Rio Tinto

Wildlife Monitoring Program Report - 2009

1 April 2010

Diavik Diamond Mine

Health, Safety and Environment Department

Executive Summary

As a requirement of the Environmental Agreement, Diavik Diamond Mines Inc. (DDMI) conducts a Wildlife Monitoring Program (WMP). The objective of the WMP is to collect information that will assist in determining if there are effects on wildlife in the study area and if these effects were accurately predicted in the Environmental Assessment. The WMP also allows the collection of data to determine the effectiveness of site-specific mitigation practices and the need for any modifications. The following report documents results collected for the 2009 Wildlife Monitoring Program for the Diavik Diamond Mine located at Lac de Gras, Northwest Territories. The data were collected according to procedures outlined in departmental Standard Operating Procedures (SOPs), as derived from the Wildlife Monitoring and Management Program document (Appendix I). Wherever possible, comparisons to the information gathered during the previous monitoring years (2000 to 2008) and the pre-construction baseline (June 1995 to August 1997) have been included.

General observations and recommendations for possible improvement in each program are as follows:

Vegetation/Habitat Loss

- Direct vegetation/habitat loss in 2009 due to the mine footprint was 0.12 km^2, which is within expected values. Total habitat loss to date from mining activities is 9.78 km^2 and below that predicted during the Environmental Assessment.
- At the end of 2009, actual habitat loss for Riparian Shrub (0.03 km^2) and Esker Complex (0.16 km^2) were equal to that predicted in the EA.
- The fifth and final year of the re-vegetation study being conducted with the University of Alberta was completed during the summer of 2009.
- Permanent Vegetation Plots (PVP) and lichen monitoring program are scheduled for 2010

Barren-ground Caribou

- Direct summer habitat loss in 2009 from the mine footprint was 0.04 habitat units (HU's), for a total of 2.46 HU's to date, which is less than what was predicted during the Environment Assessment.
- No caribou mortalities occurred due to the mine during 2009.
- The level of caribou advisory monitoring remained at "No Concern" (no or fewer than 100 caribou) for 364 days during 2009. One day (29 April) the board was at "Caribou Advisory" due to 150 animals off the south road.

- In 2009, two herding events occurred, both in May. One was to move a group of caribou off the airstrip while the other was to escort 1 caribou off the rock pile.
- DDMI successfully implemented a the revised aerial caribou surveys in cooperation with BHP-Billiton for the 2009 season. Fourteen surveys were conducted from July to October. A total of 8849 caribou were observed, with 2549 of these within the Diavik wildlife study area. The largest group observed was 550 animals.
- Results from the 2009 survey appear to support recent zone of influence (ZOI) estimates of 14-28 km, which is above the 3 to 7 km ZOI originally predicted during the Environmental Assessment, but influence of the lake on the ZOI is currently unclear.
- A total of 110 ground-based caribou behavioural observations occurred in 2009. Efforts to obtain a representative number of observations by working in partnership with BHP-Billiton proved successful. Distances of observations ranged from less than 2 km up to 30 km from mine infrastructure.
- Caribou collar data from the GNWT showed that caribou moved west of Diavik during the northern migration and east and south of Diavik during the southern migration, as predicted during the Environmental Assessment.
- The numbers of caribou observed around the mine site during 2009 increased from the past couple of years and observations occurred mainly during the northern migration.
- Caribou road, rock pile and PKC surveys were conducted 49 times during 2009. Caribou were noted 7 times; 1 less than 50 m from the road, 1 between 50 and 200 m from the road and 5 greater than 200 m from the road.

Grizzly Bear

- Direct terrestrial habitat loss in 2009 from the mine footprint was within the expected amount at 0.12 km^2. Total, direct grizzly bear habitat loss to date is 7.18 km^2, which is below the amount predicted during the Environmental Assessment.
- Grizzly bears are still present in the Diavik wildlife study area, and a family of 3 bears (1 sow and 2 cubs) were resident on the mine site from 6 July to 21 August 2009.
- A total of 22 incidental sightings were recorded for the mine site during 2009.
- No mining-related bear mortalities, injuries or relocations occurred during 2009.
- DDMI plans to conduct a pilot study to undertake hair snagging using tripods to confirm grizzly bear presence within the Diavik wildlife study area, using existing habitat plots.

Wolverine

- Wolverines were present on East Island in 2009.
- No wolverine mortalities occurred during 2009.

- The snow track survey was conducted in the spring with 12 tracks noted over 152 km of transects. Two wolverine and one wolverine den were also noted during the survey.

Waste Management

- Regular inspections were conducted at the Waste Transfer Area (WTA) and Inert Landfill in 2009.
- Food and food packaging were found during 11% and 9% of inspections, respectively, at the WTA; a decrease when compared to 2008 results.
- Food and food packaging were found during 6% and 23% of inspections, respectively, at the inert landfill; a decrease when compared to 2008 results.

Raptors

- Raptor monitoring was performed in June and July 2009.
- During 2009, two raptor nests (peregrine falcons) were productive within the Diavik study area. This is similar to results from the control area at Daring Lake.
- No project-related mortalities occurred during 2009.

Waterfowl

- There was no direct habitat loss in 2009 for shallow or deep water habitats. The total area of water habitat loss to date remains at 2.54 km^2.
- Waterfowl were present at East Island Shallow Bays.
- Waterfowl are utilizing mine-altered wetlands, particularly the North Inlet

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Introduction

Diavik Diamond Mines Inc. (DDMI) conducted wildlife baseline studies from 1995 to 1997. Information gathered was used to describe ecological conditions found in the Lac de Gras area in support of the Project Description and Environmental Assessment (DDMI, March 1998a, 1998b). Information was used by DDMI throughout the project design to identify mitigation practices to limit impacts on wildlife species and to formulate predictions of the effects on wildlife due to mining activities. This information was used to develop a Wildlife Monitoring Program (WMP) for the Diavik Diamond Mine. Documents that were utilized in developing the WMP include:

- Comprehensive Study Report, The Canadian Environmental Assessment Act June 1999;
- Environmental Assessment Overview, Diavik Diamonds Project, September 1998;
- Environmental Effects Report, Wildlife, Diavik Diamonds Project, September 1998; and
- Wildlife Baseline Report, Diavik Diamonds Project, Penner and Associates, July 1998.

A Wildlife Monitoring Program (DDMI, 2002) was designed specifically to monitor and manage wildlife issues of concern identified by communities and regulatory agencies. The year 2009 was the tenth year of monitoring. John Virgl of Golder Associates was contracted to assist in the development of the WMP and has provided expertise in data collection methods for the majority of programs so that there is similarity with other wildlife effects monitoring programs in the NWT.

The current objectives of the monitoring program are to:

- collect information that will assist DDMI in determining if there are effects on wildlife and if these effects were accurately predicted in the Environmental Assessment (EA);
- assist in determining the effectiveness of mitigation practices intended to limit project-related effects on wildlife and whether or not these practices and policies require modification; and
- determine if new effects are found that were not predicted in the Environmental Assessment.

DDMI has compiled an updated document titled, “Wildlife Monitoring and Management Plan for the Diavik Diamond Mine” (Appendix I). The Plan outlines the current monitoring programs in place for 2010, as well as mitigation and management practices relating to wildlife presence at the mine site. This document reflects changes to various programs that have occurred over the past few years, as well as recent discussions with stakeholders from various agencies, communities and government. DDMI recognizes that the review process for the wildlife

monitoring programs will continue throughout 2010, and DDMI is cooperatively working towards developing options for various programs that focus on assessing program objectives so that monitoring is relevant to the operation and stakeholder requirements, as well as providing feedback necessary to make management decisions. We continue to look at ways to increase the value of information that is being collected while assessing sampling frequencies and cooperative efforts with other mining companies, communities and ENR to possibly reduce efforts and costs being expended. Community consultation will continue to occur for any proposed revisions to the program.

The wildlife study area (Figure 1-1) encompasses approximately 1,200 square kilometers (km^2). Its boundaries are roughly: west to the southwest arm of Lac de Gras, east to Thonokeid Lake, north to the BHPB wildlife survey area and south to the north shore of MacKay Lake. An extension to the northwest was made to include the Lac du Sauvage narrows. The local study area during baseline studies (Penner, 1998) covered an area of approximately 805 km^2 and the rationale for increasing the study area during current and future monitoring was to take into account the eastern portion of Lac du Sauvage, as this area was identified in the Wildlife Baseline Report (Penner, 1998) as an important movement corridor for caribou.

Figure 1-1 Diavik's Wildlife Study Area

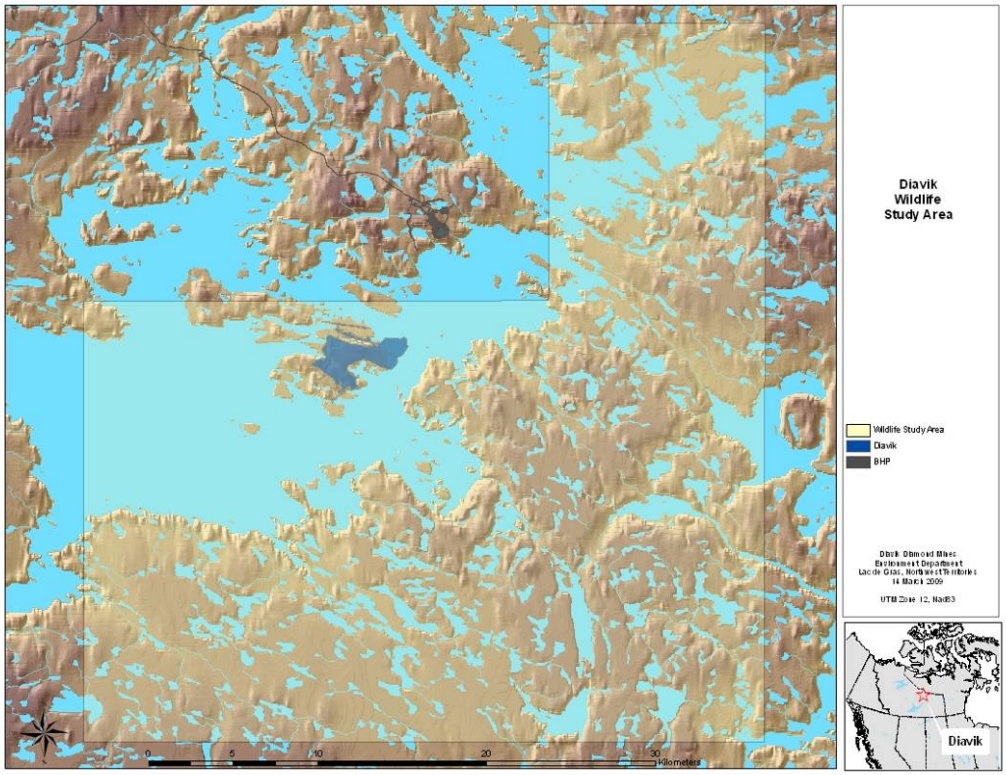
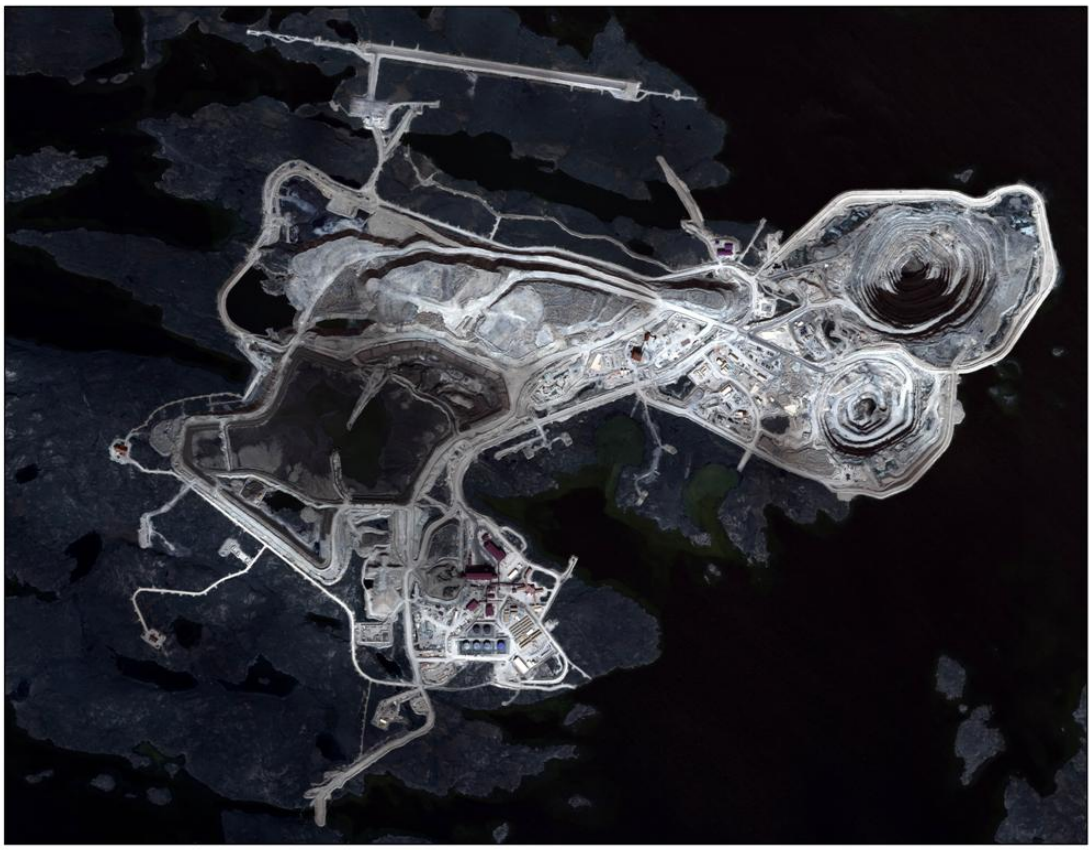


Figure 1-2 Satellite Image of East Island – 2009



The mine footprint is restricted to East Island and consists of haul roads, an airstrip, country rock piles, A154 pit, A418 pit and all mine infrastructure (Figure 1-2).

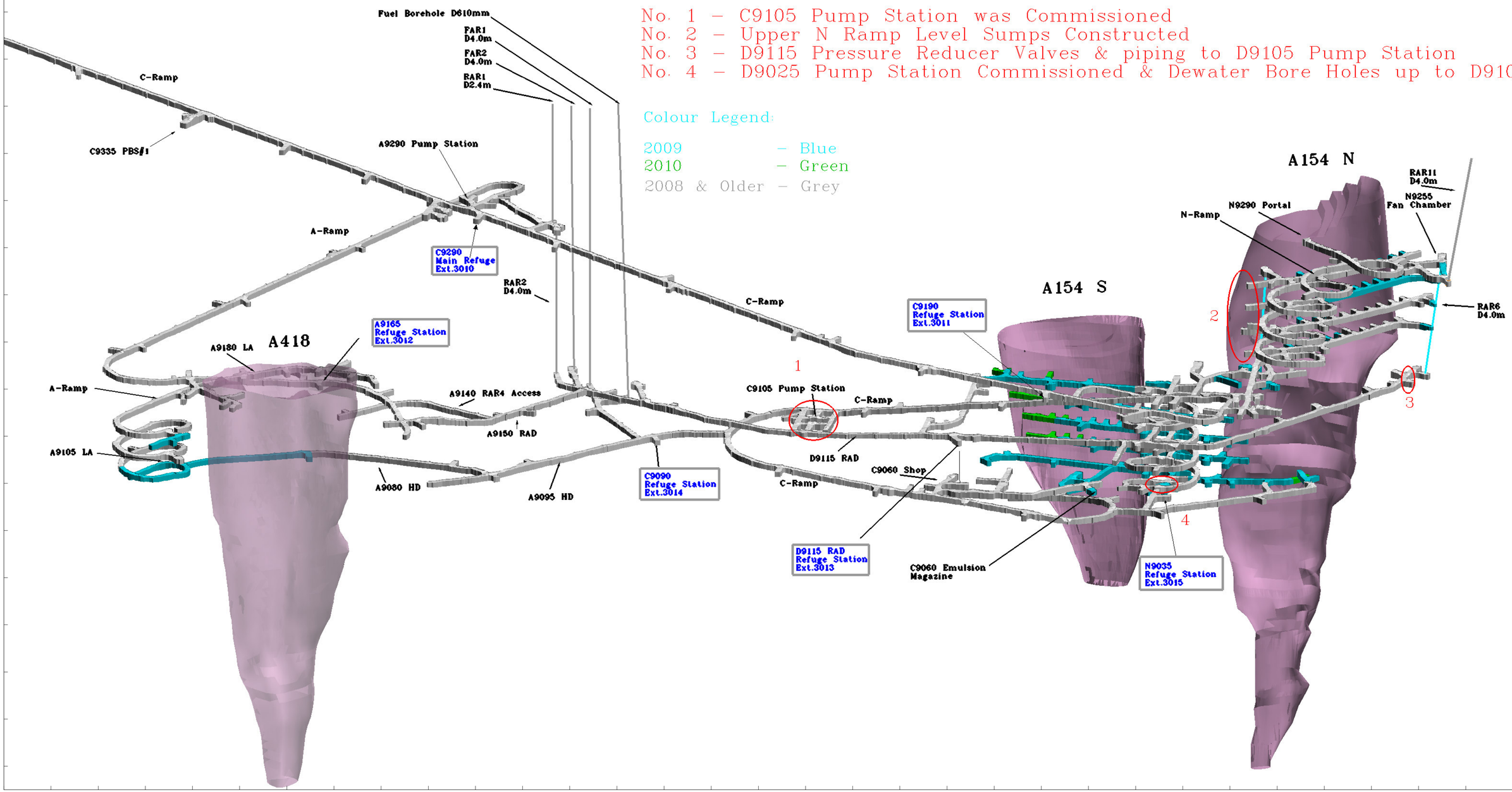
During 2009, minimal surface construction was undertaken, resulting in no increase in the overall mine footprint. All haul roads required for mining activities to date are complete. Development of the underground mine at the A154/418 decline continued during 2009, with 3,436 meters (m) completed by year end (Figure 1-3). Infrastructure development included sumps, pump stations, the raise bore and electrical (MCC) rooms.

2009 Infrastructure Development

No. 1 – C9105 Pump Station was Commissioned
No. 2 – Upper N Ramp Level Sumps Constructed
No. 3 – D9115 Pressure Reducer Valves & piping to D9105 Pump Station
No. 4 – D9025 Pump Station Commissioned & Dewater Bore Holes up to D9105

Colour Legend:

2009 – Blue
2010 – Green
2008 & Older – Grey



3D Overall Mine Design - Asbuilt: March 29,2010

Comments:
Environment & Sustainable Development

Figure 1-3 Underground Development to the end of 2009

DIAVIK DIAMOND MINE
UNDERGROUND

Title:
DDMI Underground Project
3 D Overall Mine Asbuilt
Isometric View

Asbuilt Date:	Purpose:
March 29,2010	Information
Drawn by: GN / Date: 29-Mar-2010	Scale: 1:2000 / Plot Size: D

A production shutdown occurred for 6 weeks during the summer of 2009 and minimal construction activities occurred at the mine. This resulted in lower camp population numbers than those noted for the past few years. The number of people present on East Island decreased from 2008, equalling an annual average of 562 people. The average population of the main camp accommodation was 314 people while the average for south camp accommodation was 248 people. During the month of January, East Island reached a peak population of 699 people, compared with the 2008 peak of 1,044 people.

This report is divided into nine sections that make up the core monitoring program.

- Vegetation
- Caribou
- Caribou Advisory
- Caribou Mitigation Effectiveness
- Grizzly Bear
- Wolverine
- Waste Management
- Raptors
- Waterfowl

Within each section of the report, data are presented that will be tracked over the life of the mine. Recommendations for enhancement to the WMP are presented at the end of each section for consideration. Based on technical experience gained throughout the baseline period and the ongoing monitoring program (in this case the 2009 program), key recommendations are described in this report and will be incorporated into the Wildlife Monitoring Program for subsequent years. The DDMI WMP is an evolving program that will reflect recommendations during previous years, as well as advances in project development. Changes such as these will be captured in annual revisions of the Wildlife Monitoring and Management Plan for the Diavik Diamond Mine (Appendix I). Community visits for Diavik to present proposed changes and obtain feedback from the communities is completed annually. During 2009, the majority of community visits relating to wildlife program changes were conducted during the fall and winter, with one community group being visited in early 2010.

Vegetation

Vegetation Loss

East Island's vegetation cover is predominantly characterized by heath tundra, heath tundra with boulders and/or bedrock and tussock/hummock habitat types. The main effect on vegetation during operations is the reduction in the geographic extent of all vegetation/land cover types due to disturbance caused by the mine and the mine infrastructure. The recovery of vegetation would be slow, which is characteristic of arctic environments (Burt, 1997). The direct loss of vegetation/wildlife habitat due to mining activities is important as it decreases the biodiversity at the landscape, community and species level (DDMI, 1998a). This would be a direct loss of habitat utilization for wildlife, but also altered landscapes may attract certain wildlife species such as caribou that could make use of the airstrip and hauls roads for insect relief (Mueller and Gunn, 1996).

The intent for this program is to determine if vegetation loss is within the extent predicted in the Environmental Effects Report (DDMI, 1998b). The objective is:

> ***To determine if direct vegetation/habitat loss due to the mine footprint exceeds the prediction of 12.67 km^2.***

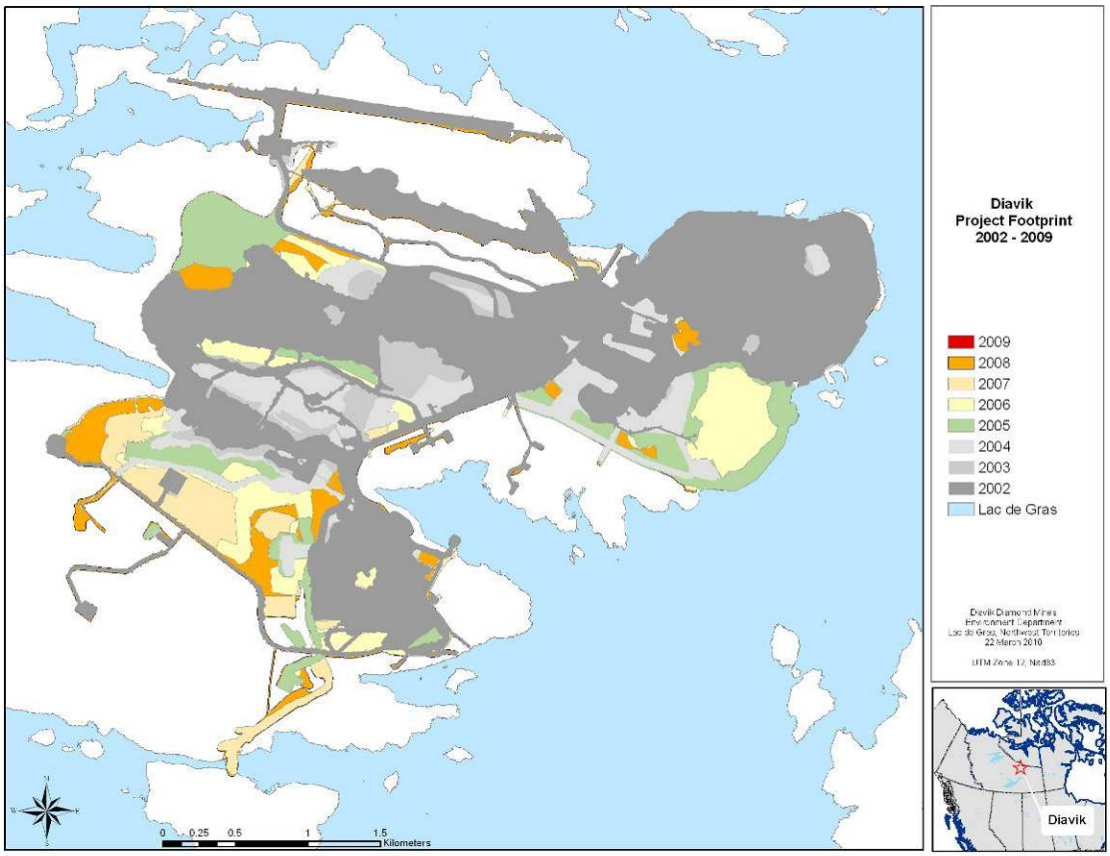
Methods

A satellite image of the mine site area was obtained and used to update the area of the current mine footprint. This dataset was then laid over the vegetation baseline image, which shows each vegetation/habitat type based on the Ecological Landscape Classification developed by ENR (Matthews *et. al* 2001). Each vegetation/habitat type that has been replaced by the mine footprint was selected and area calculations were made to determine how many square kilometers of each habitat type has been replaced by the mine footprint (Figure 2-1).

Results

As of December 2009, a total of 9.78 km^2 of habitat has been altered due to mine footprint expansion, with construction beginning in 2000. This represents a total loss of 77.2% of the predicted mine disturbance (Figure 2-1).

Figure 2-1 Habitat Loss by Year, 2000 to 2009



Direct habitat loss in 2009 was 0.12 km^2. Heath tundra represents the largest cumulative loss on East Island over the years (Table 2-1), and represents the largest predicted vegetation habitat type loss due to mining activities.

Table 2-1 Predicted Mine Disturbance versus Cumulative Actual Mine Disturbance for All Years (2000-2009)

Habitat Classification	Total Area (km²)									
	up to 2001	2002	2003	2004	2005	2006	2007	2008	2009	Predicted
Heath Tundra	1.45	1.89	2.02	2.38	2.62	2.76	2.93	2.97	**3.03**	3.68
Heath Bedrock (30-68%)	0.08	0.34	0.36	0.4	0.45	0.49	0.53	0.58	**0.59**	0.78
Health Boulder (30-68%)	0.26	0.64	0.73	0.96	1.07	1.24	1.43	1.49	**1.52**	1.89
Tussock/Hummock	0.45	0.63	0.79	1.01	1.19	1.27	1.35	1.42	**1.44**	1.64
Sedge Wetland	0.02	0.03	0.04	0.09	0.16	0.16	0.17	0.21	**0.21**	0.26
Riparian Shrub	0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	**0.03**	0.03

Habitat Classification	Total Area (km²)									
	up to 2001	2002	2003	2004	2005	2006	2007	2008	2009	Predicted
Birch Seep & Shrub	0.03	0.05	0.06	0.08	0.08	0.09	0.09	0.09	**0.09**	0.11
Boulder Complex	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.04	**0.04**	0.05
Bedrock Complex	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06	**0.06**	0.07
Shallow Water	0.11	0.23	0.23	0.26	0.29	0.34	0.35	0.35	**0.35**	0.48
Deep Water	0.15	1.8	1.81	1.82	1.93	2.17	2.19	2.19	**2.19**	3.46
Disturbed	0	0.05	0.05	0.05	0.05	0.05	0.06	0.06	**0.06**	0.06
Esker	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.17	**0.17**	0.16
Total	**3.12**	**5.88**	**6.32**	**7.3**	**8.15**	**8.86**	**9.4**	**9.66**	**9.78**	**12.67**

** Any discrepancies in totals across the rows results from the rounding of numbers in annual columns for presentation purposes*
***Values in red represent actual habitat loss equal to or exceeding that predicted*

In 2009, very few construction projects occurred outside the existing mine footprint. Heath Tundra habitat experienced the greatest loss in 2009 (0.06 km^2). A progression of habitat loss from the mine footprint can be seen in Figure 2-1.

Values provided for habitat loss are estimates based on the predicted mine footprint, satellite imagery and the ecological classification map. DDMI will continue to monitor habitat loss as the mine expands and will identify any exceedences that may occur during this time.

Revegetation Study

Research Program Objectives

The goal of the land reclamation research program at Diavik Diamond Mines is to gain greater knowledge of soil and plant characteristics and processes on disturbed and undisturbed reference sites at the mine to develop ecologically and economically effective methods to restore tundra communities following mine closure. The research began in 2004 and is being conducted in two related but specific phases.

Specific objectives for Phase I are as follows.

- To determine which substrates are most effective for enhancing soil properties and native plant community development.
- To determine which soil amendments are most effective at enhancing substrate properties (texture, organic matter, nutrient content, water holding capacity), native plant establishment and community development.
- To determine which groups and individual native plant species can establish and survive on a variety of soil substrates and amendments.

Specific objectives for Phase II are as follows.

- To investigate the effect of microtopography including boulders, soil mounds and depressions on plant emergence, establishment and survival.
- To investigate methods to establish native shrubs from wild collected seed and stem cuttings.
- To investigate the potential of salvaged topsoil as a surface soil amendment and source of native propagules for reclamation of disturbed sites.

Summary of Progress in 2009

This was the final year of monitoring for Phase I. Vegetation was assessed during the last week of July and the first week of August. Three systematically random 0.1 m^2 quadrats were located in each revegetation treatment subplot. Total vegetation cover and plant density and health by plant species were measured. Presence of florets or flowers and evidence of grazing were recorded. Three random soil samples at two depths, 0 to 10 cm and 11 to 20 cm, were collected in each substrate amendment plot. Samples were kept cool until transported to a commercial laboratory for pH, electrical conductivity, cation exchange capacity, extractable cations, total carbon, total nitrogen, available nitrogen, phosphorus, potassium and sulfur and Canadian Council of Ministers of the Environment (CCME) metals analyses. Soil water and temperature continued to be recorded on an hourly basis using HOBO microstations.

To address the objectives of Phase II, each shrub cutting was assessed in late July, identifying presence or absence and if present, given a health rating. Seeded species were also identified as present or absent and given a health rating. A rating of 1 indicated the plant was dead, 2 indicated the plant was mostly dead or dying, 3 indicated the plant had average health, 4 indicated the plant was doing well, and 5 indicated the plant was robust and vigorously growing. In August 2009, three transects, located parallel to the longest edge, were randomly established in each plot. Quadrats, 0.1 m^2 in size, were located every 5 m along transects, starting 1 m from the plot edge. Total percent cover of vegetation, litter and bare ground were assessed. Density, health rating and average height of each species were measured. Species not identified in a quadrat but present in the plot were recorded.

Description of Results

In Phase I, native grass cultivars and some native forbs were successfully established. *Betula glandulosa* (dwarf birch) did not establish from seed. Plant density and cover increased slightly between 2008 and 2009, as did the cover of moss and litter in treatments. Mean plant cover was less than 5% except in “50% PK 50% Till (50:50) Sewage” (PK/Till with sewage amendment) and “Till Sewage” treatments. Mean plant density was less than 10 plants per 0.1 m^2 except for in the same two treatments. “50:50 No Amendment” and “Till Fertilizer” also had greater plant density than most other treatments. Treatments that performed well in the first few years are not

necessarily the ones that had the highest plant densities and cover in 2009, five years after revegetation treatments were implemented. Data are currently being analyzed.

In Phase II, the majority of shrub cuttings were dead. Of those that were found alive, *Empetrum nigrum* (crowberry) was the most frequent followed by *Arctostaphylos rubra* (bear berry) and *Vaccinium vitis idaea* (cranberry). Of the seeded species, only *Hedysarum mackenzii* (wild sweet pea) established, although in low densities. *Epilobium angustifolium* (fireweed) was the most abundant species on site and established naturally. Water erosion of seed, cuttings and topsoil were issues in some plots.

Plans for 2010

Data from Phase I and II is currently being analyzed and a final report will be submitted by 30 April 2010. The report will include recommendations, based on results from the multi-year study, for consideration of further studies. This report will be forwarded to all interested parties once received.

Recommendations

Permanent Vegetation Plots (PVP) will be surveyed during the 2010 monitoring year and results will be assessed within the 3-year wildlife effects report.

Lichen monitoring program is scheduled to be conducted during 2010. Discussions related to program design should occur between Diavik and EMAB to address comments submitted from the previous study.

Caribou

The Bathurst caribou utilize a migration corridor that passes through the Lac de Gras area on their way to and from their calving grounds at Bathurst Inlet (Gunn *et. al* 2002). A portion of the herd frequently forages and moves through the Lac de Gras area during the summer and fall periods, sometimes following shorelines along the lake and onto the west and east islands (DDMI, 1998b).

New estimates of the Bathurst caribou herd suggest this herd has been in decline for the last decade at approximately five percent per year. The latest population estimate suggests that the number of breeding females in the herd has declined from approximately 55,500 in 2006 to 16,000 animals in 2009 (ENR 2009, website). Management actions for the herd are currently being considered by the Government of the Northwest Territories (GNWT) and the Wek'èezhìi Renewable Resources Board (WRRB).

The Ahiak herd was confirmed as distinct from the Bathurst herd based on movements and range use by satellite-collared caribou (ENR 2008, website). The Ahiak calving grounds are near the Queen Maud Gulf, Nunavut but can range as far south as the Thelon Game Sanctuary, and animals can pass through the Lac de Gras area. It was estimated that the Ahiak herd was the third largest in the Northwest Territories (NWT) with approximately 200,000 animals in 1996 (ENR 2008, website).

These barren-ground caribou herds are some of the most heavily harvested of any in the Northwest Territories. They are an important food source for hunters of both western Nunavut and the communities of the Northwest Territories. The barren-ground caribou was selected as one of the key indicator species for impact assessment because of its cultural and economic value to northern residents, ecological importance, management status, and biological vulnerability (DDMI, 1998b).

Habitat Loss

Physical alteration of the landscape can have an influence on caribou as the vegetation can no longer be exploitable as a source of life basics (DDMI, 1998b). Habitat loss on East Island is expressed in habitat units (HUs) for caribou summer habitat. A habitat unit is the product of surface area and suitability of the habitat in that area to supply food for caribou and cover for predators (DDMI, 1998b). Habitats were rated on a scale of 0 to 1 for their capability to support use for caribou, with values >0.30 regarded as highly suitable habitat and values <0.25 rated as

low suitability for caribou. The area of each habitat type on East Island was multiplied by its habitat suitability value to determine the number of foraging habitat units available to caribou.

