connectivity.

Roads with high traffic volumes may be a partial barrier to wolf movement. Alexander et al. (2005) found that crossing rates of roads by carnivores (including wolf) in Banff National Park significantly ($P \leq 0.05$) decreased when traffic volumes were greater than 300 vehicles per day. In this assessment, road trains were predicted to make 56 trips per day on the Misery and Jay roads during Project operation (Section 3.5.1.6 of the Jay Project DAR). The traffic volume predicted for the Sable Road ranges from 15 to 99 vehicles per day (BHP and DIAMET 2000). Traffic volumes are predicted to be less than or equal to 35 vehicles per day for 5 of the 8 years the Sable Pit is anticipated to be in operation (BHP and DIAMET 2000). Sensory disturbance from increased traffic may decrease the use of habitat near these roads by wolves. However, traffic volumes are not anticipated to be high enough to result in large changes in the crossing rates by wolves.

Cumulative effects from human developments are predicted to result in minor changes to den occupancy and productivity in the wolf ESA. A total of 23 gray wolf dens have been found in the wolf ESA from 1995 to 2014. From 1 to 7 of these dens have been occupied each year, with each den being occupied for 1 to 6 of the 18 survey years. Of the 23 dens that have been found in the wolf ESA, 3 may be affected by the Jay Project, Sable Pit, and Sable Road. The Misery Esker den is located approximately 400 m from the proposed Jay WRSA and 3 km north of the proposed Jay Road. The Misery Esker den was active in 2013 and has been occupied for 5 of the 8 years it has been surveyed (ERM Rescan 2014c). The Wedge Lake den is located approximately 2.5 km northwest of the Pigeon Pit and has been occupied for 1 of the 5 years it has been surveyed (ERM Rescan 2014c). The Ursula Esker den is approximately 1.5 km from the proposed Sable Road. The Ursula Esker den has been occupied for 5 of the 17 years it has been surveyed (ERM Rescan 2014c).

The close proximity of wolf dens to Ekati Mine infrastructure may lead to abandonment of dens, although wolves in the ESA have been found to den close to the Ekati Mine (BHP Billiton 2004). Wolves can develop new den sites and there are numerous other den sites in the wolf ESA that can be used. Since 1995, a maximum of 7 of the 23 located dens in the ESA have been occupied in any given year (ERM Rescan 2014c). As such, cumulative effects from human developments in the ESA are predicted to have negligible effects on the gray wolf population.

4.2.5.2.2 Waterbirds, Raptors, Wolverine and Grizzly Bear

The following primary pathways identified in the DAR were assessed for cumulative effects from previous existing, and reasonably foreseeable developments (including the Sable project) and the Jay Project on waterbirds, raptors, wolverine and grizzly bear:

- Direct loss and fragmentation of wildlife habitat from the Project footprint may cause changes in abundance and distribution of waterbirds, raptors, wolverine and grizzly bear.
- Sensory disturbance (lights, smells, noise, dust, viewscape) may cause changes to habitat quality, and the movement and behaviour of waterbirds, raptors, wolverine and grizzly bear, and influence population abundance and distribution.
- Increased traffic on the Misery Road and Jay Road and the above-ground power line along these roads, may create barriers to carnivore and caribou movement, change migration routes, which may affect wolverine and grizzly bear population connectivity, abundance, and distribution.

4.2.5.3 Residual Effects Analysis

4.2.5.3.1 Methods

The methods used to determine the residual effects from the Jay and Sable projects on wildlife VCs are the same as described in the DAR, with one exception. In the DAR there was no RFD Case assessed for waterbirds and raptors (Sections 13.4.2 and 13.4.3 in the DAR). In this DAR Addendum, the changes from the Project and previous, existing, and reasonably foreseeable developments (i.e., Sable) on waterbirds and raptors were estimated by calculating the relative difference or net change in habitat types between the reference condition and the RFD Case as follows:

100 × (RFD Case value – reference condition value) / reference condition value.

Similarly, the changes from the Project and previous, existing, and reasonably foreseeable developments (including the Sable project) on wolverine and grizzly bear seasonal ranges were estimated by calculating the relative difference or net change in that map unit between the reference condition and the RFD Case.

In addition, the numerical and qualitative changes between the Application Case (i.e., Base Case plus Jay Project) and the RFD Case (Application Case plus Sable) are presented to illustrate the incremental effects to waterbirds and raptors from the addition of the Sable project. For wolverine and grizzly bear, this was accomplished by presenting both the cumulative changes associated with the RFD Case with the Sable project and the cumulative changes of RFD Case without the Sable project presented in the DAR.

4.2.5.3.2 Results

Effects to the Abundance and Distribution of Waterbirds

Habitat Loss and Fragmentation

Determination of habitat loss and fragmentation for waterbirds used the same ESA, methods, and ELC data as vegetation. Thus, the results from habitat loss and fragmentation for waterbirds are the same as presented for vegetation (Section 4.2.3.3.2).

The cumulative reduction in land cover types from the reference condition to the RFD Case is predicted to be 7,128 ha or approximately 1.2% of the mapped ELC units in the ESA (Map 4.2-2). The RFD Case is predicted to directly decrease high suitability habitat (i.e., deep water, shallow water, and sedge wetland habitats) in the ESA for waterbirds by 2,023 ha (1.0%) relative to the reference condition (Table 4.2-3). The greatest reduction in highly suitable habitat is a 1,550 ha loss of deep water, which represents a 0.9% reduction. The incremental direct disturbance to high suitability habitat of the RFD Case (i.e., including Sable project) is 163 ha (<0.1%) relative to the Application Case.

In addition to direct loss of land cover types, the human developments result in the fragmentation of the landscape. The cumulative change from the reference condition to the RFD Case is a predicted loss of 587 patches (0.8%) of high suitability habitat (Table 4.2-3). The greatest change occurs for shallow water, which decreased by 333 patches (0.8%). The incremental change to the number of high suitability patches from the Application Case to the RFD Case is 54 patches (<0.1%). Cumulative differences to the MDNN of highly suitable habitats from the RFD Case were less than 1.0 m and no more than a 0.3% change relative to the reference condition (Table 4.2-4). Similarly, cumulative changes to mean patch size of high suitability were less than 1.0 ha and no more that 1.4% relative to the reference condition. Incremental changes to MDNN and mean patch size of high suitability habitats from the RFD Case were all less than 0.1% relative to the Application Case.

Habitat Quality, Behaviour, and Movement

Under the reference condition, approximately 52.6% of the ESA is suitable (high, good, low) staging habitat for waterbirds and 34.3% of the area represents suitable nesting habitat (Table 4.2-20) Several waterbird species were identified during additional baseline studies in 2013 and 2014 (Appendix I). For staging habitat, the ESA is predominantly of either poor (47.3%) or high (34.7%) suitability; the areas representing good or low suitability are much less abundant. Poor breeding habitat suitability comprises 65.7% and is the dominant habitat area in the ESA.

From reference condition to the RFD Case, high and good quality staging habitats in the ESA are expected to be decreased by 9,539 ha (4.6%) and 4,301 ha (5.2%), respectively. Previous, existing, and reasonably foreseeable developments, and the Jay Project are predicted to reduce high and good breeding habitats by 5,445 ha (5.6%) and 4,301 ha (5.2%), respectively (Table 4.2-20). Changes to waterbird staging and breeding habitat suitability in the ESA for the RFD Case are illustrated in Maps 4.2-8 and 4.2-9, respectively. Incremental reductions of high and good quality habitats associated with the RFD Case are 0.7% or less of staging habitat and 0.7% of breeding habitat, relative to the Application Case.

Table 4.2-20 Relative Changes in the Availability of Different Quality Habitats for Waterbirds from the Reference Condition to Reasonably Foreseeable Development Case

Model/Habitat Suitability	Reference (ha)	RFD Case with Sable Project (ha)	Cumulative Change (%) from Reference Condition to Application Case	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
Staging Habitat (Entire Waterbody Plus Upland Habitat Within 100 m of Waterbodies)				
High	206,310	196,771	-4.2	-4.6
Good	82,192	77,891	-4.5	-5.2
Low	23,960	34,667	39.0	44.7
Poor	280,812	283,946	1.1	1.1
Breeding Habitat (Shallow and Deep Water Within 100 m of the Shore Plus Upland Habitat Within 100 m of Waterbodies)				
High	97,437	91,993	-4.9	-5.6
Good	82,192	77,891	-4.5	-5.2
Low	23,960	31,469	26.8	31.3
Poor	389,685	391,923	0.5	0.6

ha = hectare; % = percent; m = metre; RFD = reasonably foreseeable development.

LEGEND

WATERCOURSE
WATERBODY
EFFECTS STUDY AREA
DEVELOPMENT

HABITAT SUITABILITY
HIGH
GOOD
LOW
POOR

10 0 10
SCALE 1:500,000 KILOMETRES

REFERENCE

NATIONAL TOPOGRAPHIC BASE DATA (NTDB) 1:250,000
CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT
DOMINION DIAMOND
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
STAGING HABITAT SUITABILITY FOR WATERBIRDS: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_006_GIS
DESIGN	LD	15/07/14	SCALE AS SHOWN REV. 0
GIS	JE	28/11/14	MAP 4.2-8
CHECK	JLF	27/11/14	
REVIEW	JV	27/11/14	

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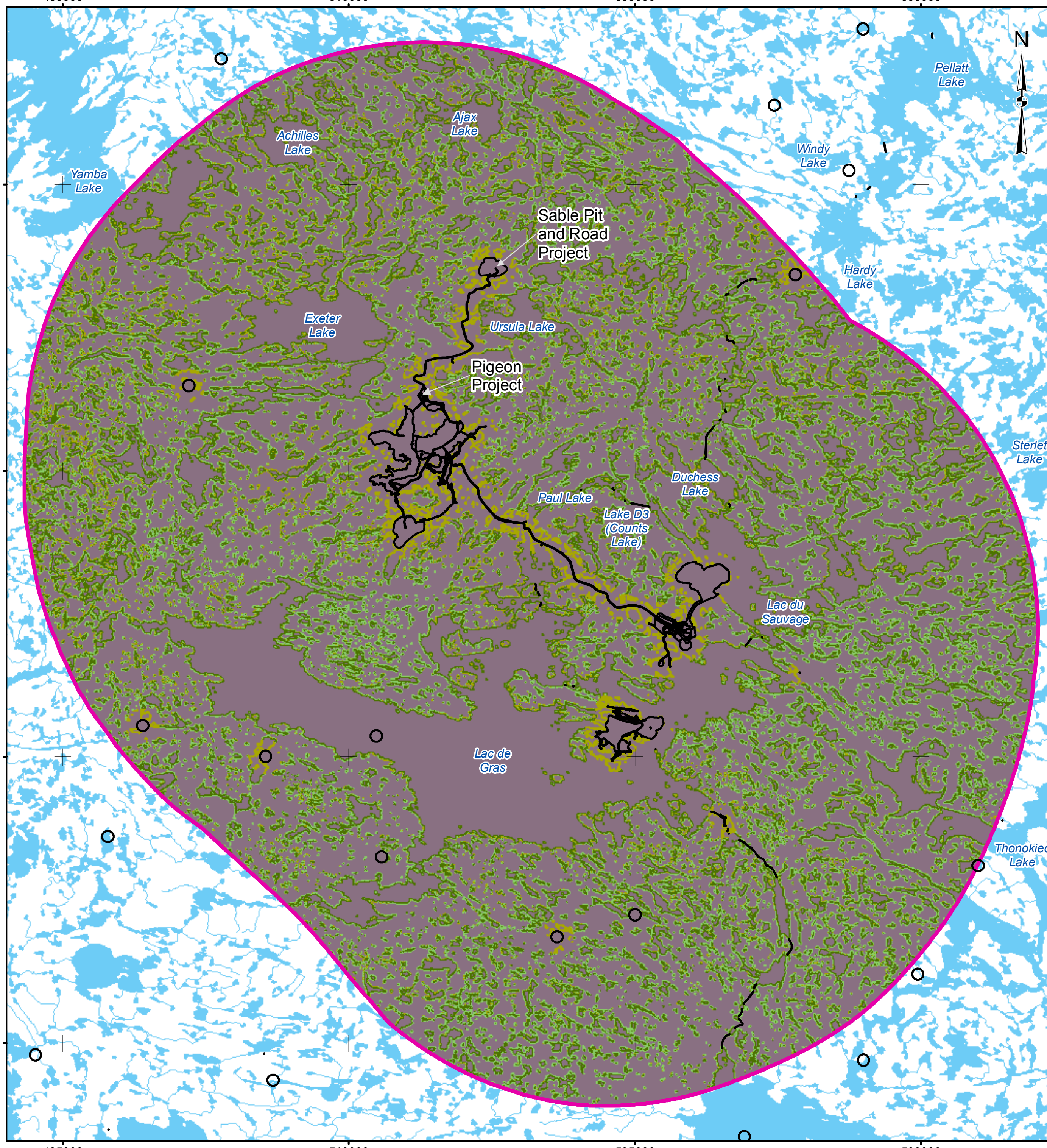

LEGEND

- WATERCOURSE
- WATERBODY
- EFFECTS STUDY AREA
- DEVELOPMENT

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR

10 0 10

SCALE 1:500,000 KILOMETRES

REFERENCE

NATIONAL TOPOGRAPHIC BASE DATA (NTDB) 1:250,000
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NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

BREEDING HABITAT SUITABILITY FOR WATERBIRDS: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_007_GIS
DESIGN	LD	15/07/14	SCALE AS SHOWN REV. 0
GIS	JE	28/11/14	MAP 4.2-9
CHECK	JLF	27/11/14	
REVIEW	JV	27/11/14	

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Effects to the Abundance and Distribution of Raptors

Habitat Loss and Fragmentation

The development of the Project will lead to a reduction in the quantity and fragmentation of raptor habitat. Raptors tend to have home ranges that encompass a variety of habitat types. This makes it difficult to determine habitat use from raptor surveys. The spatial boundary for the effects assessment for raptors was the birds ESA; thus, the results of loss and fragmentation of different habitat types determined for vegetation (Section 4.2.3.3.2) will be the same for raptors. However, nest locations are likely the more critical information regarding raptor distribution and abundance in the ESA. A habitat suitability index (HSI) model was used to determine incremental and cumulative disturbance to suitable raptor nest habitat as described in the DAR (Section 13.4.3.1.1).

Cumulative effects from the application of the Jay Project and previous, existing, and reasonably foreseeable developments are predicted to reduce suitable (high and good quality) habitat by 94 ha (0.9%), relative to the reference condition. Cumulative direct changes to high, good, and low habitats will increase the amount of poor habitat by 3,311 ha or 0.9% (Table 4.2-21). Incremental reductions of high and good suitability habitats associated with the RFD Case (i.e., from Sable project) are 0.3% and 0.4%, respectively, relative to the Application Case.

Table 4.2-21 Direct Loss of Different Suitable Habitats for Raptors from the Reference Condition to Reasonably Foreseeable Development Case

Habitat Suitability	Reference Condition (ha)	RFD Case with Sable Project (ha)	Cumulative Change (%) from Reference Condition to Application Case	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
High	10,185	10,091	-0.6	-0.9
Good	15,233	14,998	-1.1	-1.5
Low	214,732	211,750	-1.2	-1.4
Poor	353,125	356,436	0.8	0.9

Values less than -0.1 are approaching 0.0.

ha = hectare; % = percent; RFD = reasonably foreseeable development.