One objective of the caribou monitoring program is to determine if direct summer habitat loss (in habitat units [HUs]) is greater than predicted. The following section summarizes methods used and results obtained. The impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

> ***At full development, direct summer habitat loss from the project is predicted to equal 2.965 habitat units (HU's).***

Methods

The approach is similar to methods used in the Vegetation section of this report. The area (km^2) of vegetation type lost was multiplied by its habitat suitability value (Table 3-1; DDMI, 1998b) to determine habitat units lost (HUs).

Results

Direct summer habitat loss to date from the mine totalled 2.46 habitat units (Table 3-1). Heath tundra, which has the highest habitat suitability rating, represents 3.03 km^2 of lost vegetation since construction began. Caribou summer habitat loss was greatest in 2001, when the majority of haul roads and laydown areas for mine infrastructure were constructed. Overall, total direct losses for all summer habitat suitability classes for caribou are currently below that predicted in the EER.

Table 3-1 Predicted area of summer caribou habitat – disturbed vs. actual area of summer caribou habitat on East Island

Vegetation Cover Type	Habitat Suitability Value	Area of Habitat Lost in 2009	Habitat Suitability Class	Predicted Habitat Units Lost	Actual Habitat Units Lost										Total Habitat Units Lost to Date*
					2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	
Heath Tundra	**0.37**	0.06	High	**2.13**	0.30	0.42	0.19	0.09	0.23	0.14	0.12	0.14	0.09	0.03	**1.75**
Heath Boulder	**0.40**	0.03													
Riparian Shrub	**0.46**	0.00													
Bedrock Complex	**0.27**	0.00	Moderate	**0.63**	0.07	0.12	0.07	0.05	0.08	0.08	0.02	0.03	0.03	0.01	**0.56**
Tussock/Hummock	**0.30**	0.02													
Sedge Wetland	**0.28**	0.00													
Esker	**0.30**	0.00													
Birch Seep & Shrub	**0.11**	0.00	Low	**0.20**	0.02	0.05	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	**0.15**
Boulder Complex	**0.21**	0.00													
Heath Bedrock	**0.23**	0.01													

**Totals may vary slightly due to rounding of values for reporting purposes.*

Zone of Influence

Mining activities have the potential to decrease the use of habitat adjacent to human developments for caribou due to behavioural disturbance (Diavik Diamond Mines Inc. [DDMI], 1998b). Miller and Gunn (1979) explained the expression of disturbance in relation to wildlife as "the phenomenon, which resulted from the introduction of unfamiliar stimuli into an animal's environment brought about by the presence of human activities". Zones of Influence (ZOI) were estimated during Diavik's Wildlife Environmental Effects Report (EER) so that a conservative approach was used in the assessment of the possible impacts from human activity on caribou. The ZOI were estimated based on literature and the experience of barren-ground caribou biologists.

Information collected on the activity of caribou, as part of DDMI's Wildlife Monitoring Program, is used to determine whether a change in behaviour is detected in relation to distance from mining activities. Scan sampling is conducted on East Island where the foraging behaviour of animals may be influenced by mining activities. Observations are also made on the mainland ("control site"), to determine whether or not "changes in behaviour were a response to human activity" (Gunn, 1983).

The current objective for this program is to determine if the ZOI from mining activities is greater or less than predicted. The following section summarizes the methods used and results obtained from aerial surveys. The current impact prediction found in the EER (Wildlife, 1998) is:

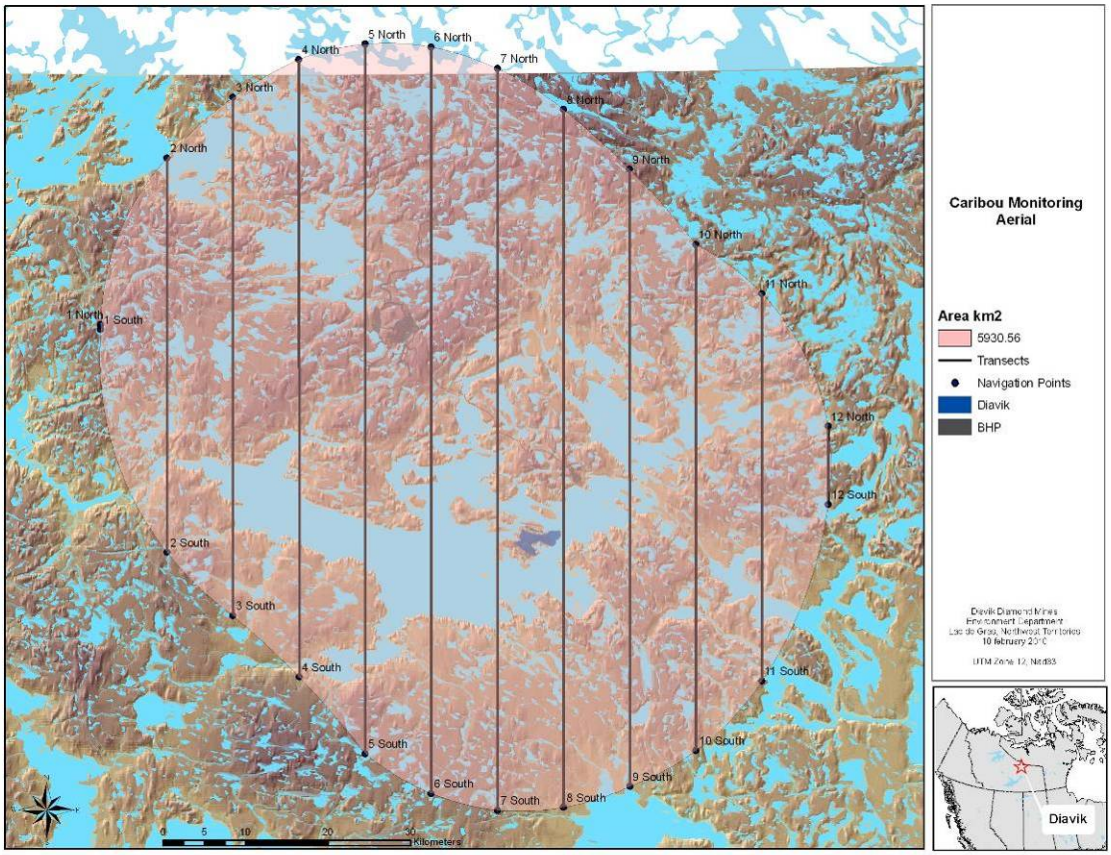
> ***The zone of influence from project-related activities would be within 3 km to 7 km.***

Methods

Aerial Surveys

From 2002 through 2009, DDMI has completed weekly aerial surveys, weather permitting, within a study area that surrounds the mine site. During 2009, the survey area was aligned with that of BHP-Billiton to improve sampling efficiencies while covering a larger spatial area (Figure 3-1). Surveys were completed from mid-July through to October to collect information on caribou numbers, habitat type associated with the caribou groups, and distance from the Diavik mine site. This survey period focuses on the southern (post-calving) migration period. The northern migration was not included due to low probability of animals being within the study area, as well as the animals' tendency to move rapidly through the mine study areas on their way to the calving grounds. A helicopter was used to conduct the survey and all were completed at 120 m to 180 m above ground level (agl) at a speed of 145 km to 160 km per hour.

Figure 3-1 Aerial survey transects - 2009



The aerial survey area covers approximately 6,300 km^2. Twelve transects were spaced 8 km apart, and the observation width along transects was 1,200 m, which generated 15% coverage (887 km^2) of the study area (Figure 3-1). This area covers a distance of approximately 30 kilometres in each direction from mine infrastructure associated with the Diavik Diamond Mine and the Ekati mine. This distance would account for a ZOI that was greater than originally predicted (3 to 7 km), and allow for monitoring within proposed new estimates for ZOI ranging from 11 to 28 km.

In 2009, surveys began on 11 July and were flown once per week until 18 October, as weather permitted (n = 14 surveys). One survey, 3 October 2009, was cancelled due to weather and the last survey of the year on 18 October had 4 transects not surveyed due to ice build up on the helicopter.

Habitat type associated with the caribou groups was recorded. During the southern migration, habitat classifications included heath tundra, esker, sedge wetland, riparian shrub and other (water, bedrock, disturbed, and boulder). Distance from transect was also recorded however

behaviour data were not collected, as the noise of the helicopter may influence behaviour of the caribou during aerial surveys.

Behavioural Observations

In an attempt to obtain more localized effects data on caribou behaviour, ground-based behavioural observations, or scan sampling, is conducted. These types of observations can provide useful data on potential changes in caribou behaviour as they move closer to or further from the mine. For the 2009 sampling season, BHP-Billiton and Diavik identified an opportunity to pool data from behavioural observations between both mines. The Ekati mine regularly has caribou close to mine infrastructure, while the location of the Diavik mine on East Island is better suited to collecting observations further from the mines.

Individual caribou activities were recorded as feeding, bedded, standing, alert, walking, trotting, or running. Individuals will be classified as feeding when they are actually foraging or searching for food (i.e., walking with head down).

The GPS location was recorded, and observations were conducted during the spring, summer, and autumn by two observers; the bulk of observations were conducted in the fall when more caribou were passing through the area. Group composition was classified, and the number of animals in the group was recorded. Thus, the response variable is caribou behaviour, while the potential stressors include distance from mine, season, and group composition. In order to control for the effects of habitat and insect harassment, all observations were performed within one habitat type (tundra with < 30% bedrock or boulders) and the level of insect harassment was recorded.

The group was scanned every 8 minutes for a minimum of 4 observations and a maximum of 8. For each scan, the number of animals exhibiting each type of behaviour was recorded. For all caribou groups, instantaneous observations were used to assess the response of caribou to different potential stressors as a function of distance. In the event that a stressor was introduced during scan sampling, the observers noted the time and recorded the response of caribou to stressors as “no reaction” or “exhibiting a reaction”. The reaction of the majority of the group was used in selecting the category. Estimated distance (m) from the stressor was also recorded. Stressors included type of aircraft, type of vehicle, and blasts from pits.

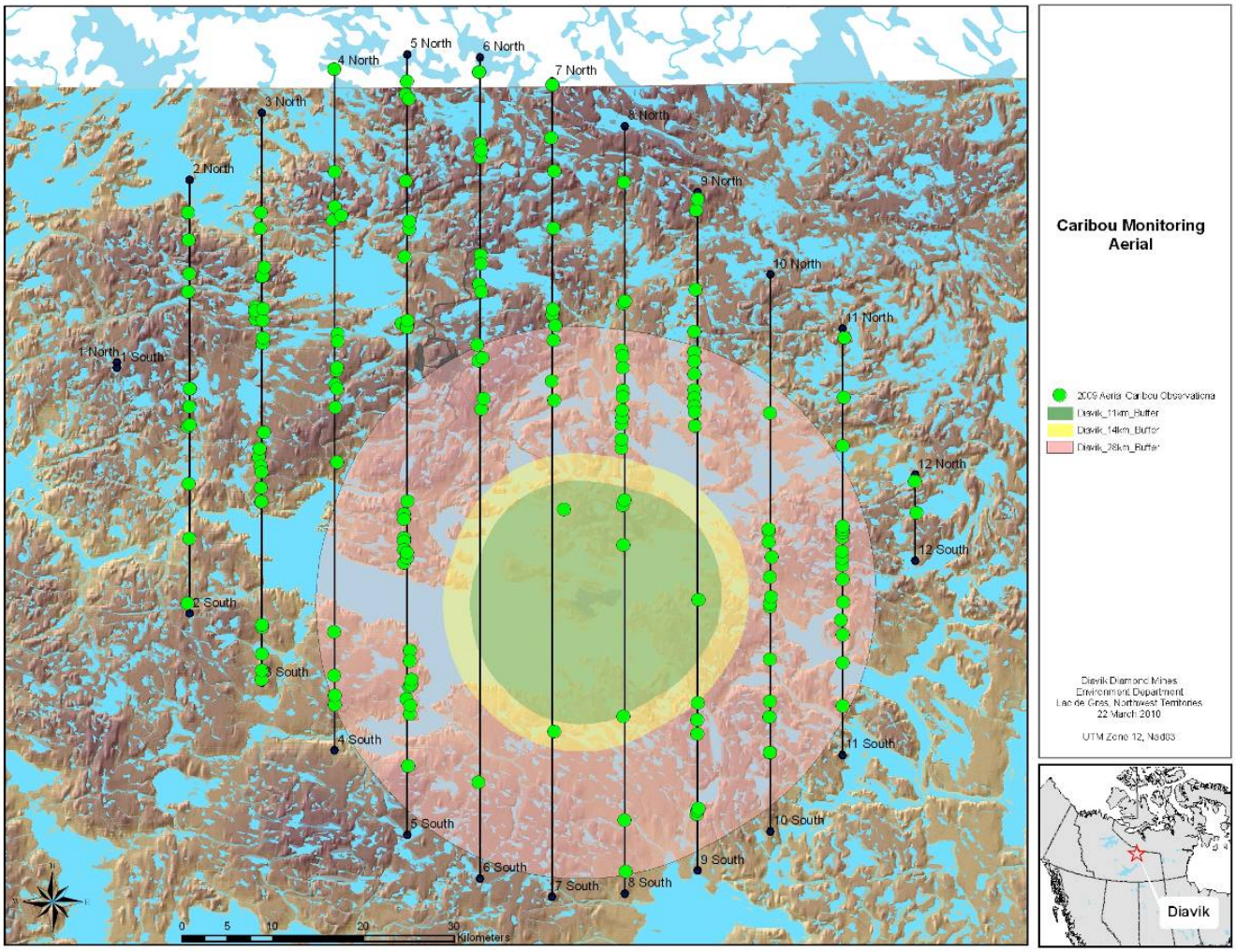
The observers then waited until the animals resumed their previous behaviour (usually 1 – 2 minutes), and would begin scanning observations again. For the scan observations, weather conditions such as wind speed and direction, temperature, and type of precipitation were documented.

Results

Aerial Surveys

Impact predictions relating to the ZOI were tested through a comprehensive analysis of regional caribou data (Golder, 2008). This analysis suggests an increased ZOI for the mine relative to impact predictions, ranging from 22 to 28 km. Another analysis conducted by Boulanger et al. (2009) estimates a ZOI of approximately 14 km from the mine site based on aerial survey data and 11 km based on collar data. Results from the 2009 aerial survey in relation to these Zones of Influence are outlined below (Figure 3-2).

Figure 3-2 Distribution of caribou within the survey area in relation to estimated ZOIs - based on aerial survey data, 2009 southern migration



In 2009, the number of caribou groups observed within 11 km of the Diavik mine footprint equalled 5 groups. Those within 14 km of the mine equalled 8 groups, and include the same 5 groups that were counted within 11 km of the mine. The number of groups within 28 km of the mine equalled 106 during the 2009 survey. In total, 203 groups of caribou were observed within the survey area during the 2009 monitoring year. Of these 52% occurred within 28 km of the Diavik mine footprint, 4% within 14 km and 2% within 11 km. These results are confounded by the presence of open water around the East Island, which caribou have to shown to avoid in this area (Golder, 2008).

Behavioural Scans

A total of 110 behavioural observations of caribou were obtained during 2010 (Table 3-2). The number of observations can be categorized into the following distance categories:

Table 3-2 Caribou behavioural observations as a function of distance from mine infrastructure, 2009

Total Number of Scans Conducted	Distance from Mine Infrastructure	Number of Scans Conducted by Diavik Personnel
17	≤ 2 km	3
2	< 5 km	1
24	8 – 12 km	19
47	13 – 20 km	46
20	21 – 30 km	20

The collaborative approach to gathering data with BHP-Billiton allows for an adequate sample size for analysis (n=110). Two to three years of data with a similar sample size will lend itself well to a statistical analysis that will assist with interpreting behavioural response mechanisms within the ZOI.

Summary

Impact predictions relating to the ZOI have been more fully tested through a comprehensive analysis of regional caribou data (Golder 2008). This analysis suggests an increased ZOI for the mine, relative to impact predictions, ranging from 22 to 28 km. Another analysis conducted by Boulanger et al. (2009) estimates a ZOI of approximately 14 km from the mine site based on aerial survey data or 11 km based on collar data. Seasonal migrations of the Bathurst herd annually varies (Gunn et al. 2001), which causes the number of caribou in the vicinity of the

mines to fluctuate. Results from the 2009 aerial survey in relation to the Diavik mine footprint appear to support the 14 km ZOI proposed by Boulanger et al. (2009), with increased observations of caribou groups between 14 and 28 km from the Diavik mine footprint. However, the results are confounded by the presence of water around the East Island.

This was the first year implementing the revised survey area in cooperation with BHP-Billiton. Data from this survey area has been obtained by BHP-Billiton since 2006. The 3-year comprehensive analysis of wildlife effects data will examine the results from the Ekati and Diavik surveys conducted over the past 13 years and will compile data from the two survey areas over all years. This report will be completed at the end of the 2010 monitoring season and submitted in spring 2011.

Reporting of survey results from 2009 focused on results relating to the most recent estimates of ZOI for the diamond mines, rather than those originally predicted within the EER. The reason for this is that monitoring data has indicated that the ZOI for caribou occurrence and distribution was greater than the impact prediction of 3 to 7 km (Golder, 2009). The area originally predicted for the ZOI (3 to 7 km) is likely better suited to observe local-scale behavioural responses (Golder, 2009, 2010). Data required to test a potential local-scale effect is best obtained through on-the-ground behavioural observations (scan sampling) obtained from a range of distances from mine infrastructure.

While carrying out the Wildlife Monitoring Program, DDMI has had limited opportunities to study caribou behaviour on the ground through scanning observations. From 2003 to 2008 the maximum number of ground observations of caribou scan samples successfully completed in any one year was 24; and all of these observations were completed away from the mine site, as the number of caribou on East Island was low. The collaborative approach to gathering data with BHP-Billiton allows for an adequate sample size for analysis (n=110). Two to three years of data with a similar sample size will lend itself well to a statistical analysis that will assist with interpreting behavioural response mechanisms within the ZOI.

Interestingly, a group of 27 caribou grazed in an area between the airport and the north inlet for approximately two weeks in May 2009. Overall, caribou incidental observations on East Island increased during 2009 and are summarized in Appendix III.

Distribution of Movement

Due to construction and operations of mining areas, infrastructure, roads and an airstrip, a deflection of caribou movements may be associated with mining activities (DDMI, 1998b). Information collected from aerial surveys and caribou collar locations is used to examine the distribution of caribou within the wildlife study area. These observations are then compared with predicted trends in movement.

The following section describes the methods used and results obtained from aerial surveys and information provided by caribou collar locations supplied by Environment and Natural Resources (ENR). The impact prediction found in the EER (DDMI, 1998) is:

> ***During the northern (spring) migration, caribou would be deflected west of East Island and during the southern migration (fall), caribou would move around the east side of Lac de Gras.***

Methods

Aerial survey areas and methods are described in the previous section.

Information was evaluated to provide metrics such as first and last date observed, maximum number, total number, and density of caribou within the DDMI study area. Density of caribou was calculated as the number of caribou per survey per survey area. The total area surveyed within the Diavik study area was calculated as 153 km^2; this value differs from previous years (269.3 km^2 in 2008) due to the revised survey area and distance between transects. Both values omit portions of the transects that are located over Lac de Gras (75 km^2 for 2009 survey area). An important reminder while reading this section is that total number of caribou observed (actual caribou counted) will be reported throughout this portion of the report.

For the southern migration, density was compared to annual estimates from what was previously referred to as sector C for 2002 through 2006. Sector C was the area within the Diavik wildlife study area but excluded the East Island, and had a survey area equal to 221.0 km^2.

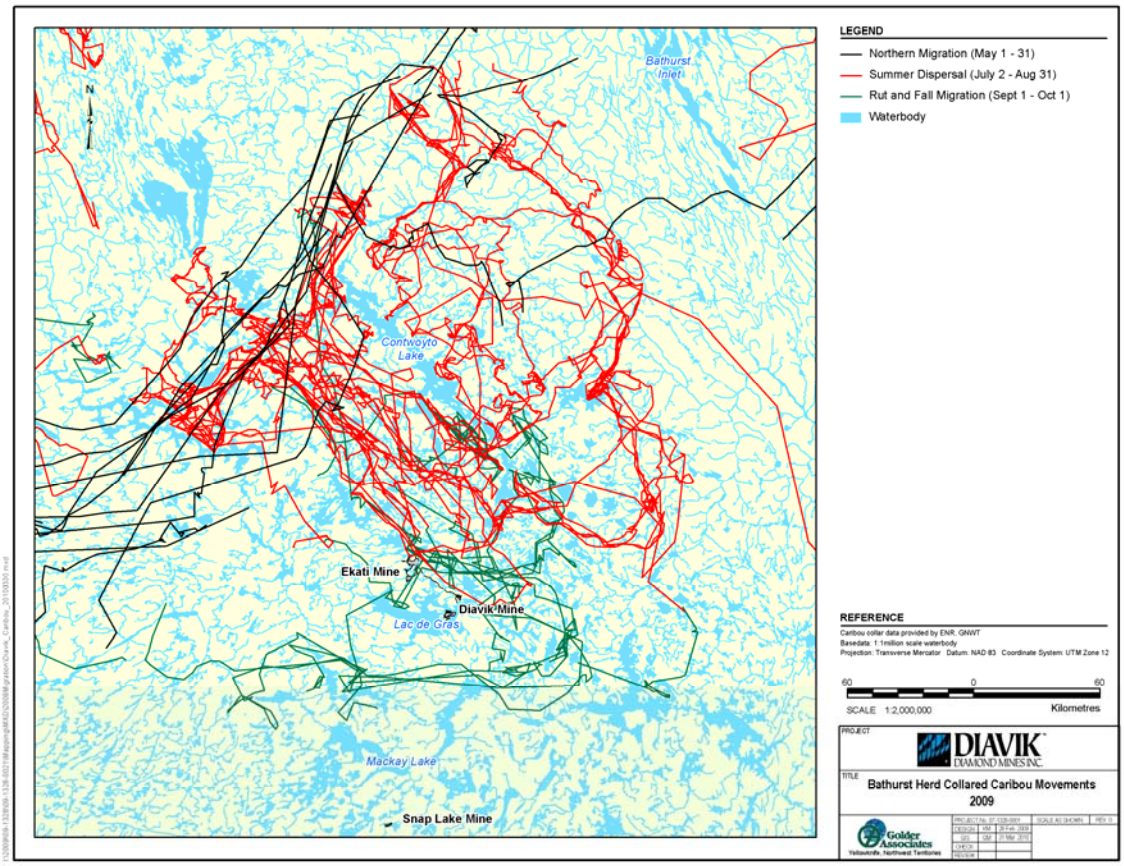
ENR provided weekly data on the geographic location of collared cows and this information was used to show general locations of the Bathurst caribou herd during migration periods (Gunn *et al.*, 2002). Movements of collared Bathurst caribou during the 2009 northern and southern migrations are included in this report. Historical data for 2002 to 2007 caribou collar locations can be found in Golder (2005, 2008).

Results

Northern Migration

Data from satellite-collared caribou suggested that females in the Bathurst herd traveled west of the mine during the 2009 northern migration (Figure 3-3). This result appears to be in alignment with the impact prediction. Data from satellite-collared caribou provide a reliable estimate of the movement of animals within the Lac de Gras region. While aerial surveys were not conducted during the northern migration in 2009, past aerial survey data has shown support of the data provided by collars (Golder, 2008).

Figure 3-3 Caribou Collar Locations during 2009



Southern Migration

In 2009, 2,549 caribou were observed in the Diavik wildlife study area during the southern migration (Figure 3-4). This is similar to the numbers observed during 2002, 2003 and 2006 (Table 3-3), but less than the number of caribou observed during 2004, 2005, 2007 and 2008 (Figure 3-5). Caribou numbers throughout the 2009 season were distributed among groups of 1 to 500 individuals.

Figure 3-4 Number of caribou observed within the DDMI wildlife study area during southern migration, 2009

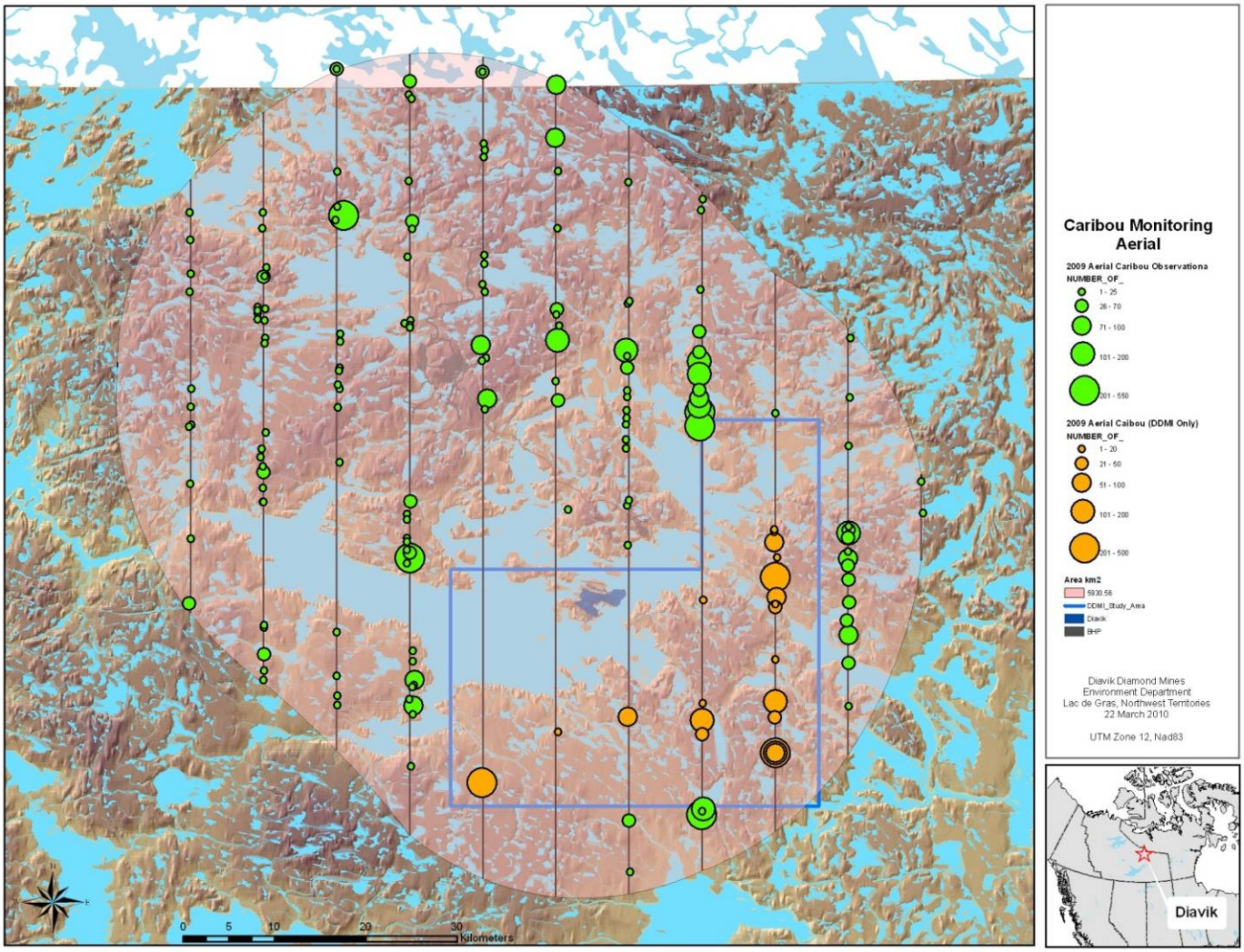
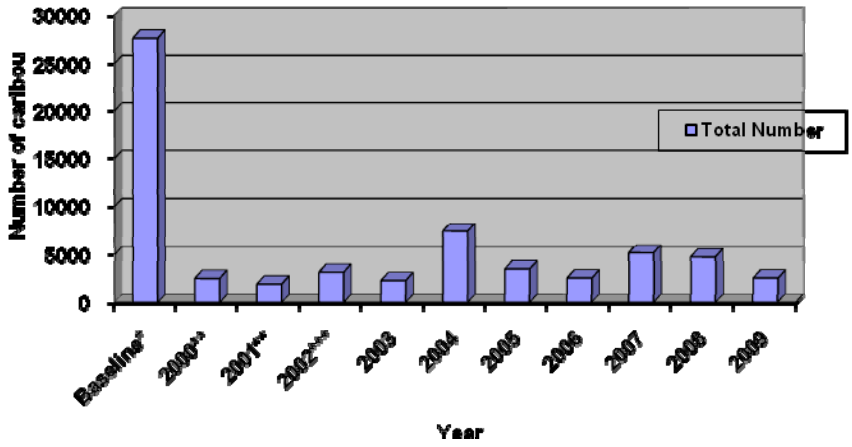


Figure 3-5 Total number of caribou in the Diavik wildlife study area – southern migration



**Baseline observations (1995-1997). Consists of mean numbers on the east and west islands of Lac de Gras (Penner, 1998)*
***Caribou numbers based on East Island ground counts and aerial survey observations.*
****Caribou numbers based on weekly aerial surveys of Diavik's wildlife study area (2002–present).*

The date that caribou were first sighted in the Diavik study area was similar to previous years (Table 3-3). The number and density of caribou in the study area during the southern migration has been similar among years. Caribou surveys are continued in the fall until no caribou are observed during the survey. In previous years, this typically occurred at the end of September. During 2009, caribou surveys were conducted up to 18 October; some caribou were observed on this date, but weather prevented any further attempts at conducting surveys later in the month.

The total survey area for 2009 includes coverage of 887 km^2 over 12 transects. Throughout this survey area, a total of 8,849 caribou were observed, with the largest group being 550 animals.

Table 3-3 Caribou Observations in DDMI study area, Southern Migration, 2002-2009

	2002 (n = 11)	2003 (n = 12)	2004 (n = 14)	2005 (n = 14)	2006 (n =17)	2007 (n=16)	2008 (n=15)	2009 (n=14)
Survey Date Caribou First Observed	26 July	25 July	18 July	2 July	8 July	28 July	19 July	18 July
Survey Date Caribou Last Observed	23 Sept	19 Sept	25 Sept	24 Sept	04 Nov	6 Oct	25 Oct	18 Oct*
Maximum Caribou Observed in Single Survey (survey date)	2340 (26 July)	1660 (01 Aug)	7000 (23 July)	500 (30 July)	1351 (16 Sept)	3094 (8 Sept)	1000 (27 Sept)	500 (3 occasions)

	2002 (n = 11)	2003 (n = 12)	2004 (n = 14)	2005 (n = 14)	2006 (n =17)	2007 (n=16)	2008 (n=15)	2009 (n=14)
Total Caribou Observed in Sector	3088	2280	7399	3507	2120	5160	4718	2549
Number of Surveys Caribou were Observed	8	9	9	11	12	11	14	13
Mean ± 1SD Caribou / Survey / km^2	1.3 ± 3.1	0.86 ± 2.15	3.04 ± 9.51	1.13 ± 1.73	0.41 ± 1.06	0.69 ± 1.35	1.09 ± 2.01	1.00 ± 2.00

*n = number of surveys; *date of last survey conducted*

Collar maps for the southern migration suggest that the majority of cows travelled east and through the southern portion of the study area during the fall migration period (Figure 3-3). The distribution of caribou groups observed during aerial surveys also indicated groups were recorded east and south of Lac de Gras (Appendix II). A comprehensive analysis also showed that from 2002 to 2007, with the exception of 2006, the majority of collared caribou traveled adjacent to or through the southeast corner of the study area (Golder, 2008). Data collected for the southern migration appears to agree with the impact prediction found in the EER (DDMI, 1998), stating that caribou would travel east of the mine site during the southern migration.

Maps showing monthly caribou movement throughout the aerial survey area during 2009 were generated using results from the DDMI/BHP Billiton survey data and are included in Appendix II.

Summary

The number of caribou observed within the Diavik wildlife study area was higher during baseline (1996 to 1997) than from 2000 through 2009. However, data from 2002 to 2009 (aerial surveys) show relatively similar numbers, with the exception of 2004, 2007 and 2008. The particular factors associated with this pattern are not known, but are likely associated with changes in aerial survey methods, variables influencing the geographic distribution of caribou within their annual home range and changes in population size. During 2009, transect spacing throughout the DDMI study area increased from 4 to 8 km. This change would likely influence the total number of caribou observed within the study area. Additionally, ENR population estimates for the Bathurst herd were further reduced during 2009. There are a number of factors that can affect the annual distribution and movement of caribou across their home range, which can create year-to-year changes in the abundance of animals in the study area, and other local areas (e.g., communities) within the Slave Geological Province.

ENR noted concerns relating to the reduced use of habitat around the mine site, as it may relate to either dust or noise. DDMI conducted noise monitoring during 2009 to determine levels near

the mine, as well as background levels away from the mine. While there are no noise guidelines for wildlife, this information can assist in determining relative differences in caribou occurrence and density at various distances from the mine. A recommendation for noise monitoring locations to determine potential effects on wildlife involves four "in-line" monitoring locations at distances of 1 km, 1.5 km, 3 km and 5 km from the DDMI operational boundary. Distances are based on standard attenuation formulae used to calculate a distance where noise levels from typical open pit mining activities would attenuate to a level that would not affect the ambient noise level and would account for the majority of potential cumulative effects (Golder, 2009b).

DDMI undertakes dust control procedures during the summer months. Dust control practices include watering of roads, use of EK-35 (an approved dust suppressant) on the helipad, apron, taxiway and parking lot at the airport and mat blasts for smaller construction blasts. The new crusher building operating at the mine site is enclosed within a building to further reduce fugitive dust while processing rock.

The location of caribou groups observed during post-calving aerial surveys showed that most animals were observed in the southeast corner of the regional study area. These data are supported by the migration paths of collared caribou, which showed that from 2002 to 2009, the majority of collared animals traveled through or adjacent to the eastern portion of the regional study area during the early part of the southern migration (Golder, 2008). This information supports the prediction that caribou would travel east of the mine site during the southern migration (DDMI, 1998).

Future movements of caribou in the area after closure of the mine were identified as a concern during preparation of DDMI's Interim Closure and Reclamation Plan during 2009. In an effort to address these concerns, DDMI held a workshop in August of 2009 to discuss closure options for some of the key structures associated with the mine that may impede wildlife movement post-closure. A summary of the results of this workshop are provided in Appendix V.

Mortality

Mineral development in the Bathurst caribou herd range has caused concerns about increased mortality, which include ground-vehicle collisions, collisions with aircraft, and accidental losses associated with caribou moving in hazardous areas around mining activities (DDMI, 1998b). Mitigation practices and policies have been developed and implemented to reduce the potential for mortalities such as, wildlife have the "right of way" on all haul roads, suspension of blasts when caribou are within the "safe zone" of the blast, and the caribou traffic advisory (Appendix I). The objective for this program is to determine if the number of caribou deaths or injuries associated with DDMI mining activities is greater than predicted. The following section summarizes methods applied and the results produced from incident reporting and road observations. The impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

Project-related mortality is expected to be low.

Methods

Project-related caribou mortalities are monitored in a number of ways. All personnel undergo environmental orientation where it is stipulated that should a wildlife incident occur, an incident report is to be completed. Numerous environmental data collection programs occur on East Island such as water quality sampling and dust and vegetation monitoring programs; any caribou mortalities located during these sampling events are investigated by Environment personnel. Weekly caribou aerial surveys also provided information on observed mortalities.

Results

No project-related caribou mortalities or injuries occurred on East Island in 2009. A summary of natural and mine-related caribou mortalities from baseline through 2009 is provided in Table 3-4.

Table 3-4 Caribou mortalities on East Island

	Baseline*	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Natural Caribou Mortalities on East Island	8	7	1	1	0	2	0	0	1	0	0
Project-related Mortalities	0	0	0	0	0	1	0	0	0	0	0

**Includes data from 1995-1997*

Recommendations

A joint letter from Rio Tinto and BHP-Billiton issued on 17 December 2009 outlined both companies' intentions to suspend aerial caribou surveys for the 2010 monitoring year. This decision was based on recommendations from the Advisory Boards for each of the mines, as well as feedback from communities relating to concerns over aircraft disturbance as a potential stressor for the caribou. During this time when surveys are suspended, alternative methods for conducting aerial surveys will be considered and discussed among stakeholders. Some of the ideas to date include less-frequent surveys to reduce disturbance (e.g. every second year), survey 'blocks' of a few years at a time and Traditional Knowledge programs that lessen disturbance to caribou. DDMI will continue to involve the Environmental Monitoring Advisory Board (EMAB), communities and ENR in discussions and inform these groups of any proposed changes to the existing programs.

Continue to work cooperatively with BHP Billiton to collect ground-based caribou behavioural data from areas surrounding the mine and farther away from the mine during 2010. This data will be pooled and analyzed during the 3-year analysis of environmental effects on wildlife in the Lac de Gras region.

Determine feasibility to conduct noise monitoring during 2010 or 2011 in accordance with Golder's recommendation for 4 stations ranging from 1 to 5 km from site.

Caribou Advisory

The objective of the Caribou Advisory Monitoring program is to make certain that workers are aware of the approximate numbers of caribou on or near East Island. This raises general awareness so that employees are alert to the likelihood that mitigation could be triggered. The number of animals on the island and in specific areas dictates which mitigation practices are to be undertaken (e.g. haul road closure, speed reduction).

Methods

Various methods were used to determine whether or not animals were present in the vicinity of East Island; these included reports from pilots and workers, Environment department road surveys on East Island and utilizing the satellite collar locations provided by Environment and Natural Resources (ENR). If animals were reported in the general area, ground surveys were initiated (Appendix I). Ground-based surveys are completed by Environment personnel travelling in vehicles along the haul roads twice per day and documenting approximate caribou numbers.

Results

During 2009, the caribou traffic advisory remained at “No Concern” for 364 days, as caribou numbers on the island did not exceed 100 at any given time. On one day, 29 April 2009, the traffic advisory sign was changed to ‘Caribou Advisory’ in response to 150 caribou present off the south road. The caribou moved off to the west and had left East Island that same evening.

When small numbers of caribou were noted within the vicinity of haul roads, an announcement was made on radio Channel 7 to notify all users of the haul road as to their presence and location. All incidental observations of caribou are reported in Appendix III.

Recommendations

There are no recommendations for this program.

Caribou Mitigation Effectiveness

Caribou mitigation effectiveness monitoring allows DDMI to evaluate whether or not mitigation designs, policies and practices are effective in preventing adverse impacts to wildlife (Appendix I). Mitigation monitoring allows DDMI to confirm their effectiveness and identify where adjustments in operating strategies are required. Monitoring investigations will determine if herding procedures are successful and if there is preferential use of areas impacted by dust (DDMI, 2002).

Caribou Herding

While on the island, caribou movements were monitored so that mine site personnel were aware of their presence and relative location. Of particular importance from a safety perspective (both human and animal), caribou movements in the vicinity of the airstrip and blast areas were tracked. When caribou are sighted adjacent to potentially hazardous locations in association with the airstrip and blast areas, DDMI implements its standard operating procedure (SOP) for caribou herding.

Methods

The method used to move caribou away from hazardous areas consisted of the slow advancement of personnel behind the caribou, encouraging the movement of the animals in a safe direction.

Results

DDMI's Caribou Herding SOP was employed twice during 2009. The first instance occurred on 14 May 2009 when a group of 27 animals located near the airstrip moved on to the airstrip prior to an incoming flight. A vehicle was used to encourage the caribou to move off and away from the airstrip. Pilots were made aware of the location of the caribou prior to beginning descent in order to be able to monitor the animals' proximity to the airstrip, and DDMI Environment personnel remained on location until the aircraft landed and again departed site. This same group of 27 caribou frequented the area between the airstrip and the north inlet for approximately two weeks in May during the northern migration (Appendix III). During this time, a number of incoming and outgoing flights occurred with only one herding event being required.

The second herding event took place on 28 May 2009 when a solitary caribou was discovered on the Type I rock pile. Environment staff coordinated with the Mine Operations Supervisor to close the haul road and then proceeded to herd the animal off the pile and toward the north inlet where it then started to graze. This was a single, adult female and staff noted a slight limp when the animal was walking, indicating a potential injury to its left hind leg. The caribou had moved off site by that evening.

Use of Dust Deposition Areas

Dust deposition can influence vegetation vigour, snowmelt rates, and changes in vegetation community structure. As a result, caribou may be attracted to these areas (Gunn, 1998). Dust from Diavik's mining activities is monitored and information on this year's program can be found in the Dust Deposition Monitoring Program 2009 Annual Report (DDMI, 2010).

Methods

Road observations were conducted twice a week from the beginning of May to the end of October to determine if caribou were utilizing areas adjacent to haul roads. These roads are chosen to represent the greatest degree of dust deposition. Information collected includes number of caribou encountered at various distances (on road, <50 m of road, 50-200 m of road and greater than 200 m from the road), dominant behaviour of group, group size and group composition (Appendix IV). East Island was divided up into four haul road sections (Figure 5-1) for a total of 9.8 kilometers of roads surveyed.

At the same time that road surveys are conducted, the Processed Kimberlite Containment (PKC) area and rock piles are also monitored. The purpose is to determine if caribou use the PKC and rock piles for insect relief or as a water supply. In addition to worker observations, this program would also help in detecting caribou if they were to become trapped in the PKC.

Figure 5-1 Caribou road observation locations

Results

Caribou road surveys and PKC and rock pile monitoring were conducted on 49 occasions between 2 May and 30 October 2009. Results are attached to this report as Appendix IV. No caribou were observed during the PKC and rock pile surveys. Caribou observations along roads occurred seven times over six (6) days during 2009. Of these observations, 1 was <50 m from the road, 1 was between 50 and 200 m and the remaining 5 were >200 m from the road. This was the first year since 2005 where caribou were observed during road surveys.

Recommendations

Observations for mitigation effectiveness will continue to be conducted.

Grizzly Bear

The barren-ground grizzly bear ranges throughout most of the Northwest Territories. It is considered a 'Species of Special Concern', as assessed by the Committee on the Status of Endangered Species (COSEWIC, 2002).

Grizzly bears have low population densities, low reproductive rates and are sensitive to human activity (DDMI, 1998b). The barren-ground grizzly bears of the NWT are unique, as they "have not been subjected to the exploitation and habitat changes" and "have remained relatively undisturbed from human activity" (McLoughlin et al. 1999). As such, the grizzly bear is considered 'sensitive' in the Northwest Territories (RWED, 2000).

Impacts to grizzly bears from mining may occur through direct mortality, habitat suitability reduction and direct habitat loss. The focus of the monitoring program is to determine direct habitat loss, level of grizzly bear activity, zone of influence from mining activities and if project-related mortalities have occurred.

Habitat loss

Grizzly bears use a wide variety of vegetation and habitats types. Studies of grizzly bears in the Northwest Territories have led to an understanding of their seasonal habitat preferences (McLoughlin et al. 2002a). Loss of habitat may result in negative effects on grizzly bears; for that reason habitat loss is calculated to determine if it is different from the prediction (DDMI 1998b), which is:

> ***At full development, direct terrestrial habitat loss from the project is predicted to be 8.67 km^2.***

Methods

Methods used to determine grizzly bear habitat loss are similar to that described in the Vegetation section.

Results

Cumulative grizzly bear habitat loss on East Island due to mining related activities was 7.18 km^2 (Table 6-1). This loss represents a value up to December 2009 and includes losses prior to 2000. The wildlife study area is approximately 1,200 km^2 (including shallow and deep water) and a loss of 7.06 km^2 represents a loss of 0.60% of habitat available in the wildlife study area. East Island encompasses approximately 20 km^2 of terrestrial habitat; a loss of 7.06 km^2 indicates a loss of 35% of available habitat.

Table 6-1 Predicted versus actual grizzly bear habitat loss on East Island

Vegetation / Land Cover Type	Predicted Area Lost (km^2)	Area Lost (km^2) 2000	Area Lost (km^2) 2001	Area Lost (km^2) 2002	Area Lost (km^2) 2003	Area Lost (km^2) 2004	Area Lost (km^2) 2005	Area Lost (km^2) 2006	Area Lost (km^2) 2007	Area Lost (km^2) 2008	Area Lost (km^2) 2009	Total Area Lost (km^2)
Heath Tundra	**3.68**	0.65	0.80	0.41	0.14	0.37	0.24	0.14	0.20	**0.04**	**0.06**	**3.03**
Heath Boulder	**1.89**	0.15	0.30	0.19	0.08	0.23	0.11	0.17	0.20	**0.06**	**0.03**	**1.52**
Riparian Shrub	**0.03**	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	**0.00**	**0.00**	**0.03**
Bedrock Complex	**0.07**	0.02	0.03	0.01	0.00	0.00	0.00	0.00	0.00	**0.00**	**0.00**	**0.06**
Tussock/Hummock	**1.64**	0.19	0.26	0.19	0.15	0.22	0.18	0.08	0.10	**0.07**	**0.02**	**1.44**
Sedge Wetland	**0.26**	0.02	0.00	0.02	0.01	0.04	0.07	0.00	0.00	**0.04**	**0.00**	**0.21**
Esker	**0.16**	0.13	0.00	0.00	0.00	0.00	0.03	0.00	0.00	**0.00**	**0.00**	**0.17**
Birch Seep & Shrub	**0.11**	0.01	0.02	0.02	0.01	0.02	0.00	0.00	0.00	**0.00**	**0.00**	**0.09**
Boulder Complex	**0.05**	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	**0.00**	**0.00**	**0.04**
Heath Bedrock	**0.78**	0.06	0.20	0.08	0.03	0.04	0.05	0.04	0.00	**0.05**	**0.01**	**0.59**
Total	**8.67**	**1.25**	**1.62**	**0.94**	**0.42**	**0.93**	**0.00**	**0.43**	**0.50**	**0.26**	**0.12**	**7.18**

**Totals Area Lost includes data up to 2001 - discrepancies across the rows results from the rounding of numbers in annual columns for presentation purposes*
***Values in red represent actual habitat loss equal to or exceeding that predicted*

Presence

Mining activities can impact the presence of grizzly bears due to disturbance and habitat loss (DDMI, 1998b). Vegetation loss and changes to caribou distribution from mining activities may also impact the presence of grizzly bears (Gau and Case, 1999). The predicted effect is:

> ***Mine development is not predicted to influence the presence of grizzly bears in the area.***

Methods

Based on diet selection (Gau et al. 2002) and seasonally preferred habitats (McLoughlin et al. 2002a), the presence of bear sign within and adjacent to seasonal high quality habitats (sedge wetland in June and riparian shrub in August) was used as an index of habitat utilization by grizzly bears within the Diavik study area (Golder, 2008).

Diavik has identified 36 randomly-selected plots within the study area, each consisting of a 500 m by 500 m area and comprised of at least 25% of either sedge wetland or riparian shrub habitats (Figure 6-2). In previous years, sedge wetland plots were surveyed in early July, while riparian shrub plots were surveyed in early August. Each plot was searched for bear sign for approximately one hour by two observers and all bear sign (dens, diggings, tracks, scat, hair and kill sites) was documented. Only sign determined to have been left in this year (i.e. since spring den emergence) were included in the analysis. Plots with a bear present were considered to contain fresh sign, but not surveyed.

Incidental observations of grizzly bears on East Island and within the DDMI wildlife study area were recorded and used as a measure of grizzly bear presence within the study area.

Results

Habitat Plots

Habitat plot surveys were suspended during 2009 due to safety concerns associated with the field work component of the program.

Incidental Observations

Grizzly bear incidental observations on East Island in 2009 totalled 22 sightings over 22 days (Table 6-2). It is important to note however that the actual number of bears on site is unknown, as the same bear(s) may be observed on multiple occasions (Appendix III).

Table 6-2 Average camp population and number of incidental grizzly bear observations by year, 2002-2009

	2002	2003	2004	2005	2006	2007	2008	2009
Average Camp Population	1100	470	397	646	716	747	979	562
# Grizzly Bear Observations	5	19	24	43	21	41	5	22

A family of 3 grizzly bears, a sow and 2 cubs, resided on East Island for much of the summer, approximately 6 July to 21 August 2009. Due to the continuous presence of these bears, incidental observations listed in the Appendix do not capture multiple sightings that occurred each day the bears were on site. Instead, records were only made when deterrent actions were required to move these bears for the safety of personnel. These bears were present on site during the production shutdown and were deterred from the island prior to operations resuming.

The first bear sighting occurred on 24 April 2009, off site on the mainland to the east and was noted by Environment staff conducting water quality monitoring on Lac de Gras. The first sighting at the mine site occurred on 14 May 2009 near the emulsion plant. The last recorded observation was on 27 October 2009.

Summary

Safety concerns relating to grizzly bear habitat surveys have been raised. DDMI is currently assessing alternative methods that would allow for similar information to be collected in a safer and more reliable manner. The use of hair snagging mechanisms allows for positive identification of fresh sign and reduces exposure of field staff to grizzly bear encounters during field work.

Additionally, DDMI recognizes that the current monitoring program design is biased toward the east and south shores, due to the presence of BHP Billiton's Ekati mine to the north and the water of Lac de Gras to the west. As such, DDMI is also exploring options to work cooperatively with BHP Billiton in order to better test for changes in the presence of grizzly bears in the areas surrounding the mine.

DDMI is planning a pilot study to test an alternative monitoring program to determine grizzly bear presence in the study area during 2010. The method proposed makes use of the existing 36 plots within the study area, but involves the use of hair snagging to more reliably confirm the presence of grizzly bears within each of the plots. Wooden tripods wrapped with barbed wire would be constructed and placed within each plot, and a scent lure would be place on each tripod. Each plot would be checked three times throughout the monitoring season (June through August) and grizzly bear hair samples would be collected each time. A hair sample obtained and identified as grizzly bear confirms their presence within that plot, and hair samples can be

archived for DNA analysis. DDMI plans to conduct this program for 2 consecutive years and, pending successful results, would continue to implement this program on alternate years (i.e. every second year).

Incidental observations of grizzly bears in the area during 2009 were similar to those in previous years, but did not fully capture the presence of 3 grizzly bears on the island from 6 July to 21 August. Incidental visits and temporary residency of 3 bears provide evidence that supports continued activity of grizzly bears on East Island, within and adjacent to mining activities. The bears that took up residence on East Island mainly utilized the pit shelf areas adjacent to the A154 and A418 dikes, as well as areas near the North Inlet. With no production and very little aircraft activity, these relatively quiet areas provided attractive habitat features for the bears while reducing safety risks commonly associated with bear presence on site. During the time of residency on East Island, these bears did not seek out alternative food sources generated from site operations, nor did they attempt to access buildings or non-native shelters. This could be considered an indicator of successful implementation of the waste management system at the mine site.

Zone of Influence

Mining activities may cause behavioural disturbances, which could result in the spatial and temporal displacement of an animal from otherwise useful habitat (DDMI, 1998b). The effects of disturbance may cause bears to become displaced or habituated to industrial activities. Information is limited on the zone of influence (ZOI) for bears in response to mining activities, but Harding and Nagy (1980) reported disrupted bear foraging activities up to 4 km from industrial sites. The predicted effect is:

> ***The maximum zone of influence from mining activities is predicted to be 10 km.***

Methods

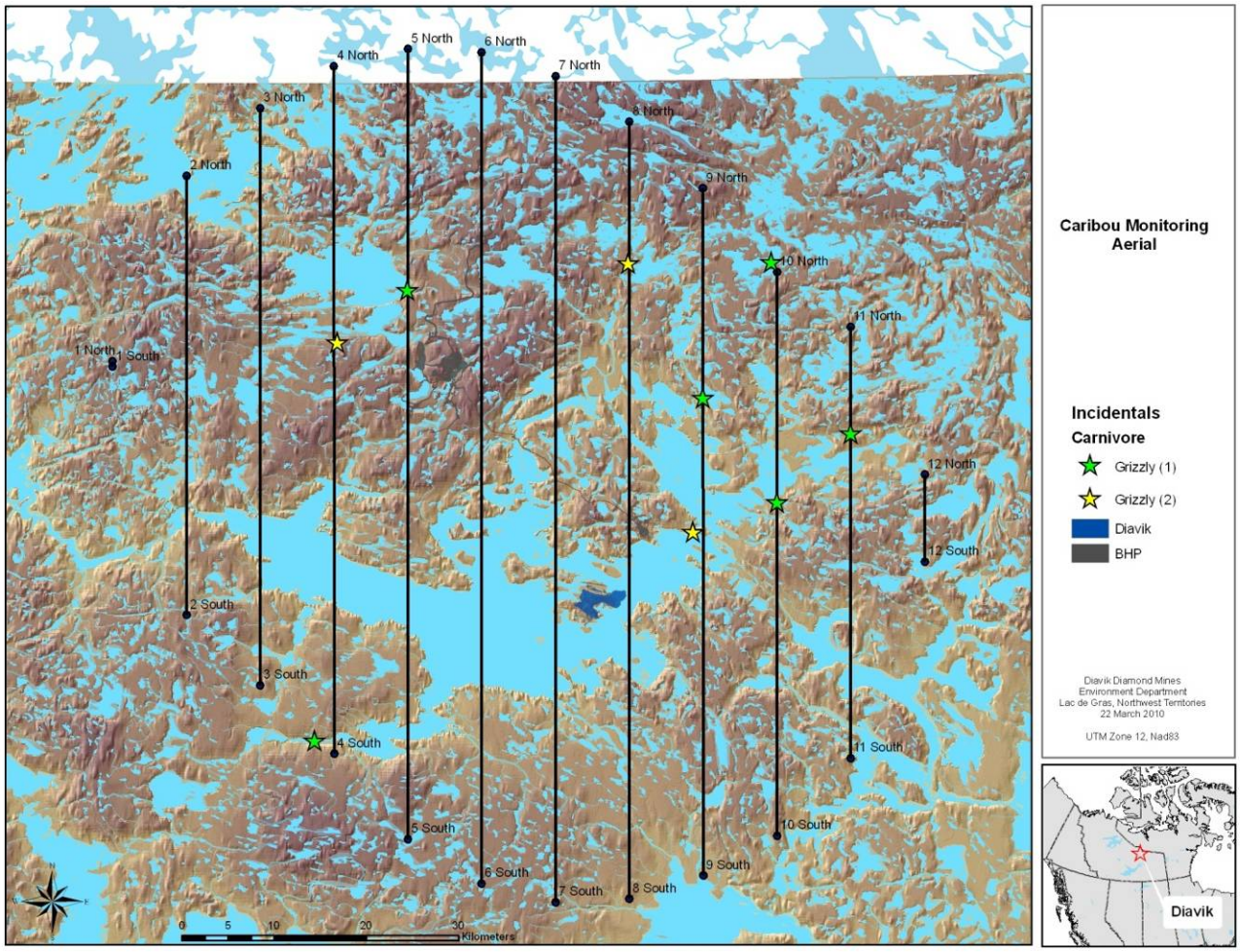
While conducting weekly caribou aerial surveys, all observations of grizzly bears within the predicted zone of influence (<10 km) and outside of the predicted zone of influence (>10 km) were documented.

Results

Based on recent statistical analysis of bear sign data among sedge wetland and riparian plots (Golder, 2008), a ZOI could not be estimated for grizzly bears within the study area. Habitat surveys have indicated that grizzly bears show a slight avoidance of areas near the mine during operations. There are many factors that likely contribute to this pattern of use, some relating to mine operations (e.g. waste management practices) and others to natural variables (e.g. caribou distribution).

During the caribou aerial surveys for 2009, one observation of 2 grizzly bears was observed within the DDMI wildlife study area (Figure 6-1). A total of 9 observations were recorded within the entire aerial survey boundary; three sightings of 2 grizzly bears and six sightings of 1 bear.

Figure 6-1 Grizzly bears observed within and outside the Diavik zone of influence, 2009



Mortality

Despite mitigation, mine activities may lead to grizzly bear mortalities, injuries or relocations from year to year. The specific impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

> ***Mortalities associated with mining activities are predicted to be 0.12 to 0.24 bears per year.***

Methods

Project-related incidents and mortalities are reported to environment staff for documentation.

Results

No grizzly bear injuries, mortalities or relocations occurred during 2009 (Table 6-3), despite the presence of a family of 3 bears on site from 6 July to 21 August 2009.

Table 6-3 Grizzly Bear Statistics for all Monitoring Years

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Days with Bear Visitation on East Island	15	14	5	15	24	34	20	34	5	22
Days Deterrent Actions were Utilized	10	8	2	6	20	23	8	20	3	18
Grizzly Relocations	0	1	0	1	0	0	0	0	0	0
Mine-related Grizzly Mortalities	0	0	0	0	1	0	0	0	0	0

A total of 22 observations of grizzly bears were made during 2009, with one additional observation off the Island. These observations occurred over 22 days between 24 May and 27 October 2009. Deterrent actions, primarily consisting of pen launched bear bangers and vehicles, were utilized on 18 occasions to protect people and property by moving the bears off to a safe distance (Appendix III). During 3 of the deterrent events, a helicopter was utilized to assist with moving bears away from infrastructure, or to a safer water crossing.

Although there is some interaction between the Diavik Diamond Mine and grizzly bears, every effort is made to immediately report any animals that come into contact with the mine site. Bear awareness sessions continue to help raise employee awareness and response, and contributed to the timely reporting of bears approaching site. This, in turn, limits unwanted interactions.

Construction began at the Diavik Diamond Mine site in the year 2000. The calculated mine mortality rate over the past nine years is 0.10, which falls below the range predicted during the environmental assessment.

Recommendations

It is recommended that the DDMI Environment Department continue to facilitate bear awareness training sessions, for all site employees and contractors.

Deterrent events to move grizzly bears off East Island in a timely manner should occur. The risks to wildlife and staff associated with having bears resident on East Island for an extended period of time should be avoided.

Due to safety concerns associated with conducting the bear plot surveys, DDMI recommends a pilot study hair snagging program using tripods for 2010. This program would incorporate existing plots and would be conducted in a similar manner as is planned for BHP-Billiton's Ekati mine (pers comm., John Bartlett). Data obtained from this type of program would be a more reliable indicator of presence.

Wolverine

Wolverines are year round residents in the Lac de Gras area (DDMI, 1998b). The western population is listed as a species of 'Special Concern' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2003).

Wolverine home ranges have been estimated at 126 km^2 for adult females and 404 km^2 for adult males (Mulders, 2000). The feeding behaviour of wolverine may result in their attraction to camps, and habituation if they receive a food reward (Penner, 1998). This potential has been demonstrated during baseline, construction, and operations in the Lac de Gras area.

Presence

The objective for this program is to determine if mining activities are influencing the presence of wolverines in the study area, and the impact prediction is stated as:

> ***The mine is not predicted to cause a measurable shift in the presence of wolverines in the study area.***

Methods

Wolverine presence around the Diavik Diamond Mine is monitored in three ways: snow track surveys, incidental observations at site and sightings during caribou aerial surveys.

Wolverine snow track surveys are conducted by snowmobile along 40 transects. Each transect is 4 kilometres (km) in length, totalling 160 kilometres for the study. Each route is driven once by snowmobile in March or April, and has occurred in December, and all wolverine tracks and other sign (digs and dens) are recorded. The snow track surveys began in 2003, and have been conducted with the assistance of community members from Kugluktuk, as available.

Representatives of DDMI record all sightings of wolverines on East Island, and summarize observations of wolverine during caribou aerial surveys.

Results

The spring wolverine snow track survey was conducted from 2 to 6 April 2009. A total of 12 sets of wolverine tracks were encountered on 38 transects (Figure 7-1). Two transects were not surveyed during 2009 due to equipment damage. This resulted in a track index of 0.08 wolverine tracks per kilometre (Tables 7-1 and 7-2).

Table 7-1 Wolverine Track Index and Mean days Since Snow, 2003 to 2009

	Spring 2003	Spring 2004	Winter 2004	Spring 2005	Winter 2005	Spring 2006	Spring 2008	Spring 2009
Tracks Encountered	13	16	12	7	16	5	15	12
Track Index (Tracks/km)	0.09	0.11	0.08	0.05	0.11	0.03	0.09*	0.08**
Mean Days Since Snow	2	4	4	7.5	2	1	2	1

**New survey design resulting in greater distance travelled (160 km vs 148 km)*
***Distance surveyed was 152 km, due to 2 missed transects*

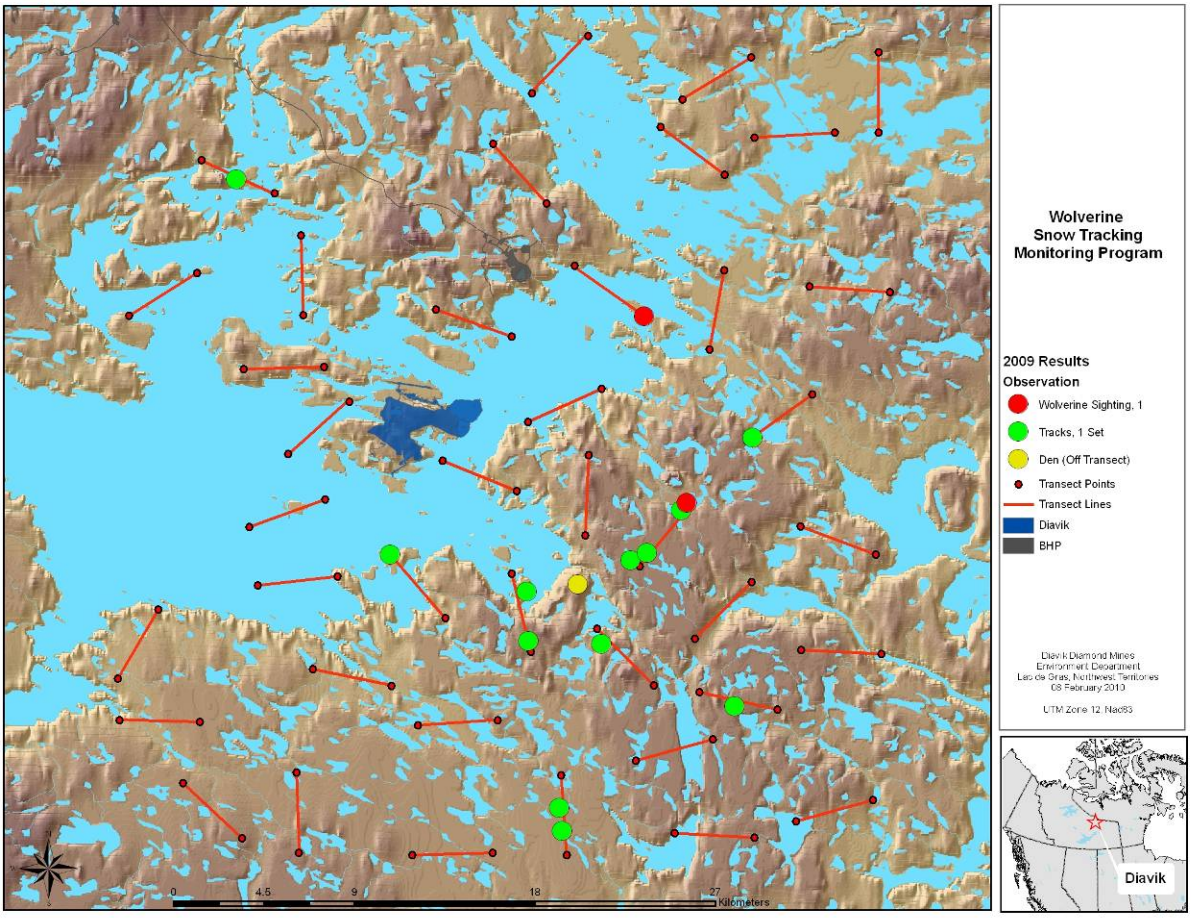
An assistant from Kugluktuk, Jorgen Bolt, participated in the survey and estimated that 10 to 12 wolverine were present in the area, based on the tracks observed. The assistant also noted a rocky area to the east where one wolverine had high use; numerous tracks for this animal were found, there were caribou and wolf tracks in that area and it was good hare habitat. Many incidental sightings of wolverine and wolverine sign were made during the spring survey. These included: a rabbit kill site with wolverine tracks, a fox following wolverine on 3 occasions, two sets of tracks of a breeding pair, wolf and caribou tracks, and a wolverine den site.

Table 7-2 Wolverine Track Survey Results, 2009

Day	Days Since Snow	Snow Condition	Greater or Less than 10 km	Observation Type	Number	Age of Sign	Comments
2-Apr-09	0	Powder	<10 km	Animal	1	Days	Male, medium size
3-Apr-09	0	Powder	>10 km	Tracks	1	Hours	Male, medium size
3-Apr-09	0	Powder	<10 km	Tracks	1	Hours	Male, medium size
4-Apr-09	1	Powder	<10 km	Tracks	1	Days	Walking, medium male
4-Apr-09	1	Powder	>10 km	Tracks	1	Days	Walking, same animal as previous, medium male
4-Apr-09	1	Powder	>10 km	Tracks	1	Days	
4-Apr-09	1	Powder	>10 km	Tracks	1	Hours	Tracks identical to previous
4-Apr-09	1	Powder	>10 km	Tracks	1	Hours	
4-Apr-09	1	Powder	>10 km	Tracks	1	Hours	Wolverine walking, small
4-Apr-09	1	Packed	<10 km	Den	1	Days	Den
5-Apr-09	2	Packed	>10 km	Tracks	1	Days	Pronounced track, no drag
5-Apr-09	2	Packed	>10 km	Tracks	1	Days	Same walk as previous
5-Apr-09	2	Packed	>10 km	Tracks	1	Days	Wolverine Walking
5-Apr-09	2	Packed	>10 km	Animal	1	Days	Visual
6-Apr-09	0	Powder	>10 km	Tracks	1	Days	With Fox tracks

Winter wolverine snow track surveys (December) were not conducted for the 2009 monitoring year, and will permanently be removed from the program due to poor tracking conditions and safety concerns. Refer to the Recommendations section for more details.

Figure 7-1 Results of the Spring Snow Track Survey for 2009



Using a 10 km zone around the Diavik mine site, a proximity analysis of total wolverine track densities for 2009 show an index of 0.06 tracks per kilometre for all transects located within 10 km and an index of 0.09 tracks/km for those transects outside the 10 km zone (Table 7-2).

All incidental observations of wolverines on East Island during 2009 were recorded by Diavik staff (Appendix III). From 1 January to 31 December 2009, 23 wolverine sightings occurred on East Island, one of which involved Environment personnel implementing deterrent actions (Table 7-3). It is common that wolverine will have left the area where originally observed by the time Environment staff are able to visit the area.