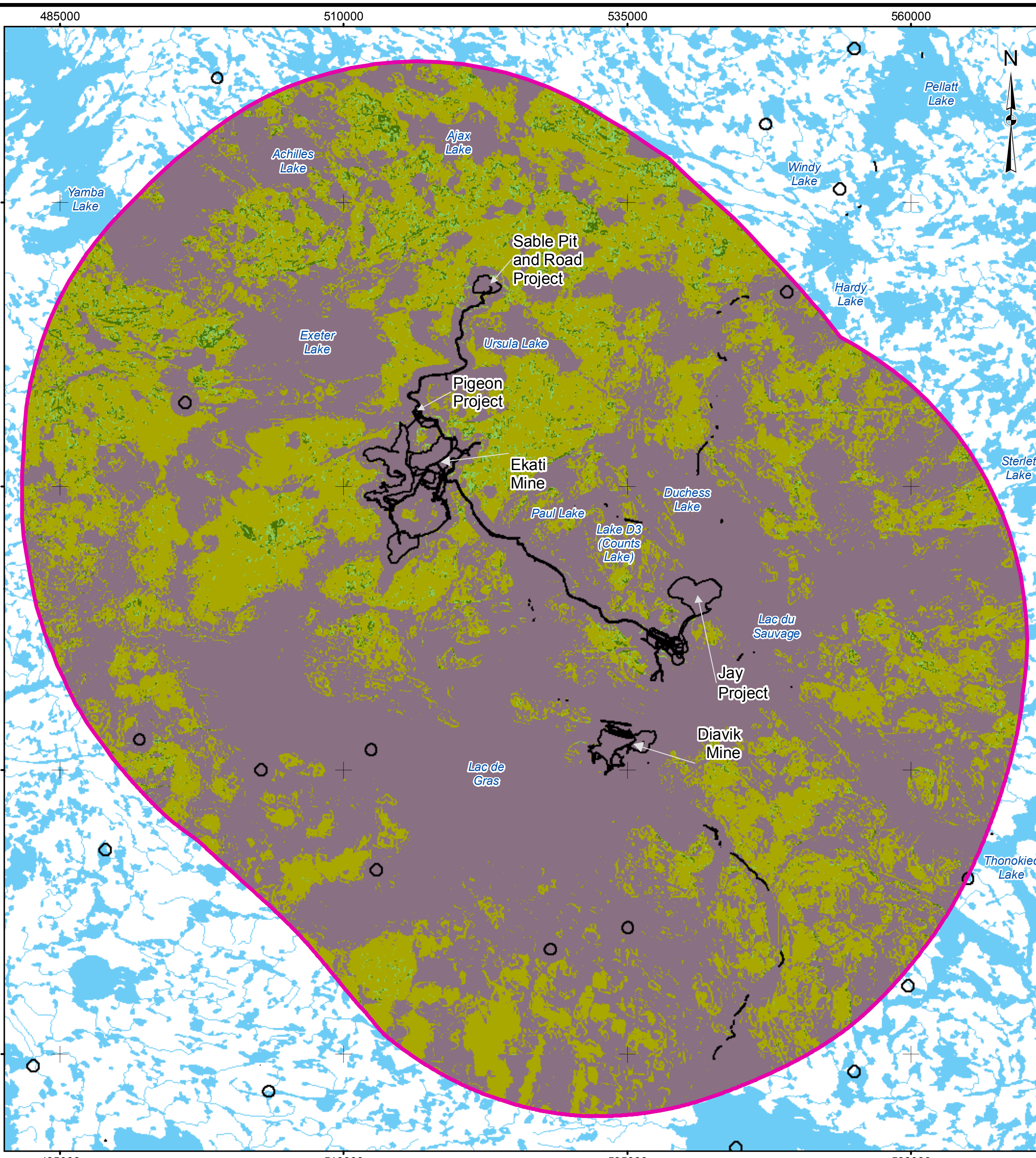
Habitat Quality, Movement, and Behaviour

Changes to habitat quality, movement, and behaviour were determined through application of the HSI model and 800 m zone of influence described in the DAR (Section 13.4.3.2.1). Suitable raptor habitat (combined high and good quality) comprised 4.3% of available habitat during the reference condition; thus, higher suitability habitats are limited for raptors in the ESA. The cumulative direct and indirect changes from the Jay Project and previous, existing, and reasonably foreseeable developments is expected to reduce high and good suitability habitat by 478 ha (4.7%) and 754 ha (4.9%), respectively, of that available in the reference condition (Table 4.2-22). Changes to raptor habitat suitability in the ESA for the RFD Case are illustrated in Map 4.2-10. Incremental reductions to high and good suitability habitat from the RFD Case (i.e., due to Sable project) were 1.2% and 1.0%, respectively, relative to the Application Case.

Table 4.2-22 Relative Changes in the Availability of Different Suitable Habitats for Raptors from the Reference Condition to Reasonably Foreseeable Development Case

Habitat Suitability	Reference (ha)	RFD Case with Sable Project (ha)	Cumulative Change (%) from Reference Condition to Application Case	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
High	10,185	9,707	-3.5	-4.7
Good	15,233	14,479	-4.0	-5.0
Low	214,732	202,045	-4.8	-5.9
Poor	353,125	367,044	3.2	3.9

ha = hectare; % = percent; RFD = reasonably foreseeable development.



LEGEND

WATERCOURSE	
WATERBODY	
EFFECTS STUDY AREA	
DEVELOPMENT	

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR

10 0 10

SCALE 1:500,000 KILOMETRES

REFERENCE

NATIONAL TOPOGRAPHIC BASE DATA (NTDB) 1:250,000
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NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT SUITABILITY FOR RAPTORS: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT	13-1328-0041		FILE No. SR_Wild_008_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	UW	28/11/14		
CHECK	JLF	27/11/14	**MAP 4.2-10**	
REVIEW	JV	27/11/14		

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Effects to the Abundance and Distribution of Wolverine

Habitat Loss and Fragmentation

Under the reference condition, the grizzly bear and wolverine ESA is mainly composed of open water (34.3%), heath tundra (22.7%), heath rock (16.0%), and sedge association (10.6%) habitats. Rock association covers approximately 7.4% of the ESA, while lichen veneer habitat covers approximately 3.2%. Low shrub and forest habitats constitute approximately 1.6% and 2.0% of the ESA, respectively. For the reference condition, less than 1% of the ESA is covered by each of esker, riparian shrub, peat bog, old burn, and young burn habitats.

Wolverine occurrence in the ESA is positively correlated with sedge association, heath rock, and rock association habitats in the winter; positive correlation is also present for sedge association habitat during the summer (Section 13.4.5.2 in the DAR). Persistent spring snow cover is an important component of wolverine habitat selection because females make their dens in snow. Wolverine dens are mostly associated with open areas (e.g., sedge association and heath rock habitats) and boulders (e.g., rock association habitat).

Human disturbance is expected to cover 0.4% of the ESA under the RFD Case (with Sable project). Cumulative changes from the reference condition to the RFD Case for rock association, heath rock, and sedge association habitats are less than or equal to 1.5% (Table 4.2-23). Addition of the Sable project to the RFD Case resulted in non-detectable changes in direct habitat loss for wolverine.

Table 4.2-23 Change (percent) in Area and Configuration of Habitat Types Within the Grizzly Bear and Wolverine Effects Study Area During Reference Condition and Reasonably Foreseeable Development Case (Winter Period)

Habitat Type	Reference Condition (ha)	RFD Case with Sable Project	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
Total Area (ha)				
Esker	89,488	88,144	-1.5	-1.5
Lichen Veneer	617,004	616,128	-0.1	-0.1
Rock Association	1,439,420	1,435,344	-0.3	-0.3
Heath Rock	3,102,960	3,092,196	-0.3	-0.3
Heath Tundra	4,397,132	4,383,200	-0.3	-0.3
Forest	387,668	386,872	-0.2	-0.2
Peat Bog	48,192	48,140	-0.1	-0.1
Riparian Shrub	88,860	88,688	-0.1	-0.2
Low Shrub	318,836	318,248	-0.2	-0.2
Sedge Association	2,049,608	2,042,444	-0.3	-0.3
Open Water	6,660,344	6,620,952	-0.3	-0.6
Old Burn	47,272	47,224	-0.1	-0.1
Young Burn	26,036	26,036	0.0	0.0

Table 4.2-23 Change (percent) in Area and Configuration of Habitat Types Within the Grizzly Bear and Wolverine Effects Study Area During Reference Condition and Reasonably Foreseeable Development Case (Winter Period)

Habitat Type	Reference Condition (ha)	RFD Case with Sable Project	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
Mean Distance to Nearest Neighbour (m)				
Esker	1,071	1,074	0.2	0.3
Lichen Veneer	705	706	0.1	0.1
Rock Association	687	688	<0.1	0.1
Heath Rock	511	512	<0.1	0.1
Heath Tundra	509	509	<0.1	<0.1
Forest	778	778	0.0	0.0
Peat Bog	750	751	0.1	0.1
Riparian Shrub	987	987	0.0	0.0
Low Shrub	840	841	0.1	0.1
Sedge Association	560	561	0.1	0.1
Open Water	486	486	<0.1	0.1
Old Burn	787	788	<0.1	0.1
Young Burn	4,053	4,053	0.0	0.0

Values of less than -0.1 approach 0.0.
ha = hectare; m = metre; % = percent; RFD = reasonably foreseeable development.

Wolverines are highly mobile and can travel up to 40 km per day (Section 13.4.5.2 in the DAR). Female wolverines in the NWT disperse an average of 133 km (range 69 to 225 km) and males an average of 231 km (range 73 to 326 km). Long distance movements of 378 km and 300 km (over 8 and 5 months, respectively) have also been reported. The MDNN for rock association, heath rock, and sedge association habitats ranged from 511 to 687 m under the reference condition (Table 4.2-23). Cumulative changes to the MDNN for rock association, heath rock, and sedge association habitats are predicted to be 0.1% (0.5 m or less), from the reference condition to the RFD Case (including Sable project). Incremental changes in MDNN from the addition of the Sable project were less than or equal to 0.1%.

Habitat Quality, Movement, and Behaviour

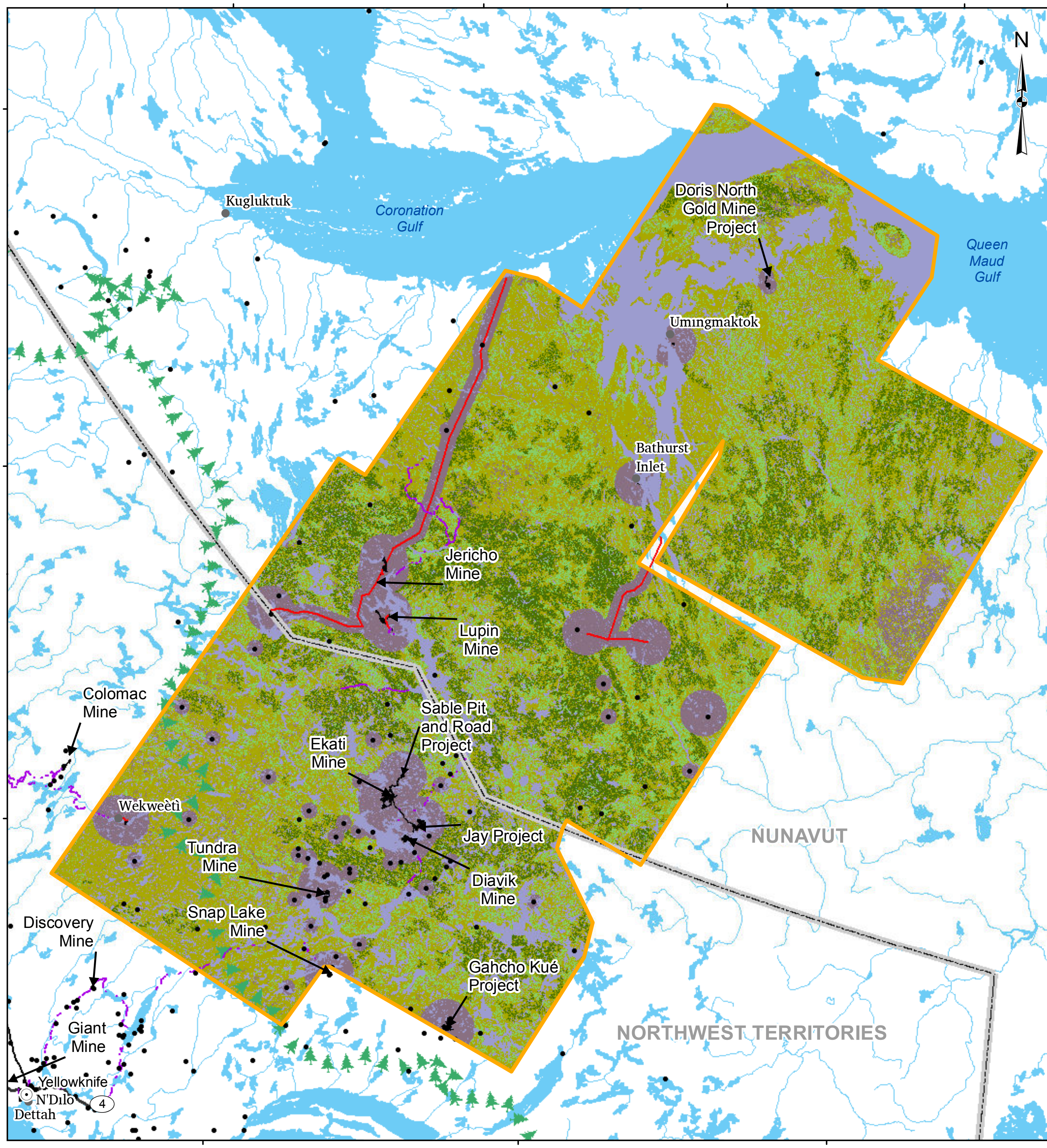
Changes to habitat quality, movement, and behaviour were determined through application of an resource selection function (RSF) model and zones of influence described in the DAR (Section 13.4.5.2.1). Suitable (combined high and good quality) spring to autumn habitats covered 29.0% of the ESA during the reference condition, while suitable winter habitats covered 21.2%. The RFD Case (with Sable project) is predicted to remove 8.4% of high quality and 10.6% of good quality spring to autumn habitats for wolverine (Table 4.2-24). The cumulative loss of suitable spring to autumn habitat is estimated to be 9.5%. The removal of high and good quality winter habitat from the reference condition to the RFD Case (with Sable project) is predicted to be 11.5% and 13.7%, respectively. The cumulative loss of suitable winter habitat is estimated to be 12.6%. Changes to wolverine spring through autumn and winter habitat suitability in the ESA for the RFD Case (with Sable project) are illustrated in Maps 4.2-11 and 4.2-12. The incremental reductions of high and good quality spring to autumn habitats from the RFD Case with Sable project are 0.1% and 0.4%, respectively, relative to the RFD Case without Sable project used in the DAR. For winter, the incremental reductions of high and good quality habitats from the RFD Case with Sable project are 0.1% and 0.5%, respectively, relative to the RFD Case without Sable project.

The cumulative amount of high and good winter habitat removed by human developments is considered to be a conservative estimate. Approximately 7.6% of the total 12.6% cumulative loss of suitable winter habitat is due to seasonal ice roads such as the TCWR and access roads to mine sites (i.e., 60.3% of the area within the ZOI in the ESA is due to winter roads). Disturbance from these roads is considered temporary because winter roads are only active for 8 to12 weeks every year. Additional conservatism was included in the analysis by assuming the section of the TCWR that is north of the Lac de Gras region was active (i.e., buffered by a 5 km ZOI). However, this northern portion of the road has not been constructed since 2008. The portion of the TCWR that is north of the Lac de Gras region accounts for 4.8% of the 7.6% loss of high and good quality winter habitat from winter roads from the reference condition to the RFD Case with the Sable project (i.e., 62.8% of the high and good quality habitats within the ZOIs of winter roads in the ESA is from the northern portion of the TCWR).

Table 4.2-24 Relative Changes in the Availability of Different Quality Habitats for Wolverine from Reference Condition to Reasonably Foreseeable Development Case

Season/Habitat Suitability	Reference Condition (ha)	RFD Case with Sable Project	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
Spring to Autumn				
High	2,815,256	2,579,208	-8.3	-8.4
Good	2,809,416	2,512,576	-10.2	-10.6
Low	9,082,064	8,353,648	-7.8	-8.0
Poor	532,076	1,793,380	231.7	237.1
Nil (water)	4,174,052	4,174,052	0.0	0.0
Winter				
High	2,026,292	1,794,252	-11.4	-11.5
Good	2,081,744	1,796,712	-13.2	-13.7
Low	9,489,256	8,439,424	-10.9	-11.1
Poor	1,641,520	3,208,424	93.7	95.5
Nil (water)	4,174,052	4,174,052	0.0	0.0

ha = hectare; % = percent; RFD = reasonably foreseeable development.



LEGEND

- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- EFFECTS STUDY AREA

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT
DOMINION DIAMOND
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
HABITAT SUITABILITY FOR WOLVERINE IN THE SPRING TO AUTUMN: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_009_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	JE	28/11/14	MAP 4.2-11	
CHECK	JLF	27/11/14		
REVIEW	JV	27/11/14		

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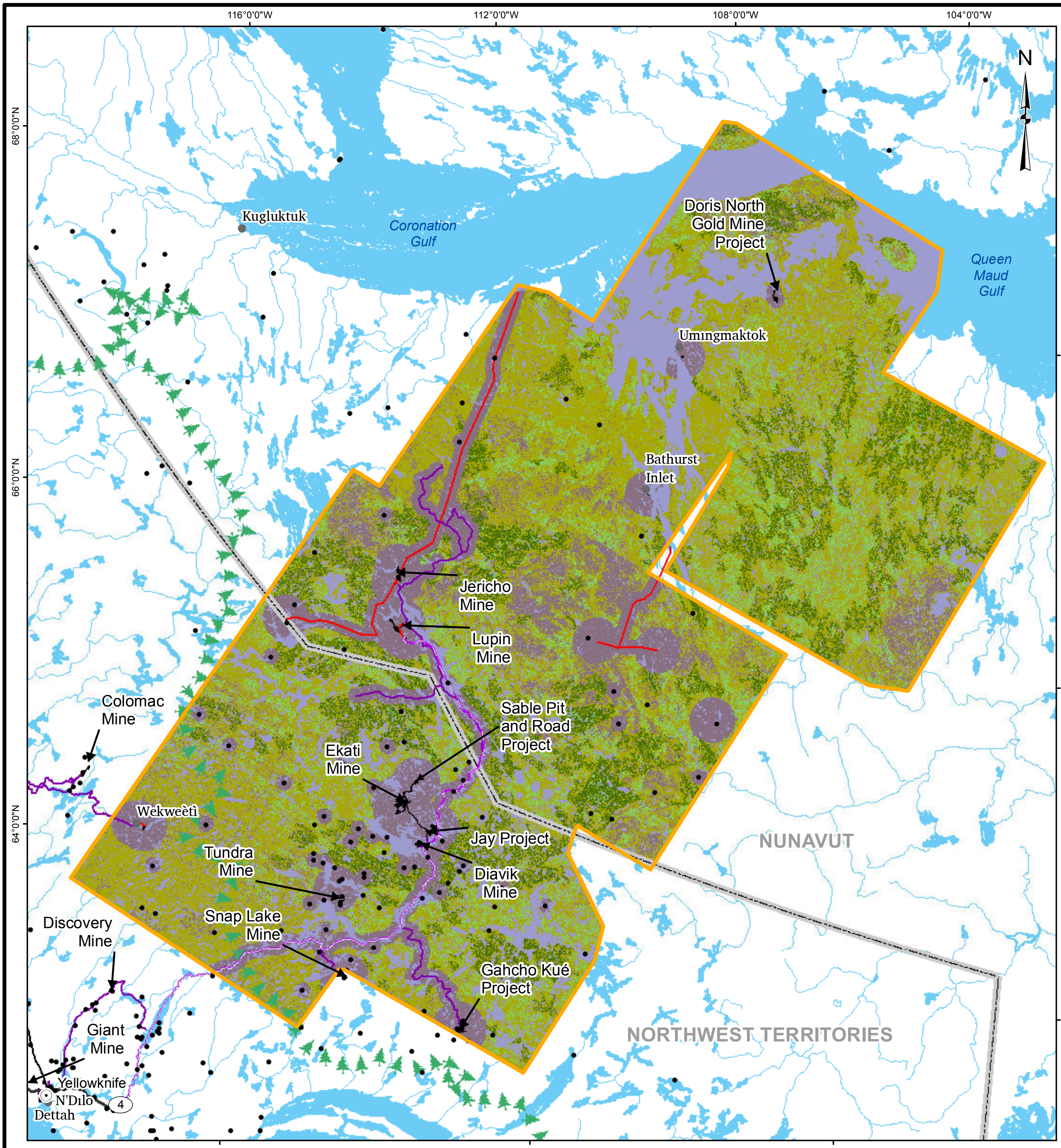

LEGEND

- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- WINTER ROAD
- TRANSMISSION LINE
- TIBBITT TO CONTWOYTO WINTER ROAD
- NORTHERN PORTION OF TIBBITT TO CONTWOYTO WINTER ROAD
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- EFFECTS STUDY AREA

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,750,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT SUITABILITY FOR WOLVERINE IN THE WINTER: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_010_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	JE	20/11/14	MAP 4.2-12	
CHECK	JLF	27/11/14		
REVIEW	JV	27/11/14		

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Effects to the Abundance and Distribution of Grizzly Bear

Habitat Loss and Fragmentation

Habitat loss and fragmentation analysis were completed using the same methods and study area for wolverine and grizzly bear (Table 4.2-23). Thus, similar to wolverine, addition of the Sable project to the RFD Case resulted in non-detectable changes in direct habitat loss for grizzly bear.

Barren-ground grizzly bears in the ESA were found to prefer esker, tussock/hummock tundra (sedge association), lichen veneer, birch seep (low shrub), and tall shrub riparian habitats (Section 13.4.6.2 in the DAR). Traditional and scientific knowledge suggest that eskers provide important denning habitat for grizzly bears in tundra environments. Traditional and scientific knowledge also suggests that the Lac de Gras region of the NWT contains high quality habitat for grizzly bears (Section 13.4.6.2 in the DAR). This may be due the prevalence of eskers for denning, access to food resources including caribou, fish, and forage in riparian zones, and low level of hunting in the area.

Cumulative loss of esker habitat in the ESA from the reference condition to the RFD Case (with Sable project) is predicted to be 1.5% (Table 4.2-23). Cumulative loss of other preferred grizzly bear habitats is predicted to be less than or equal to 0.3%, relative to the reference condition. The incremental reduction of preferred grizzly bear habitats from the RFD Case (with Sable project) is predicted to be less than 0.1%, relative to the RFD Case (without Sable project).

Grizzly bears are highly mobile. Males in the North Slave Region of the NWT travel an average of 7 to 11 kilometres per day (km/day); females travel an average of 4 to 6 km/day (Section 13.4.6.2 in the DAR). The maximum distances recorded for bears in the Lac de Gras Region was 8.5 km/day for males and 5.3 km/day for females. Grizzly bear home ranges in the North Slave Region average 6,685 km^2 for males and 2,074 km^2 for females; these are the largest home ranges recorded for grizzly bears in North America.

Under the reference condition, the mean distance to nearest similar habitat patch for preferred grizzly bear habitats (i.e., esker, lichen veneer, low shrub, riparian shrub, and sedge association) was from 560 to 1,071 m (Table 4.2-23). Cumulative changes in the MDNN for esker, lichen veneer, low shrub, riparian shrub, and sedge association habitats are predicted to be less than or equal to 0.3% (less than or equal to 3 m) from the reference condition to the RFD Case (including the Sable project). Incremental changes in MDNN from the addition of the Sable project were less than or equal to 0.1%.

Habitat Quality, Movement, and Behaviour

Changes to habitat quality, movement and behaviour were determined through application of an RSF model and zones of influence described in the DAR (Section 13.4.6.2.1). Grizzly bears that have home ranges near the Ekati and Diavik mines appear to be concentrated north and east of the mines in a band that reaches from Yamba Lake in the north, along the north shores of Lac de Gras, to Aylmer Lake in the southeast (Section 13.4.6.2 in the DAR). This area is thought to be highly suitable for grizzly bears because of the abundance of waterbodies, which provide forage and relief from hot weather, and the large number of eskers present in the area. The area north and east of the Ekati and Diavik mines is also considered to be highly suitable for the Bathurst caribou herd during the post-calving and summer periods. The spring, mid-summer, and fall diet of grizzly bears in the North Slave Region of the NWT is primarily comprised of caribou (Section 13.4.6.2 in the DAR).

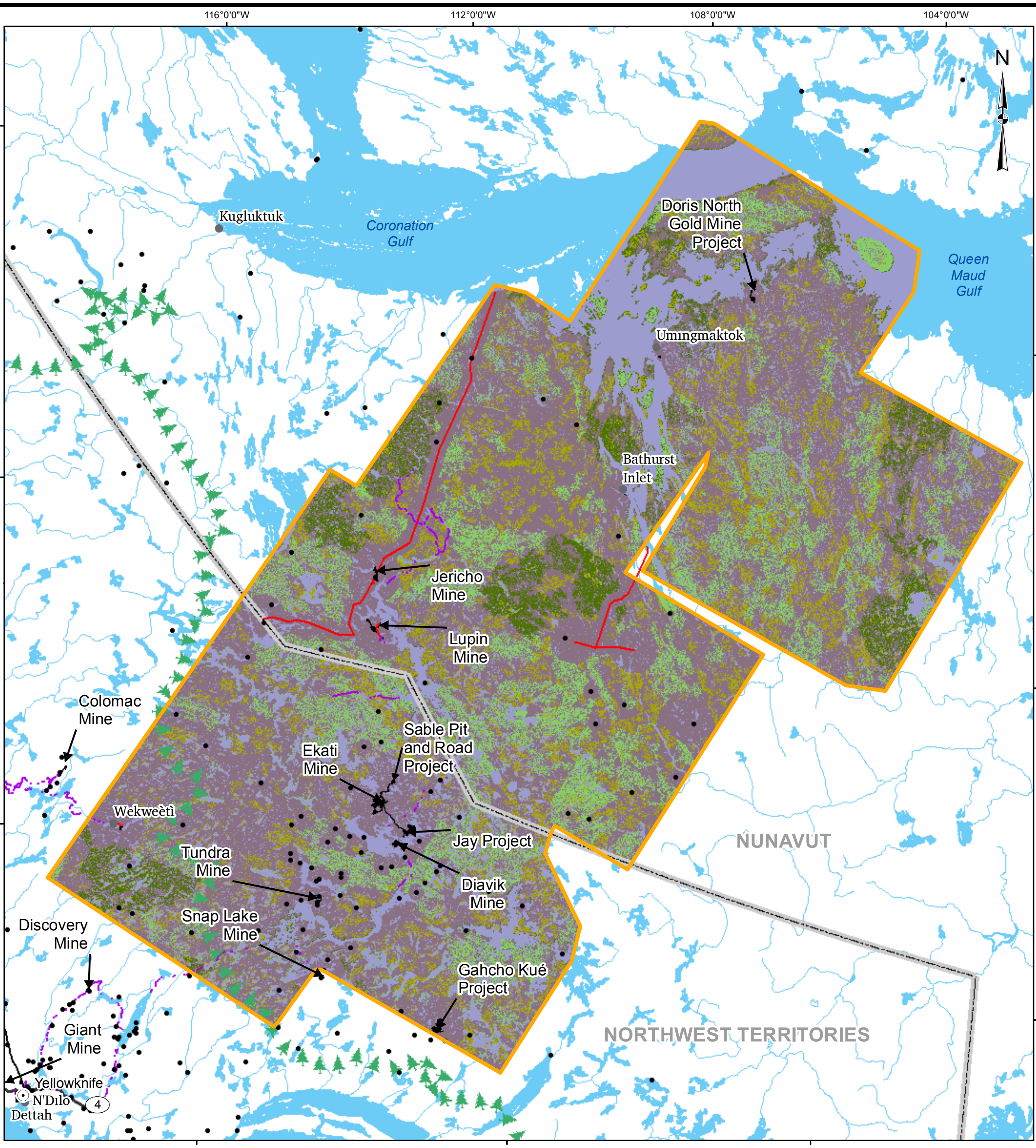
Based on RSF modelling, suitable (combined high and good quality) grizzly bear spring habitats comprised 16.7% of the ESA under the reference condition. Suitable early summer habitat comprised 23.9% of the ESA, while suitable late summer habitats comprised 30.8%. Under the reference condition, suitable autumn habitat comprised 21.1% of the ESA.

Cumulative changes from the RFD Case (with Sable project) is predicted to remove from 7.1% (spring) to 8.8% (autumn) suitable habitats, relative to the reference condition (Table 4.2-25). Predicted cumulative decreases in high quality habitat ranged from 3.5% (spring) to 7.2% (late summer), while the cumulative reduction in good quality habitat ranged from 8.5% (spring) to 10.4% (autumn). Changes to spring, early summer, late summer, and autumn grizzly bear habitat suitability in the ESA for the RFD Case (with Sable project) are illustrated in Maps 4.2-13 through 4.2-16. The incremental changes to high and good quality grizzly bear habitats from the RFD Case with Sable project are predicted to be 0.3% or less across spring, early summer, late summer, and autumn ranges, relative to the RFD Case without Sable project.

Table 4.2-25 Relative Changes in the Availability of Different Quality Habitats for Grizzly Bear from the Reference Condition to Reasonably Foreseeable Development Case

Season/Habitat Type	Reference Condition (ha)	RFD Case with Sable Project	Cumulative Change (%) from Reference Condition to RFD Case without Sable Project	Cumulative Change (%) from Reference Condition to RFD Case with Sable Project
Spring				
High	932,576	899,504	-3.5	-3.5
Good	2,315,576	2,118,412	-8.5	-8.5
Low	2,155,580	1,952,604	-8.9	-9.4
Poor	9,835,080	10,268,292	4.3	4.4
Nil	4,174,052	-	-	-
Early Summer				
High	2,174,676	2,046,156	-5.9	-5.9
Good	2,466,712	2,214,924	-10.0	-10.2
Low	4,128,708	3,751,888	-8.9	-9.1
Poor	6,462,092	7,219,220	11.5	11.7
Nil	4,172,060	-	-	-
Late Summer				
High	2,458,140	2,280,576	-7.2	-7.2
Good	3,521,052	3,181,772	-9.3	-9.6
Low	8,627,884	7,877,820	-8.5	-8.7
Poor	631,736	1,898,644	196.0	200.5
Nil	4,174,052	-	-	-
Autumn				
High	2,007,504	1,865,148	-7.1	-7.1
Good	2,083,088	1,866,976	-9.9	-10.4
Low	9,836,644	8,995,220	-8.4	-8.6
Poor	1,311,576	2,511,468	89.3	91.5
Nil	4,174,052	-	-	-

ha = hectare; % = percent; RFD = reasonably foreseeable development; - = not calculated.



LEGEND

- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- EFFECTS STUDY AREA

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,750,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT SUITABILITY FOR GRIZZLY BEAR IN THE SPRING: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_011_GIS
DESIGN	LD	15/07/14	SCALE AS SHOWN REV. 0
GIS	JE	20/11/14	MAP 4.2-13
CHECK	JLF	27/11/14	
REVIEW	JV	27/11/14	

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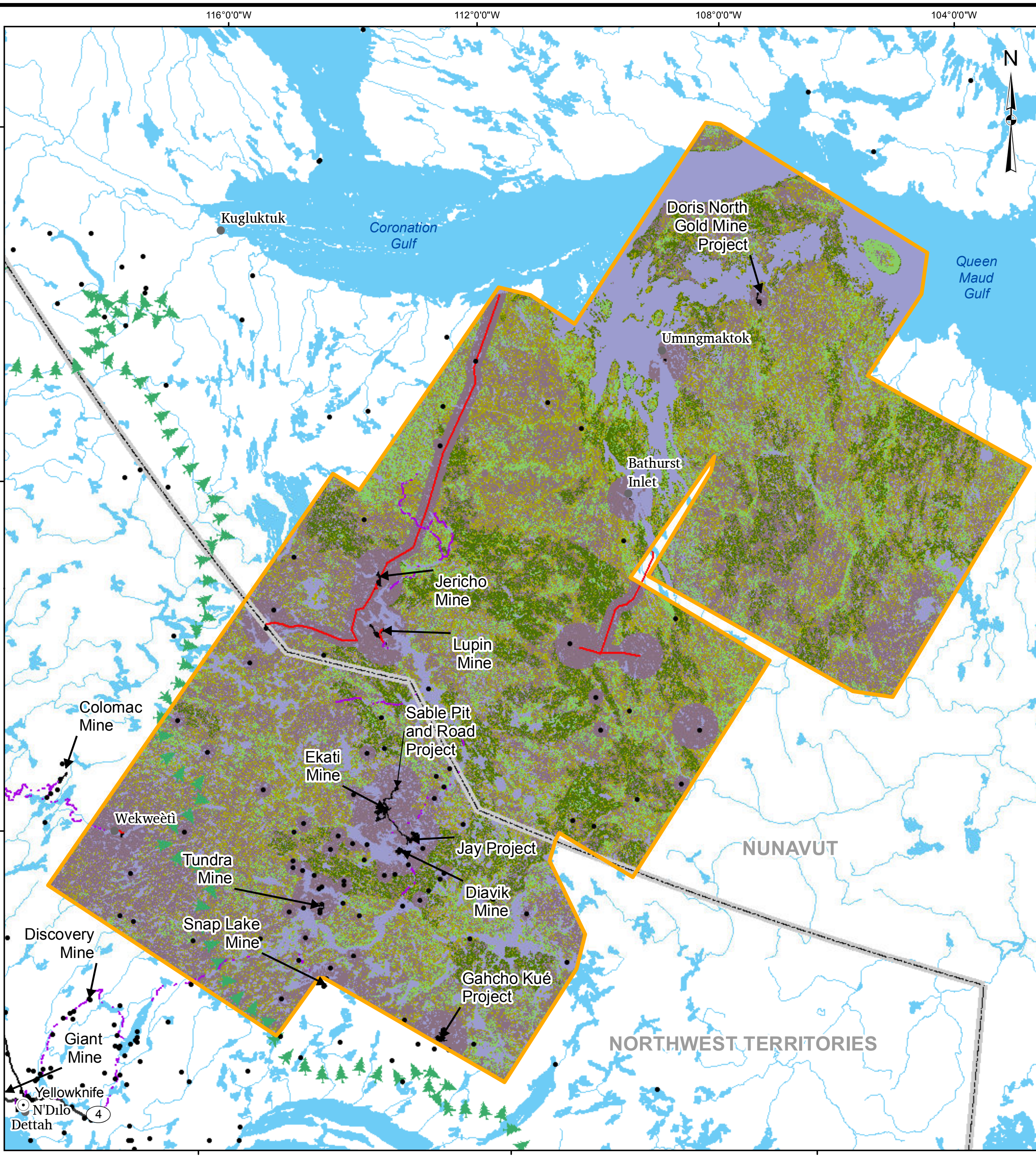

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LEGEND

- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- EFFECTS STUDY AREA

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,750,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

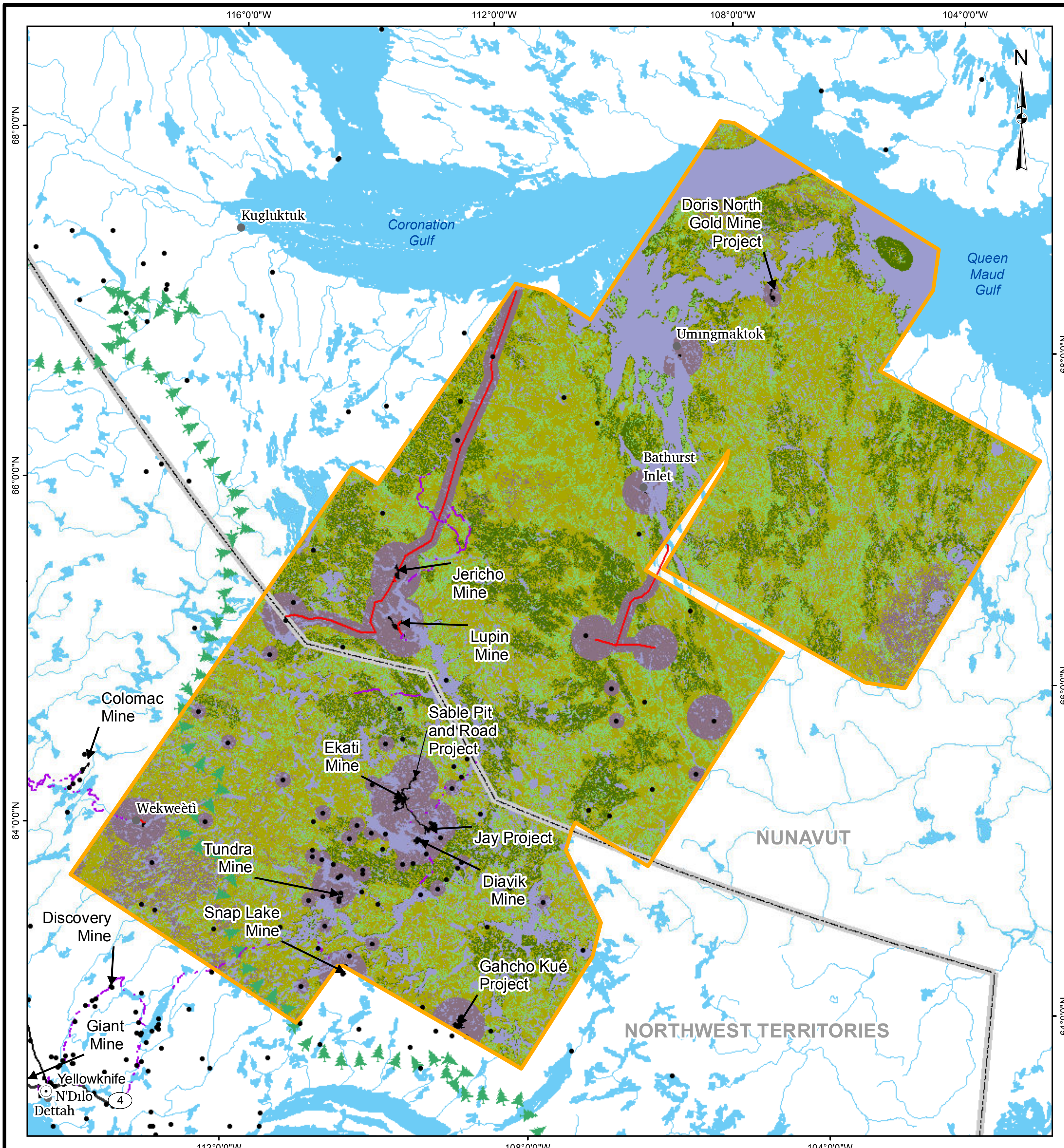
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT SUITABILITY FOR GRIZZLY BEAR IN THE EARLY SUMMER: REASONABLY FORESEEABLE DEVELOPMENT CASE