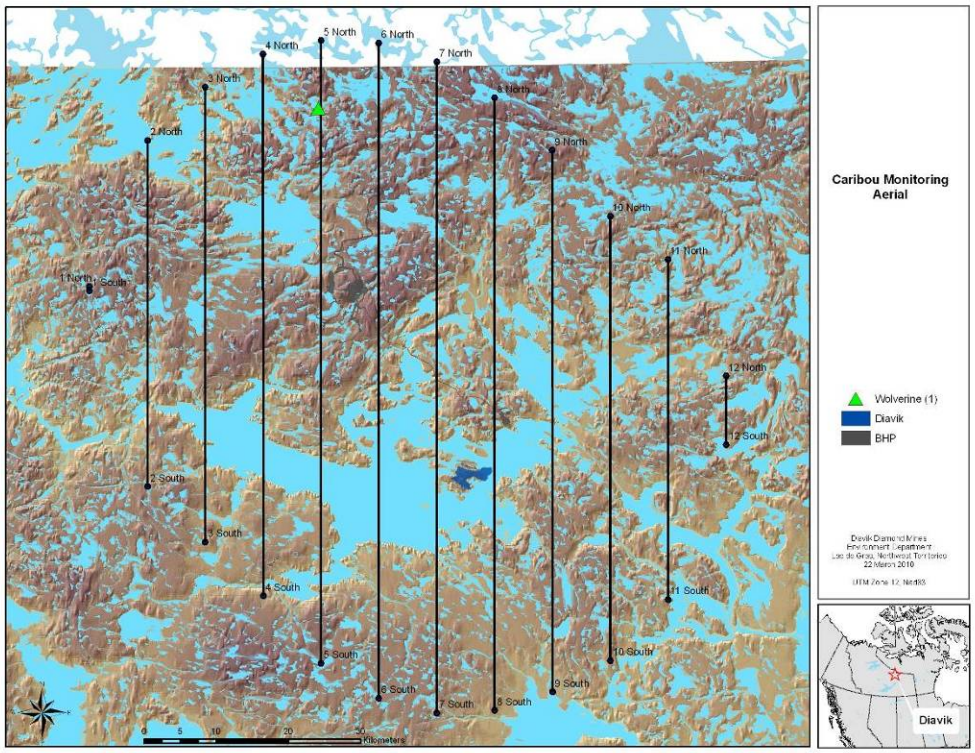
Table 7-3 Wolverine Sightings on East Island

	Baseline*	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of days with wolverine visitations on East Island	27/year Total = 82	25	36	4	38	14	43	31	19	46	21
Number of days deterrent actions were used	Unknown	9	10	0	1	1	5	2	1	17	1
Relocations	1	0	2	0	0	0	0	0	0	0	0
Mine-related Mortalities	1	0	1	0	0	0	0	0	0	1	0

**Includes Wolverine occurrences recorded at three different camps (i.e. Diavik, Kennecott, and/or Echo Bay Road camps). Yearly numbers are not available for baseline investigations.*

In addition to the incidental observations of wolverine at the Diavik site, one wolverine was observed during the caribou aerial surveys in 2009, but was not located within the Diavik wildlife study area (Figure 7-2).

Figure 7-2 Wolverine sightings during aerial caribou surveys, 2009



Summary

Overall tracking conditions were favourable, and the survey was conducted after a fresh snowfall. Employing a community assistant for this program improves the data obtained and assists Diavik Environment staff in learning about track observations and wildlife in the area.

For the 2010 monitoring season, Diavik agreed to participate in another year of data collection toward the regional wolverine DNA monitoring program that will be conducted in participation with the GNWT-ENR and BHP-Billiton in the past. GNWT will be supporting the project through obtaining supplies, the wildlife permit and conducting training for site staff. BHP Billiton and Diavik will be implementing the program in April 2010 in each of their respective study areas.

Mortality

Mortalities can occur if wolverines become habituated to mining activities resulting from efforts to locate food or shelter (DDMI, 1998b). Diligent waste management, strictly enforced speed limits, and immediate reporting of wildlife sightings on East Island have limited the mortality of wolverine during the operational period of the Diavik mine. The prediction made during the environmental assessment was:

> ***Mining related mortalities, if they occur, are not expected to alter wolverine population parameters in the Lac de Gras area.***

To date, efforts have been focused on limiting mining related mortalities to prevent any changes to wolverine population parameters.

Methods

Project-related incidents that may occur are reported to Environment personnel through incident reports submitted by mine staff. The Environment department follows up on any incident and completes the necessary documentation. This information is tabulated and provided for annual comparisons.

Results

Since 2000, two wolverines have been relocated and two mortalities have occurred at the Diavik mine site. There were no mortalities during 2009.

Recommendations

When possible, wolverine snow track surveys will continue to include community involvement for the survey and input on the movements and approximate numbers of wolverines within the study area.

Snow track surveys to be conducted during April only. Tracking conditions during December are generally not favourable to performing valuable surveys. Bare ice and exposed tundra make snowmobile travel and track recognition very difficult. Temperature extremes and limited daylight hours also result in concern for personnel and equipment safety.

Waste

Diavik Diamond Mines Inc. is committed to taking all the necessary steps so that the collection, storage, transportation and disposal of all wastes generated by the project are being conducted in a safe, efficient and environmentally compliant manner. The DDMI Waste Management Plan, an integral part of Diavik Diamond Mines' Environmental Management System, focuses on minimizing the generation of wastes at points of use, optimizing the usage of materials before disposal and facilitating the collection and processing of wastes with the least adverse effects on the physical and biological conditions at site.

Along with the ideals of the four R's embodied in the Waste Management Plan (Appendix VII), namely reduction, recovery, reuse and recycling, there are several mitigation practices to prevent and reduce adverse impacts on wildlife. These practices include, but are not limited to, incineration of all food wastes, categorical segregation of all non-food waste for storage and subsequent removal from site, and on-site disposal. All of these methods are designed to limit wildlife attraction.

Incineration, segregation and storage of waste takes place at the DDMI Waste Transfer Area (WTA), which was established to provide proper handling and storage of waste on site. The facility operated on the south side of the Processed Kimberlite Containment (PKC) area for the first half of the year and was then transferred to a new facility in September 2008. The new WTA is approximately 100 X 165 meters (m), and is surrounded by a gated, 3 meter high chain link fence erected to control wind transportation of any litter and prevent most wildlife intrusion. Contained within the WTA are two incinerators for food waste, a burn pit for non-toxic/non-food contaminated burnable material, a contaminated soils containment area, a treated sewage containment area, as well as sea cans, sheds, and storage areas for drums, crates, bins and totes. The majority of wastes are inventoried and stored at the WTA while awaiting backhaul on the winter ice road.

On-site disposal of non-burnable wastes such as steel, plastics and glass currently occurs at the inert landfill located within the Type 3 waste rock pile. These materials are covered with waste rock on a regular basis to prevent wildlife attraction.

Methods

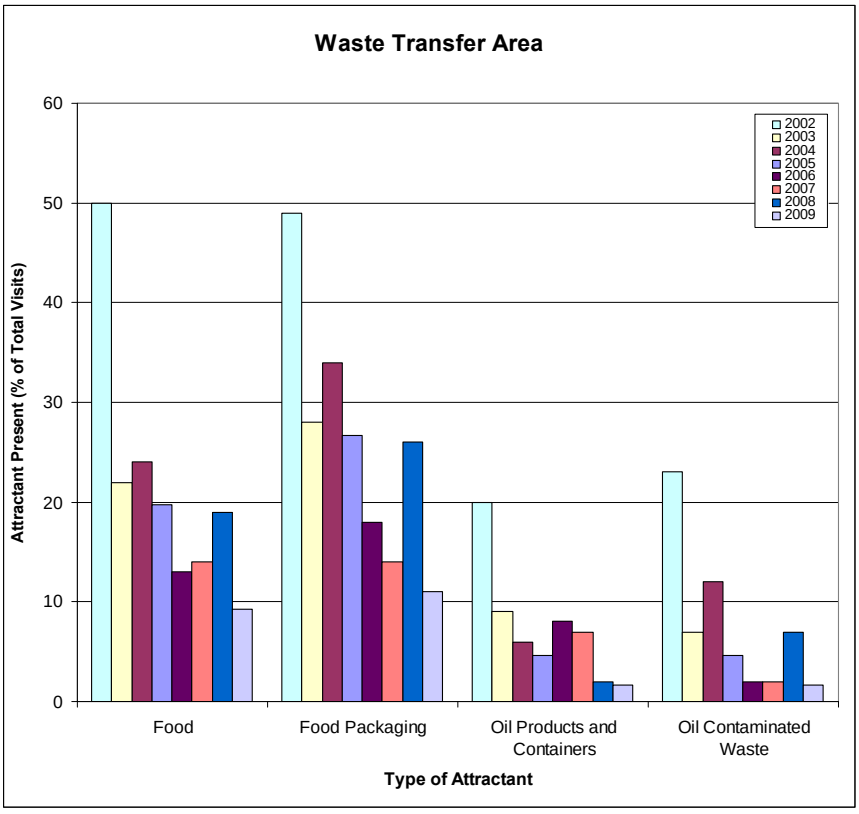
Waste inspections are conducted to check that all waste segregation, storage and disposal procedures set out in the DDMI Waste Management Plan are being followed, thereby preventing the attraction of wildlife and protecting environmental integrity. Environment personnel record all occurrences of improperly disposed waste materials that attract wildlife, as well as all wildlife sign and observations. Any infractions are reported to waste management personnel for immediate rectification.

In 2009, inspections of the Waste Transfer Area and landfill were conducted every two days beginning 1 January and ending 31 December. Inspections consisted of Environment personnel walking the area of the waste transfer and landfill, where safe to do so, and documenting the type and number of attractants found, as well as wildlife species or fresh sign that were present during the survey.

Results

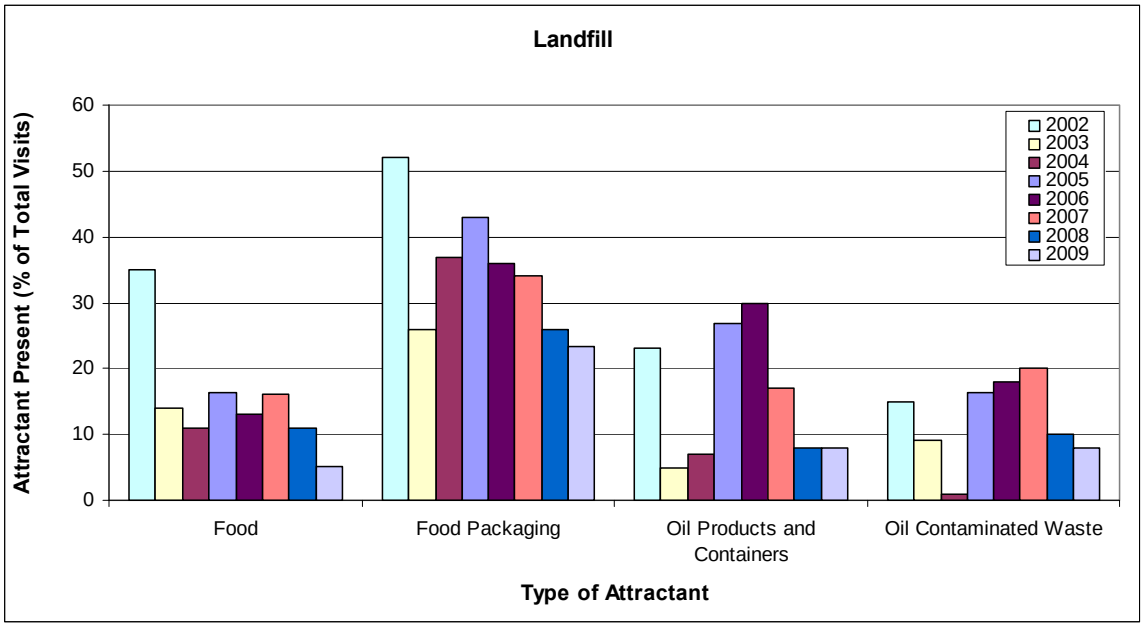
Potential wildlife attractants such as food and oil were found at the Waste Transfer Area on 24% of the 172 inspections during 2009. Food packaging and food were the most commonly observed attractants, with findings for each occurring in 11% and 9% of all inspections, respectively (Figure 8-1).

Figure 8-1 Percentage of Total Inspections Identifying Attractants at the Waste Transfer Area 2002-2009



Attractants were found on 40% of 176 inspections of the inert landfill. Again, food packaging was the most commonly found attractant, having been observed during 23% of all inspections (Figure 8-2). However, the occurrence of oil-contaminated waste dropped in 2009 to 8%, and the occurrence of oil products and containers remained at 8%. This is an improvement over the last three years where oil-based wastes were higher.

Figure 8-2 Percentage of Total Inspections Identifying Attractants at the Inert Landfill 2002-2009



Wildlife was observed on 52% of the inspections of the waste transfer area, and on 11% of the inspections at the landfill; an improvement from 2008. Ravens were the most frequently observed wildlife in the waste transfer area, followed by foxes and gulls (Table 8-1). Ravens were the most frequent at the landfill, followed by gulls.

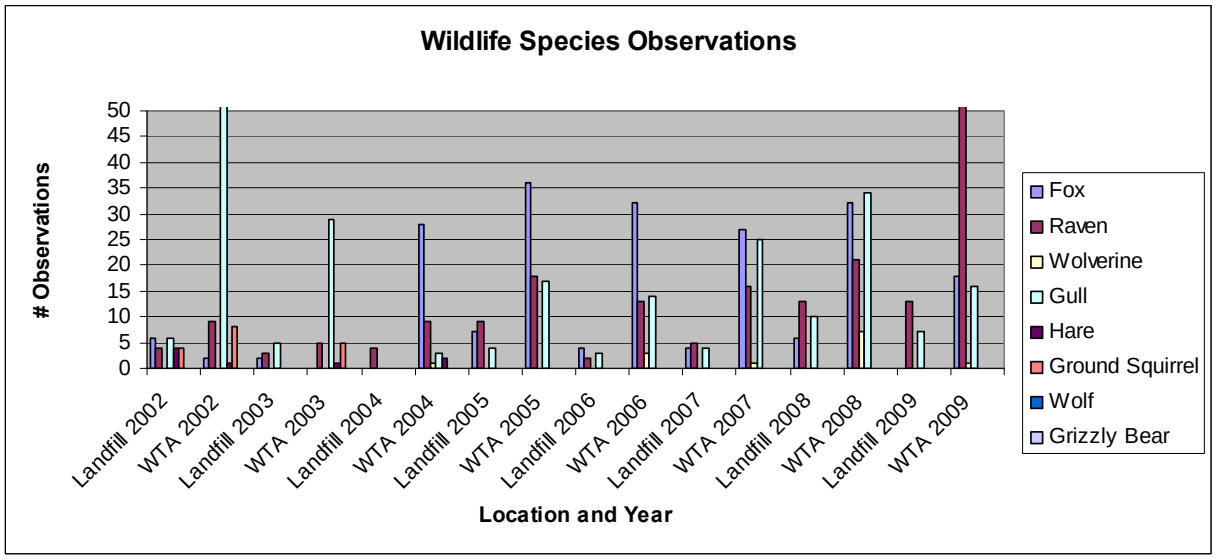
Wildlife sign was found on 25% of visits to the waste transfer area, and 13% of visits to the landfill, both a reduction from 2008. The most commonly observed sign, as with previous years, belonged to foxes (Table 8-1).

Table 8-1 Occurrences of Wildlife or Wildlife Sign during Waste Inspections

	WTA (172 visits)		Landfill (176 visits)	
	Wildlife	**Wildlife Sign**	**Wildlife**	**Wildlife Sign**
Gull	16	0	7	0
Raven	54	16 tracks, 2 scat	13	3 tracks
Fox	18	22 tracks, 2 scat	0	19 tracks
Hare	0	0	0	0
Ground Squirrel	0	0	0	0
Wolverine	1	0	0	0
Wolf	0	0	0	0
Grizzly Bear	0	0	0	0

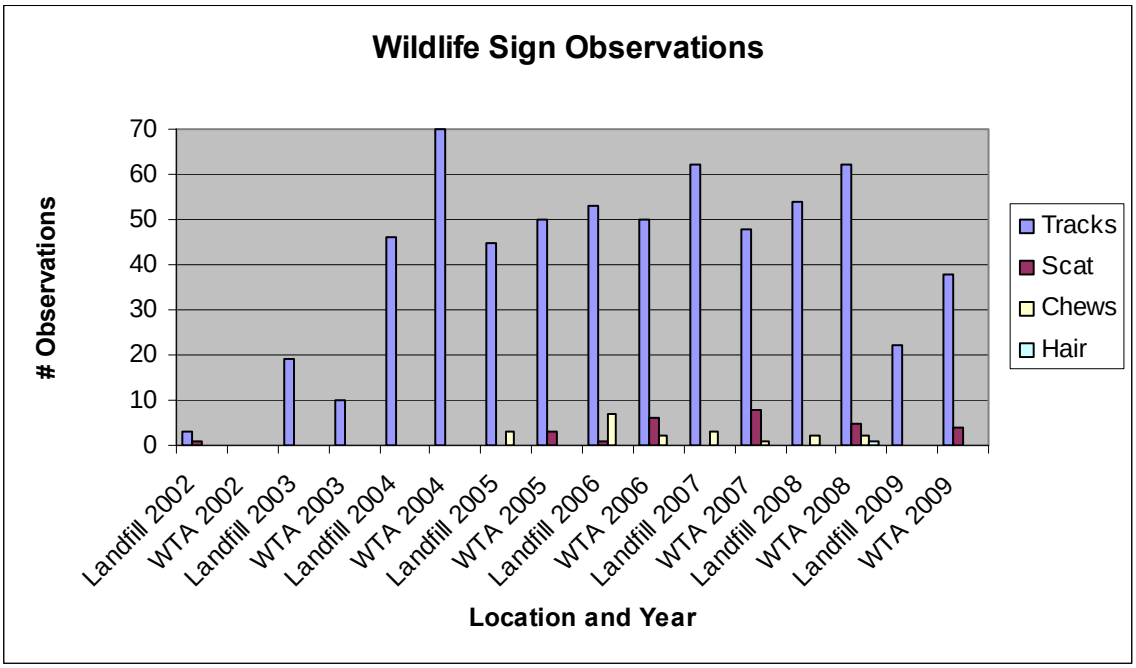
Presence of wildlife and wildlife sign at the landfill and Waste Transfer Area are summarized in Figures 8-3 and 8-4, respectively.

Figure 8-3 Presence of wildlife (sightings) at the Diavik landfill and WTA, 2002-2009



Wildlife sightings within the landfill have remained similar across all years. Ground squirrel and and hare sightings were more common during 2002, and likely decreased due to increased infrastructure (rock pile and crusher) in the area of the landfill. There was an increase in raven observations at the landfill in 2009. Wildlife sightings at the Waste Transfer Area have also remained similar across all years since 2004. Prior to 2004, few foxes were present but larger numbers of gulls were observed, with a maximum of 97 gull sightings during 2002.

Figure 8-4 Presence of wildlife sign at the Diavik landfill and WTA, 2002-2009



Tracks are the predominant sign of wildlife in each of the waste disposal areas on site. The number of tracks at the landfill increased from 2002 to 2004. From 2004 to 2008, the number of tracks observed at the landfill showed little variation between years. The presence of tracks at the landfill decreased in 2009. The highest number of sign observations occurred during 2007 (62 observations). Within the WTA, observations of wildlife sign peaked during 2004 at 70 observations. Observations of sign remained consistent from 2005 to 2008 and decreased slightly during 2009.

Recycling Initiatives

During 2008, Diavik implemented an employee-driven recycling program for plastic bottles and aluminium cans generated on site. Proceeds from this program are donated to the Stanton Breast Cancer Foundation, to benefit people from all communities. Throughout 2009, 7,000 aluminium cans and 18,000 plastic bottles were recycled. This resulted in a total donation of $2,500.

In addition to these smaller-scale programs, a number of waste materials generated on site are also shipped to Alberta using winter road backhauls each year. Diavik is committed to maximizing recycling opportunities for wastes generated from mine operations that cannot be disposed of on site. Items shipped for recycling include:

- used oil and oil filters;
- used glycol;

- aerosol cans;
- used kitchen grease;
- batteries (lead-acid and dry cell);
- empty drums and totes;
- waste water;
- Ensolve;
- expired/waste fuel (e.g. Jet B);
- paint; and,
- fluorescent tubes.

During 2010, Diavik is looking to increase recycling opportunities within the business, with a particular focus on the waste streams generated at the mine site.

Summary

The DDMI Waste Management Plan outlines the practices in place so that materials which may act as wildlife attractants are routed toward the Waste Transfer Area for incineration or storage. To this end, occasional observations identifying attractants can be expected and should not present a problem if incineration is prompt.

During development of the most recent Waste Transfer Area, mitigation designs resulting from lessons-learned at the previous WTA were used in the new facility. These included a gate reinforced with heavy rubber mats to prevent openings for wildlife access, a perimeter road surrounding the fence, the fence being buried within the gravel berm to help prevent animal access by burrowing and barbed wire at the top of the fence. Even with these improvements, scavengers continue to gain access to the area.

The total number of observations for each type of waste occurring within the WTA has shown an overall decreasing trend since 2002 when data collection began, and this trend continued during 2009. The six week summer shutdown likely contributed to the decrease noted in attractants at each waste collection area during 2009. Staff numbers, including contractors, were greatly reduced; this results in less waste generation and an improved ability to proactively manage waste segregation in various work areas. Diavik remains committed to carrying out employee education programs related to waste handling.

The landfill established in 2008 is located within the rock pile and a gate was installed in an effort to limit uncontrolled dumping in this area. Attractant levels remained similar to last year at the landfill and are likely associated with the restricted access and summer shutdown. The location of the landfill within the rock pile and traffic in the area will continue to discourage wildlife access to the landfill, thereby limiting the availability of food and food packaging to animals.

Working in conjunction with waste management staff, we continue to identify problem areas and work with all contractors and DDMI employees to resolve any issues. Numbering and inspection of waste collection bins prior to pick up has continued to be effective at facilitating communication between waste management staff and Environment, and to address issues within various departments. Unfortunately it can be difficult to identify all improper waste in the large waste collection bins prior to collection, which results in some inappropriate wastes ending up in either the landfill or the burn pit. We continuously work with waste management and other department staff to review waste handling and storage procedures within all work areas. The revised site orientation procedure introduced in 2008 continues to assist with increasing awareness of proper waste segregation procedures for new employees.

Overall, procedures and mitigation strategies currently in place have been relatively successful at limiting wildlife interactions. While foxes, ravens and gulls appear to be frequenting the WTA and landfill areas, these animals are natural scavengers and will continue to be present throughout the mine life.

Recommendations

Environment personnel will continue to provide a dynamic workforce with information on consequence of improper waste management, such as human safety issues related to carnivore problems.

Regular inspections (every second day) at the WTA and landfill will continue, as this has proven successful in the prompt discovery and resolution of potential concerns.

Falcons

The peregrine falcon and gyrfalcon were selected as key species because of their special management status, biological vulnerability to disturbance and that they are known to nest regularly in the Lac de Gras area (DDMI, 1998b). The peregrine falcon (*Falco peregrinus tundrius*) is listed under Schedule 3 of the Species at Risk Act as a "Species of Special Concern", as designated by the Committee of the Status of Endangered Wildlife in Canada (COSEWIC, 2007). A Species of Special Concern is defined as a wildlife species that may become a threatened or endangered species because of a combination of biological characteristics and identified threats.

Presence and Distribution

Habitat loss, sensory disturbance, and impacts to prey populations may influence raptors nesting in the Lac de Gras area. The impact predictions for raptors are that:

> ***Disturbance from the mine and the associated zone of influence is not predicted to result in measurable impacts to the distribution of raptors in the study area.***
>
> ***The mine is not predicted to cause a measurable change in raptor presence in the study area.***

Other raptors present in the study area include rough-legged hawks, snowy owls, and short-eared owls. However, these species are not common, and their presence from year to year is unpredictable. Falcons are thereby used to monitor impacts to raptors; peregrine falcons are used specifically for DDMI's Wildlife Monitoring Program.

Methods

Falcon nesting sites were visited on 11 June and 27 July 2009, in cooperation with ENR, and included nest sites near the Daring Lake Tundra Research Station (July only), Ekati^{TM} Diamond Mine, and Diavik Diamond Mine wildlife study areas. The falcon monitoring results from Daring Lake are presented here as control data for productivity from an undisturbed area. Previously identified potential nesting sites were visited by helicopter in June to determine if nesting sites were occupied, and again in July to count any young in the nest (Figure 9-1). Minimal time was spent in the vicinity of the sites to reduce disturbance.

This was the sixth year an occupancy survey of falcon sites was incorporated into the monitoring program. The purpose is to document those nests that are occupied in spring but fail before the July chick count. The reasoning for this is that following arrival at the breeding grounds, falcons

must locate and defend a suitable cliff for nesting, attract a mate, contend with unpredictable weather and occasional storms, and assess the availability of prey in that year. Any one of these factors may influence the choice, or the option, of breeding in that year. As such, this is also the most vulnerable period for falcons, and the time when breeding attempts are most likely to fail. Spring surveys also assist in identifying occupied nest sites that may pose a problem for mining operations and allow mitigation actions before birds begin to lay eggs. DDMI therefore added a spring survey to account for this sensitive time of year.

Results

Six known nesting sites in the Diavik wildlife study area were surveyed during 2009. During the spring occupancy survey conducted on 11 June by DDMI and ENR, four of the six sites surveyed were occupied by peregrine falcons (8, 11, 19-2 and 20). One of the nests (11) contained a breeding pair of peregrines, while the other three contained a single peregrine falcon. No eggs were noted in any of the nest sites.

The productivity survey was completed on 27 July, and found three of the six nest sites occupied by peregrine falcons (11, 14 and 20), and one site occupied by a rough-legged hawk (19). Two peregrine falcon nest areas were confirmed productive, as was the rough-legged hawk nest with 3 chicks. Site 11 had a peregrine falcon nest that was productive with 2 chicks. Nest site 14 was occupied by a peregrine falcon but was unproductive (Table 9-1).

Productivity and occupancy were similar to the range recorded in the Diavik wildlife study area since 2000 (Table 9-1). Chick production in the past has ranged from zero to seven. During 2007, a total of 7 chicks were recorded; this is equal to the number produced in 2006 and ranks as one of the most successful years for chick production recorded since data collection began in 2000. The observations made in 2009 are similar to those of the control site at Daring Lake for productivity (Table 9-1).

Figure 9-1 Falcon Nest Site Locations and Results for 2009

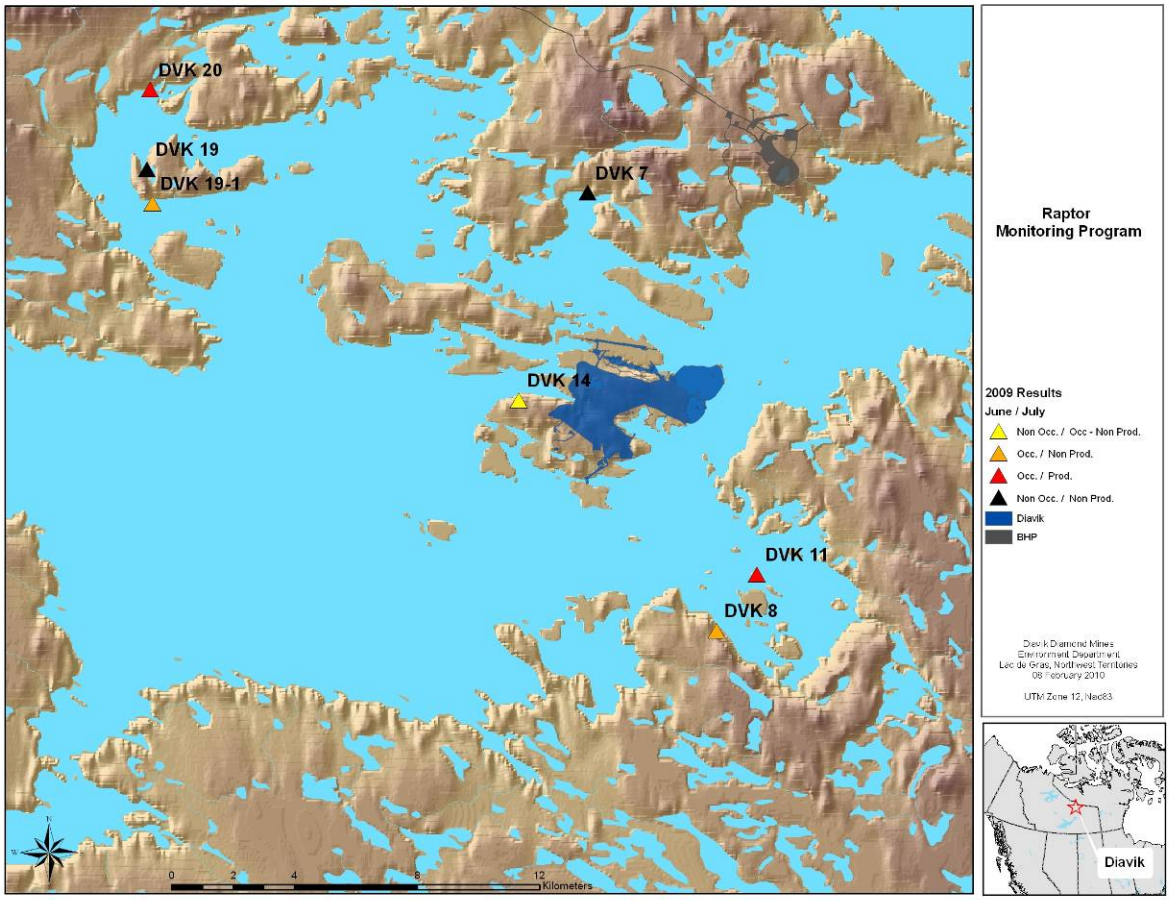


Table 9-1 Falcon nest occupancy and production at Diavik and Daring Lake, 2000 to 2009

Year	Survey Area	Total Sites	Occupied	Productive	Total Young
2000	Diavik	6	2	2	5
	Daring	-	-	-	-
2001	Diavik	6	2	0	0
	Daring	13	3	1	3
2002	Diavik	6	4	1	3
	Daring	18	10	9	15
2003	Diavik	6	1	0	0
	Daring	10	5	3	4
2004*	Diavik	6	5	4	7
	Daring	12	6	1	2
2005*	Diavik	6	3	1	2
	Daring	10	5	1	1
2006*	Diavik	6	3	0	0
	Daring	10	4	1	3
2007*	Diavik	6	3**	2	7
	Daring	10	1	2	8
2008*	Diavik	6	5***	2	3
	Daring	12	6	3	4
2009*	Diavik	6	4	2	5
	Daring	12	5	3	6

Daring Lake data originates from the Daring Lake research station (S. Matthews, personal communication, ENR).
**Diavik data includes spring (occupancy only) and summer (productivity only) monitoring data. Previous occupancy values based on productivity survey only.*
***Occupancy data for May provided by BHP-B and GNWT – Site 11 not checked*
****Does not include additional site (19-1) found occupied during the June survey*

The occupancy of falcon nest sites has changed little since studies began in 1995 (Table 9-2). Sites 11, 14 and 20 have been the most commonly used sites since monitoring began in 1995. Site 8 has been the least occupied site for the duration of these surveys, and while it was occupied this year it remained unproductive. The cliffs around Site 19 have housed new nest sites over the last couple of years (19-1 and 19-2). Interestingly, Site 19-2 was occupied by peregrine falcon in June but the July productivity survey found only a productive rough-legged hawk nest in the area. A rough-legged hawk also nested in this area during 2007, and was located near a productive peregrine falcon nest.

Table 9-2 History of Activity at Falcon Nests Surrounding Diavik, 1995 to 2009

Year	Site 7	Site 8	Site 11	Site 14	Site 19	Site 20
1995	No	No	Yes	No	Yes	Yes
1996	No	No	Yes	No	No	No
1997	No	No	Yes	Yes	No	No
1998	No	No	No	No	No	No
1999	No	No	No	No	No	No
2000	No	No	Yes	Yes	No	No
2001	No	No	Yes	No	No	Yes
2002	No	No	Yes	Yes	Yes	Yes
2003	No	No	Yes	No	No	No
2004	Yes	Yes (July only)	Yes	Yes	Yes (July only)	Yes
2005	Yes	No	Yes (July only)	Yes	No	Yes
2006	Yes (July only)	No	No	Yes	Yes	Yes
2007	Yes	Yes (July only)	Yes* (July only)	Yes	Yes (July only)	Yes
2008	Yes	No	Yes	Yes	Yes	Yes
2009	No	Yes (July only)	Yes	No	Yes (July only)	Yes

**Site was not checked in May*

Falcon production is known to be variable across years and highly dependent upon small mammal and bird populations, availability of suitable nesting habitat and weather events. As such, annual changes in falcon occupancy or productivity are unlikely to be sensitive indicators of disturbance. Rather, impacts from mining would probably manifest in a gradual decline in falcon occupancy or productivity over several years, or with proximity to the mine. An alternative scenario is that falcon productivity and occupancy are only affected by human disturbance in years when natural environmental factors are limiting the falcon's ability to breed.

In 2009, falcon productivity and occupancy was similar to previous years for the Diavik study area. The total number of young produced in 2009 was the same as in 2000 and similar to that of Daring Lake for the current monitoring year.

Since May 2005, Diavik experienced peregrine falcons nesting on the highwall of the A154 pit in some years. No raptors were confirmed to be nesting in the A154 pit during 2009, but

frequent sightings of these birds were reported, indicating their continued use of the study area this past year.

Mortality

The objective for this program is to determine the number of raptors killed or injured due to DDMI mining-related activities. The following section summarizes methods used and results produced from incident reporting. The impact prediction in the Environmental Effects Report (DDMI, 1998b) is:

> ***The mine is not predicted to cause a measurable change in raptor presence in the study area.***

Methods

Project-related incidents that may occur are reported to Environment personnel through incident reports submitted by mine staff. The Environment department follows up on any incident and completes the necessary documentation. This information is tabulated and provided for annual comparisons.

Results

There were no falcon injuries or mortalities at the Diavik site during 2009.

Recommendations

There are no new recommendations for this program.