PROJECT		13-1328-0041	FILE No. DAR_Wild_049_GIS
DESIGN	LD	15/07/14	SCALE AS SHOWN REV. 0
GIS	JE	20/11/14	
CHECK	JLF	27/11/14	MAP 4.2-14
REVIEW	JV	27/11/14	

Golder Associates



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LEGEND

- TERRITORIAL CAPITAL
- POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- DEVELOPMENT
- DEVELOPMENT
- EFFECTS STUDY AREA

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,750,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

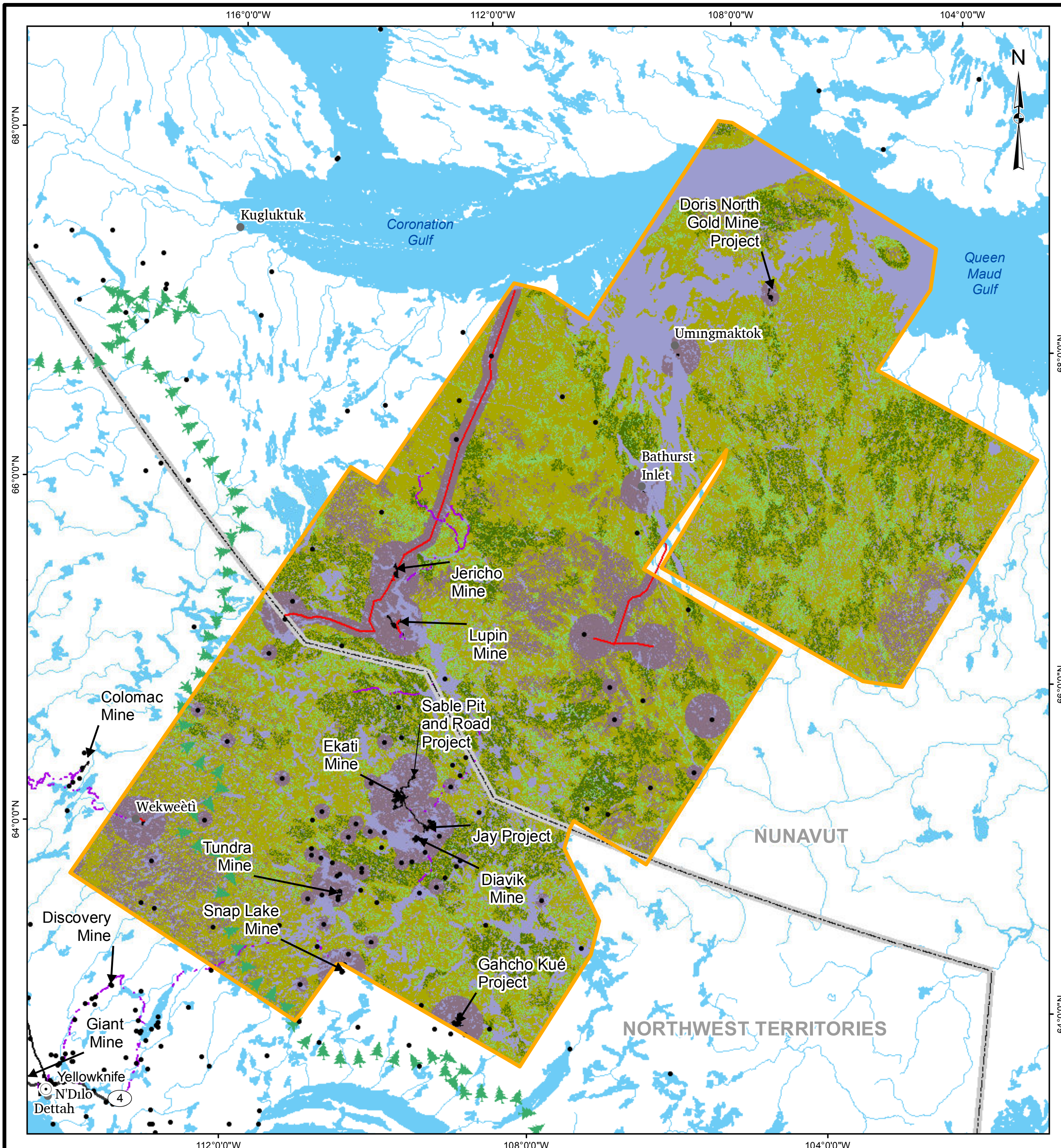
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT SUITABILITY FOR GRIZZLY BEAR IN THE LATE SUMMER: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_013_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	JE	20/11/14		
CHECK	JLF	27/11/14	**MAP 4.2-15**	
REVIEW	JV	27/11/14		



LEGEND

- ⊙ TERRITORIAL CAPITAL
- ● POPULATED PLACE
- HIGHWAY
- ALL-SEASON ROAD
- PORTAGE
- TRANSMISSION LINE
- TERRITORIAL/PROVINCIAL BOUNDARY
- TREELINE
- WATERCOURSE
- WATERBODY
- • DEVELOPMENT
- DEVELOPMENT
- EFFECTS STUDY AREA

HABITAT SUITABILITY

- HIGH
- GOOD
- LOW
- POOR
- NIL

75 0 75

SCALE 1:3,750,000 KILOMETRES

REFERENCE

WATER OBTAINED FROM ATLAS OF CANADA
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
PROJECTION: CANADA LAMBERT CONFORMAL CONIC

DOCUMENT

SABLE ADDENDUM REPORT

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

HABITAT SUITABILITY FOR GRIZZLY BEAR IN THE AUTUMN: REASONABLY FORESEEABLE DEVELOPMENT CASE

Golder Associates

PROJECT		13-1328-0041	FILE No. SR_Wild_014_GIS	
DESIGN	LD	15/07/14	SCALE AS SHOWN	REV. 0
GIS	JE	28/11/14		
CHECK	JLF	27/11/14		
REVIEW	JV	27/11/14		

MAP 4.2-16

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4.2.5.4 Residual Impact Classification and Significance

The DAR predicted that there would be no significant incremental and cumulative effects from the Jay Project and other developments on the ability of wildlife populations (including waterbirds, raptors, wolverine and grizzly bear) to be self-sustaining and ecologically effective (Section 13.6.2; Table 13.6-2). For waterbirds, the addition of the Sable project resulted in a direct loss of high suitability habitat of less than 0.1%. The incremental increase to direct disturbance of high and good quality raptor nesting habitat from the Sable project was 0.3% and 0.4%, respectively. Incremental changes in habitat fragmentation metrics (patch size, number of patches and distance to nearest neighbour) for waterbirds and raptors were less than 1%. Similarly, direct and indirect changes to high and good quality waterbird and raptor habitats were less than 1.5% due to the addition of the Sable project.

Addition of the Sable project to the RFD Case resulted in non-detectable changes to direct habitat loss for wolverine and grizzly bear. Incremental changes in distance to nearest neighbour for habitat types were less than or equal to 0.1%. For wolverine, direct and indirect decreases to high and good quality winter and spring-autumn habitats varied from 0.1% to 0.5% with the addition of the Sable project. Similarly, the incremental changes to high and good quality grizzly bear habitats from adding the Sable project to the RFD Case are predicted to be less than 0.5% across spring, early summer, late summer, and autumn ranges.

In summary, the addition of the Sable project to the RFD Case represents small incremental contributions to the cumulative changes predicted in the DAR for wildlife. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to waterbirds, raptors, wolverine and grizzly bear (Tables 4.2-26 and 4.2-27; Section 13.6.2 in the DAR).

DOMINION DIAMOND

Table 4.2-26 Summary of Residual Impact Classification of Primary Pathways and Predicted Significance of Cumulative Effects on Waterbirds and Raptors

Pathway	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance for Assessment Endpoint[(a)]
Direct loss and fragmentation of habitat from the Jay Project footprint leading to changes in abundance and distribution	Low	Regional	Permanent	Periodic (migratory species) to continuous (non-migratory species)	Irreversible	Highly likely	*Not Significant*
Sensory disturbance (lights, smells, noise, viewscape) leading to changes to movement and behaviour	Low	Regional	Long-term	Periodic (migratory species) to continuous (non-migratory species)	Reversible	Highly likely	

a) Self-sustaining and ecologically effective wildlife populations.

Table 4.2-27 Summary of Residual Impact Classification of Primary Pathways and Predicted Significance of Cumulative Effects on Wolverine and Grizzly Bear

Pathway	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Likelihood	Significance for Assessment Endpoint[(a)]
Direct loss and fragmentation of habitat from the Jay Project footprint leading to changes in abundance and distribution	Low	Regional	Permanent	Continuous	Irreversible	Highly likely	*Not Significant*
Sensory disturbance (lights, smells, noise, viewscape) leading to changes to movement and behaviour	Moderate	Regional	Long-term	Periodic (grizzly bear) to continuous (wolverine)	Reversible	Highly likely	
Increased traffic on the Misery Road and Jay Road, as well as and the above-ground power line along these roads, may create barriers to wolverine, grizzly bear, and caribou movement, which may affect wolverine and grizzly bear population connectivity, abundance, and distribution	Moderate	Regional	Long-term	Periodic (grizzly bear) to continuous (wolverine)	Reversible	Highly likely	

a) Self-sustaining and ecologically effective wildlife populations.

4.2.5.5 Follow-up and Monitoring

Monitoring and follow-up programs are recommended for the Jay Project (Section 13.7 in the DAR). Monitoring and follow-up programs for the Sable project have been established through its environmental assessment and permitting processes. These programs form part of the environmental management system for the Ekati Mine. If monitoring or follow-up detect effects that are different from predicted effects, or the need for improved or modified design features and mitigation, then adaptive management will be implemented. This may include increased monitoring, changes in monitoring plans, and additional mitigation.

4.3 Human Environment

4.3.1 Socio-economics

4.3.1.1 Overview of Changes

The purpose of Section 4.3.1 is to assess the effects of the addition of the Sable project to socio-economics. Addition of the Sable project to the RFD Case for the Project resulted in changes to the Residual Effects Analysis section. All other sections in the DAR remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on socio-economics.

4.3.1.2 Pathway Analysis

In the DAR, all effects pathways from the Project on the socio-economic environment were assessed as no linkage or primary (Section 14.1.4.2; Table 14.1-4). Environmental design features and mitigation have been assessed for the Sable project. Consequently, there are no predicted changes to the no linkage pathways on socio-economic VCs with the addition of the Sable project.

The development of the Sable Pit does not result in meaningful changes to economic, employment, or demographic conditions in the NWT. Incremental effects of the Sable project to those predicted in the DAR are limited to construction expenditures and subsequent effects on the Gross Domestic Product (GDP) of the NWT. Therefore, most of the primary pathways assessed in the DAR have no linkage to the development of the Sable Pit. The primary pathways associated with the Sable project, with respect to maximizing benefits and minimizing impacts to communities, include:

- capital expenditure would add to the economic activity in the NWT, including investment; and,
- the Project would contribute to the GDP of the NWT.

4.3.1.3 Residual Effects Analysis

4.3.1.3.1 Methods

The methods used to determine the residual cumulative effects from previous and existing developments, and the Jay and Sable projects on economic VCs are the same as described in the DAR (Section 14.3), with one exception. The changes to the cumulative effects from including the Sable project in the RFD Case were assessed qualitatively in this DAR Addendum.

4.3.1.3.2 Results

The Sable Pit would represent additional construction and mining activity at the Ekati Mine from 2017 to 2025. Demand for construction labour and goods would be primarily met by contractors, and would represent a small increase in capital expenditure during the short Sable construction period. There will be a modest increase in territorial GDP as a result.

The operation of the Sable project does not represent an increase in production levels at the Ekati Mine from those currently in existence, or those predicted in the DAR. As a result, operational expenditures associated with production at the Ekati Mine are not anticipated to increase due to the development of the Sable project. Further, the development of the Sable project is not anticipated to result in additional demand for operational labour. It is expected that labour demand during operations would be met by the existing workforce at the Ekati Mine. As mining activity at other existing pits comes to completion, employees would transition to the Sable project. The Sable project would serve to fill some of the potential gap in demand for operational employment between the existing Ekati Mine pits and full production at the Jay Project, relieving the urgency for early operational employment positions at the Jay Project, as described in the DAR.

Given that the Sable project does not represent a substantial increase in capital expenditures within the territory, or a new demand for operational labour, the development of the Sable Pit would not result in meaningful changes to the primary pathways assessed in the DAR. The effect of extending employment opportunities and subsequent implications for territorial population patterns would be in line with those predicted for the Jay Project (Section 14.4 in the DAR).

Sable project operations would not have a noticeable effect on territorial GDP or revenue, and would not generate additional demand for employment. Similarly, the Sable project would not result in changes to migration patterns, or the overall population of the NWT, as demand for employment (a major driver of population change in the context of the NWT) is not expected to fluctuate. In the absence of population shifts, there is no anticipated associated population-driven change in demand for infrastructure and services, and health and wellbeing conditions in the NWT.

4.3.1.4 Residual Impact Classification and Significance

The DAR predicted that there would be significant incremental and cumulative effects from the Jay Project and other developments on the capital expenditure and contribution to GDP in the NWT (Section 14.3.4; Table 14.3-8 in the DAR). The addition of the Sable project to the RFD Case represents a small incremental change to both capital expenditures in the NWT and related effects on territorial GDP. The effect is considered to be negligible due to the proportionally small demand generated by construction for goods and services.. The addition of the Sable project to the RFD Case represents a small increase to the cumulative changes predicted in the DAR. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to economic VCs (Table 4.3-1; Section 14.3.4 in the DAR).

Table 4.3-1 Summary of Residual Impact Classification and Predicted Significance of Effects on the Economy of the Northwest Territories

Pathway	Magnitude	Geographic Extent	Duration	Reversibility	Significance for Assessment Endpoint
Capital expenditure would add to the economic activity in the NWT, including investment	High	Regional	Long term	n/a	*Significant*
The Project would contribute to the GDP of the NWT	High	Regional	Long term	n/a	

n/a = not applicable.

4.3.1.5 Follow-up and Monitoring

Socio-economic effects are monitored for a project as a whole, and not by project component (Section 14.1.3 in the DAR). Dominion has a Socio-Economic Agreement with the GNWT that outlines hiring and procurement targets by priority group. Dominion Diamond will continue to report on their achievement of these targets annually, which will include the incremental effects from the Sable project.

4.3.2 Culture

4.3.2.1 Overview of Changes

The purpose of Section 4.3.2 is to assess the effects of the addition of the Sable project to Traditional Land Use (TLU) and heritage resources. An Archaeological Impact Assessment was completed for the Jay Project and Sable Road (Permit Number NWT 2014-019) and Sable Pit (Permit Numbers NWT 99-884, 2001-908, 2002-918, and 2005-969) and applied mitigation resulted in no effects to heritage resources. Subsequently, there is no linkage to heritage resources VCs from the addition of the Sable project. All sections in the DAR related to heritage resources remain unchanged with the addition of the Sable project.

In the DAR, the Sable project was not included in the assessment of vegetation, caribou and other wildlife (Sections 4.2.3, 4.2.4 and 4.2.5). Because of the strong linkage between TLU and the terrestrial environment, the assessment of TLU in the DAR did not include the Sable project. Addition of the Sable project to TLU resulted in changes to the Residual Effects Analysis section, which are driven by changes to the effects analysis for vegetation, caribou and other wildlife. All other sections in the DAR related to TLU remain unchanged. The following sections describe the effect of the inclusion of the Sable project in the analysis and assessment of cumulative effects on TLU.

4.3.2.2 Pathway Analysis

Pathway analysis identifies and assesses the potential for linkages between Project components or activities and effects on TLU after consideration of environmental design features and mitigation. In the DAR, pathways identified and assessed as potentially affecting TLU are presented in Section 15.3.2.1 (Table 15.3-1). Mitigation and management practices have been assessed for the Sable project.

Consequently, there are no predicted changes to the no linkage and secondary pathways associated with TLU from the addition of the Sable project to the RFD Case.