Waterfowl

The Diavik site lies along the western arctic feeding ground for migratory birds known as the central flyway (Penner, 1998). Migratory birds often stop or "stage" to feed in the Lac de Gras area before moving on to their nesting grounds in the high arctic. Diavik's surveys include both natural (shallow bays) and man-made (mine-altered) wetlands in an effort to provide a clear picture of potential impacts of mining activities on waterfowl.

In the East Island area, shallow bays, melt-water ponds and shoreline leads have been identified as important areas for migrant waterfowl (DDMI, 1998b) as they provide habitat requisites such as open water. The shallow bays consist of a combination of mudflats and sedge bands, which are proximate to open water and upland vegetation, providing ideal habitat for shorebirds (Van Egmond *et al*. 1997a). The shallow bays near the Diavik site are unique to the region surrounding the mine, and may therefore attract waterfowl during the spring migration when open water in other areas may be limited. Mining activities may artificially produce early open water due to dust deposition and the associated increased rate of snowmelt. This, in turn, may also attract migrating waterfowl. DDMI monitors the shallow bays of East Island to determine if there is a change in the number and species of waterfowl present.

Artificially created water habitat is also monitored to ascertain the level of use by waterfowl in those created habitats. Habitat loss (shallow and deep water) due to mining activities is also monitored to determine if more or less habitat is lost than predicted.

Habitat Loss

The objective is to determine if direct habitat loss is greater than predicted. The following section summarizes the methods used and results obtained from satellite imagery. As a result of mining activities, habitat loss will occur and it has been predicted that:

> ***At full development, direct aquatic habitat loss from the project is predicted to be 3.94 km^2.***

Methods

The vegetation classification map used in the vegetation/land cover section of the Environmental Effects Report (DDMI, 1998b) was used to determine the loss of waterfowl habitat.

Results

Habitat loss is defined as the loss of habitat utilized by waterfowl in the East Island area. The amount of shallow and deep water disturbed has remained the same since 2007, and equalled 0.35 and 2.21 km^2, respectively. It was predicted that a total of 3.94 km^2 of shallow and deep water would be lost as a result of mine operations over the course of the mine life (DDMI, 1998b). To date, a total of 2.56 km^2 of waterfowl habitat has been lost to mine development (Table 10-1).

Table 10-1 Predicted Versus Actual Direct Waterfowl Habitat Loss on East Island - 2009

Wetland Type	Predicted Area Lost (km^2)	Actual Area Lost (km^2)									Total Area Lost (km^2)
		up to 2001	2002	2003	2004	2005	2006	2007	2008	2009	
Shallow Water, <2 m	**0.48**	0.11	0.12	0.01	0.03	0.03	0.04	0.01	0	0	**0.35**
Deep Water, >2 m	**3.46**	0.15	1.66	0.01	0.01	0.12	0.24	0.02	0	0	**2.21**
Total Area	**3.94**	0.26	1.78	0.02	0.04	0.15	0.28	0.03	0	0	**2.56**

**Discrepancies in totals across the rows results from the rounding of numbers in annual columns for presentation purposes.*

Presence

The objective for this component is to determine if disturbance from the mine is impacting the presence of waterfowl species. Disturbance may result from habitat loss, altered drainage patterns, dust fall, noise from mining activities and human presence (DDMI, 1998b). The following section summarizes the methods used and results obtained from yearly surveys of East Island shallow bays and mine altered water bodies. This monitoring program is used to determine if conditions are different than the predicted impact:

> ***The mine is not predicted to cause a measurable change in waterfowl presence in the study area.***

Methods

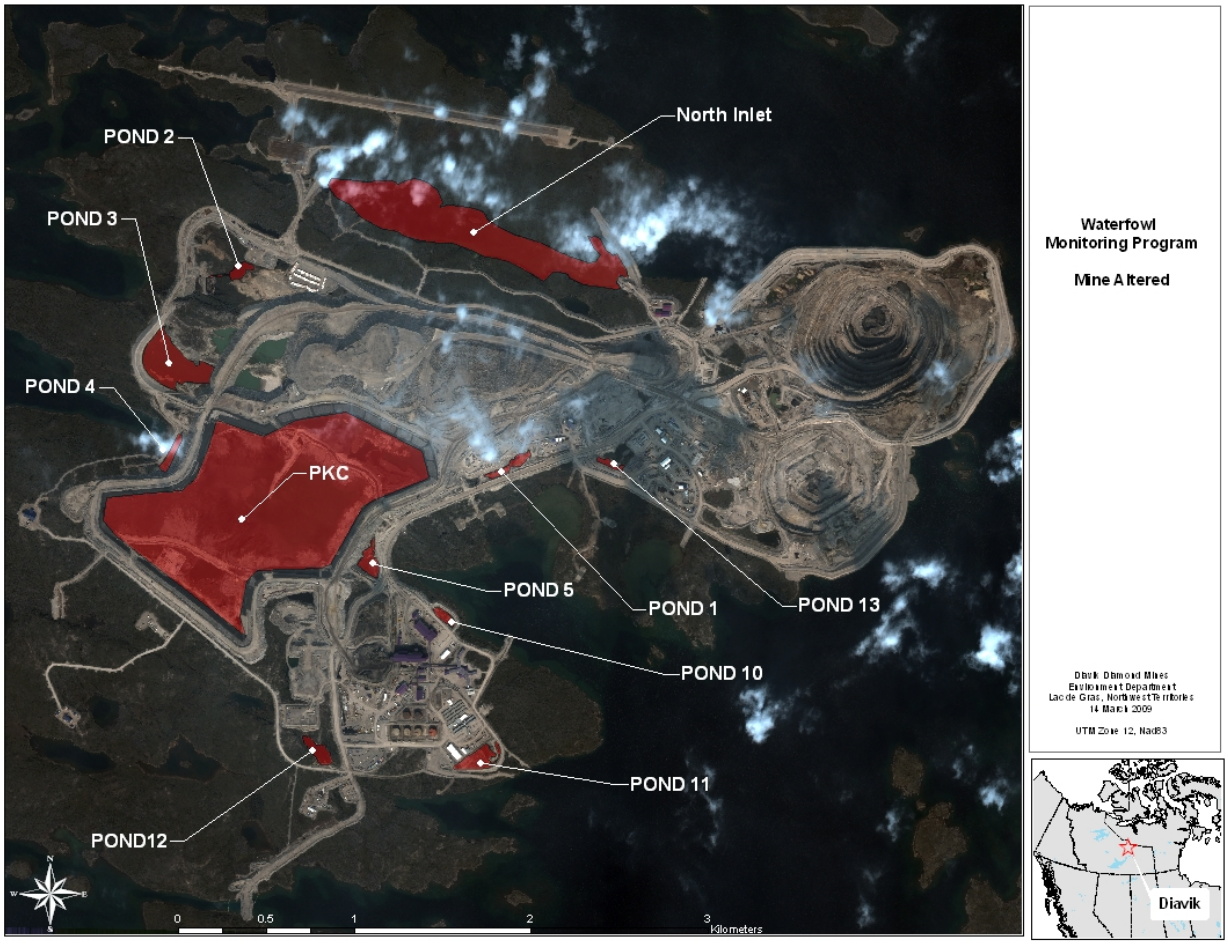
East Island shallow bays (Figure 10-1) and mine-altered water bodies (Figure 10-2) were surveyed for waterfowl presence daily from 24 May to 1 July 2009 and then weekly to 30 October 2009. Shallow bay surveys continued to be conducted by Environment personnel walking the perimeter of the bays. Given the unique nature of the shallow bays in the region

around the mine, no control site has been identified or monitored since initiation of this monitoring program.

Figure 10-1 East Island Shallow Bay Monitoring Locations 2009

All birds observed were identified in accordance with specific characteristics outlined in Petersons Field Guide to Western Birds (3rd Edition, 1990), and counted and recorded. For analytical simplicity, species observations were categorized into groups, based upon easily identifiable characteristics and similarities, such as fowl-like birds and dabbling ducks. The waterfowl presence section of this report summarizes staging waterfowl groups; specifically, shorebird, geese, dabbling and diving ducks from both the shallow bays and mine-altered water bodies.

Figure 10-2 Mine Altered Waters on East Island 2009



Results

Shorebirds

In 2009, 10 species of shorebird were recorded during waterfowl monitoring surveys (Table 10-2). The Semipalmated Plover, Semipalmated Sandpiper and Least Sandpiper are the only shorebird species present during all years of monitoring. Three species of shorebirds, the Sanderling, Common Snipe and Lesser Golden Plover observed during baseline were not recorded in 2009. Three species of shorebirds, the Sandhill Crane, Long Billed Dowitcher and Spotted Sandpiper that were not observed during baseline were recorded in 2009.

Table 10-2 Shorebird Species Present (√) or Absent (X) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Semipalmated Plover	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Black-bellied Plover	×	×	×	×	×	✓	✓	×	×	×	×
Lesser Golden Plover	✓	✓	✓	✓	×	×	✓	×	×	✓	×
Semipalmated Sandpiper	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Least Sandpiper	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
White-rumped Sandpiper	✓	✓	✓	✓	×	✓	✓	✓	✓	✓	✓
Baird's Sandpiper	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓
Pectoral Sandpiper	✓	✓	×	✓	×	×	×	×	×	✓	✓
Stilted Sandpiper	✓	✓	✓	✓	×	×	✓	×	×	✓	✓
Dunlin	✓	✓	×	✓	×	✓	×	✓	×	✓	✓
Sandhill Crane	×	×	×	×	×	✓	✓	✓	×	×	✓
Sanderling	✓	✓	✓	×	×	×	×	×	×	×	×
Red-necked Phalarope	✓	✓	✓	✓	✓	×	✓	✓	✓	✓	×
Common Snipe	✓	✓	×	×	×	×	×	×	×	×	×
Ruddy Turnstone	×	✓	×	✓	×	×	✓	✓	×	×	×
Long billed Dowitcher	×	×	✓	×	×	×	×	✓	×	×	✓
Spotted Sandpiper	×	×	×	×	×	×	×	✓	×	✓	✓
Lesser Yellowlegs	×	×	×	×	×	×	×	×	×	✓	×

In 2009, a total of 161 observations of shorebirds were made during waterfowl and mine-altered water body surveys, 13 of which were recorded as unidentified shorebird species (Table 10-3).

The Semipalmated Plover was the most common species of shorebird observed in 2009 comprising 36% of total shorebird observations. The White-rumped Sandpiper, Dunlin and Long Billed Dowitcher were the least commonly observed shorebird species in 2009 with only one observation made for each species (Table 10-2).

Table 10-3 Waterfowl Survey Shorebird Observations - 2009

Species	Observations
Baird's Sandpiper	4
Dunlin	1
Long Billed Dowitcher	1
Least Sandpiper	22
Sandhill Crane	5
Semipalmated Plover	58
Semipalmated Sandpiper	45
Pectoral Sandpiper	6
Spotted Sandpiper	13
Stilted Sandpiper	3
White-rumped Sandpiper	2
Shorebird Spp.	1
Total	161

Geese

The Greater White-fronted Goose, Canada Goose and Snow Goose were all identified and confirmed present on site for the 2009 monitoring season (Table 10-4). No observations of Tundra Swans were made although they were observed during baseline studies. The total number of geese observations made during 2009 was 281.

Table 10-4 Geese Species Present (√) or Absent (X) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Canada Goose	✓	✓	✓	✓	✓	✓	✓	✓	×	✓	✓
Greater White-fronted Goose	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Snow goose	✓	×	✓	✓	×	✓	✓	×	×	×	✓
Tundra Swan	✓	✓	×	×	×	×	✓	×	×	✓	×

The Greater White-fronted Goose comprised 67% of observations made of goose species (Table 10-5). The remaining observations were of Canada Goose and Snow Goose.

Table 10-5 Waterfowl Survey Goose Observations

Species	Observations
Canada Goose	56
Greater White-fronted Goose	189
Snow Goose	36
Total	**281**

Dabbling Ducks

Four species of dabbling ducks were confirmed present during the 2009 waterfowl monitoring surveys (Table 10-6). Northern Pintail have been observed consistently since baseline, while the American Green-winged Teal, which were absent from 2002 to 2004, were recorded again for the fifth straight year. There were four sightings of Mallard. This is the third subsequent year the Mallard has been present.

Table 10-6 Dabbling Duck Species Present (√) or Absent (X) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Northern Pintail	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mallard	✓	×	×	✓	×	×	×	×	✓	✓	✓
American Wigeon	✓	×	✓	×	×	×	×	✓	×	✓	✓
American Green-winged Teal	✓	✓	✓	×	×	×	✓	✓	✓	✓	✓

Northern Pintail continue to be the most abundant dabbling duck observed with 85% of all observations in 2009. The American Green-winged Teal accounted for 12%, Mallard comprised 2% and American Wigeon 1% of observations (Table 10-7). A total of 201 dabbling duck observations were recorded in 2009.

All unidentified duck observations (10) were grouped with diving ducks, as has been done consistently since baseline.

Table 10-7 Waterfowl Survey Dabbling Duck Observations – 2009

Species	Observations
Northern Pintail	170
American Green-winged Teal	25
Mallard	4
American Wigeon	2
Total	201

Diving Ducks

Ten bird species categorized as diving ducks were observed during the 2009 shallow bay and mine-altered water body monitoring programs (Table 10-8). To date, the Long Tailed Duck is the only species to be observed during baseline and all subsequent monitoring years.

Table 10-8 Diving Duck Species Present (√) or Absent (X) on East Island for All Monitoring Years

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Long Tailed Duck (Oldsquaw)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Greater Scaup	✓	✓	✓	×	✓	×	✓	✓	✓	✓	✓
Black Scoter	✓	×	×	×	×	×	✓	×	×	✓	✓
Surf Scoter	×	×	×	×	×	✓	×	×	×	×	×
Red-breasted Merganser	✓	✓	✓	×	✓	×	✓	✓	✓	✓	✓
Common Loon	✓	×	×	✓	✓	×	✓	✓	×	✓	✓
Red-throated Loon	✓	✓	✓	×	×	×	✓	✓	✓	✓	✓
Pacific Loon	×	×	×	×	×	×	×	✓	✓	✓	×

Species	Baseline (1995-1997)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Yellow Billed Loon	×	×	×	×	×	×	×	✓	×	×	×
Lesser Scaup	×	×	×	×	×	×	×	✓	×	✓	✓
Common Merganser	×	×	×	×	×	×	×	✓	✓	✓	✓
Hooded Merganser	×	×	×	×	×	×	×	×	✓	×	×

In total, 198 observations were made from the diving duck category, including those duck–like birds that were unidentified (Table 10-9). The Long Tailed Duck and Greater Scaup were the most common diving ducks, with 49% and 18% of the observations, respectively.

Table 10-9 Waterfowl Survey Diving Duck Observations - 2009

Species	Observations
Black Scoter	2
Common Loon	6
Common Merganser	10
Greater Scaup	36
Lesser Scaup	12
Long Tailed Duck	97
Horned Grebe	1
Red Breasted Merganser	5
Red Throated Loon	17
Duck spp.	10
Loon spp.	2
Total	198

Habitat Utilization

The water management system for the Diavik mine includes several engineered lined ponds to collect site run off water. There are 11 mine-altered water bodies to date, each of which has the potential to provide suitable habitat for migratory birds. Specific water bodies included in surveys are the North Inlet, Processed Kimberlite Containment (PKC) area, and collection ponds 1, 2, 3 (formerly the Clarification Pond), 4, 5, 10, 11, 12 and 13 (Figure 10-

2). Former collection pond 14 was drained of water and ceased operation in the spring of 2008; this pond was only required during construction of the A418 dike and pit. The area previously designated as the Sedimentation Pond was removed from the monitoring program in 2006 as it was reclaimed by the waste rock pile.

As part of the water management system, the water within the North Inlet was lowered, which resulted in exposed "new" shoreline habitat that may potentially be used by waterfowl and shorebirds. The Processed Kimberlite Containment (PKC) area was constructed in 2002, and waters that could potentially be used by waterfowl are stored in this area for use within the diamond process plant. Use of these areas will be monitored by DDMI to determine the extent to which early open water or vegetation growth may attract waterfowl. These data can then be compared to that of East Island's shallow bays, which have not been substantially altered by mine activities.

The objective is to determine if waterfowl are using mine-altered waters, thereby determining if:

> ***Early open water or early vegetation growth might attract waterfowl during spring migration.***

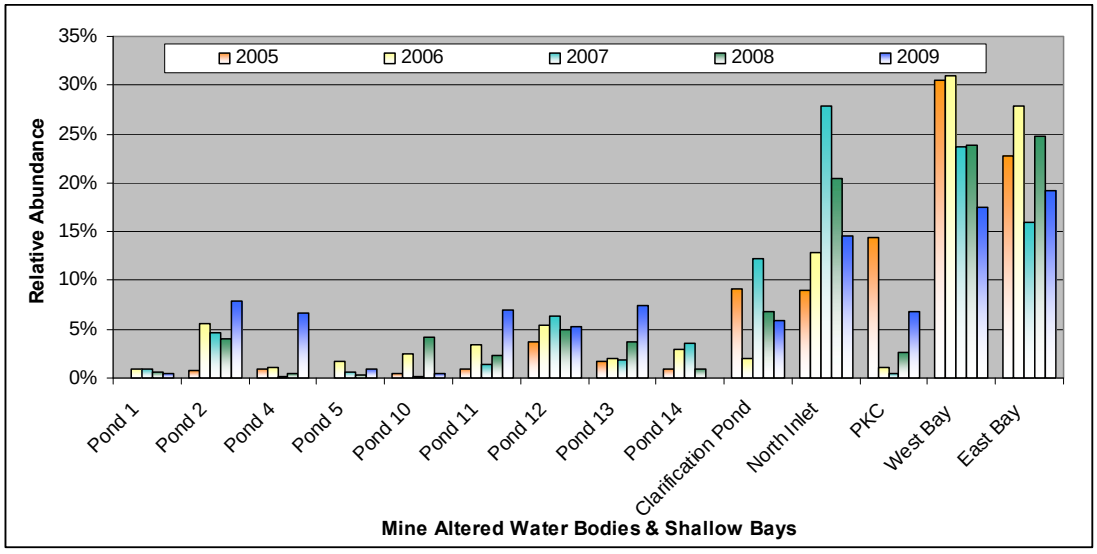
Methods

Mine-altered water bodies and East Island shallow bays were surveyed daily from 24 May to 1 July 2009 and then weekly until 9 October 2008. In accordance with the 2009 DDMI waterfowl survey methods, Environment personnel walked the perimeters of the shallow bays and scanned mine-altered water bodies and shoreline perimeters with binoculars to identify and record all bird observations.

Results

Monitoring surveys conducted on the shallow bays and mine-altered water bodies of the Diavik mine site resulted in a total of 1,250 bird observations and 8,721 individuals recorded including all passerines, birds of prey and seabirds. The West and East shallow bays each accounted for 18% (219) and 19% (241) of all observations, respectively. Mine-altered water bodies combined accounted for the remaining 63% (1,009) of observations (Figure 10-3).

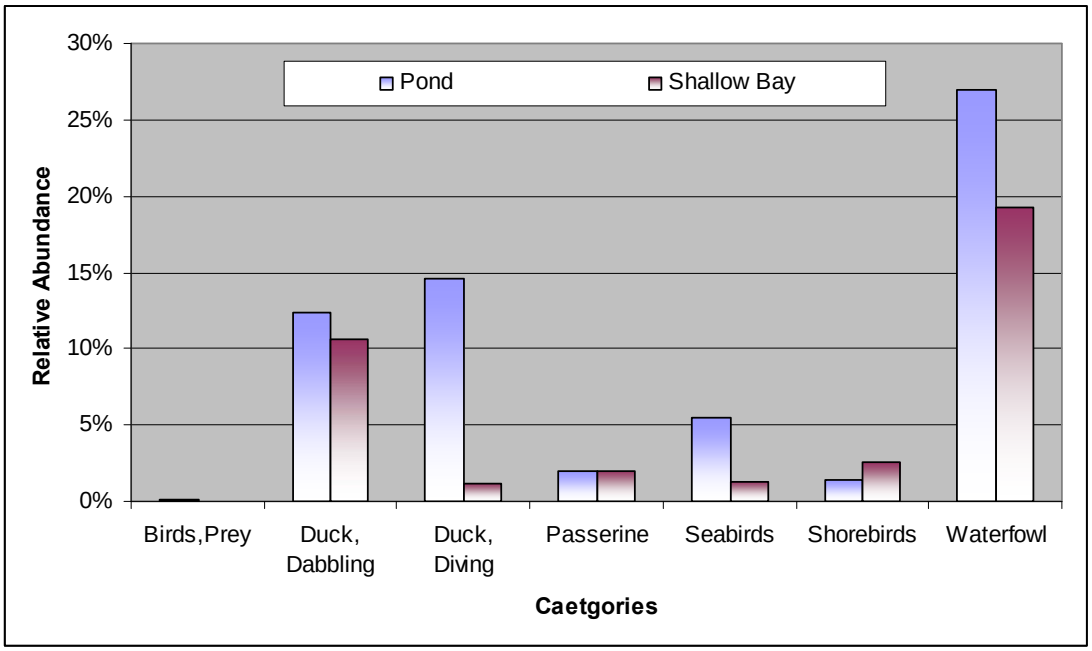
Figure 10-3: Relative abundance of observations by habitat area



In 2009, as with previous years, the majority of observations in mine-altered water bodies occurred at the North Inlet (Figure 10-3). Overall distribution has remained fairly constant, in that the majority of observations continue to occur in the larger water bodies, possibly indicating habitat preference. Construction activities were taking place at both the North Inlet and PKC area water bodies during the summer of 2009.

When comparing relative abundance of waterfowl monitoring categories between shallow bays and mine-altered water bodies a noticeable habitat preference seems to be apparent for shorebirds and diving ducks (Figure 10-4). Diving ducks tend to prefer the mine-altered water bodies such as the North Inlet, which have deeper water and a shoreline of rock outcrops suitable for nesting ducks. The data for 2009 also show an affinity for seabirds to mine-altered ponds.

Figure 10-4: Relative abundance of Waterfowl – Shallow Bays vs. Mine-altered water bodies, 2009.



Recommendations

Observations at the shallow bays and mine-altered water bodies will only be done for 5 weeks during the peak migration in order to capture presence of bird species using the area. Weekly surveys after the peak migration to the end of October will no longer be conducted.

Results of the waterfowl data will no longer be analyzed in the 3-year summary report of wildlife effects. The lack of a suitable control site in the region makes it difficult to separate mine-related effects from natural factors on changes to waterfowl and shorebird populations in the East and West bays, which is the primary objective of the comprehensive effects analysis report.

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Appendix I

Wildlife Monitoring and Management Plan (WMMP)

Rio Tinto

Health, Safety and Environment Department

Wildlife Monitoring and Management Plan for the Diavik Diamond Mine

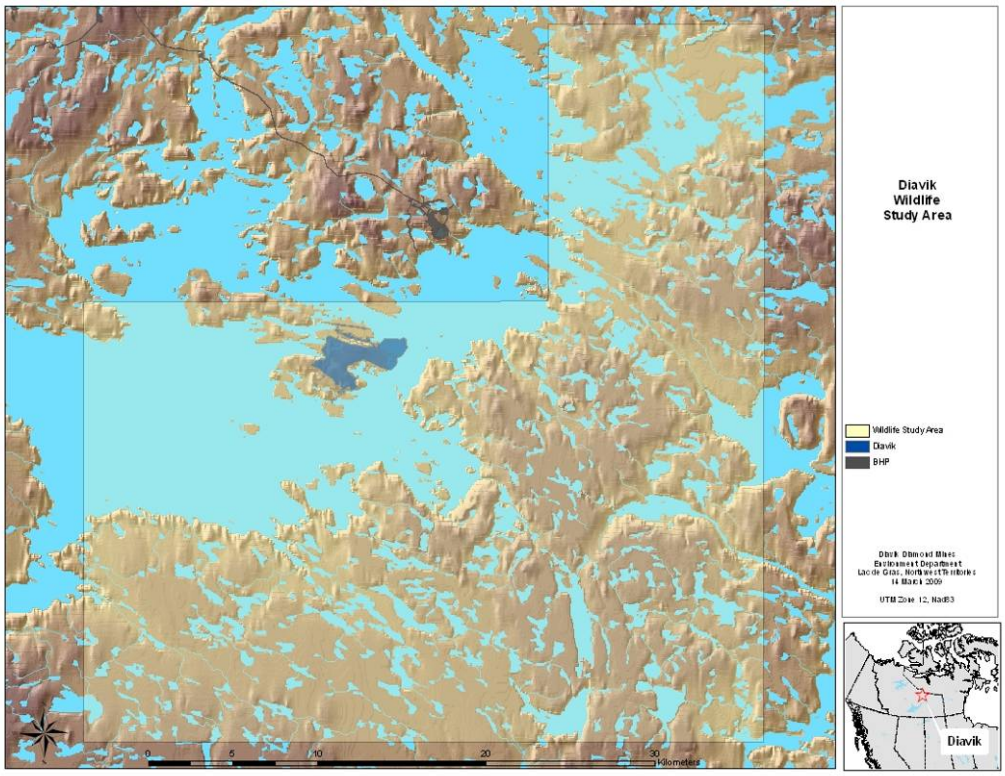
1 April 2010

Contents page

1. Background

The Diavik Diamond Mine (also referred to as the mine or Project) is located approximately 300 km northeast of Yellowknife, Northwest Territories, on an island in eastern Lac de Gras (Figure 1). The wildlife study area includes a 1,200 km^2 area encompassing the East and West islands, the aquatic habitats, many smaller islands in the east half of Lac de Gras and the mainland along the southern, eastern and northern shores of Lac de Gras (Figure 1). Wildlife common to the area includes barren-ground caribou, wolverine, grizzly bear, raptors and waterfowl.

Figure 1 Wildlife Study Area for the Diavik Mine Site



The Wildlife Monitoring Program (WMP) was designed to evaluate predictions made in the Environmental Effects Report (EER) (DDMI 1998) during the original Environmental Assessment of the Project. Monitoring programs can change over time in response to trends observed in the data or identification of improvements or concerns related to objectives, methodologies, logistics and costs. In 2009, based on monitoring data acquired since 2000, reviews of the impact predictions as well as the current monitoring program were conducted to determine if the program was effective, or if changes to objectives, design and/or methods were required (Golder 2009). Rationale for the proposed changes was based on the effectiveness of data to test impact predictions, community concerns, adaptive management principles and availability of resources and logistics.

This document, the Wildlife Monitoring and Management Plan (WMMP), is meant to provide a summary of the finalized programs for monitoring and managing wildlife at the Diavik Diamond Mine. Monitoring and management programs may change over time based on recommendations from various organizations or lessons learned during operations; the WMMP will capture those changes and be updated as required.

2. Objectives and Scope

2.1 Objectives

The purpose of the WMMP is to maintain ecological integrity and limit impacts to wildlife as a result of mine operations. Programs must also respect the importance of wildlife to northern communities, limit risk to humans and wildlife and comply with legislative and regulatory requirements (DDMI 2001).

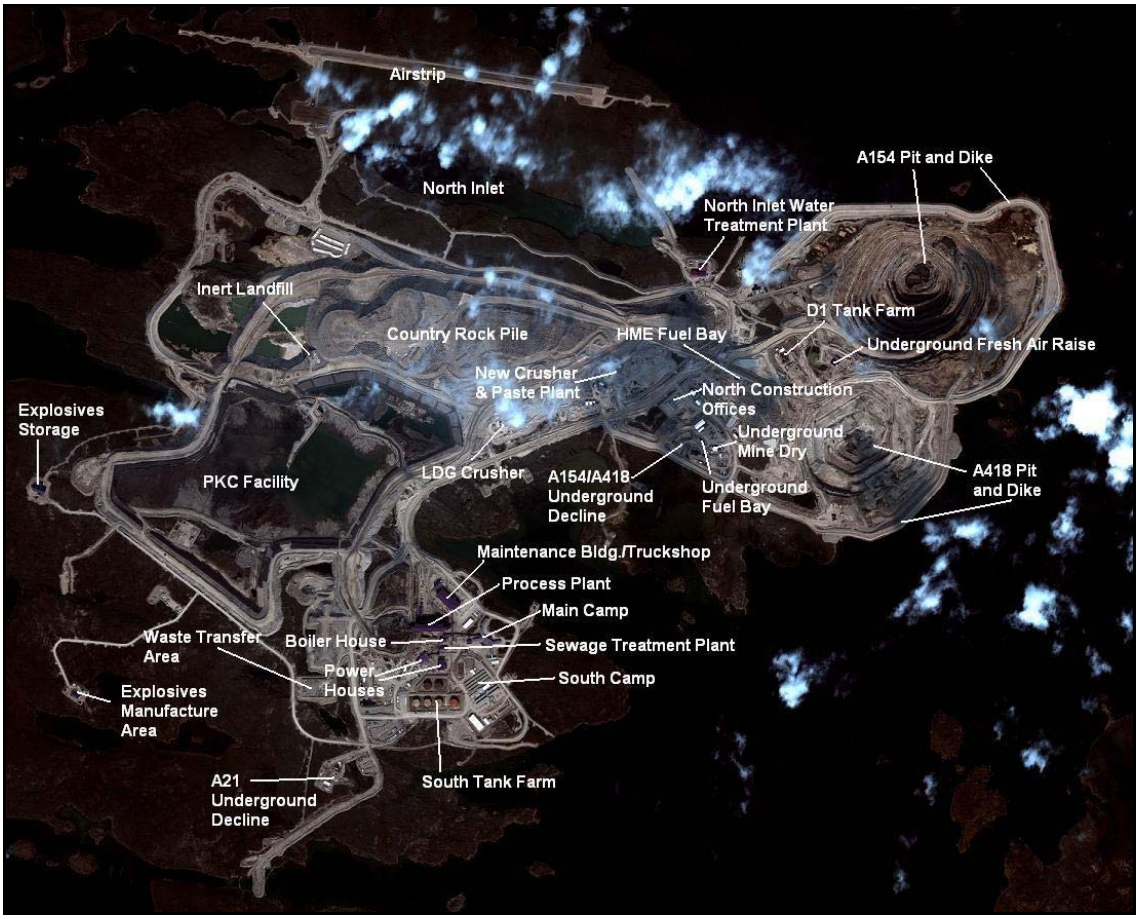
The purpose of the WMP is to determine if the distribution (location as it relates to the mine, habitat and region) and abundance (number) of wildlife species are affected by the mine. It also helps us to determine if our impact predictions are correct and that mitigation (lessening of impacts) and management practices are working.

2.2 Scope

The intent of this document is to identify infrastructure designs, policy, and procedures used by Diavik to mitigate potential impacts on wildlife, and promote and facilitate wildlife and human safety. Figure 2 demonstrates the infrastructure found at the Diavik site.

Additionally, this document outlines the monitoring programs conducted at the mine site. A summary of each program is provided and Standard Operating Procedures (SOP) for monitoring and management tasks (includes mitigation) are provided in Appendix A.

Figure 2 Diavik Mine Site Infrastructure



3. Potential Impacts to Wildlife

This section addresses how wildlife are potentially impacted (changes in abundance, distribution, or behaviour) through attraction or avoidance, changes to movement and behaviour, and mortality.

Effects to the distribution and abundance of a population represent the assessment endpoint for each species (DDMI 1998); which should be protected for their use by future human generations. In the EER, Diavik used the following form of a key question to assess the overall impact from the Project on wildlife species.

- Would the distribution and abundance of wildlife (e.g., caribou) be affected by the proposed Project?

Population abundance and distribution may be potentially affected by the Project through direct and indirect mechanisms. Direct impacts occur through the physical disturbance of habitat, and injury or death of individuals (Table 1).

Indirect impacts result from changes to habitat suitability or effectiveness. Disturbance from the mine (dust, noise, and attractive and repulsive smells) can negatively alter the behaviour of animals and decrease the quality of habitats within a zone of influence (ZOI) around the Project (Table 1). Decreased habitat suitability can result in increased energetic costs to individuals and affect the abundance and distribution of the population. Indirect effects to

some animals also may occur through changes in other species of the terrestrial community, such as small mammals, waterfowl, and plants, which provide food resources.

Altered wildlife habitat and behaviour have the potential to change the distribution and abundance of wildlife by impacting habitat suitability and energetic costs or mortality risks. Changes to wildlife habitat quality and energetic/mortality risks at the regional scale resulting from the mine were two key areas of concern identified in meetings with communities and the public (DDMI 1998). Therefore, habitat suitability and energetic/mortality risks were used as biological impact predictors.

Four measurement endpoints (variables) affecting habitat suitability and energetic/mortality risks were used to relate changes in wildlife population abundance and distribution to the mine:

- habitat change;
- blockage/deflection of movements;
- behavioural response; and
- health/mortality.

Changes to habitat quality result from the combination of direct and indirect habitat disturbance and behavioural response by wildlife to the mine. Blockage or deflection of movements due to the mine could change energetics that lead to a reduction in wildlife health and fecundity, or increase the risk of mortality. Two biological impact predictors, habitat suitability and energetics/mortality, were the principal elements used in determining the effects classification for the Project (DDMI 1998).