Several of the primary pathways identified in the DAR cannot be assessed on a pit-by-pit basis (similar to socio-economics; see Section 4.3.1.2 above). Changes to social and economic factors that may influence participation in TLU, changes to Aboriginal land users' intangible relationship with the land, and increased concerns regarding human or ecological health are all factors in the continuation of TLU. The effects of the inclusion of Sable project on these factors are predicted to not be meaningfully different from what was assessed in the DAR. No traditional access routes were identified in the Sable project area, and the Sable Road will not be available for public use. Therefore, there is no expected change in the assessment of access presented in the DAR from the inclusion of Sable project.

In this DAR Addendum, the following primary pathways identified in the DAR were assessed for cumulative effects from previous and existing developments, and the Jay and Sable projects on TLU:

- changes to the abundance or distribution of traditionally harvested wildlife;
- changes to the abundance or distribution of fish for traditional harvesting;
- changes to the abundance or distribution of traditionally harvested plants; and,
- disturbance to traditional use of the land resulting from sensory changes.

4.3.2.3 Residual Effects Analysis

4.3.2.3.1 Methods

The methods used to determine the residual effects from the Sable project on TLU are the same as described in the DAR (Section 15.2.6).

4.3.2.3.2 Results

Effects on Traditional Wildlife Harvesting

Effects on traditional wildlife harvesting resulting from the inclusion of the Sable project in the RFD Case include consideration of sensory changes (discussed in the preceding section), direct disturbance to preferred wildlife harvesting areas, and changes in the abundance and distribution of traditionally harvested wildlife.

The Sable project is within a larger area that has been identified as a preferred caribou and other wildlife harvesting area. Therefore, the Sable project will result in an increase in direct disturbance to a preferred wildlife harvesting area. However, compared against the seasonal ranges of culturally important species, this disturbance is expected to have a minor effect.

Cumulative effects from previous, existing and reasonably foreseeable developments (including the Sable project) and the Jay Project are discussed in Section 4.2.4.3 (caribou), and Sections 4.2.5.2 and 4.2.5.3 (upland birds, waterbirds, wolf, wolverine and grizzly bear). The cumulative effects from the Project and other developments (including the Sable project) should not have a significant influence on the sustainability and ecological effectivity of the Bathurst caribou herd (and the Ahiak and Beverly herds).

For all primary pathways influencing the abundance and distribution of the Bathurst herd, the classification of cumulative residual impacts were determined to be unchanged from that presented in the DAR, where magnitude ranged from low to moderate (Table 4.2-18).

For waterbirds, cumulative changes from direct habitat loss associated with the Project and previous, existing, and reasonably foreseeable developments (including the Sable project) is expected to be approximately 1% of the ESA. Overall, the magnitude of the cumulative changes to habitat area and configuration (e.g., number and distance between similar patches) from the physical disturbance of the Jay Project and previous, existing, and reasonably foreseeable developments are estimated to be approximately 1% relative to a reference landscape. Waterbird populations are expected to be resilient to these small changes in habitat.

Cumulative direct loss of habitat from the Jay Project, and previous, existing, and reasonably foreseeable developments (including the Sable project) in the grizzly bear and wolverine ESA is predicted to be 1.5% relative to the reference condition. Wolverine and grizzly bear populations should be resilient to these small changes. The cumulative localized changes from developments on the occupancy, movement and behaviour of grizzly bear and wolverine is predicted to have a measurable influence on the abundance and distribution of populations. However, the effect is expected to be within the resilience limits and adaptive capacity of these VCs.

Effects on Traditional Fish Harvesting

Effects on traditional fishing resulting from the inclusion of Sable project in the RFD Case include consideration of sensory changes (discussed in effects descriptions), direct disturbance to preferred fishing areas, and changes in the abundance and distribution of traditionally harvested fish species.

Sable Lake has not been specifically identified as a preferred fishing spot but is located within a larger area of preferred use. The loss of fish habitat associated with Sable Lake will be compensated (i.e., offset) under the existing Ekati Mine *Fisheries Act* Authorization for the Sable, Pigeon, and Beartooth areas. Alternative preferred fishing areas, such as Lac de Gras remain.

Based on Section 4.1.4.3 in this DAR Addendum, no additional cumulative effects would occur in Lac du Sauvage, as the Sable development would not interact with this waterbody. There is a potential for cumulative effects on water quality and lake ecosystem productivity in Lac de Gras through the continued use of the LLCF for the Sable project that could affect fish and other aquatic life. However, the addition of the Sable project to the RFD Case is not expected to change the current version of DAR water quality predictions because discharge water from the LLCF (including Sable inputs) will meet Ekati Mine Water Licence discharge quality criteria. The cumulative effects from the Project in combination with previous, existing, and reasonably foreseeable developments are predicted to not have a significant adverse impact on self-sustaining and ecologically effective fish populations or ongoing fisheries productivity. Therefore, the addition of the Sable project to the RFD Case does not change the outcome of the assessment for fish and fish habitat, and as a result, the availability of traditionally fished species.

Effects on Traditional Plant Harvesting

Effects on traditional plant harvesting resulting from the inclusion of the Sable project to the RFD Case include consideration of sensory changes (discussed in effects descriptions), direct disturbance to preferred plant harvesting areas, and changes in the abundance and distribution of traditionally harvested plant species. As no specific areas of preferred plant harvesting were indicated in the TLU ESA, direct disturbance and changes in abundance are considered to be represented by changes to high and moderate traditional plant potential.

Baseline information did not indicate any specific areas of preferred plant harvesting locations within the TLU ESA, and plant harvesting likely occurs opportunistically by land users while undertaking other TLU activities. However, TLU baseline information referenced several preferred plant species and the assessment of vegetation in the DAR (Section 11.4) noted that traditional plant species occur within the vegetation ESA. Therefore, direct disturbance to preferred plant harvesting areas is represented by the direct disturbance to areas with high and moderate traditional use plant habitat potential, assessed in the Vegetation section of this addendum (Section 4.2.3.3). The incremental change to the high and moderate potential units due to Sable project is predicted to be 0.3% or less. The total amount of high potential ELC units and moderate potential ELC units within the vegetation ESA that have been removed due to previous and existing developments, the Jay Project and Sable project is expected to be 1.3% and 1.5% relative to reference conditions, respectively. The magnitude of effects on traditional plant populations remains unchanged from the DAR (i.e., low magnitude) with the inclusion of effects from the Sable project.

Effects on Opportunities to Participate in Other Cultural Uses of the Land

Effects on opportunities to participate in other cultural uses of the land resulting from the inclusion of Sable project in the RFD Case include consideration of sensory changes and direct disturbance to culturally important sites and areas.

As discussed in Section 15.4.1.2 of the DAR, cumulative sensory disturbances are expected due to the Project in combination with existing developments. The inclusion of the Sable project to the RFD Case may cause a small increase in the sensory disturbance of land users in the immediate vicinity of the Ekati Mine; however, this disturbance is expected to result in a minor effect on the overall opportunity to use the land in the area.

No specific cultural sites have been identified within the Sable footprint, but the project is located within a larger landscape that has a variety of cultural uses. Therefore, the Sable project will result in an increase to the direct disturbance of a preferred use area. Due to the availability of undisturbed land in the TLU ESA, this disturbance is expected to result in a minor effect on the continued opportunity to use the land.

4.3.2.4 Residual Impact Classification and Significance

The DAR predicted that no significant incremental or cumulative effects on the continued opportunity to participate in traditional wildlife harvesting, fishing, plant harvesting or other cultural uses of the land (Section 15.4.1.3; Table 15.4-1).

The addition of the Sable project to the RFD Case represents an overall incremental decrease of 0.2% for the abundance and distribution of plant communities (including listed and traditional use plants). For waterbirds and raptors, the addition of the Sable project resulted in a direct loss of high suitability habitat of less than 0.5%. Direct and indirect changes to high and good quality waterbird and raptor habitats were less than 1.5% due to the addition of the Sable project. Addition of the Sable project to the RFD Case resulted in non-detectable changes to direct habitat loss for wolverine and grizzly bear. Direct and indirect decreases to high and good quality habitats varied from 0.1% to 0.5% across wolverine and grizzly bear seasonal ranges with the addition of the Sable project.

The addition of the Sable project to the RFD Case represents less than 0.001% incremental reduction of the total area of caribou spring, post-calving, or autumn ranges. The addition of the Sable project to the RFD Case is predicted to result in additional losses of preferred habitat of 0.0%, 0.4%, and 0.4% in spring, post-calving, and autumn seasons, respectively. Deflections in animal movement from increased traffic on the Sable Road could adversely affect migration and connectivity of the Bathurst caribou herd in the same manner as traffic on the Jay and Misery roads. The expansion of the Ekati Mine monitoring program during migration periods will identify concentrations and movements of animals that may interact with the roads. As with the Jay Project, stockpiling of ore, modifications to traffic patterns, and the implementation of road closures are expected to provide opportunities for caribou to move across Sable Road, and limit effects to migration and maintain population connectivity.

In summary, the inclusion of the effects of Sable project is predicted to result in no changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to TLU (Table 4.3-2; Section 15.4.1.3 in the DAR). .

4.3.2.5 Follow-up and Monitoring

As stated in the DAR, follow-up and monitoring is designed to assist in determining levels at which effects will prevent or discourage traditional use of the land (Section 15.5). The DAR describes Dominion Diamond's intent to meet with potentially affected Aboriginal groups about establishing a monitoring program that tracks the use and avoidance by traditional land users of the Ekati Mine area. Existing monitoring programs in place to track effects on wildlife, aquatics, and air quality will be expanded to include the Sable project. Dominion Diamond will discuss ways for community members to be involved in these programs with the potentially affected Aboriginal groups.

Table 4.3-2 Summary of Residual Impact Classification of Assessment Endpoints and Predicted Significance of Cumulative Effects on Traditional Land Use

Valued Component	Assessment Endpoint	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Significance for Assessment Endpoint[a]
Traditional Land Use	Continued opportunities to participate in traditional wildlife harvesting	Negative	Moderate	Regional	Long-term	Continuous	Irreversible	*Not Significant*
	Continued opportunities to participate in traditional fishing	Negative	Low to moderate	Regional	Long-term	Continuous	Irreversible	*Not Significant*
	Continued opportunities to participate in traditional plant harvesting	Negative	Low	Regional	Long-term	Continuous	Irreversible	*Not Significant*
	Continued opportunities to participate in other cultural uses on the land	Negative	Low	Regional	Long-term	Continuous	Irreversible	*Not Significant*

5 SUMMARY AND CONCLUSIONS

This section provides a summary of the principal elements of the Jay Project (Project) residual effects analysis, and impact classification and determination of significance taking into consideration the supplemental information presented in this Developer's Assessment Report (DAR) Addendum. The overall assessment approach used in the DAR Addendum is unchanged from that used in the DAR (Dominion Diamond 2014).

In brief, the incremental and cumulative effects from the Project and previous, existing and reasonably foreseeable developments (after addition of the Sable project) are predicted to have a positive influence on the economic environment, and positive and negative (but not significant) impacts on the social and cultural environments. Project-specific and cumulative changes in measurement indicators from all developments are predicted to have no significant adverse impacts on valued components of the aquatic and terrestrial environments (i.e., water quality, fish and other aquatic life, air quality, vegetation, caribou and other wildlife). These predictions remain unchanged from the conclusions in the DAR (Dominion Diamond 2014).

5.1 Aquatic Impacts

- For hydrogeology, the addition the addition of the Sable project to the RFD Case would not result in any changes to the assessment for the groundwater VC. In the DAR, the hydrogeologic effects of the Project were limited to the local scale study area. Due to the distance between the Project and the Sable Pit, and the presence of several large lakes, no cumulative effects for hydrogeology are anticipated.

- For surface hydrology, the addition of Sable to the RFD Case for the Project is expected to result in negligible cumulative effects to flows, water levels, and downstream channel/bank stability in Lac du Sauvage and downstream waterbodies. Minor changes within the Koala watershed in the RFD Case with the inclusion of the Sable Pit, are not expected to significantly change the cumulative effects to flows, water levels, and channel/bank stability within Slipper Lake or downstream in Lac de Gras.

- Concurrent back-flooding of the Sable and Jay pits may cause cumulative decreases in outlet flows and water levels at the Lac du Sauvage, Lac de Gras, and Desteffany Lake outlets; however, the mitigation of suspending or reducing back-flooding rates to the Sable or Jay pits could reduce potential cumulative effects on the hydrological regime.

- For water quality, the addition of the Sable project to the RFD Case is not anticipated to change the water quality predictions due to the potential for acidifying air emissions and deposition of dust and metals or change the water quality predictions for the discharge from the LLCF. Therefore, potential cumulative changes to water quality in Lac de Gras from the Project and the Sable project in the RFD Case are expected to be similar to those assessed in the DAR.

- Based on the water quality assessment that included the Sable project in the RFD Case, potential effects on fish and other aquatic life that may occur from cumulative changes to water quality and lake ecosystem productivity during the early operations, closure, and closure phases are expected to be as assessed and described in the DAR.

- Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to valued components of the aquatic environment.

5.2 Terrestrial Impacts

- For air quality, the addition of the Sable project to the RFD Case and RFD Case – Construction Phase would likely change the spatial distribution of emissions predicted for the Application Case in the DAR, but the overall emissions would be very similar in magnitude because the processing plant operates at fixed capacity (as was assumed in the Application Case; Section 7.4 in the DAR).
- For soils and vegetation, addition of the Sable project to the RFD Case results in an incremental loss of 1 ha of Esker Complex. An overall incremental reduction of 0.2% for the abundance and distribution of plant communities (including listed and traditional use plants) is expected.
- For waterbirds and raptors, the addition of the Sable project resulted in a direct loss of high suitability habitat of less than 0.5%. Direct and indirect changes to high and good quality waterbird and raptor habitats were less than 1.5% due to the addition of the Sable project.
- Addition of the Sable project to the RFD Case resulted in non-detectable changes to direct habitat loss for wolverine and grizzly bear. Direct and indirect decreases to high and good quality habitats varied from 0.1% to 0.5% across wolverine and grizzly bear seasonal ranges with the addition of the Sable project.
- For caribou, the addition of the Sable project to the RFD Case represents less than 0.001% incremental reduction of the total area of spring, post-calving, or autumn ranges. The addition of the Sable project to the RFD Case is predicted to result in additional losses of preferred habitat of 0.0%, 0.4%, and 0.4% in spring, post-calving, and autumn seasons, respectively.
- Based on the expected number of disturbance encounters for current landscape conditions with the Project and future developments without the Sable project (approximately 28), female caribou would have to increase their encounter rate per day by approximately 14 to 19 times to result in no calf production the following spring. The addition of the Sable project to the RFD Case is predicted to increase the number of encounters with the ZOI by 3.9 in an average year or 5.2 in a peak year resulting in an additional reduction in annual fecundity rate of 2.2%.
- Deflections in animal movement from increased traffic on the Sable Road could adversely affect migration and connectivity of the Bathurst caribou herd in the same manner as traffic on the Jay and Misery roads. The expansion of the Ekati Mine monitoring program during migration periods will identify concentrations and movements of animals that may interact with the roads. As with the Jay Project, stockpiling of ore, modifications to traffic patterns, and the implementation of road closures are expected to provide opportunities for caribou to move across Sable Road, and limit effects to migration and maintain population connectivity.
- In summary, the addition of the Sable project to the RFD Case represents small incremental contributions to the cumulative changes predicted in the DAR for air quality, soils and vegetation, caribou, and other wildlife. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to valued components of the terrestrial environment.

5.3 Socio-economic and Culture Impacts

- For socio-economics, the addition of the Sable project to the RFD Case represents a small incremental change to both capital expenditures in the NWT and related effects on territorial GDP. The effect is considered to be negligible due to the proportionally small demand generated by construction for goods and services. Therefore, there are no predicted changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to economic VCs.
- An Archaeological Impact Assessment was completed for the Jay Project and Sable Road (Permit Number NWT 2014-019) and Sable Pit (Permit Numbers NWT 99-884, 2001-908, 2002-918, and 2005-969) and applied mitigation resulted in no effects to heritage resources. Subsequently, there is no linkage to heritage resources VCs from the addition of the Sable project to the RFD Case. All sections in the DAR related to heritage resources remain unchanged with the addition of the Sable project.
- Addition of the Sable project resulted in changes to the residual effects analysis for Traditional Land Use (TLU), which are largely driven by changes to the effects analysis for vegetation, caribou, and other wildlife. The addition of the Sable project to the RFD Case represents small incremental contributions to the cumulative changes predicted in the DAR for vegetation, caribou, and other wildlife. Therefore, the inclusion of the effects of Sable project is predicted to result in no changes to the residual impact classification and determination of significance provided in the DAR for cumulative effects to TLU.

6 REFERENCES

Alexander SM, Waters NM, Paquet PC. 2005. Traffic volume and highway permeability for a mammalian community in the Canadian Rocky Mountains. Can Geog 49: 321-331.

Avalon (Avalon Rare Metals Inc.). 2014. Application for New Land Use Permit - MV2004D0001. Yellowknife: Mackenzie Valley Land and Water Board, 2014.

Banci V, C. Hanks C, Spicker R, Atatahak G. 2006. Walking in the Path of the Caribou: Knowledge of the Copper Inuit, Naonaiyaotit Traditional Knowledge Project Report Series, Vol. I Pitkohit: Heritage and Culture. Kitikmeot Inuit Association, Cambridge Bay and Kugluktuk, NU, Canada.

Bayne EM, Habib L, Boutin S. 2008. Impacts of Chronic Anthropogenic Noise from Energy-Sector Activity on Abundance of Songbirds in the Boreal Forest. Conservation Biology 22:1186-1193.

Benitez-Lopez A, Alkemade R, Verweij PA. 2010. The Impacts of Roads and Other Infrastructure on Mammal and Bird Populations: A Meta-Analysis. Biological Conservation 143:1307-1316.

Bergerud AT, Luttich SN, Camps L. 2008. The Return of Caribou to Ungava. McGill-Queen’s University Press, Montreal, QC, Canada Berryman, A.A. 2002. Population: A Central Concept for Ecology? Oikos 97:439-442.

BHP and DIAMET (Broken Hill Proprietary Company and DIAMET Minerals Ltd.). 2000. Environmental Assessment Report for Sable, Pigeon, and Beartooth Kimberlite Pipes. Yellowknife, NWT, Canada

BHP Billiton (BHP Billiton Canada Inc. including subsidiary BHP Billiton Diamonds Inc.). 2004. EKATI Diamond Mine 2003 Wildlife Effects Monitoring Program. Prepared by Golder Associates Ltd. 193 pp.

BHP Billiton. 2011. Ekati Diamond Mine Interim Closure and Reclamation Plan – Version 2.4. Submitted to Wek’èezhìi Land and Water Board. Yellowknife, NT, Canada August 2011.

BHP Billiton. 2012. Ekati Diamond Mine 2012 Environmental Impact Report. Yellowknife, NWT, Canada.

Bishop SC, Chapin FS. 1989. Patterns of natural revegetation on abandoned gravel pads in Arctic Alaska. J Appl Ecol 26: 1073-1081.

Cluff HD, Walton LR, Paquet PC. 2002. Movements and Habitat Use of Wolves Denning in the Central Arctic, Northwest Territories, and Nunavut, Canada. Final Report to the West Kitikmeot/Slave Study Society, Yellowknife, NWT. 96 pp.

Cluff D, Klaczek M. 2014. NWT Wolf Project 2013. Yellowknife, NWT, Canada. 20 pp.

Copeland JP, Peek JM, Groves CR, Melquist WE, McKelvey KS, McDaniel GW, Long CD, Harris CE. 2007. Seasonal Habitat Associations of the Wolverine in Central Idaho. Journal of Wildlife Management 71:2201–2212.

COSEWIC (Committee on the Status of Endangered Wildlife in Canada). 2014. Wildlife Species Assessments (detailed version). Available at: http://www.cosewic.gc.ca/rpts/detailed_species_assessments_e.html. Accessed July 31, 2014.

De Beers (De Beers Canada Inc.). 2010. Environmental Impact Statement for the Gahcho Kué Project. Volumes 1, 2, 3a, 3b, 4, 5, 6a, 6b, 7 and Annexes A through N. Submitted to Mackenzie Valley Environmental Impact Review Board. December 2010.

Dominion Diamond (Dominion Diamond Ekati Corporation). 2013a. Ekati Diamond Mine Northwest Territories, Canada NI 43-101 Technical Report. Yellowknife, NWT, Canada.

Dominion Diamond. 2013b. 2013 Ekati Diamond Mine Closure and Reclamation Progress Report. December 2013. Yellowknife, NWT, Canada

Dominion Diamond. 2013c. Project Description Proposed Development of the Lynx Kimberlite Pipe. September 2013.

Dominion Diamond. 2014. Developer’s Assessment Report for the Jay Project. Prepared by Golder Associates Ltd., October 2014. Yellowknife, NWT, Canada.

ERM Rescan (ERM Rescan Environmental Services Ltd.). 2014a. Water Balance and Water Quality Modelling related to the Jay Project. Memo prepared for Dominion Diamond Ekati Corporation. Yellowknife, NWT, Canada, October 2014.

ERM Rescan. 2014b. Ekati Diamond Mine: 2013 Aquatic Effects Monitoring Program Summary Report. Prepared for Dominion Diamond Ekati Corporation, Yellowknife, NWT, Canada.

ERM Rescan. 2014c. Ekati Diamond Mine: 2013 Wildlife Effects Monitoring Program. Prepared for Dominion Diamond Ekati Corporation. Yellowknife, NWT. March 2014.

Fortune (Fortune Minerals Limited). 2011. Developer’s Assessment Report. Fortune Minerals Limited NICO Project. EA 0809-004. Submitted to the Mackenzie Valley Review Board.

Frame PF, Cluff DF, David SH. 2007. Response of Wolves to Experimental Disturbance Homesites. Journal of Wildlife Management 71:316–320.

GNWT-ENR. 2014. NWT Barren-ground Caribou (*Rangifer taradus groenlandicus*). Available at: http://www.enr.gov.nt.ca/_live/pages/wpPages/caribou_information.aspx. Accessed: November 10, 2014.

Johnson CJ, Boyce MS, Case RL, Cluff HD, Gau RJ, Gunn A, Mulders R. 2005. Cumulative Effects of Human Developments on Arctic Wildlife. Wildlife Monographs 160: 1-36

Kershaw GP, Kershaw LJ. 1987. Successful plant colonizers on disturbances in tundra areas of northwestern Canada. Arct Alpine Res 19:451-460.

Male SK, Nol E. 2005. Impacts of Roads Associated with the Ekati Diamond Mine™, Northwest Territories, Canada, on Reproductive Success and Breeding Habitat of Lapland Longspurs. Canadian Journal of Zoology 83: 1285-1296.

McLoughlin PD, Walton LR, Cluff HD, Paquet PC, Ramsay MA. 2004. Hierarchical Habitat Selection by Tundra Wolves. Journal of Mammalogy 85:576-580.

MVRB (Mackenzie Valley Review Board). 2014. Revised Terms of Reference (EA1314-01) Jay Project, Dominion Diamond Ekati Corporation. July 17, 2014. Yellowknife, NWT, Canada.

Nesbitt L, Adamczewski J. 2013. Decline and Recovery of the Bathurst Caribou Herd: Workshops Held in Yellowknife, NWT October 1 and 2, and 5 and 6, 2009. Manuscript Report No. 238. 66 pp.

NWT Infobase. 2012. NWT Species Monitoring Infobase. Available at: http://nwtspeciesatrisk.ca/tiki/tiki-index.php?page=Infobase. Accessed: March 23, 2014.

SARA (*Species at Risk Act*). 2013. Public Registry. [website database]. Available at: http://www.sararegistry.gc.ca/species/default_e.cfm. Accessed: November 4, 2013.

Smith AC, Virgl JA, Panayi D, Armstrong AR. 2005. Effects of a Diamond Mine on Tundra-Breeding Birds. Arctic 58: 295-304.

Thiel RP, Merrill S, Mech LD. 1998. Tolerance by Denning Wolves, *Canis lupus*, to Human Disturbance. Canadian Field-Naturalist 122: 340-342.

Walton LR, Cluff HD, Paquet PC, Ramsay MA. 2001. Movement Patterns of Barren-Ground Wolves in the Central Canadian Arctic. Journal of Mammalogy 82: 867-876.

7 GLOSSARY

Term	Description
All-season access road	An all-season road is a road that is motorable all year by the prevailing means of rural transport.
Catchment	An area of land where water from precipitation drains into a body of water.
Drainage	The removal of excess surface water or groundwater from land by natural runoff and percolation, or by means of surface or subsurface drains.
Ecosystem	Ecological system consisting of all organisms in an area and the physical environment with which they interact.
Ekati Diamond Mine (Ekati Mine)	Canada's first surface and underground diamond mine ; it officially began production in 1998 and is located in the Lac de Gras region of the Northwest Territories.
Kimberlite	Igneous rock that originate deep in the Earth's mantle and intrude the Earth's crust. These rock typically form narrow pipe-like deposits that sometimes contain diamonds.
Kimberlite pipe	A more or less vertical, cylindrical body of kimberlite that resulted from the forcing of the kimberlite material to the Earth's surface. Typically vertical structures of volcanic rock in the Earth's crust that can contain diamonds.
Long Lake Containment Facility (LLCF)	The processed kimberlite containment cells and the associated engineering structures that are designed to contain processed kimberlite and that are regulated through the Water Licence. Long Lake has been divided into a series of cells modified to contain processed kimberlite after completion of the diamond extraction process.
Mean	Arithmetic average value in a distribution
Permafrost	Permanently frozen soil or rock and incorporated cie and organic material that remain at or below 0°C for a minimum of two years due to natural climatic factors. The occurrence of permafrost increase with latitude (i.e., in more northern areas permafrost is continuous, in more southern areas patches of permafrost alternate with unfrozen ground).
Pervious	The potential of soil to transmit water internally, as inferred from soil characteristics such as structure, texture, porosity, cracks, and shrink-well properties.
Reclamation	The process of reconverting disturbed land to its former or other productive uses.
Sedimentation	The process by which suspended particles in water settle out of the water column to the bottom.
Suspended solids	The amount of suspended substances in a water sample. Solids, found in wastewater or in a stream, which can be removed by filtration. The origin of suspended matter may be artificial or anthropogenic wastes or natural sources such as stilt.
Terms of Reference	The Terms of Reference identify the information required by government agencies to be considered during an Environmental Impact Assessment.
Tundra	An area between the polar ice cap and taiga that is characterized by a lack of tress and permanently frozen subsoil.
Valued component (VCs)	Valued components represent biophysical, economic, social, heritage, and health properties of the environment that are considered to be important by society.
Waste Rock	Rock moved and discarded during excavation completed to access mineral resources.

APPENDIX I

2014 WILDLIFE BASELINE STUDY

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Abbreviations

Abbreviation	Definition
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
Dominion Diamond	Dominion Diamond Ekati Corporation
NWT	Northwest Territories
Project	Jay Project
SARA	*Species at Risk Act*

Units of Measure

Unit	Definition
%	percent
ha	hectare
km	kilometre
m	metre
m^2	square metre

I1 INTRODUCTION

Dominion Diamond Ekati Corporation (Dominion Diamond) is proposing the construction and operation of the Jay Project (Project) extension of the Ekati Mine. The Project kimberlite pipe is located in the southeastern portion of the Ekati Mine property about 25 kilometers (km) from the main facilities and approximately 7 km to the northeast of the Misery Pit, on the shoreline of Lac du Sauvage (Map I-1). A horseshoe-shaped dike will be constructed to isolate the portion of Lac du Sauvage overlying the Jay pipe. The isolated portion of Lac du Sauvage will be dewatered to allow open-pit mining of the kimberlite pipe. The Project will also require access roads, pipelines, and a power line to the Jay Pit from the Misery Pit.

Project components and associated activities that could potentially affect caribou and other wildlife include the following:

- dewatering of the diked area of Lac du Sauvage;
- roads, pipelines, and power-lines to Lac du Sauvage and associated removal of esker material;
- increased traffic on the Misery Road;
- quarrying of granite rock for construction material and/or use of granite rock mined from the Lynx Pit;
- diversion of a small drainage area on the northwest shore of Lac du Sauvage (Sub-basin B Diversion Channel) to direct the Christine Lake outflow south around the dike into the main basin of Lac du Sauvage;
- open-pit mining of the Jay Pit;
- Jay waste rock storage area;
- processed kimberlite deposition;
- dust deposition on vegetation; and,
- reclamation of the Jay Project (re-established surface flows, dike breaching, and other activities).

In July 2014, a targeted field program was completed to provide additional data on local wildlife and environmental conditions in the area of the Project. Surveys were specifically designed to collect information on waterbirds, carnivore dens, and historic caribou trails. Caribou, carnivores (e.g., wolf, grizzly bear, and wolverine) and waterbirds are valued components for several mineral developments in the Northwest Territories (NWT), including the Project and the Ekati Mine Wildlife Effects Monitoring Program. Valued components represent properties of the environment that are important to the ecosystem, people and society, and often include species at risk. For the purposes of the Project, wildlife species at risk were identified by their federal and/or territorial status (Table I-1).

LEGEND

- EKATI MINE FOOTPRINT
- DIAVIK MINE FOOTPRINT
- PROPOSED JAY PROJECT DEVELOPMENT AREA
- WINTER ROAD
- TIBBITT TO CONTWOYTO WINTER ROAD
- NORTHERN PORTION OF TIBBITT TO CONTWOYTO WINTER ROAD
- ELEVATION CONTOUR (10 m INTERVAL)
- ESKER
- WATERCOURSE
- WATERBODY

REFERENCE

CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

WILDLIFE BASELINE REPORT: 2015 ADDENDUM

3 0 3

SCALE 1:150,000 KILOMETRES

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

LOCATION OF THE EKATI MINE AND PROPOSED JAY PROJECT DEVELOPMENT AREA

Golder Associates

PROJECT	13-1328-0041	FILE No. WBRA_Wild_001_GIS	
DESIGN	EN	02/09/14	SCALE AS SHOWN REV 0
GIS	UW	25/11/14	MAP I-1
CHECK	JV	25/11/14	
REVIEW	JV	25/11/14	

G:\CLIENTS\DOMINION\DDEC Jay and Lynx Projects\Figures\13-1328-0041 Jay & Lynx EA\Wildlife\Baseline Report 2015 Addendum\WBRA_Wild_001_GIS.mxd

Table I-1 Wildlife Species at Risk Observed or Expected in the Area of the Project

Species	Scientific Name	Species at Risk (NWT) Act	COSEWIC Status	SARA Category of Concern
Grizzly bear (northwestern population)	Ursus arctos	no status	special concern	under consideration
Wolverine (western population)	Gulo gulo	no status	special concern	no status
Peregrine falcon	Falco peregrinus tundrius	no status	special concern	special concern, Schedule 1
Short-eared owl	Asio flammeus	no status	special concern	special concern, Schedule 1
Rusty blackbird	Euphagus carolinus	no status	special concern	special concern, Schedule 1

Source: NWT SAR (2014).
COSEWIC = Committee on Status of Endangered Wildlife in Canada; NWT = Northwest Territories; SARA = *Species at Risk Act*.

This report provides a description of the methods and a summary of the information gathered during the 2014 wildlife field investigations, and is intended to complement larger-scale studies described in the Wildlife Baseline Report, Annex VII of the Jay Project Developer's Assessment Report (Dominion Diamond 2014) and the 2014 Ekati Mine WEMP report. Data from a similar targeted baseline field program in June 2013, which are presented in Annex VII (Dominion Diamond 2014), are also included here. Results from the baseline and monitoring studies were used to support the environmental assessment of the Project on caribou and other wildlife (Dominion Diamond 2014).

I2 METHODS

The 2014 field program occurred from July 10 to 13 and included:

- ground-based surveys of wildlife and wildlife habitat within the proposed Project access road alignment and Project footprint;
- aerial surveys of waterbirds at Lac du Sauvage;
- ground-based surveys for the presence of caribou trails around the Project footprint; and
- ground-based surveys for the presence of carnivore dens on selected eskers near the Project.

The crew for this field program included Damian Panayi and Emily Nichol of Golder Associates Ltd, and were accompanied by Ekati Environment Department summer students Bryana Matthews, Kimberly Balsillie, and Tyanna Steinwand.

I2.1 Environmental Setting Survey

The environmental setting surveys were completed on July 10, 11, and 13. The surveys involved walking in parallel by three observers, separated approximately 50 metres (m) apart. All wildlife and wildlife sign were recorded. The surveys included the proposed Misery to Jay Project road alignment and infrastructure. A ground-based survey of the large island near the proposed Jay pipe was completed on July 12.

I2.2 Waterbird Surveys

The objective of the waterbird survey was to estimate species composition of waterbirds (ducks, geese, loons, and grebes) at Lac du Savage and the islands that will be affected by the Project. The aerial survey of waterbirds present at Lac du Sauvage was completed on July 11. The survey included flying nine transects from north to south spaced 2 km apart and flying the shoreline contour by helicopter at 80 m above ground level at a speed of 80 to 100 km per hour. The transects were followed as closely as possible; however, some deviation occurred due safety concerns. Observers noted waterbirds present within 200 m of either side of the helicopter.

I2.3 Caribou Trail Surveys and Digitization

A ground-based caribou trail survey was completed on July 12 and 13. The objective of the survey was to ground-truth caribou trails that were visible on high resolution orthophotos of in the area of the Project. The location of caribou trails were first identified on maps that were taken into the field. The field crew then verified these locations on the ground (Photo I-1). The information was used to assist in digitizing trails, and can also provide information about caribou movement through the area of the Project.

The digitization of caribou trails was completed at a resolution of 1 hectare (1 ha) or 10, 000 square metres (m^2) (100 m by 100 m) to identify areas of low (Photo I-2), medium (Photo I-3) and high (Photo I-4) occurrence of trails around the Project. Low, medium, and high use trail occurrences were assigned classification values 1, 2, and 3, respectively. A low use trail area was an area that had five or less caribou trails, or trails covered less than 25 percent (%) of the cell area (i.e., 100 m^2). A medium trail area was classified as containing more than five trails but less than 15 trails, or trails that covered less than 50% of the cell area. A high use area had greater than 15 trails, or had trails that covered greater than 50% of the cell area.