Table 1: Mine Activities Potentially Leading to Direct and Indirect Changes to Wildlife and Wildlife Habitat

Mine Activity	Main Activities	Potential Change	Potential Biological Impact	Potential Population Impact	Project Phase
Mining and Processing	Dike Construction Blasting & Excavating Country Rock Storage Processed Kimberlite Containment	Habitat Change, Blockage/Deflection of Movements Behavioural Response	Change in Habitat Suitability/Effectiveness Change in Energetic Costs/Mortality Risk	Change in Distribution and Abundance	Construction, operation, closure, post-closure

Mine Activity	Main Activities	Potential Change	Potential Biological Impact	Potential Population Impact	Project Phase
Infrastructure	Construction pads Drainage Treatment Sewage Treatment Pipe & Power Lines Facility Operations Food Waste Treatment	Habitat Change Blockage/Deflection of Movements Behavioural Response	Change in Habitat Suitability/Effectiveness Change in Energetic Costs/Mortality Risk	Change in Distribution and Abundance	Construction, operation, closure and post-closure
Roads and Transportation	Construction pads Traffic Fuel/Containment Spills	Habitat Change Blockage/Deflection of Movements Behavioural Response Collisions	Change in Habitat Suitability/Effectiveness Change in Energetic Costs/Mortality Risk	Change in Distribution and Abundance	Construction, operation, closure and post-closure
Aircraft	Aircraft Operation	Blockage/Deflection of Movements Behavioural Response Collisions	Change in Energetic Costs/Mortality Risk	Change in Distribution and Abundance	Construction, operation, closure
Employees	Work Site Activity Recreational Activity	Health/Mortality Risk Behavioural Response	Change in Energetic Costs/Mortality Risk	Change in Distribution and Abundance	Construction, operation, closure

The objective of monitoring programs conducted for wildlife is to test impact predictions made in the EER. The goal is to determine if any of the potential predicted impacts identified are occurring and, if so, are they with the range of effects predicted in the EER.

Consultation is conducted with communities and regulators throughout the year to discuss results from monitoring and any proposed changes to the programs. Additionally, if a change to any one program is being considered, a description of this change is included in the annual Wildlife Monitoring Report distributed by Diavik in March of each year. Alternatively, if a change is identified after the report has been published, a letter outlining any proposed change is distributed to communities and regulators, as appropriate, in an effort to obtain feedback on the change. Each year, Diavik applies for a Wildlife Research Permit from the Government of the Northwest Territories (GNWT) and monitoring activities to be carried out for the upcoming year are clearly outlined in the permit application.

4. Framework

The Environmental Agreement identifies the requirement for a Wildlife Monitoring Program (WMP) and a Wildlife Management Plan; together these form the Wildlife Monitoring and Management Plan (WMMP), and include wildlife mitigation practices and policies for the mine. The monitoring programs, management plans, mitigation practices and Standard Operating Procedures (SOP) established for the mine support the WMMP and are outlined in Tables 2 through 5. Management Plans provide an overall structure and approach for the mine site and Environment department personnel to follow in relation to the specific topics covered within that plan (e.g. waste management). Standard Operating Procedures outline steps to take in conducting work that is associated with requirements set out in various Management Plans (e.g. waste segregation). Mitigation actions may also be utilized to minimize hazards identified as having the potential to impact wildlife (e.g. incineration). Lastly, monitoring programs are designed to check that the objectives of the Management Plans and mitigation actions are being met (e.g. waste inspections).

Table 2: Documents related to the Diavik Wildlife Monitoring Programs and Management Plans

Document	Description	Management Role
Wildlife Monitoring Program (DDMI 2009)	Wildlife monitoring to test impact predictions, management actions and mitigation effectiveness.	On-going feedback for mitigation design, policies, and procedures
Wildlife Monitoring Program Annual Report (DDMI)	Summary of wildlife monitoring activities as they relate to impact predictions, management actions and mitigation effectiveness	On-going feedback for mitigation design, policies, procedures, program changes; communication of results to external parties
Analysis of Environmental Effects on Wildlife (Golder), every 3 yrs	Comprehensive analysis of data collected on each VEC to examine indirect mine-related effects on wildlife as they relate to impact predictions	Determination of mine-related effects on wildlife; on-going feedback for mitigation, procedures, monitoring program changes; communication of results to external parties
Waste Management Plan (DDMI)	Identifies various waste streams, handling and disposal requirements for all employees	Proper storage and/or disposal of materials that may be attractants for wildlife or cause contamination
SOPENV-WILD-22 – Wildlife Reporting	Wildlife reporting protocols for external regulators	Communication with regulators to allow for input and decisions relating to problem wildlife; outlines reporting and procedural requirements

SOPENV-WILD-11	Methods and procedures for conducting wolverine snow tracks	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-25 Wolverine DNA Program	Methods and procedures for conducting wolverine hair snagging and DNA analysis	Estimate of animal abundance, demographic trends, regional data
SOPENV-WILD-12	Methods and procedures for monitoring caribou using aerial surveys	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-15	Methods and procedures for monitoring caribou through behavioural observations	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-20	Methods and procedures for monitoring waterfowl, shorebirds and other aquatic birds	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-02	Methods and procedures for monitoring grizzly bear	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-05	Methods and procedures for monitoring raptors	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-26	Methods and procedures for monitoring vegetation cover and composition	On-going feedback for mitigation design, policies, procedures, program changes
SOPENV-WILD-09	Methods and procedures for monitoring waste disposal/segregation practices	On-going feedback for mitigation design, attractant management
SOPENV-WILD-18	General considerations for conducting various wildlife monitoring programs	Highlights safety considerations, equipment required and emergency preparedness

Monitoring of mine-related influences on the abundance and distribution of key wildlife species was grouped into the following effects categories and associated measurement variables.

- Direct Effects to Habitat
    - Physical change to habitat types from the mine footprint

- Indirect Effects to Habitat
    - Change in habitat value (suitability) for caribou and grizzly bears within the estimated zone of influence (ZOI) of the mine
    - Caribou numbers, distribution, behaviour and group composition within the study area
    - Presence and distribution of grizzly bear within the study area
    - Presence and distribution of wolverine within the study area
    - Presence and distribution of raptors within the study area
    - Occupancy and nest production of raptors within the study area
    - Presence of waterfowl and shorebirds on East Island

- Mine-related Mortality or Incidents
    - Number and type of mine-related incidents (including mortality) for wildlife

5. Caribou Monitoring

5.1 Habitat Loss

Habitat loss on East Island is expressed in habitat units (HUs) for caribou summer habitat. A habitat unit is the product of surface area and suitability of the habitat in that area to supply food for caribou and cover for predators (DDMI, 1998b). To address how the change of habitat may affect caribou on East Island, a habitat suitability index (HSI) model was developed for DDMI during the EA by Rowell and Van Egmond (1998). Habitats were rated on a scale of 0 to 1 for their capability to support use for caribou, with values >0.30 regarded as highly suitable habitat and values <0.25 rated as low suitability for caribou. The area of each habitat type on East Island was multiplied by its HSI value to determine the number of foraging habitat units available to caribou.

Anticipated changes in caribou summer habitat quality and quantity from the mine included direct physical alteration of habitat by the mine footprint. The objective of this component of the WMP is to determine if direct habitat loss for caribou from the mine footprint is within the amount predicted in the EER (DDMI 1998a). The impact prediction is:

> *At full development, direct summer habitat loss from the Project is predicted to equal 2.965 habitat units (HUs).*

5.2 Behaviour Observations

Mining activities have the potential to decrease the use of habitat adjacent to human developments for caribou due to behavioural disturbance (DDMI, 1998b). Zones of Influence (ZOI) were established during Diavik's Wildlife Environmental Effects Report (EER) to provide a conservative approach in the assessment of the possible impacts from human activity on caribou. The ZOI were based on literature and the experience of barren-ground caribou biologists. Information collected on the activity of caribou, as part of DDMI's Wildlife Monitoring Program, is used to determine whether a change in behaviour is detected in relation to distance from mining activities. Behavioural observations, or scan sampling, are conducted near the mine where the foraging behaviour of animals may be influenced by mining activities. Observations are also made on the mainland ("control sites"), at varying distances from the mine to determine whether or not "changes in behaviour were a response to human activity" (Gunn, 1983).

Monitoring data obtained to date indicate that the ZOI for caribou occurrence and distribution are greater than the original impact prediction of 3 to 7 kilometers (km), and that monitoring efforts to assess ZOI on caribou behaviour at the local scale need to increase. Scan sampling of caribou groups will be used to monitor caribou behaviour as a function of distance from the mine. This monitoring is conducted jointly with BHP-Billiton, where Ekati biologists focus on near-mine observations and Diavik biologists focus on observations further from the mines. Groups are scanned every 8 minutes for a minimum of 4 observations and a maximum of 8 observations. Data recorded includes: location, number of animals, behaviour, habitat type, weather and insect harassment.

The original impact prediction found in the EER (Wildlife, 1998) stated "*The zone of influence from Project-related activities would be within 3 km to 7 km"*, and Diavik is proposing to re-word this prediction to be:

> *The zone of influence from Project-related activities on caribou behaviour is predicted to be within 3 to 7 km.*

5.3 Aerial Surveys

Recent analysis of aerial survey data have suggested that the ZOI for the probability of caribou occurrence near mineral developments may range from 11 to 33 km (Boulanger et al. 2004, 2009; Johnson et al. 2005; Golder 2008). During 2009, caribou aerial surveys were conducted jointly by the Ekati and Diavik mines over an area of approximately 6,000 km^2, with 11 transects located 8 km apart.

In response to recommendations raised from Ekati and Diavik Advisory Boards and during the NWT Diamond Mine Wildlife Monitoring Workshop (2009), Diavik and BHP-Billiton jointly announced that caribou aerial surveys would be suspended for 2010 in favour of revising the existing monitoring methods. Revisions to impact predictions and monitoring objectives are currently being considered and will be discussed jointly with various stakeholders to determine a preferred approach for future monitoring programs.

6. Grizzly Bear Monitoring

6.1 Habitat Loss

Anticipated changes in grizzly bear habitat and prey availability from the mine included direct physical alteration of habitat by the mine footprint.

A high resolution Quickbird satellite image is used to derive the mine footprint. This dataset is then laid over the vegetation baseline image, which shows each vegetation/habitat type based on the Ecological Landscape Classification developed by ENR (Matthews et al. 2001). Each vegetation/habitat type that has been replaced by the mine footprint is selected and area calculations are made to determine how many square kilometers of each habitat type has been replaced by the mine footprint.

The objective of this component of the WMP is to determine if direct habitat loss for grizzly bear from the mine footprint is within the amount predicted in the EER (DDMI 1998a).

> *At full development, direct terrestrial habitat loss for grizzly bear from the Project is predicted to be 8.67 km^2.*

6.2 Presence

Mining activities can impact the presence of grizzly bears due to disturbance and habitat loss (DDMI, 1998b). Vegetation loss and changes to caribou distribution from mining activities may also impact the presence of grizzly bears (Gau and Case, 1999). Based on diet selection (Gau et al. 2002) and seasonally preferred habitats (McLoughlin et al. 2002), the presence of bear sign within and adjacent to seasonal high quality habitats (sedge wetland in June and riparian shrub in August) is used as an index of habitat utilization by grizzly bears

within the Diavik study area (Golder 2008). Monitoring is conducted to determine if mining activities influence the presence of grizzly bears in the study area. The predicted effect is:

> *Mine development is not predicted to influence the presence of grizzly bears in the area.*

A total of 36 plots were randomly selected within the study area, consisting of at least 25% of either sedge wetland or riparian shrub habitats. Plots were previously surveyed on foot by Environment staff to identify fresh bear sign left in the year of monitoring. In order to improve safety concerns and reliability of data associated with this program, Diavik is proposing to complete a pilot study on a new method of analyzing grizzly bear presence within the study area during the 2010 field season.

Wooden structures wrapped in barbed wire will be deployed in each of the 36 plots noted above during the month of June. Each structure will be inspected for presence of grizzly bear hair three (3) times, at 2 week intervals throughout the summer. Samples will be archived for DNA analysis.

7. Wolverine Monitoring

Mining activities may generate sensory disturbance and cause wolverine to avoid the mine area. Alternately, feeding behaviour of wolverine may result in their attraction to camps and habituation if they receive a food reward (Penner, 1998). The potential for this was demonstrated during baseline, construction, and operations in the Lac de Gras area. The objective of this program is to determine if mining activities are influencing the presence of wolverine in the study area, and the impact prediction is stated as:

> *The mine is not predicted to cause a measurable shift in the presence of wolverines in the study area.*

In 2007, Diavik revised the previous wolverine track survey in favour of an increased number of transects of equal length. Transects were also more randomly distributed throughout the study area to better account for presence on ice, however, some bias was still placed on tundra areas previously identified as preferred habitat for wolverine based on Traditional Knowledge. Use of transects of equal length allows more accurate analysis of proximity to the mine site and results in Diavik's program resembling those of the other diamond mines. The track survey is conducted during spring due to favourable tracking conditions.

7.1 Wolverine DNA Program

It is recognized that there is a fundamental difference between measurements generated from DNA hair sampling and snow track survey methods. Hair sampling and DNA fingerprinting represent an enumeration method that can provide estimates of animal abundance. In contrast, count-based data (e.g. snow track surveys) generate indices of the probability of occurrence or relative activity of individuals within the study area.

A hair sampling study should help to understand the potential cumulative effects from natural and human disturbance on wolverine populations, and represents a more research-oriented approach relative to effects monitoring. Hair sampling would supply regional data on wolverine population parameters for government, and help make stronger inferences and

conclusions in the WMP. For these reasons, DNA hair sampling would represent a collaborative research program between industry and government. Diavik is committed to implementing the wolverine DNA hair sampling program in 2010 and 2013, conditional upon inclusion of multiple study areas to obtain necessary sample size and statistical power to detect changes in population size and demographic trends. Participation by Diavik will be re-evaluated in 2015.

8. Falcon Monitoring

Mining activities may generate sensory disturbance and cause raptors to avoid the mine area and surrounding habitats resulting in a decrease in the quality of available hunting and nesting habitats. Foraging was expected to be affected by a reduction in the prey base impacted by direct loss of habitat from the mine footprint. Therefore, mine-related changes in habitat quality can influence the presence and distribution of raptors. This is the objective of this component of the WMP and the impact predictions are:

> *Disturbance from the mine and the associated zone of influence is not predicted to result in measurable impacts to the distribution of raptors in the study area.*
>
> *The mine is not predicted to cause a measurable change in raptor presence in the study area.*

Falcon nest sites previously identified in the Diavik wildlife study area are visited annually, twice a year to conduct occupancy and productivity surveys in cooperation with BHP-Billiton and the Government of the Northwest Territories (GNWT).

9. Waterfowl Monitoring

9.1 Habitat Loss

In the East Island area, shallow bays, melt-water ponds and shoreline leads have been identified as important areas for migrant waterfowl (DDMI, 1998b) as they provide habitat requisites such as open water. Anticipated changes to waterbird habitat included direct physical alteration of wetlands and shallow water by the mine footprint. The objective of the WMP is to determine if direct aquatic habitat loss for waterbirds is within the amount predicted in the EER (DDMI 1998a) and the impact prediction is:

> *At full development, direct aquatic habitat loss from the project is predicted to be 3.94 km^2.*

The method described in Section 6.1 is the same used to determine loss of waterfowl habitat.

9.2 Presence

The objective for this component is to determine if disturbance from the mine is impacting the presence of waterfowl species. The shallow bays near the Diavik site are unique to the region surrounding the mine, and may therefore attract waterfowl during the spring migration when open water in other areas may be limited. Disturbance may result from habitat loss, altered drainage patterns, dust fall, noise from mining activities and human presence (DDMI,

1998b). This monitoring program is used to determine if conditions are different than the predicted impact:

> *The mine is not predicted to cause a measurable change in waterfowl presence in the study area.*

East Island shallow bays are surveyed daily for three weeks in the spring during the peak migration. Shallow bay surveys are conducted by Environment personnel walking the perimeter of the bays. Given the unique nature of the shallow bays in the region around the mine, no control site has been identified or monitored since initiation of this monitoring program.

9.3 Habitat Utilization

Mining activities may artificially produce early open water due to dust deposition and the associated increased rate of snowmelt. This, in turn, may also attract migrating waterfowl. The water management system for the Diavik mine includes several engineered lined ponds to collect site run off water. There are 11 mine-altered water bodies to date, each of which has the potential to provide suitable habitat for migratory birds. Use of these areas is monitored by DDMI to determine the extent to which early open water or vegetation growth may attract waterfowl. The objective is to determine if waterfowl are using mine-altered waters, and the prediction is:

> *Early open water or early vegetation growth might attract waterfowl during spring migration.*

Mine-altered water bodies are surveyed daily for three weeks in the spring during peak migration. Environment personnel scan mine-altered water bodies and shoreline perimeters with binoculars to identify and record all bird observations.

10. Wildlife Incidents and Mortality

For all species found in the area of the Diavik mine, direct impacts to wildlife are monitored through incident (e.g., injuries and relocations) and mortality reporting and investigations. A procedure exists for notifying and reporting to GNWT Wildlife Officers regarding wildlife concerns or issues on site. Except in the event of an emergency, the GNWT is consulted on decisions to relocate or destroy wildlife or wildlife dwellings.

11. Vegetation/Habitat Assessment

The potential for a change in vegetation condition and plant community composition due to dust deposition from mining activities is monitored by conducting habitat assessments on East Island and control sites further from the mine. Permanent Vegetation Plots (PVPs) are located in four different habitat types and are monitored every second year.

12. Waste Management Plan

Diavik's Waste Management Plan outlines requirements so that the collection, storage, transportation and disposal of all wastes generated by mining and support activities are conducted in a safe, efficient and environmentally compliant manner. The plan also incorporates waste minimization. The main objectives of the plan are to:

- create a system for proper disposal of waste;
- minimize potentially adverse impacts on the physical and biological environment;
- comply with Federal and Northwest Territories (NWT) legislation;
- prevent and reduce adverse impacts on the environment, including wildlife and wildlife habitat;
- protect the environmental integrity of soil, surface water and groundwater in the immediate area of the plant site;
- reduce site waste disposal costs; and,
- practice due diligence.

13. Waste Inspections

Negative impacts to wildlife from access to food and other waste products include injury or mortality resulting from increases in human-animal conflicts. The objective of this component of the WMP is to determine the effectiveness of waste management, and provide feedback for improvement to reducing the attraction and access by wildlife to food and other wastes.

The Diavik mine site has two key areas of concern relating to waste storage, handling and disposal. The Waste Transfer Area (WTA) is both a disposal and staging area for wastes generated on site, both hazardous and non-hazardous. The approved inert landfill is for disposal of materials such as glass, plastic, steel and sytrofoam. Inspections of the Waste Transfer Area and inert landfill are conducted every second day to check that only approved materials are present. Any incorrectly disposed materials are recorded and collected for proper disposal, if safe to do so.

Mitigation and Management of Direct Effects to Wildlife and Wildlife Habitat

With the potential impacts to wildlife outlined in Section 3, mitigation practices were put in place to reduce or eliminate these potential impacts. This section focuses on practices implemented to limit direct effects to wildlife and wildlife habitat. Procedures for each of these practices are highlighted in Table 3.

Table 3: Documents related to Mitigation Practices for Direct Effects to Wildlife and Wildlife Habitat

Document	Description	Management Role
SOPENV-WILD-03 Blasting and Wildlife	Protective practices to minimize behavioural response, blockage or deflection of animals	Operational controls, wildlife protection, operational feedback
SOPENV-WILD-06 Pipelines and Power Lines	Design considerations for pipeline and power line construction methods	Operational controls, minimize physical barriers, wildlife protection
SOPENV-WILD-07 Road and Pad Construction and Maintenance	Methods to develop roads for safe wildlife passage	Operational controls, minimize physical barriers, wildlife protection
SOPENV-WILD-19 Traffic and Wildlife	Procedures to limit air and ground traffic in areas where wildlife are present	Operational controls, wildlife and habitat protection, operational limitations
Environmental Management System (EMS) Operational Control Procedure (OCP) – Natural Ground Removal	Considerations required prior to removing any natural ground for development areas	Operational controls for seasonal wildlife or wildlife habitat considerations, protection of wildlife and wildlife habitat, minimize area of disturbance
Mine Plan	Development plans & design features for the mine and supporting infrastructure	Pre-determined footprint to minimize habitat loss and area of disturbance
Re-vegetation Research Plan & Progressive Reclamation	Research commitments and plans for re-vegetation and progressive reclamation	Increase habitat available to wildlife for future use, reduce physical barriers

14. Infrastructure Design

Physical designs used to limit direct effects to wildlife and wildlife habitat includes those outlined below.

14.1 Mine Plan

Development of the mine was limited in extent based on feedback received during the Environmental Assessment phase of the Project. Infrastructure development is confined to a small area of East Island, with the goal of reducing the amount of habitat lost from construction. Some of the facility design considerations relating to wildlife are outlined below.

14.1.1 Pipelines and Power Lines

These structures may act as physical barriers to wildlife movement and may cause mortality risks to some species. Design requirements take into account distances between conductors for power lines, considerations for pole design, height and width of pipe or power lines on the ground and location of pipelines and power lines to follow roads as much as possible and use existing line routes.

14.1.2 Road and Laydown Area Construction and Maintenance

Roads and laydown areas may potentially affect: wildlife habitat due to increased dust in the area, animal behaviour due to production of noise and other stimuli and wildlife movement due to physical barriers. Berm height and slope, areas of passage and habitat surrounding roads are all factors to be considered when designing and developing roads on site.

14.1.3 Natural Ground Removal

Prior to developing any new areas on site, consultation with a representative from the Environment department is completed to verify that any proposed development is within our lease areas and would not adversely impact any wildlife habitat. Additionally, depending on the time of year, area inspections for nest and dens are conducted prior to work commencing.

14.1.4 Re-vegetation Research and Progressive Reclamation

Efforts to determine suitable substrates and species to re-vegetate the mine site after closure are currently being researched. This research is anticipated to contribute to more effective closure methods. Progressive reclamation projects are assessed in specific areas of the mine that are no longer required for operations. The goal of these programs is to increase habitat available to wildlife and reduce physical barriers near the mine.

15. Operational Policy and Procedures

Policies and procedures developed with the intent of limiting direct effects to wildlife and wildlife habitat include those outlined below.

15.1 Traffic and Wildlife

At the mine site, wildlife have the right-of-way and there is a traffic advisory program in place. Diavik staff learn about these requirements within their first day of being on site. Employees requiring a drivers license for their work on site take a mandatory driver training program that outline wildlife considerations. Environment staff is responsible for maintaining traffic advisory boards to reflect current conditions on the Island. Additionally, Environment staff are responsible to arrange for site-wide notifications of wildlife by radio and to determine when temporary road closures may be necessary for the safe passage of wildlife.

This procedure also outlines concerns for wildlife relating to air traffic. Highlights of these requirements include minimum altitudes for helicopter flights, areas that should be avoided by aircraft, herding events for aircraft takeoffs and landings and limiting potential harassment of wildlife with aircraft.

15.2 Blasting and Wildlife

Potential impacts to wildlife from blasting include behavioural responses or deflection of movement due to noise and motion stimuli. This procedure mainly focuses on establishing a safe zone around the blasting area where blasting does not occur, if wildlife are located within that zone. Surface blasting outside the pits that may be required for infrastructure development are conducted using blast mats to reduce the amount of fly rock and dust associated with such blasting. As the mine plan progresses underground, surface effects from blasting such as dust, noise and fly rock that can potentially impact wildlife will decrease or cease.

Mitigation and Management of Indirect Effects to Wildlife and Wildlife Habitat

With the potential impacts to wildlife outlined in Section 3, mitigation practices were put in place to reduce or eliminate these potential impacts. This section focuses on practices implemented to limit indirect effects to wildlife and wildlife habitat. Procedures for each of these practices are highlighted in Table 4.

Table 4: Documents related to Mitigation Practices for Indirect Effects to Wildlife and Wildlife Habitat

Document	Description	Management Role
SOPENV-WILD-08 Dust Control	Methods to reduce the amount of dust generated along haul roads, from mining and from the airstrip	Reduce dust levels on vegetation and snow that may be consumed by wildlife
DDMI Policy: No Feeding of Wildlife	Prohibits feeding of wildlife by any employee, contractor or visitor	Protect health and sustainability of wildlife, reduce human-wildlife interactions
EMS OCP – Human Activity Interference with Wildlife	Methods to help prevent wildlife attraction to the mine site	Protect health and sustainability of wildlife, reduce human-wildlife interactions
Mine Plan	Future activities of the mine focus on underground mining	Reduce dust levels on vegetation and snow, reduce noise and activity levels
Communication/ Education Plan	Internal employee Environmental orientation and education programs	Educate workforce about environment, improve health & sustainability of wildlife, reduce human-wildlife interactions

16. Infrastructure Design

Physical designs used to limit indirect effects to wildlife and wildlife habitat includes those outlined below.

16.1 Mine Plan

The mine plan for Diavik is progressing to underground mining, rather than the open surface pits currently mined to date. This change will result in a decrease to many of the potential stressors to wildlife associated with mine activities. Levels of noise and dust will decrease. The overall activity level at the mine site will also decrease, generating less waste and attractants commonly associated with the relatively larger number of people at the site.

17. Operational Policy and Procedures

Policies and procedures developed with the intent of limiting indirect effects to wildlife and wildlife habitat include those outlined below.

17.1 Dust Control

Impacts to wildlife habitat, and wildlife, have the potential to occur as a result of dust deposition on vegetation and water surrounding the mine site. In an effort to reduce any potential impacts, DDMI employs dust control designs for facilities that generate dust.

Uses and limitations of dust suppressants are described, as are water practices for site roads and the airstrip. Approved rock crushing facilities are also considered, as are potential dust controls associated with blasting practices.

17.2 No Feeding of Wildlife

Indirect effects to wildlife can occur from humans feeding wildlife non-natural foods. Injury, property damage, production of larger numbers of offspring, changes in behaviour patterns and disease are all some of the indirect effects that may occur if animals are fed non-natural foods. The goal of this policy is to protect the health and safety of wildlife and DDMI employees by preventing this activity.

17.3 Control of Human Activity Interference with Wildlife

This Operational Control Procedure (OCP) was developed in response to potential aspects and impacts identified in the development of Diavik's Environmental Management System (EMS). Considerations included in this document outline activities such as noise reduction and waste handling initiatives designed to minimize wildlife presence on site, as well as any potential indirect effects to wildlife in the region.

17.4 Education and Communication

While direct effects to wildlife may be obvious to many people, education and awareness programs are required to inform employees about potential indirect effects to wildlife and how individual actions contribute. The Environment department develops presentations and posters to assist with this learning on site.

Mitigation and Management of Direct Wildlife Injury or Mortality

With the potential impacts to wildlife outlined in Section 3, mitigation practices were put in place to reduce or eliminate these potential impacts. This section focuses on practices implemented to limit direct effects to wildlife from mine-related injury and mortality. Procedures for each of these practices are highlighted in Table 5.

Table 5: Documents related to Mitigation Practices for Direct Wildlife Injury or Mortality

Document	Description	Management Role
SOPENV-WILD-01 Problem Bears	Communication and deterrent procedures for bears on site	Protect health and sustainability of wildlife, reduce human-wildlife interactions
SOPENV-WILD-04 Rabid Animals	Precautions and handling procedures in the event of an incident	Protect health and sustainability of wildlife, provide employee safety
SOPENV-WILD-17 Problem Wildlife	Communication and deterrent procedures, mortality handling	Appropriate communication and notifications, input/ feedback on management actions
SOPENV-WILD-22 Wildlife Reporting	Communication and documentation procedures, incident reporting	Appropriate communication and notifications, input/ feedback on management actions
SOPENV-WILD-24 Preventing Human-Wildlife Interactions	Preventative policies and actions, internal reporting procedures, weapon restrictions for site	Protect health and sustainability of wildlife, reduce human-wildlife interactions
SOPENV-WILD-13 Caribou Road Observations	Methods and procedures for conducting inspections along site roads	Operational controls, wildlife protection, operational feedback
SOPENV-WILD-14 Caribou PKC and Rock Pile Observations	Methods and procedures for conducting inspections on rock pile & PKC	Operational controls, wildlife protection, operational feedback
SOPENV-WILD-16 Caribou Herding	Methods and procedures for herding caribou from mine infrastructure	Operational controls, wildlife protection, operational feedback
SOPENV-WILD-19 Traffic and Wildlife	Advisory requirements, wildlife right-of-way policy, speed limits	Operational controls, wildlife and habitat protection, operational limitations
SOPENV-WILD-27 Pit Wall Surveys for Raptors	Inspection and communication procedure	Operational controls, wildlife and habitat protection, operational limitations
SOPENV-WILD-28 Skirting Inspections	Procedure to inspect buildings for deficiencies	Protect health and sustainability of wildlife, reduce human-wildlife interactions, protect infrastructure

Mine Plan	Development plans & design features for the mine and supporting infrastructure	Pre-determined footprint to minimize barriers & entrapment of wildlife
Waste Management Plan and EMS OCP Non-mineral Waste Management	Waste segregation requirements, incineration, area inspections, design of storage areas, hazardous materials storage requirements	Protect health and sustainability of wildlife, reduce human-wildlife interactions, reduce contamination of ground/water
EMS OCP Spill Management	Spill prevention, clean up and reporting requirements	Protect health and sustainability of wildlife, reduce human-wildlife interactions, reduce contamination of ground/water
DDMI Policy: No Hunting of Wildlife	Restrictions on recreational hunting for employees	Protect health and sustainability of wildlife, reduce human-wildlife interactions
Incidental Reporting Requirements	Employee reporting requirements for wildlife sightings	Capture wildlife movements on site, feedback on deterrent practices
Communication/ Education Plan	Internal employee Environmental orientation and education programs	Educate workforce about environment, improve health & sustainability of wildlife, reduce human-wildlife interactions

18. Infrastructure Design

Physical designs used to limit direct effects on wildlife injury or mortality includes those outlined below.

18.1 Mine Plan

The Diavik mine is designed with as small a footprint as possible. Facilities were constructed to account for wildlife movement through the area and input from communities has assisted with this process.

Strategically-placed fences designed to discourage wildlife from areas that could potentially bring harm to animals were used during the early years of the mine. Skirting is required on site buildings in an effort to prevent wildlife access and denning activities under structures such as offices and accommodation facilities. Locations of roads and buildings were also considered in relation to wildlife movement when first developing the plans for the mine.

As the mine progresses underground and eventually toward closure, Diavik continues to seek advice from communities on how best to close the different types of facilities. Considerations for wildlife movement and/or use of the mine site area after closure are some of the key concerns DDMI staff are trying to address (DDMI, 2010).

Waste handling and disposal areas are designed to try and exclude wildlife from these areas, as outlined in the Non-mineral Waste Management OCP. Hazardous materials and food waste are handled in a facility surrounded by a barbed-wire fence, and waste disposal areas for different departments are regularly inspected by Environment staff.

19. Operational Policy and Procedures

Policies and procedures developed with the intent of limiting direct effects from wildlife injury or mortality include those outlined below.

19.1 Policies

19.1.1 Preventing Human-Wildlife Interactions

Much focus is placed on prevention of potential impacts to wildlife due to the presence of the mine. Policies such as no hunting, no fishing, restriction of firearms on site, no feeding of wildlife and wildlife have the right-of-way all contribute to reducing potential effects from human presence in the area. Site-wide policies such as speed limits and traffic advisories also contribute to reducing potential for wildlife injuries from mining activities.

The spill management OCP outlines spill prevention, reporting and clean-up procedures to be followed at the Diavik site. Chemicals that can serve as wildlife attractants or harm wildlife if ingested are included within these requirements. Proper storage, handling and disposal of such materials are communicated so that employees are aware of their requirements and the reasons for these requirements.

19.2 Procedures

19.2.1 Monitoring and Reporting

Key areas where wildlife interactions are expected to occur were identified during project development and are re-assessed on a regular basis. Inspections of these areas occur so that any wildlife using these areas are identified and that any mitigation actions required can occur in a timely manner. For caribou, surveys are completed on roads, PKC and rock piles. Pit wall surveys are carried out for raptors that may be establishing nests on the pit walls. Incidental reports of wildlife on the mine site or nearby are reported by all staff, from site employees to the Environment department.

Reporting requirements relating to wildlife issues, concerns, injuries or mortalities are clearly outlined for all Environment staff. Key contacts for government personnel involved in wildlife management are provided in the event that external assistance is required.

19.2.2 Management and Mitigation

Problem wildlife on the mine site generates a safety concern for both the animal and DDMI employees. Communication, notification and deterrent procedures for problem wildlife are outlined in various SOPs for the Environment department staff. Information on animal diseases and proper handling procedures is also made available to site employees.

Procedures to herd or deter animals have been developed with input from regulators, communities and other experts. Important information that can be learned from wildlife incidents or deterrent activities that take place at the mine site are captured in records obtained for each type of activity.

20. Education, Training, Communication

Education and awareness programs are conducted to inform employees about potential direct effects to wildlife and in the avoidance of injury or harm to animals. The Environment department develops presentations and posters to assist with this learning.