Photo I-1 Caribou Trail from Ground Level

Photo I-2 Low Use Caribou Trail Cell (1 ha)

Photo I-3 Medium Use Caribou Trail Cell (1 ha)

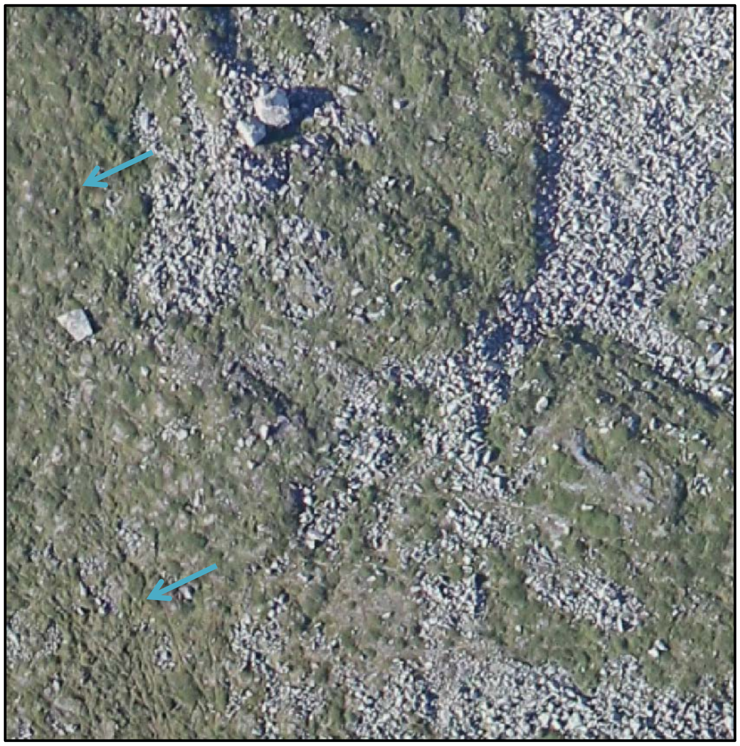
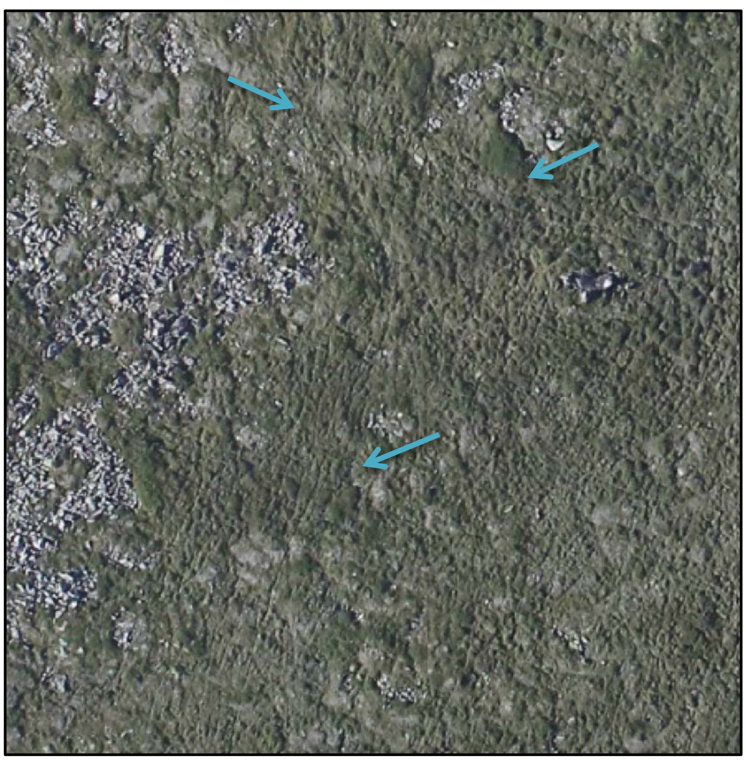


Photo I-4 High Use Caribou Trail Cell (1 ha)



I2.4 Carnivore Den Surveys

Select eskers near the Jay Project were surveyed on foot on July 12 by two biologists and one Ekati Environment Department summer student for the presence of carnivore dens and other wildlife sign. This included one observer walking along the top of the entire Misery esker plus one on either side to search for areas excavated by wolf, grizzly bear, or fox.

I3 RESULTS

I3.1 Environmental Setting Survey

During the surveys, 200 wildlife encounters and 11 wildlife sign were observed (Table I-2; Map I-2). Wildlife observed during 2014 included birds (e.g. raptors, upland birds, and waterbirds), Artic ground squirrels and a lemming. Wildlife sign included Arctic ground squirrel dens, grizzly bear digs, bear scat, and owl and raptor pellets. No species at risk were observed during the environmental setting surveys. Results from the June 2013 field surveys have also been presented.

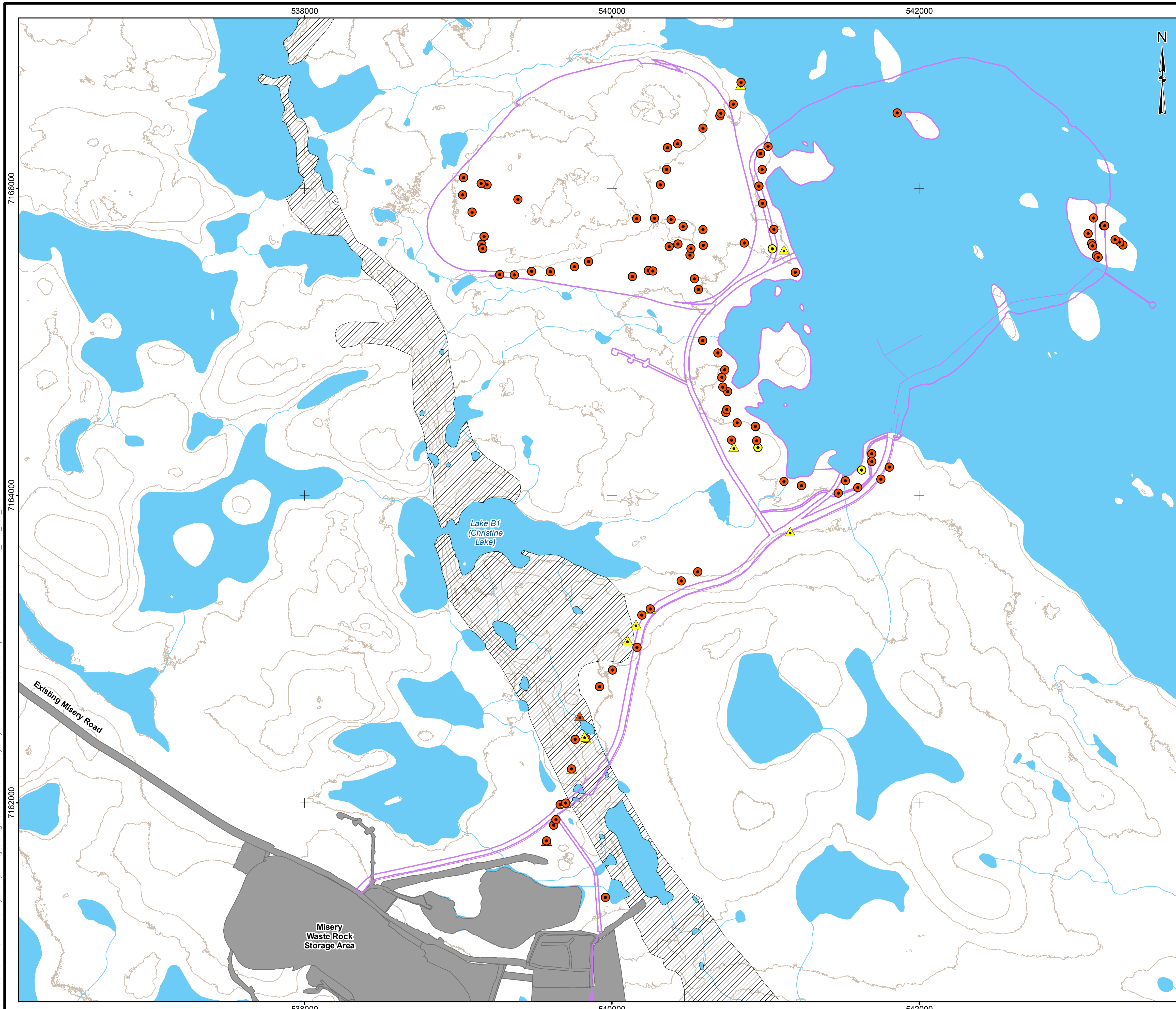
Table I-2 Wildlife Species and Wildlife Sign Observed during Environmental Setting Surveys, 2013 to 2014

Wildlife Species or Wildlife Sign		Number Observed	
Common Name	**Scientific Name**	**2013**	**2014**
American pipit	*Anthus rubescens*	0	21
American tree sparrow	*Spizella arborea*	0	27
Arctic ground squirrel	*Urocitellus parryii*	1	2
Arctic ground squirrel den	N/A	0	7
Arctic Hare	*Lepus arcticus*	2	0
Baird's sandpiper	*Calidris bairdii*	0	2
caribou kill site	N/A	1	0
common loon	*Gavia immer*	0	2
common/hoary redpoll	*Carduelis flamm./hornemanni*	0	4
gray-cheeked thrush	*Catharus minimus*	0	1
grizzly bear	*Ursus arctos* ssp.	1	0
grizzly bear dig	N/A	0	7
grizzly bear scat	N/A	0	1
grizzly bear tracks	N/A	1	0
gull	*Larus* spp.	0	3
Harris's sparrow	*Zonotrichia querula*	0	46
herring gull	*Larus argentatus*	0	1
horned lark	*Eremophila alpestris*	0	2
lapland longspur	*Calcarius lapponicus*	0	18
least sandpiper	*Calidris minutilla*	0	11
lemming/vole	*Lemmus* spp.	0	1
long-tailed duck	*Clangula hyemalis*	0	1
long-tailed jaeger	*Stercorarius longicaudus*	0	1
northern harrier	*Circus cyaneus*	1	0

Table I-2 Wildlife Species and Wildlife Sign Observed during Environmental Setting Surveys, 2013 to 2014

Wildlife Species or Wildlife Sign		Number Observed	
owl pellets	N/A	0	2
ptarmigan	*Lagopus* spp.	0	1
raptor pellets	N/A	0	1
red-throated loon	*Gavia stellata*	0	1
rough-legged hawk	*Buteo lagopus*	1	0
savannah sparrow	*Passerculus sandwichensis*	0	31
unidentified duck	N/A	0	1
white-crowned sparrow	*Zonotrichia leucophrys*	0	14
wolverine tracks	N/A	1	0
yellow warbler	*Dendroica petechia*	0	2

spp. = species; N/A = not applicable.



LEGEND

- EKATI MINE FOOTPRINT (MISERY OPERATION)
- PROPOSED JAY PROJECT DEVELOPMENT AREA
- ELEVATION CONTOUR (10 m INTERVAL)
- WATERCOURSE
- WATERBODY
- ESKER

2014 WILDLIFE OBSERVATION

- BIRD
- BIRD SIGN
- MAMMAL
- MAMMAL SIGN

NOTES

ROAD, PIPELINES, AND POWER LINE ARRANGEMENT TO BE DETAILED AS PART OF FURTHER PRE-FEASIBILITY DESIGN. APPROXIMATE CORRIDOR WIDTHS ARE SHOWN.

REFERENCE

JAY PROJECT CONCEPTUAL ENGINEERING REPORT, EKATI MINE, DOC#: 1313280041-E14037-R-REV0-4060, DATED: MAY 13, 2014
JAY PROJECT DESIGN BASIS MEMORANDUM FOR PRE-FEASIBILITY DESIGN OF PROJECT ROADS AND PIPELINE BENCHES, DOC#: 1313280041-E14031-TM-REVD-2020, DATED: AUGUST 1, 2014
LIDAR AND BATHYMETRIC DATA OBTAINED FROM AURORA, 2013
WATER OBTAINED FROM CANVEC © NATURAL RESOURCES CANADA, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

WILDLIFE BASELINE REPORT: 2015 ADDENDUM

500 0 500
SCALE 1:25,000 METRES

PROJECT
DOMINION DIAMOND
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
WILDLIFE AND WILDLIFE SIGN OBSERVED DURING ENVIRONMENTAL SETTING SURVEYS, 2014

Golder Associates

PROJECT	13-1328-0041	FILE No. WBRA_Wild_002_GIS	
DESIGN	EN	02/09/14	SCALE AS SHOWN / REV 0
GIS	UW	25/11/14	
CHECK	JV	25/11/14	MAP I-2
REVIEW	JV	25/11/14	

I3.2 Waterbird Survey

A total of 149 waterbirds were observed during the aerial survey (Table I-3; Map I-3). No species at risk were observed. Results from the June 2013 field surveys have also been presented.

Table I-3 Waterbirds and Other Bird Species Observed During the Aerial and Ground Survey of Lac du Sauvage and Islands

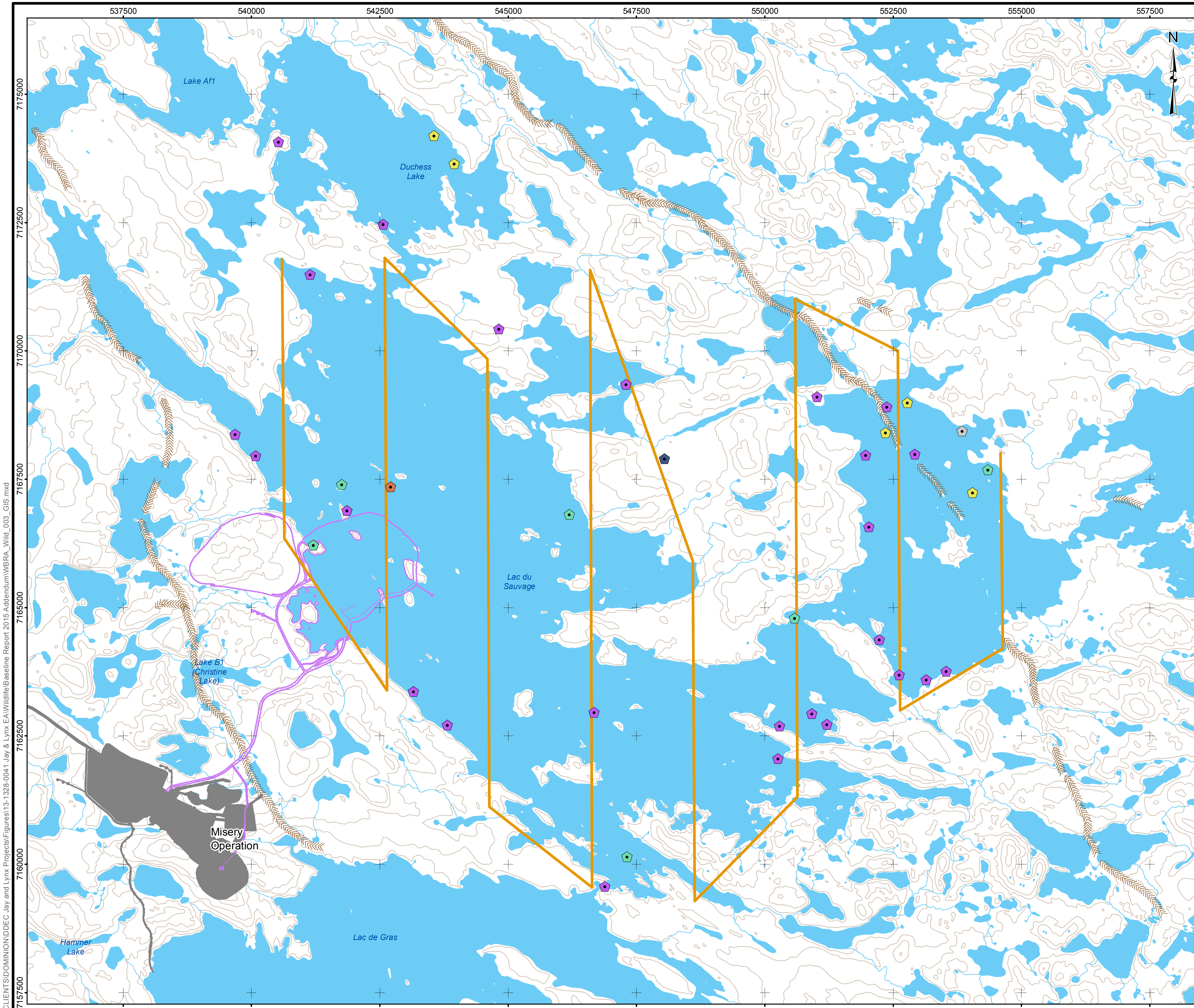
Wildlife Species or Wildlife Sign		Number Observed	
Common Name	**Scientific Name**	**2013**	**2014**
bald eagle	Haliaeetus leucocephalus	1	0
common loon	Gavia immer	6	0
common merganser	Mergus merganser	204	50
gull	Larus spp.	48	53
least sandpiper	Calidris minutilla	0	6
long-tailed duck	Clangula hyemalis	2	2
northern harrier	Circus cyaneus	0	1
parasitic jaeger	Stercorarius parasiticus	4	0
ptarmigan	Lagopus spp.	0	2
tern	Sternidae	5	34
unidentified diver		3	0
unidentified loon		1	0
yellow-billed loon	Gavia adamsii	2	1

I3.3 Caribou Trails

A total of 70 caribou trails were observed at the ground level (Map I-4) and used to verify identified trails on corresponding orthophoto maps. Further classification of historic caribou trails on the orthophotos was completed in a GIS platform and the analysis identified several areas of relatively high use by caribou in the area of the Project (Map I-5).

I3.4 Carnivore Den Survey

No dens were discovered during the 2014 survey but there were three instances of bear digs (Map I-6). The 2013 field survey covered a longer section of the esker. Findings included a single active wolf den with two adults and two pups present. One inactive wolf den was also recorded in 2013 in addition to wildlife sign such as bear and wolf scat, wolf and caribou tracks, hide remains from a caribou kill and a number of grizzly bear digs of ground squirrel burrows.