21. References

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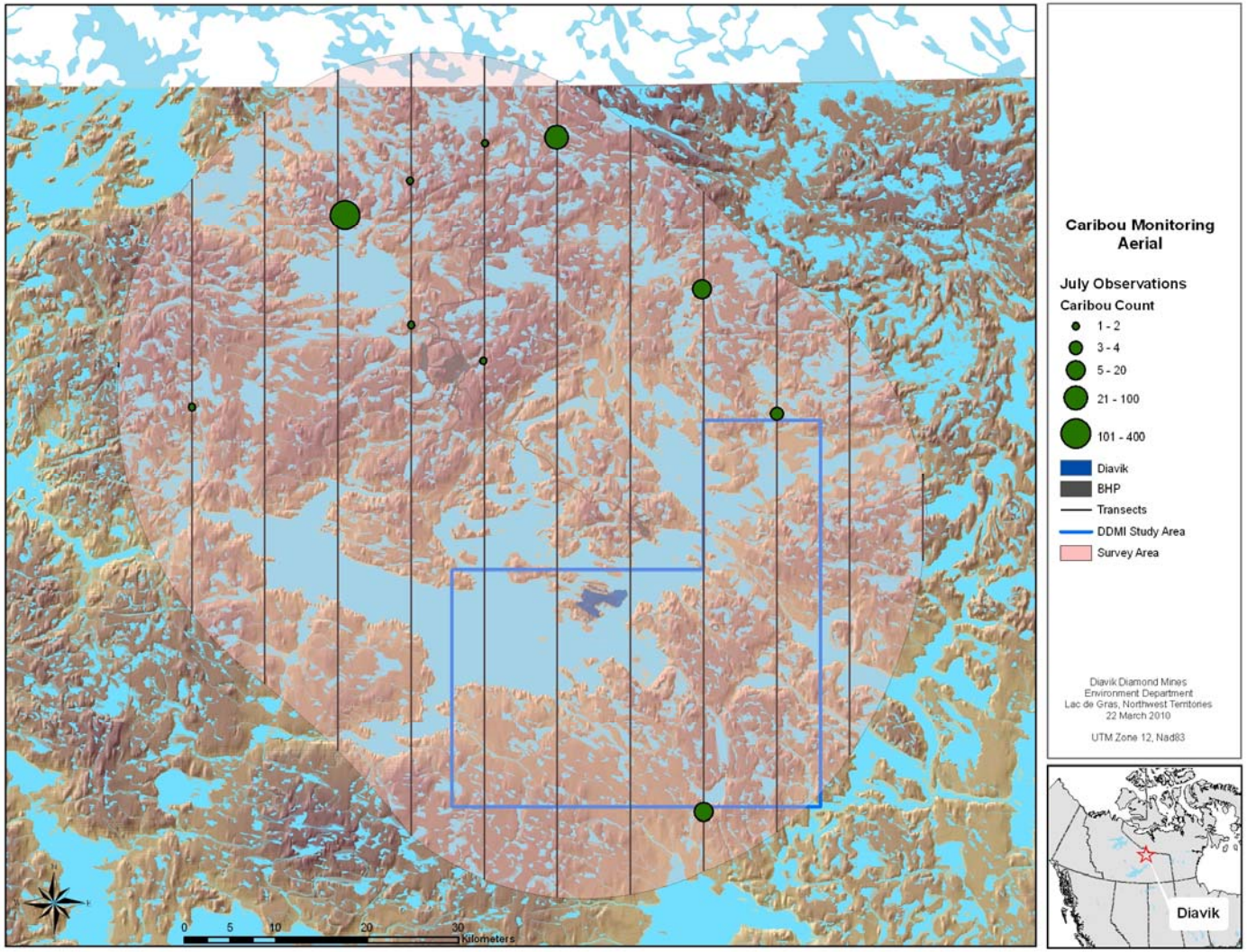
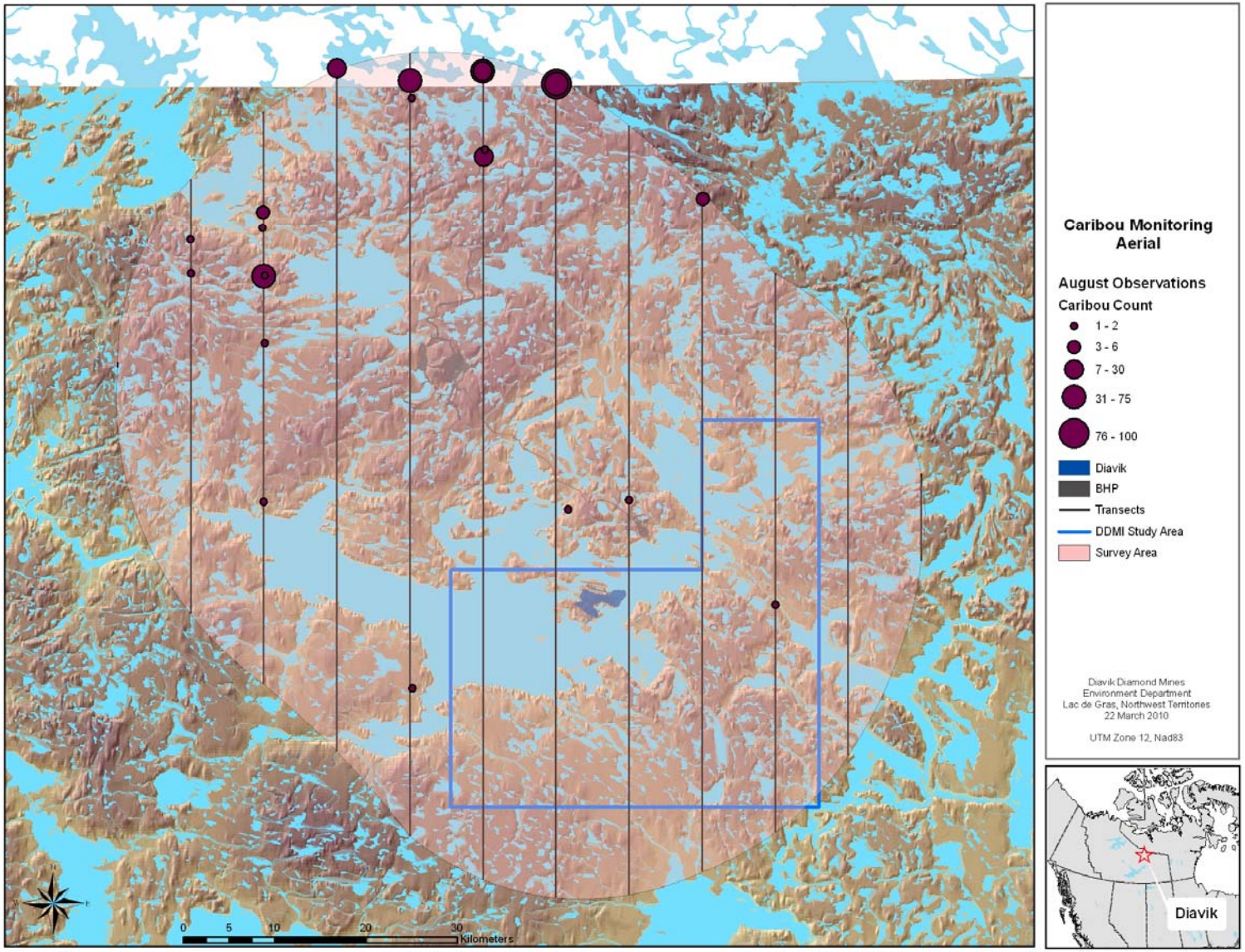
Appendix II

Caribou Monthly Aerial Survey Movements

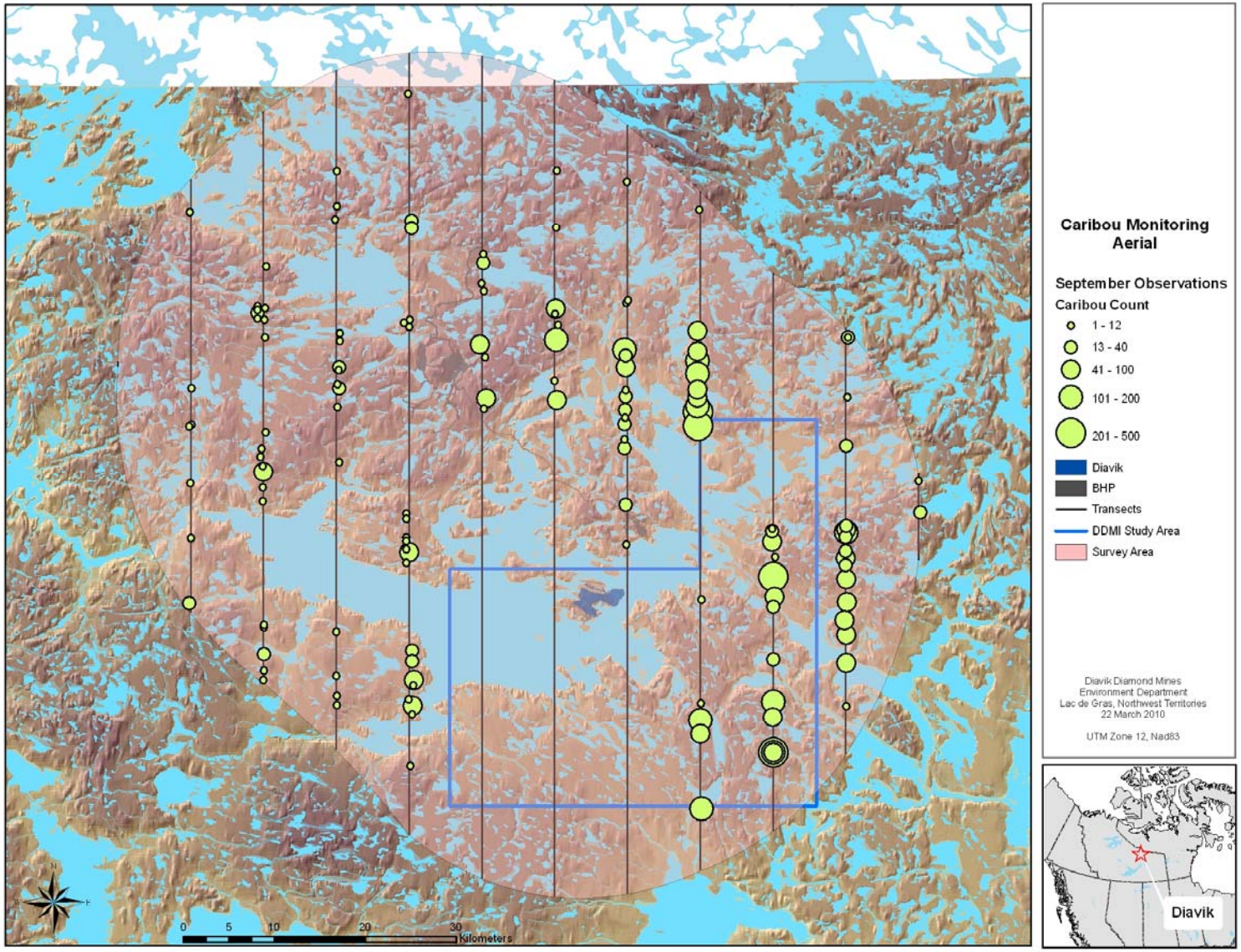
July 2009 Caribou Aerial Observations



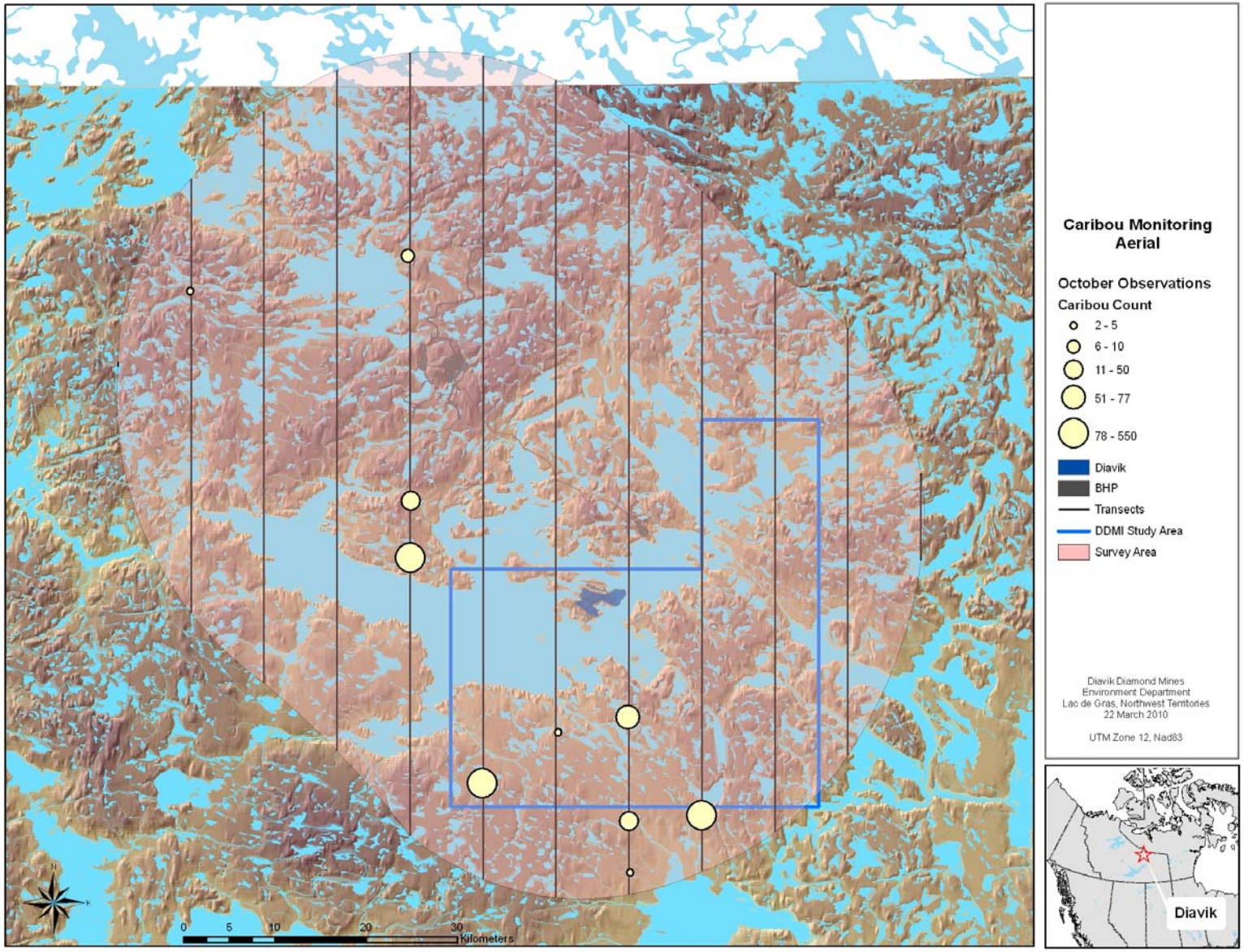
August 2009 Caribou Aerial Observations



September 2009 Caribou Aerial Observations



October 2009 Caribou Aerial Observations



Appendix III

Incidental Observations – Caribou, Grizzly Bear, Wolverine

Caribou Incidental Observations - 2009

Date	Number Of Animals	Location	Comments
28-Mar-09	1	East of A154 pit*	On Lac de Gras
18-Apr-09	18	200 m south of winter road dispatch*	On Lac de Gras
26-Apr-09	100	200 m east of A154 dike*	On Lac de Gras
28-Apr-09	9	West of airport*	On Lac de Gras, seen from helicopter
29-Apr-09	28	East of Lac du Sauvage narrows*	Seen from helicopter
29-Apr-09	150	Emulsion Plant	Road advisory issued
1-May-09	3	East of Airstrip	
3-May-09	3	North Inlet	
6-May-09	27	Airport	Remained on site in same area until 18 May
27-May-09	20	North Inlet	
28-May-09	8	West bay	
30-May-09	8	Off east bay	Wolf spotted that evening
30-Sep-09	100	East dam of North Inlet	
1-Oct-09	100	North Inlet	
2-Oct-09	74	North east of North Inlet*	

* observations off mine site

Incidental Grizzly Bear Observations, 2009

Date	Number of Animals	Color, Size, Markings of Animal	Location	Advisory Issued	Attractant Present	Corrective Measures Taken	Action Taken (Deterrents Used)	Comments
24-Apr-09	2	1 sow, 1 cub	East Mainland*	No	No	None	None	
14-May-09	3	1 sow, 2 cubs (last year cubs)	S of Emulsion Plant	Yes	No	None	None	Moved off to SW on their own
24-May-09	3	1 sow, 2 cubs (last year cubs)	W of Clarification Pond	Yes	No	None	None	Too far off for deterrents to be effective
26-May-09	3	1 sow, 2 cubs	NW corner of A154 dike	Yes	No	None	Yes - truck, bangers	
27-May-09	3	1 sow, 2 cubs, light brown	Airport	Yes	No	None	Yes - banger	Moved off to W
3-Jun-09	1	Healthy adult male	Emulsion Plant	Yes	No	None	Yes - banger	Moved off on ice south of East Island
5-Jun-09	3	1 sow, 2 cubs, light brown	West Bay	Yes	No	None	Yes - truck	Moved off on ice south of East Island
6-Jun-09	3	1 sow, 2 cubs, light brown	A21 Area	Yes	No	None	Yes - banger	Deterred south
20-Jun-09	3	1 sow, 2 cubs, blond, last year cubs	South Camp	Yes	Yes - scent	None	Yes - truck, bangers	Moved to A21 island
21-Jun-09	3	1 sow, 2 cubs, brown, this year cubs	South Camp	No	No	Yes - scent	Yes - truck, bangers	Moved off along winter road route (road closed)
6-Jul-09	3	1 sow, 2 cubs, blonde in colour	Airport	Yes	No	None	Yes - truck	Between runway & north inlet
8-Jul-09	3	1 sow, 2 cubs, blonde in colour	N of North Inlet	Yes	No	None	Yes - truck	On airstrip and deterred prior to planes arriving
10-Jul-09	3	1 sow, 2 cubs, blonde in colour	A21 Underground Laydown	Yes	No	None	Yes - truck, bangers, air horn	
13-Jul-09	3	1 sow, 2 cubs, blonde in colour	Near A154 dike	Yes	No	None	Yes - helicopter	
11-Aug-09	3	1 sow, 2 cubs, blonde in colour	A154 dike	Yes	No	None	Yes - rubber slug	Moved in to A154 pit shelf
12-Aug-09	3	1 sow, 2 cubs, blonde in colour	D1 Laydown	Yes	No	None	Yes - truck, bangers	
13-Aug-09	3	1 sow, 2 cubs, blonde in colour	ROM	Yes	No	None	Yes - truck, bangers	
18-Aug-09	3	1 sow, 2 cubs, blonde in colour	A154 dike	Yes	No	None	Yes - helicopter	Bed excavations, digs, numerous scat and tracks present within A154 dike
21-Aug-09	3	1 sow, 2 cubs, blonde in colour	A154 dike	Yes	No	None	Yes - helicopter	Final push to remove bears from site before shutdown is over and employees return
26-Aug-09	3	1 sow, 2 cubs, blonde in colour	Accomodations	Yes	No	Yes - scent	Yes - air horn, truck, bangers	
3-Oct-09	3	Large male, dark brown, broad head	D1 Laydown	Yes	No	None	Yes - air horn, truck, bangers	Very healthy and fat
4-Oct-09	3	1 sow, 2 cubs	Airport	Yes	No	None	None	Noticed on security camera footage and reported the next day
27-Oct-09	1	-	Airport	Yes	No	None	None	Large bear, too far away to identify

* observations not on east island

Wolverine Incidental Observations - 2009

Date	Number Of Animals	Location	Attractant Present	Deterrent Action Taken	Comments
11-Mar-09	1	A21 laydown	No	None	
30-Mar-09	1	Warehouse yard & accommodations	Yes - scent	None	
20-Jun-09	1	On ice, south of A21	No	None	Heading west
8-Jul-09	1	Emulsion Plant	No	None	
30-Oct-09	1	Airport	No	None	
30-Oct-09	1	Accommodations & ROM	Yes - scent	None	
31-Oct-09	1	Accommodations	Yes - scent	None	
1-Nov-09	1	Accommodations & tank farm	Yes - scent	None	
2-Nov-09	1	A418 Dike	No	None	Moving north
4-Nov-09	1	South Camp	Yes - scent	None	
9-Nov-09	1	LDG shop	No	None	
13-Nov-09	1	Area around acommodations	Yes - scent	None	
15-Nov-09	1	LDG shop & airport	No	None	
16-Nov-09	1	D1 laydown area	No	None	
17-Nov-09	1	Airport	No	None	
22-Nov-09	1	South Camp	Yes - scent	None	
2-Dec-09	1	A418 Dike	No	None	
6-Dec-09	1	South Camp	Yes - scent	None	
10-Dec-09	1	Helipad	No	None	
10-Dec-09	1	Waste Transfer Area	Yes - scent, incinerators	Yes	Used vehicle to move animal out of area
11-Dec-09	1	A418 Dike & D1 laydown area	No	None	
12-Dec-09	1	South camp & tank farm	Yes - scent	None	
19-Dec-09	1	South camp	Yes - scent	None	Seen approaching kitchen loading door

Appendix IV

Caribou Road, PKC and Rock Pile Observations

Caribou Road Observations - 2009

Date of Inspection	Location	Number	Composition	Behaviour	Encounter Distance from Road	Comments
2009.05.02	All roads					No Observations
2009.05.12	North Road	26	F/M/C	B	> 200 m from the road	North of the North Inlet
2009.05.15	North Road	28	F/M/C	F	> 200 m from the road	North of the North Inlet
2009.05.19	North Road	23	F/M/C	B	> 200 m from the road	North of the North Inlet
	North Road	3	M/F	F	50 - 200 m from the road	South of the North Inlet
2009.05.22						No Observations
2009.05.26						No Observations
2009.05.29	North Road	1	F	B	< 50 m from the road	Bedded between North Road and North Inlet
2009.06.03	A418 Road	7	M	F	> 200 m from the road	Feeding around West Bay
2009.06.05	A418 Road	7	M/F	F	> 200 m from the road	Feeding around East Bay
2009.06.09	All roads					No Observations
2009.06.13	All roads					No Observations
2009.06.16	All roads					No Observations
2009.06.19	All roads					No Observations
2009.06.23	All roads					No Observations
2009.06.26	All roads					No Observations
2009.06.30	All roads					No Observations
2009.07.03	All roads					No Observations
2009.07.07	All roads					No Observations
2009.07.10	All roads					No Observations
2009.07.14	All roads					No Observations
2009.07.17	All roads					No Observations
2009.07.21	All roads					No Observations
2009.07.24	All roads					No Observations
2009.07.28	All roads					No Observations
2009.07.31	All roads					No Observations
2009.08.04	All roads					No Observations
2009.08.07	All roads					No Observations
2009.08.12	All roads					No Observations
2009.08.14	All roads					No Observations
2009.08.18	All roads					No Observations
2009.08.21	All roads					No Observations
2009.08.28	All roads					No Observations
2009.09.01	All roads					No Observations
2009.09.04	All roads					No Observations
2009.09.08	All roads					No Observations
2009.09.11	All roads					No Observations
2009.09.15	All roads					No Observations
2009.09.18	All roads					No Observations
2009.09.25	All roads					No Observations
2009.09.29	All roads					No Observations
2009.10.02	All roads					No Observations
2009.10.06	All roads					No Observations
2009.10.09	All roads					No Observations
2009.10.13	All roads					No Observations
2009.10.16	All roads					No Observations
2009.10.20	All roads					No Observations
2009.10.23	All roads					No Observations
2009.10.27	All roads					No Observations
2009.10.30	All roads					No Observations

Caribou PKC and Rock Pile Observations - 2009

Date of Inspection	Location	Number	Composition	Dominant Behaviour	Comments
2009.05.02	Rock Pile & PKC				No Observations
2009.05.12	Rock Pile & PKC				No Observations
2009.05.15	Rock Pile & PKC				No Observations
2009.05.19	Rock Pile & PKC				No Observations
2009.05.22	Rock Pile & PKC				No Observations
2009.05.26	Rock Pile & PKC				No Observations
2009.05.29	Rock Pile & PKC				No Observations
2009.06.03	Rock Pile & PKC				No Observations
2009.06.05	Rock Pile & PKC				No Observations
2009.06.09	Rock Pile & PKC				No Observations
2009.06.13	Rock Pile & PKC				No Observations
2009.06.16	Rock Pile & PKC				No Observations
2009.06.17	Rock Pile & PKC				No Observations
2009.06.19	Rock Pile & PKC				No Observations
2009.06.23	Rock Pile & PKC				No Observations
2009.06.26	Rock Pile & PKC				No Observations
2009.06.30	Rock Pile & PKC				No Observations
2009.07.03	Rock Pile & PKC				No Observations
2009.07.07	Rock Pile & PKC				No Observations
2009.07.10	Rock Pile & PKC				No Observations
2009.07.14	Rock Pile & PKC				No Observations
2009.07.17	Rock Pile & PKC				No Observations
2009.07.21	Rock Pile & PKC				No Observations
2009.07.24	Rock Pile & PKC				No Observations
2009.07.28	Rock Pile & PKC				No Observations
2009.07.31	Rock Pile & PKC				No Observations
2009.08.04	Rock Pile & PKC				No Observations
2009.08.07	Rock Pile & PKC				No Observations
2009.08.12	Rock Pile & PKC				No Observations
2009.08.14	Rock Pile & PKC				No Observations
2009.08.18	Rock Pile & PKC				No Observations
2009.08.21	Rock Pile & PKC				No Observations
2009.08.28	Rock Pile & PKC				No Observations
2009.09.01	Rock Pile & PKC				No Observations
2009.09.04	Rock Pile & PKC				No Observations
2009.09.08	Rock Pile & PKC				No Observations
2009.09.11	Rock Pile & PKC				No Observations
2009.09.15	Rock Pile & PKC				No Observations
2009.09.18	Rock Pile & PKC				No Observations
2009.09.25	Rock Pile & PKC				No Observations
2009.09.29	Rock Pile & PKC				No Observations
2009.10.02	Rock Pile & PKC				No Observations
2009.10.06	Rock Pile & PKC				No Observations
2009.10.09	Rock Pile & PKC				No Observations
2009.10.13	Rock Pile & PKC				No Observations
2009.10.16	Rock Pile & PKC				No Observations
2009.10.20	Rock Pile & PKC				No Observations
2009.10.23	Rock Pile & PKC				No Observations
2009.10.27	Rock Pile & PKC				No Observations

Appendix V

Community-based Monitoring Camp Report:

Wildlife Movement Post-Closure

Rio Tinto

Diavik Diamond Mine Community-based Monitoring (CBM) Report – Post-closure Wildlife Movement 2009

Health, Safety & Environment

31 March 2010

Contents page

Introduction

1. Background

The Diavik mine site is located on Lac de Gras, approximately 300 km northeast of Yellowknife, Northwest Territories. For generations, Aboriginal people have used the Lac de Gras area for subsistence hunting. During the Environmental Assessment, caribou were identified as a key indicator species because of its cultural and economic value to northern residents and ecological importance. One potential impact identified with caribou was a potential decrease in the use of habitat near the mine due to mining activities. While this potential effect is being monitored through existing programs during construction and operations, consideration also has to be given to how caribou will use the area around the mine after closure. There are engineering options that Diavik could use in an attempt to attract or deter caribou and other wildlife to/from various areas around the mine site. However, consideration as to the preferences of community members relating to wildlife use around the mine site after closure must be considered.

2. Site Closure Plans

Diavik was required to submit an updated Interim Closure and Reclamation Plan (ICRP) to the Wek'èezhìi Land and Water Board (WLWB) in 2009. In preparing the ICRP report, a number of workshops and meetings involving community representatives were conducted. During these sessions various ideas around wildlife movement were considered and discussed. As a result of the interest and discussions that occurred, Diavik planned to conduct a workshop on wildlife movement post-closure, focussing on caribou.

To assist participants in this discussion, graphics were developed using Vulcan software to produce 3D images using real site data to relay as best as possible what the mine area may look like at closure. Images and descriptions of the site that were shown to participants are provided in Appendix A.

2.1 Site Placement Options for Waste Rock and Processed Kimberlite

During the Environmental Assessment, a number of options for the location of the processed kimberlite (PK) and waste rock piles were presented. Initially, options to place PK either in Lac de Gras or on the mainland south of East Island were considered. Consultations noted that the preferred location was on land and as close to the mine as possible. At the time, it was noted that this would be the most technically challenging option for closure but design of the current PK containment area was finalized on East Island.

Additionally, options considered for waste rock disposal included backfilling the material in to the open pits or widening the dikes to allow waste rock disposal in these areas ensuring it would be submerged in Lac de Gras upon closure. It was determined through consultation that there were concerns around widening the dikes; these concerns were related to fish habitat and wanting to avoid disposing of waste material in Lac de Gras. Backfilling material in to the open pits also created issues around mine sequencing (inability to mine underground if backfill open pit) and double-handling of materials (additional blasting, emissions and cost). The decision was made to dispose of waste rock near the pits to reduce the mine footprint. Similar to PK placement, it was noted that this would be a

technically challenging option for closure. With this in mind, waste rock from the pits was classified based on sulphur content and the waste rock pile has been designed to contain rock with an elevated sulphur content, in order to reduce the potential for acid rock drainage from the pile.

3. Caribou Movement

Caribou will occasionally use disturbed areas such as roads, airstrips and tailings ponds to rest (Gunn, 1998), returning to these areas after foraging on nearby tundra. This behaviour has been observed at other mines in the Bathurst range, such as Lupin and Ekati. It has been suggested that this is to take advantage of the view and to make it difficult for predators to conceal themselves, similar to their habit of bedding on frozen lakes in the winter. Further, these areas have fewer mosquitoes and blackflies (Gunn, 1998). Although it is not clear that these disturbed areas are used preferentially to undisturbed areas (Gunn, 1998), it is possible that the waste rock piles and Processed Kimberlite Containment (PKC) area may be used by caribou following closure.

Eventually, it is possible that the waste rock piles and PKC will re-vegetate, providing forage for caribou and other wildlife. During winter, caribou forage primarily on lichen, which is slow to recover. Studies of caribou behaviour in relation to forest fires indicate that caribou select areas which have remained un-burnt for at least 50 years (Dalerum et al. 2007; Joly et al. 2007). Shrubs and forbs may colonize the waste rock piles in a much shorter period, and these may be used by caribou during the late summer and fall months.

In many respects, the waste rock piles and PKC dams are similar to the boulder associations present in the Lac de Gras area and the larger central Canadian Arctic (described and mapped in Matthews et al. 2001). Both Traditional Knowledge (TK) and aerial surveys in the Lac de Gras area have indicated that caribou avoid these areas.

4. Objectives

The primary objectives for this workshop were to familiarize community representatives with ideas of what the mine site may look like post-closure and obtain input from communities on a general approach to wildlife movement at closure. Secondary objectives were to inform participants of some of the technical considerations behind the closure options for the site (e.g. landscape features), obtain input from participants on landscape considerations that may assist in deterring or encouraging wildlife movement near the mine and for participants to advise Diavik of any other closure concerns they may have in relation to wildlife.

Figure 1. A154 pit from above.

Figure 2. Camp participants overlooking Lac de Gras from top of the waste rock pile.

5. Camp

The camp was held at the Diavik mine site between 17 and 21 August 2009. Representatives from the five affected Aboriginal communities participated (Table 1). Camp activities were organized and implemented by Diavik and were supported by one Fisheries Ecologist and one Wildlife Biologist from Golder Associates Ltd., Yellowknife.

Table 1. 2009 wildlife movement study participants.

Organization	Participants
Kitikmeot Inuit Association (KIA)	Sadie Hanak and Jimmy Hanak
Lutsel K'e Dene First Nation*	Ernest Boucher and Florence Catholique (translator)
North Slave Metis Alliance (NSMA)	Nora McSwaine and Ron Balsillie[§]
Tli Cho	Francis Williah and Michel Louis Rabesca
Yellowknives Dene First Nation*	Alfred Baillargeon and Mary Rose Sundberg (translator)
DDMI	Colleen English and Jorgen Bolt
Golder Associates Ltd.	Damian Panayi and Andrew Muir

*One participant from Lutsel K'e Dene First Nation and one participant from Yellowknives Dene First Nation cancelled at the last-minute; [§] participant only present on 17-18 August.

Figure 3: Looking back at the rock pile from Lac de Gras.

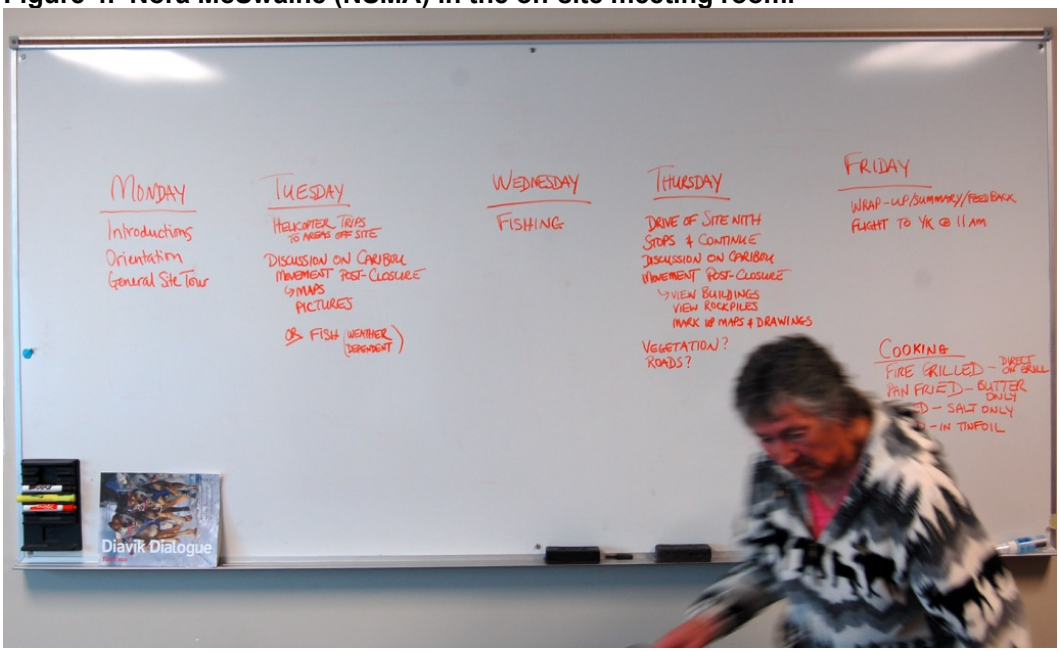
5.1 Schedule

The camp schedule is presented in Table 2 and Figure 4. This program was conducted during the same week as the Fish Palatability program; the complete schedule is provided below with tasks relevant to the wildlife movement program in black font, and those related to fish palatability in grey font.