LEGEND

- EKATI MINE FOOTPRINT (MISERY OPERATION)
- PROPOSED JAY PROJECT DEVELOPMENT AREA
- ELEVATION CONTOUR (10 m INTERVAL)
- ESKER
- WATERCOURSE
- WATERBODY

2014 WATERBIRD OBSERVATION

- COMMON MERGANSER
- GULL
- LONG-TAILED DUCK
- NORTHERN HARRIER
- TERN
- YELLOW-BILLED LOON
- AERIAL TRANSECT

REFERENCE

CANVEC © NATURAL RESOURCES CANADA, 2012
NATURAL RESOURCES CANADA, CENTRE FOR TOPOGRAPHIC INFORMATION, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

WILDLIFE BASELINE REPORT: 2015 ADDENDUM

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SCALE 1:75,000 KILOMETRES

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

WATERBIRDS OBSERVED, 2014

Golder Associates

PROJECT		13-1328-0041	FILE No. WBRA_Wild_003_GIS
DESIGN	EN	02/09/14	SCALE AS SHOWN REV 0
GIS	UW	26/11/14	MAP I-3
CHECK	JV	26/11/14	
REVIEW	JV	26/11/14	

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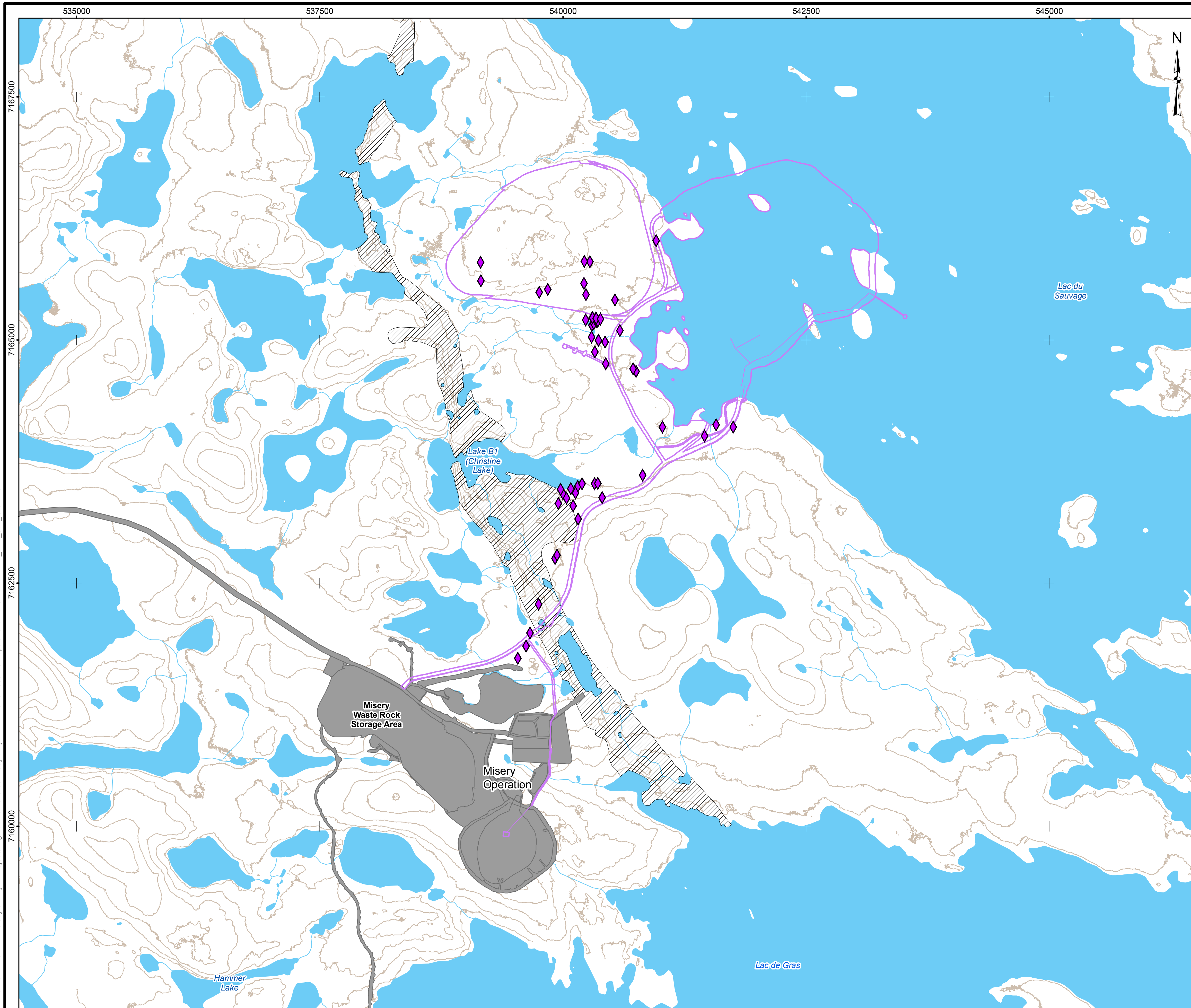


LEGEND

- EKATI MINE FOOTPRINT (MISERY OPERATION)
- PROPOSED JAY PROJECT DEVELOPMENT AREA
- ELEVATION CONTOUR (10 m INTERVAL)
- WATERCOURSE
- WATERBODY
- ESKER
- CARIBOU TRAIL

NOTES

ROAD, PIPELINES, AND POWER LINE ARRANGEMENT TO BE DETAILED AS PART OF FURTHER PRE-FEASIBILITY DESIGN. APPROXIMATE CORRIDOR WIDTHS ARE SHOWN.

REFERENCE

JAY PROJECT CONCEPTUAL ENGINEERING REPORT, EKATI MINE, DOC#: 1313280041-E14037-R-REV0-4060, DATED: MAY 13, 2014
JAY PROJECT DESIGN BASIS MEMORANDUM FOR PRE-FEASIBILITY DESIGN OF PROJECT ROADS AND PIPELINE BENCHES, DOC#: 1313280041-E14031-TM-REVD-2020, DATED: AUGUST 1, 2014
LIDAR AND BATHYMETRIC DATA OBTAINED FROM AURORA, 2013
WATER OBTAINED FROM CANVEC © NATURAL RESOURCES CANADA, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

WILDLIFE BASELINE REPORT: 2015 ADDENDUM

1 0 1
SCALE 1:40,000 KILOMETRES

PROJECT

DOMINION DIAMOND

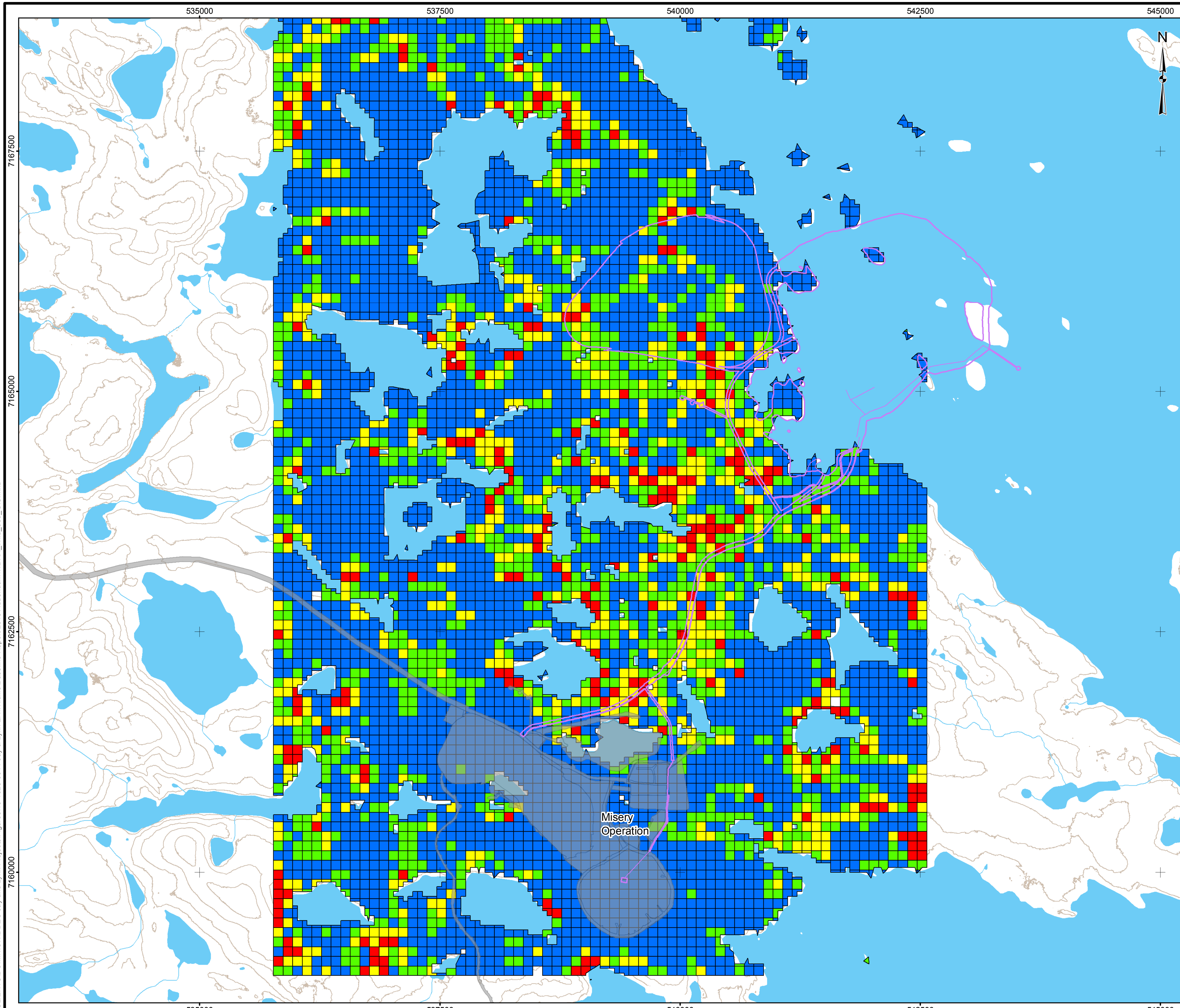
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

CARIBOU TRAILS OBSERVED, 2014

Golder Associates

PROJECT	13-1328-0041	FILE No. WBRA_Wild_004_GIS	
DESIGN	EN	02/09/14	SCALE AS SHOWN REV 0
GIS	UW	26/11/14	MAP I-4
CHECK	JV	26/11/14	
REVIEW	JV	26/11/14	



LEGEND

- EKATI MINE FOOTPRINT (MISERY OPERATION)
- PROPOSED JAY PROJECT DEVELOPMENT AREA
- ELEVATION CONTOUR (10 m INTERVAL)
- WATERCOURSE
- WATERBODY

CARIBOU TRAIL CLASSIFICATION

- NONE
- LOW
- MEDIUM
- HIGH

REFERENCE

JAY PROJECT CONCEPTUAL ENGINEERING REPORT, EKATI MINE, DOC#: 1313280041-E14037-R-REV0-4060, DATED: MAY 13, 2014
LIDAR AND BATHYMETRIC DATA OBTAINED FROM AURORA, 2013
WATER OBTAINED FROM CANVEC © NATURAL RESOURCES CANADA, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

NOTES

ROAD, PIPELINES, AND POWER LINE ARRANGEMENT TO BE DETAILED AS PART OF PRE-FEASIBILITY DESIGN. APPROXIMATE CORRIDOR WIDTHS ARE SHOWN.

1 0 1
SCALE 1:40,000 KILOMETRES

PROJECT
DOMINION DIAMOND™
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
HISTORIC HIGH, MEDIUM, AND LOW USE CARIBOU TRAIL CELLS AROUND THE PROPOSED JAY DEVELOPMENT AREA

Golder Associates

PROJECT		13-1328-0041	FILE No. WBRA_Wild_006_GIS	
DESIGN	DP EN	01/08/14	SCALE AS SHOWN	REV 0
GIS	UW	25/11/14	**MAP I-5**	
CHECK	JV	25/11/14		
REVIEW	JV	25/11/14		

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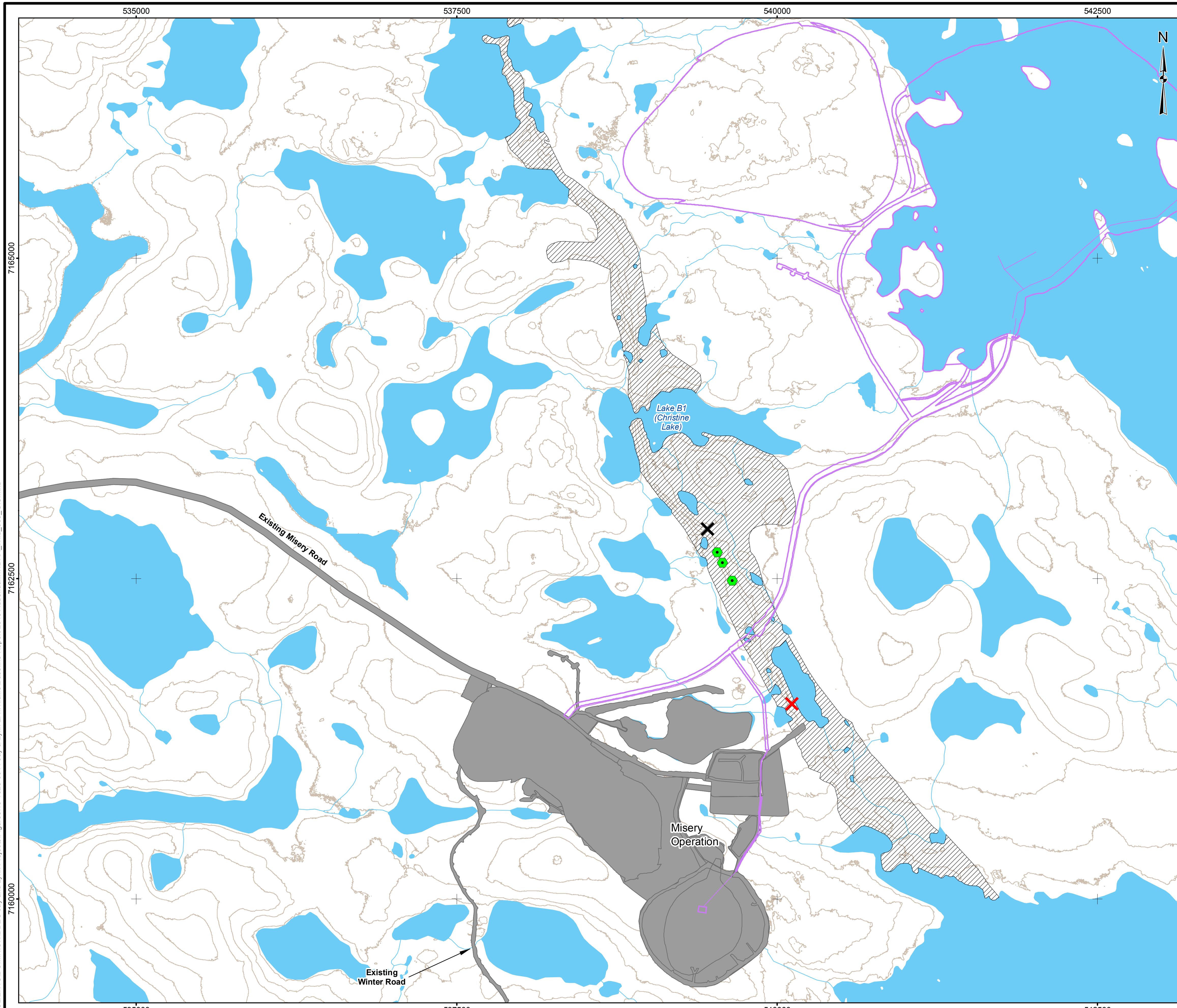

LEGEND

- EKATI MINE FOOTPRINT (MISERY OPERATION)
- PROPOSED JAY PROJECT DEVELOPMENT AREA
- ELEVATION CONTOUR (10 m INTERVAL)
- WATERCOURSE
- WATERBODY
- ESKER
- BEAR SIGN
- START OF SURVEY 2014
- END OF SURVEY 2014

NOTES

ROAD, PIPELINES, AND POWER LINE ARRANGEMENT TO BE DETAILED AS PART OF FURTHER PRE-FEASIBILITY DESIGN. APPROXIMATE CORRIDOR WIDTHS ARE SHOWN.

REFERENCE

JAY PROJECT CONCEPTUAL ENGINEERING REPORT, EKATI MINE, DOC#: 1313280041-E14037-R-REV0-4060, DATED: MAY 13, 2014
JAY PROJECT DESIGN BASIS MEMORANDUM FOR PRE-FEASIBILITY DESIGN OF PROJECT ROADS AND PIPELINE BENCHES, DOC#: 1313280041-E14031-TM-REVD-2020, DATED: AUGUST 1, 2014
LIDAR AND BATHYMETRIC DATA OBTAINED FROM AURORA, 2013
WATER OBTAINED FROM CANVEC © NATURAL RESOURCES CANADA, 2012
DATUM: NAD83 PROJECTION: UTM ZONE 12N

DOCUMENT

WILDLIFE BASELINE REPORT: 2015 ADDENDUM

1 0 1

SCALE 1:30,000 KILOMETRES

PROJECT

DOMINION DIAMOND

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

CARNIVORE SIGN OBSERVED DURING ESKER SURVEY, 2014

Golder Associates

PROJECT		13-1328-0041	FILE No. WBRA_Wild_005_GIS
DESIGN	EN	02/09/14	SCALE AS SHOWN REV 0
GIS	UW	26/11/14	MAP I-6
CHECK	JV	26/11/14	
REVIEW	JV	26/11/14	

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I4 REFERENCES

Dominion Diamond (Dominion Diamond Ekati Corporation). 2014. Jay Project Developer's Assessment Report. Prepared by Golder Associates Ltd.

NWT SAR (NWT Species at Risk). 2014. NWT Species at Risk. Website, http://nwtspeciesatrisk.ca. Accessed: November 24, 2014.