Table 2. 2009 Community-based Monitoring Program schedule

Monday 17 August	Tuesday 18 August	Wednesday 19 August	Thursday 20 August	Friday 21 August
- Arrival and orientation - Discussion of camp objectives and schedule - Bus tour of the camp, including PKC and waste rock pile	- Tour of East Island and Diavik mine by helicopter - Discussion on caribou movement post-closure (slides & maps)	- Selection of sites to net fish - Deploy nets - Visit Community-based Monitoring camp - Tasting of grilled and pan-fried fish - Deploy 1 net over night	- Retrieve final net - Clean and package extra fish - Tasting of boiled & baked fish - Discussion on closure options relating to caribou - Break-out groups to discuss closure options	- Closing remarks by Diavik and camp participants - Flights home

Figure 4. Nora McSwaine (NSMA) in the on-site meeting room.



6. Post-closure caribou movement

Prior to discussing closure options, camp participants were provided with a bus tour of the Diavik mine site, with particular emphasis on the waste rock pile and PKC. The bus tour included driving along the PKC, to show its structure and location relative to the waste rock pile. Following this, the Participants were driven up the waste rock pile, ending in a brief walk

at the top of the pile to inspect the structure, edge and height of the pile. Participants were also taken to an area of natural ground across from the rock pile, in order to gain a better understanding of the height and slope of the pile. The tour also included a visit to the test rock piles (a smaller rock pile constructed to study various aspects of the waste rock pile), to illustrate options for what the waste rock pile may look like following closure.

Additionally, participants were provided a helicopter tour to view the mine, East Island and the mainland surrounding Lac de Gras from the air. The flight included a tour to survey caribou trails on East Island and surrounding areas, and a view of the waste rock piles and PKC from the air. The tour by helicopter was intended to assist in understanding wildlife movements when approaching the mine area and view nearby habitat available for wildlife use. This provides a view of Diavik in the larger context of East Island and Lac de Gras area.

Figure 5 The waste rock pile from Lac de Gras.

Finally, participants were presented with computer-generated images of what the mine site may look like at closure, including size and area of the rock piles (Appendix A). These were presented with the intention of generating some discussion on preferences for wildlife use and movement after the mine is closed. The graphics provided examples of what possible trails over these piles could look like.

Following the site bus tour, helicopter tour and graphics illustrating closure options, participants were engaged in discussions regarding closure options for the Diavik mine in relation to caribou. At the request of participants, this included some break-out sessions to allow each community to generate their own ideas and concerns relating to wildlife movement at closure.

Figure 6. The view overlooking Lac de Gras from the waste rock pile.

Figure 7. The mine site looking across from the Community-based Monitoring camp.

Results & Discussion

7. Caribou Movement

Participants spoke of the value of caribou to all, the long history of the Dene and Inuit of hunting in the Lac de Gras area, and their concerns about the effects of mining and other activities. Although the overriding concern seemed to be of effects to water quality in the Coppermine River, caribou-related issues were an area of great concern. Some of the aspects of the mine discussed included the points noted below and relate to the PKC, rock pile, site roads, water movement and open pits.

- Concerns regarding caribou crossing very high rock piles.
- The possibility of restricting wildlife access on the pile so they don't eat any vegetation growing up there.
- Smoothing the sides of the pile so that wildlife can go over it if they want to.
- The possibility of contouring the waste rock pile so that it's similar to natural topography.
- The need for a fence around the PKC.
- Concerns that caribou will sink down into the PKC area.
- The concept of finding traditional paths and planning access/crossings around these areas.
- The need to smooth crossings/access areas so caribou feet do not get hurt.
- East Island is now dead due to mine development so caribou may naturally avoid this area in the future for this reason.
- Ramps have been used along the Misery road to facilitate caribou crossing.
- Concern that the rock pile will get higher and bigger than Diavik is saying.
- Concern over rain/seepage water off the pile going into the lake, and seepage from underneath the pile (ground water) going into the lake.
- Wash the walls of the pits before backfilling them with water, then collect this water and treat it. Then it would be okay to fill the pits with clean water.
- Once the pits are full of water, let them sit and test them for 2 years or so until water is at a safe level.
- Do not fill the pits with boulders.
- Use natural filtration systems with staging ponds and tundra for water drainage after closure.
- What has been done at other developments where pits were in lakes?

Figure 8. Caribou discussions in the on-site meeting room.

During the course of the discussions, three options in particular were developed by the participants. It is important to note that these are only options and all participants noted that further discussion on this topic would be required with other members of their respective communities. Photographs and computer-generated drawings to illustrate each of these options were developed after the camp and used during community consultations in an effort to generate discussion (Appendix B).

Option 1

Leave the rock piles and PKC as they are now. Participants stated that they view the East Island as dead because of the development so caribou will not return. Also, the current rock pile and PKC dams prevent access to most caribou due to the steep sides and large rocks.

Option 2

Cover the entire surface of the waste rock pile and PKC with fine, smooth gravel. This would allow access for caribou to pass freely over the waste rock piles and PKC. Further, the waste rock piles should be contoured to mimic the surrounding landscape.

Option 3

Design passages or corridors over or around the waste rock pile and PKC area. This would allow movement of caribou around, over and across the structures, but at specific areas. It was recommended that the general layout of these corridors should correspond to historic caribou trails on the island.

Observations of caribou in the Diavik study area and East Island do not support the assumption that the East Island is entirely dead. Although there has been disturbance to the East Island as a result of mine development and activities, caribou do still return to the island and are observed annually, predominantly in the late summer and fall. However, allowing the rock pile and PKC dams to remain as is (Option 1) would limit the ability for caribou and other wildlife to access these areas.

With regards to covering the waste rock pile and PKC with fine gravel and smoothing the surface (Option 2), there are a number of feasibility issues which may not make this option viable. First, the waste rock pile contains acid-generating rock, which should be kept encased to mitigate the potential for acid rock drainage. This encasement would likely be compromised if the waste rock piles were re-contoured to look like surrounding hills. Secondly, there are limited supplies of non-acid generating rock available to completely cap the waste rock pile and PKC area with fine gravel. Finally, the other environmental consequences to such an effort must be considered; in particular, the dust and emissions required to crush, move and contour such a large volume of rock.

The final option presented to Diavik (Option 3), of creating pathways around and over the PKC and waste rock pile, appears to have several merits and would be feasible. There are currently various ramps and access points to the waste rock pile and PKC area, used by haul trucks to access the pile. The surface of these ramps is smooth and would not present a hazard to caribou. These could be expanded and added to, providing a series of access points over or around the waste rock piles and PKC area. Further discussion is required to decide if these should be straight passages, if there should be intersections between trails, how they should be bermed, and if they should be straight or tapered corridors or lead to some open areas.

Various Traditional Knowledge studies conducted during the Ekati and Diavik baseline studies will provide insight into the historic movements of caribou on the East Island. Aerial surveys could be conducted with community members to map caribou trails or confirm trails identified in the Diavik Environmental Assessment. Air photos may also be helpful to identify pre-development trails. In consultation with land users, these trails could be used to guide the layout of caribou passages over and around the waste rock pile and PKC areas.

Recommendations

A number of recommendations were noted during the camp as they relate to wildlife movement and closure discussions.

- Further community consultations on closure options are required.
- Ensure that good interpreters are available who know some technical terminology.
- Keep participants for the camp consistent from year to year.
- Diavik needs to communicate consistent participant requirements to the communities when requesting participants.
- Each group needs to now relay information from this camp to their respective organizations.
- Further discussion of the camp and closure options should take place during the meetings between Diavik representatives and community Chief & Council being planned for September 2009 in each community.
- A summary PowerPoint presentation should be provided to community representatives so they can share it with their communities.

Literature Cited

Dalerum, F., S. Boutin, and J. Dunford. 2007. Wildfire effects on home range size and fidelity of boreal caribou in Alberta, Canada. Canadian Journal of Zoology 85: 26-32.

Gunn, A. 1998. Summer behaviour of Bathurst caribou at mine sites and responsese of caribou to fencing and plastic deflector (July 1997). Final report to the West Kitikmeot Slave Study Society. http://www.enr.gov.nt.ca/_live/documents/documentManagerUpload/WKSS_Bathurst_Caribou_Behavior_2002.pdf

Joly, K., Bente, P. and Dau, J. 2007. Response of overwintering caribou to burned habitat in Northwest Alaska. Arctic 60:401-410.

Matthews, S., Epp, H. and Smith, G. 2001. Vegetation classification for the West Kitikmeot Slave study region. Final report to the West Kitikmeot Slave Study Society.

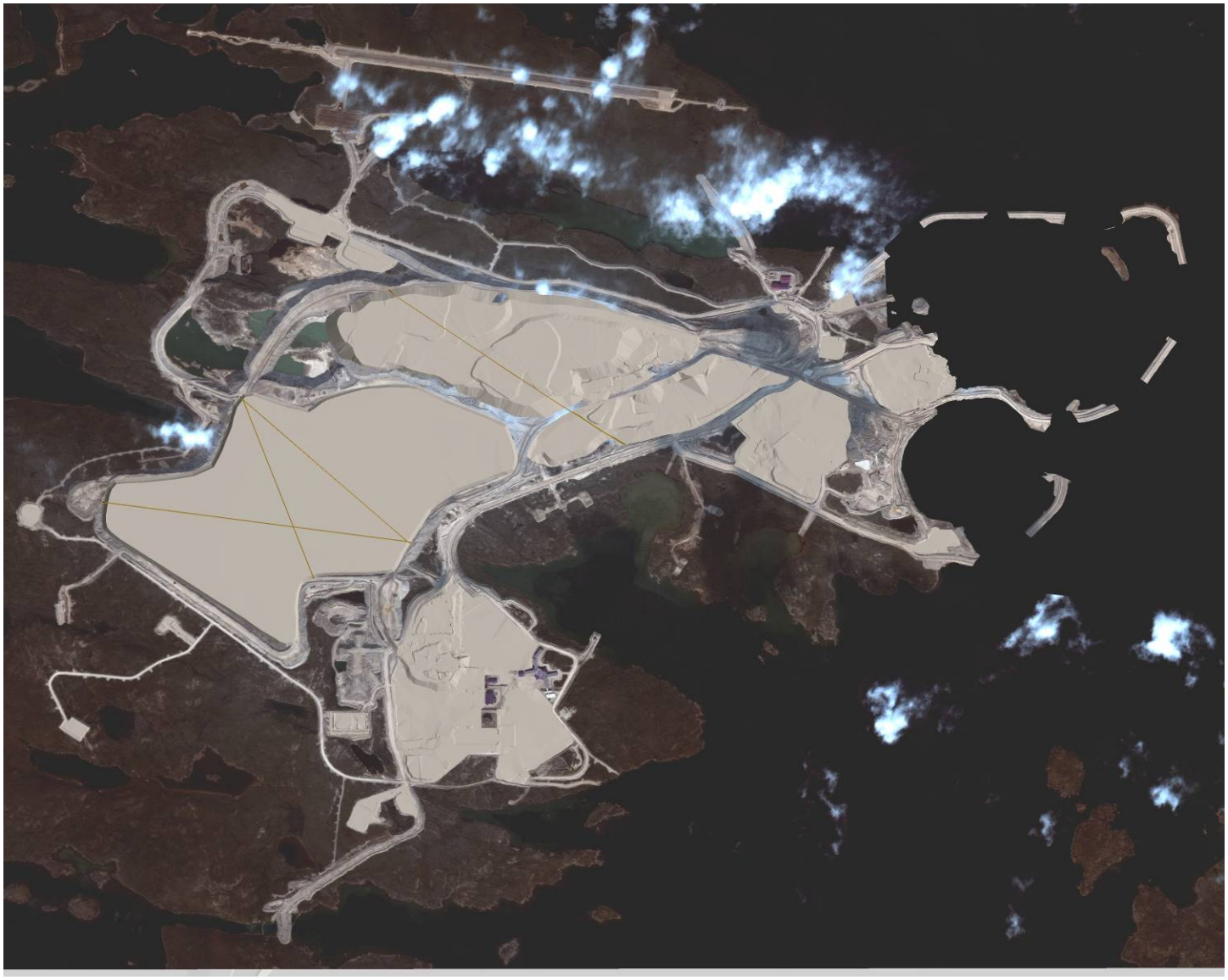
Appendix A

Post-closure Graphics for the Diavik Mine

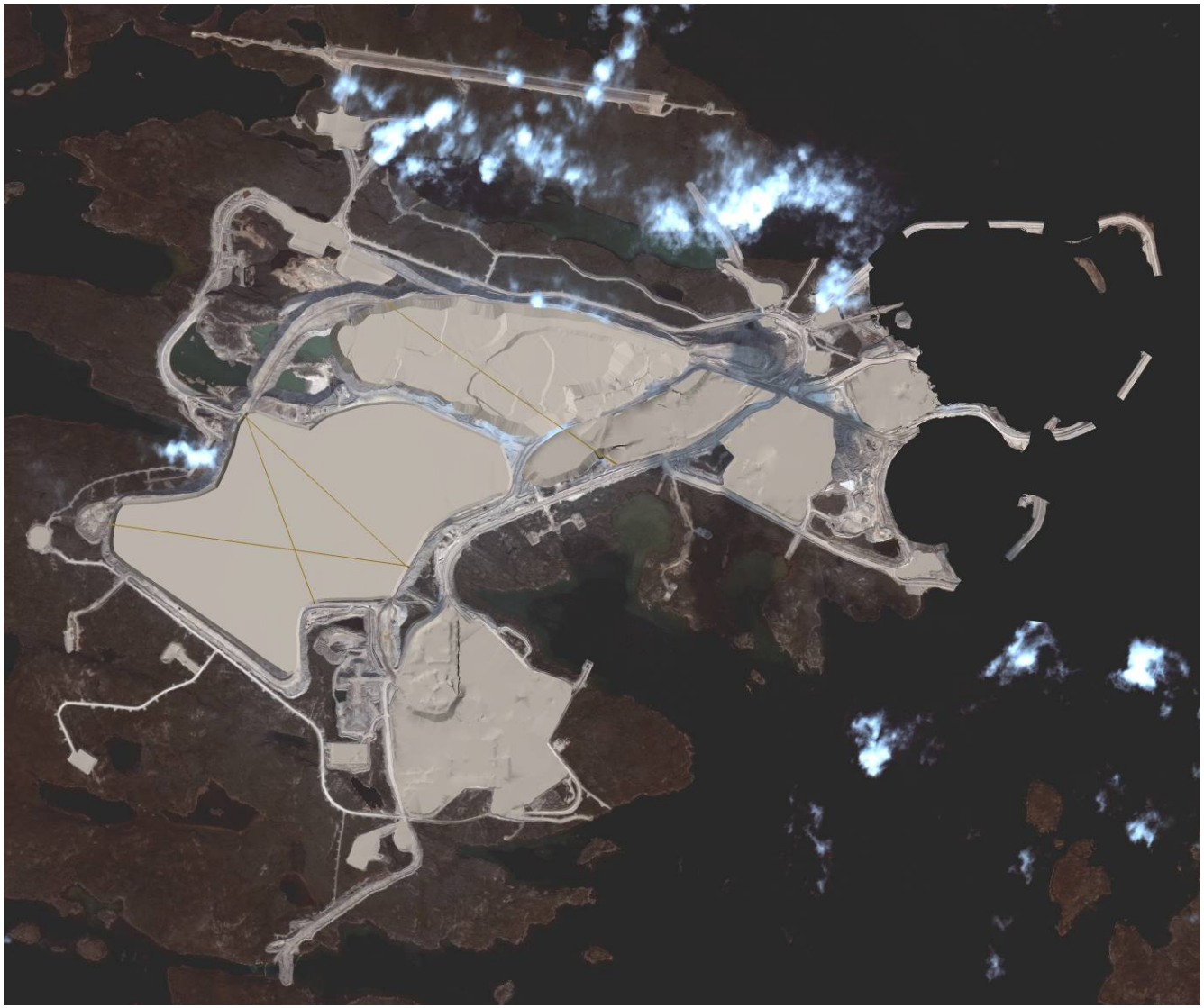
Rio Tinto

What could the site look like at closure?

Rio Tinto



- Overall site, pit dikes breached and example of possible wildlife trails over PKC and rock pile. Note that some buildings remain – airport, water treatment, fuel tank, power house and accommodations

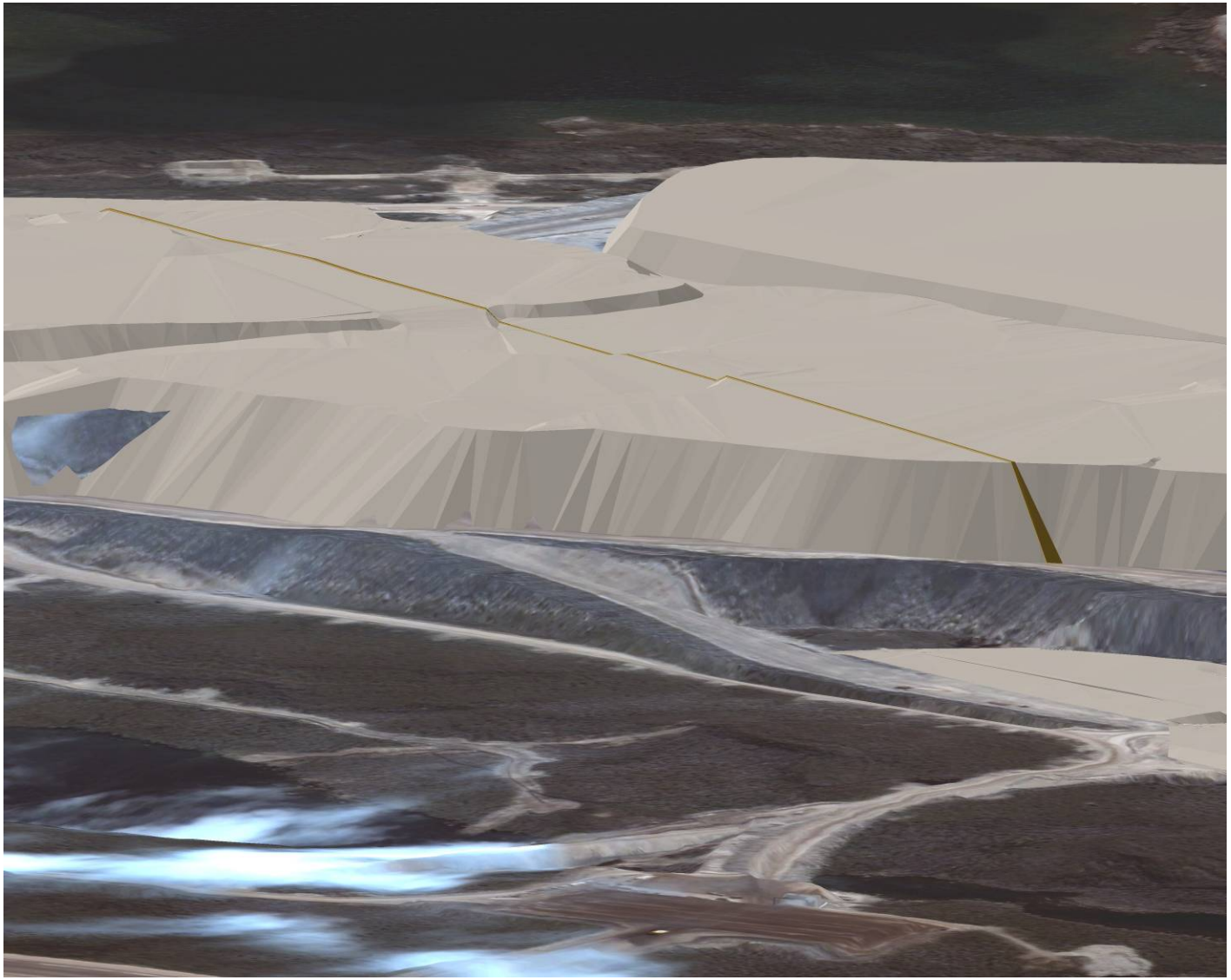


- Overall site with *all buildings removed*, pit dikes breached and example of possible wildlife trails over PKC and rock pile.

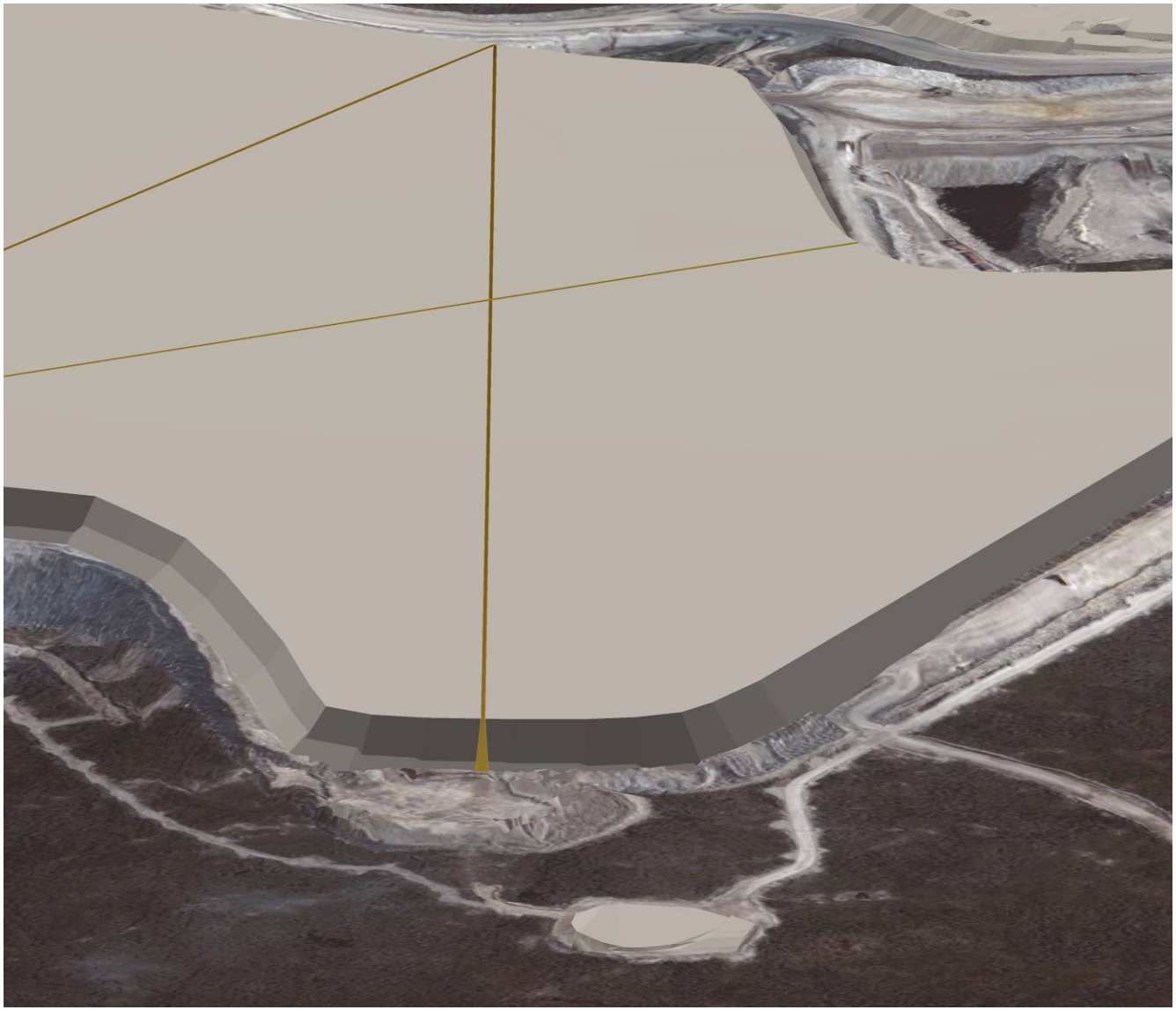
Rio Tinto

- Aerial view of rock pile with example of wildlife trail over the top of the pile

Rio Tinto

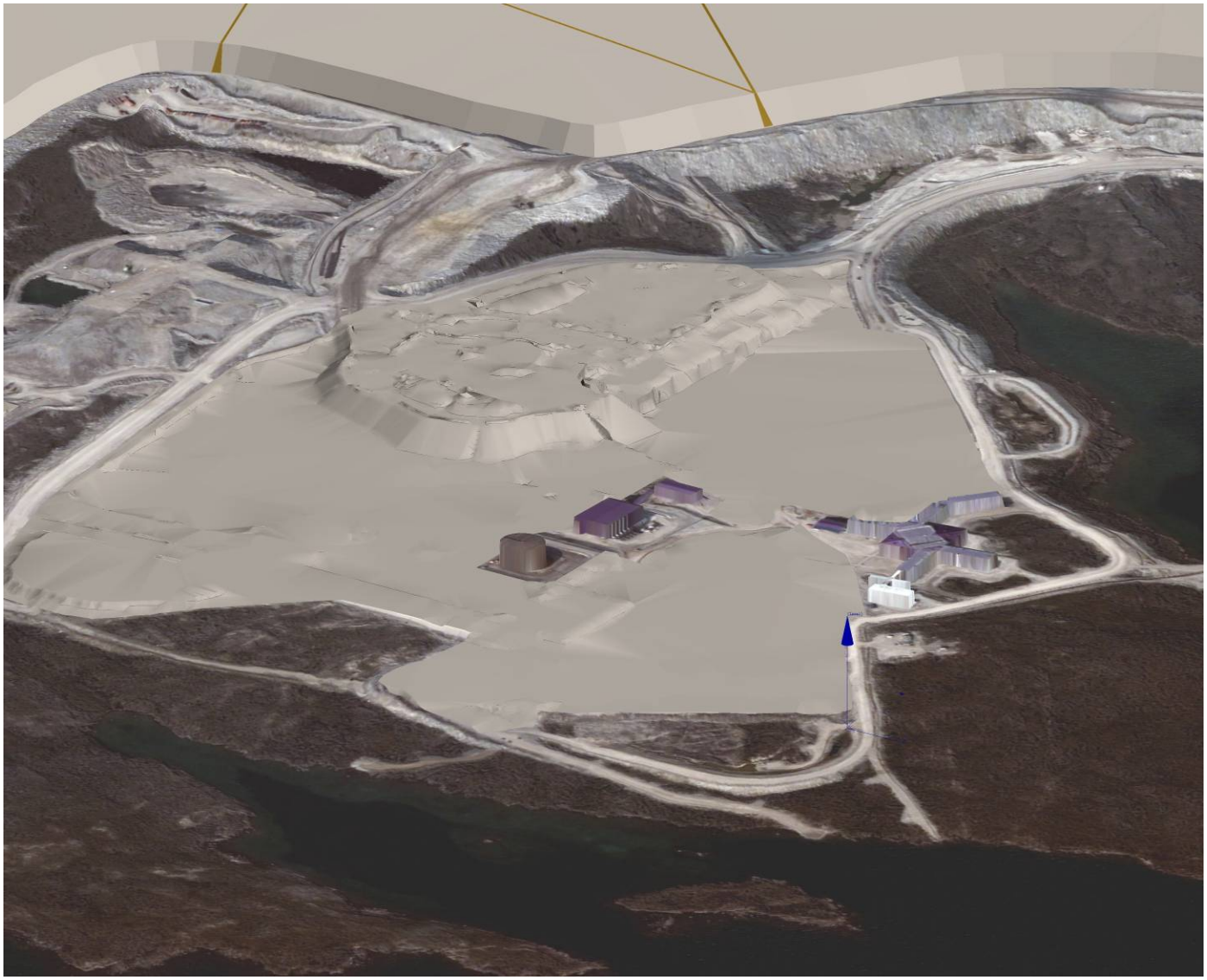


- Example of a ramp on the side of the rock pile. Approaching wildlife can use the ramp to access the trail that goes up and over the rock pile.

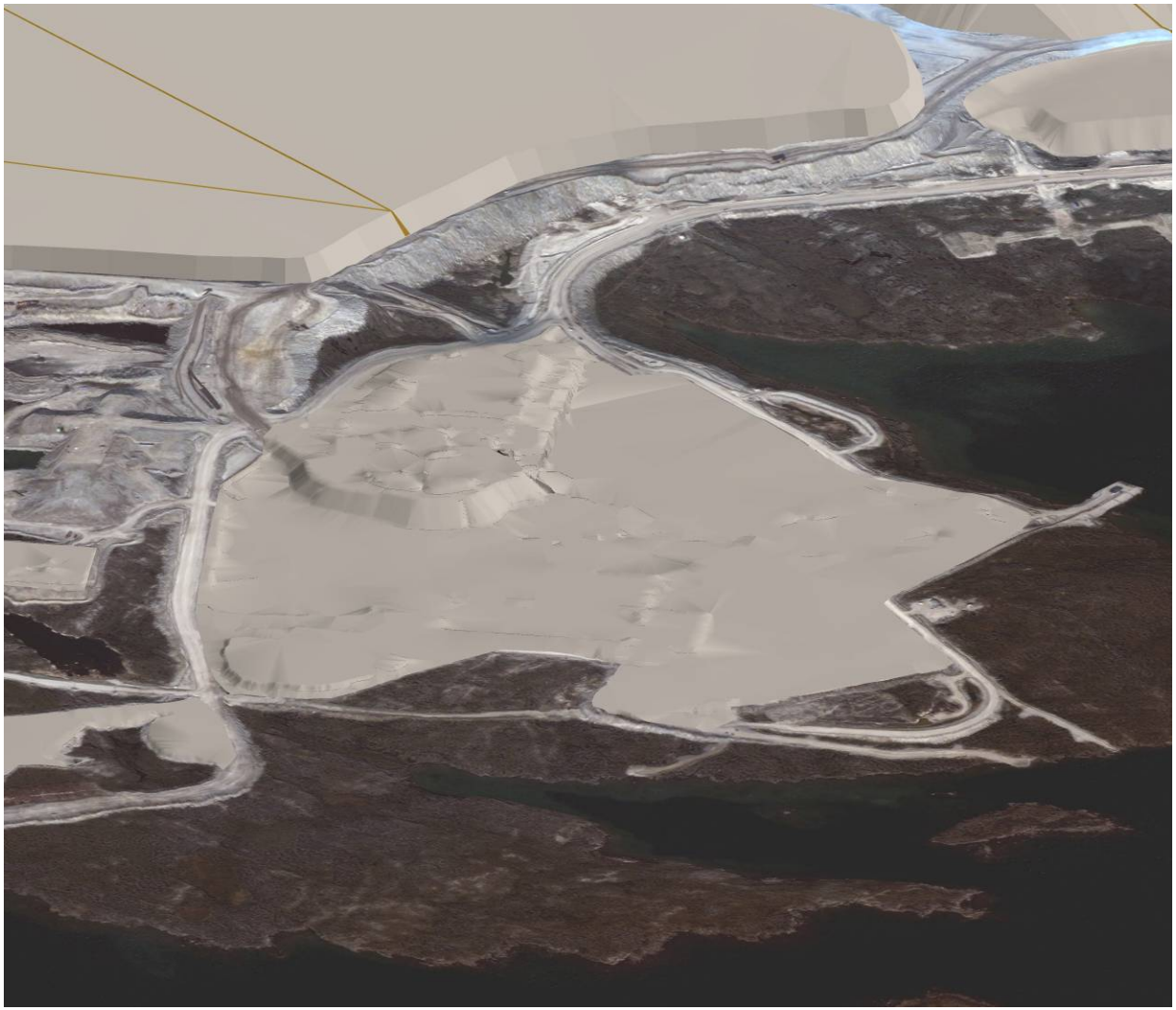


- Processed Kimberlite Containment (PKC) area, with an example of wildlife access ramps and trails.

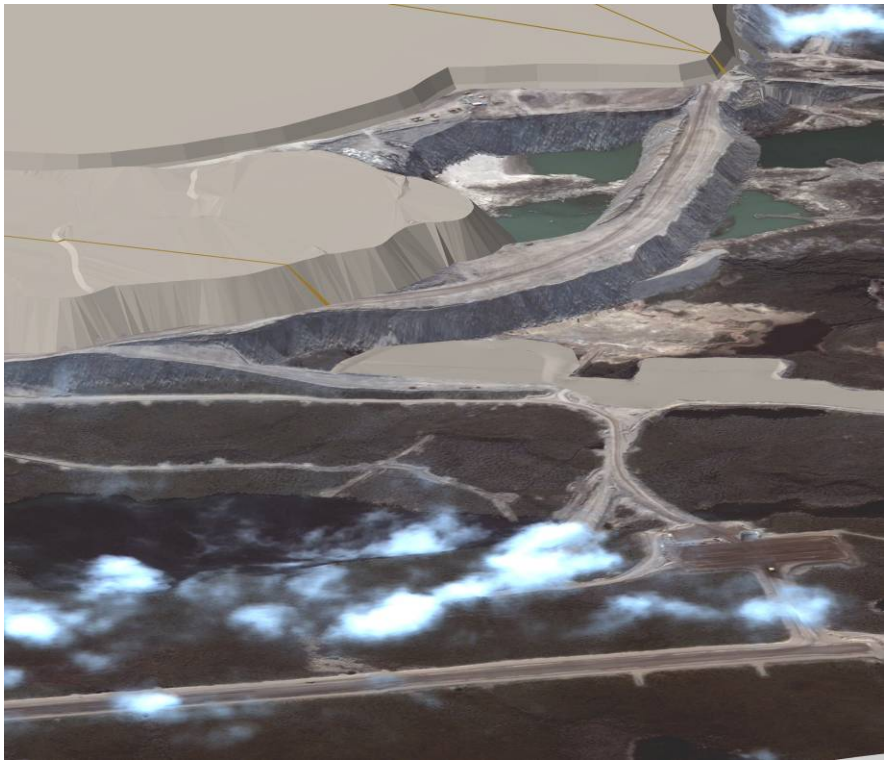
Rio Tinto

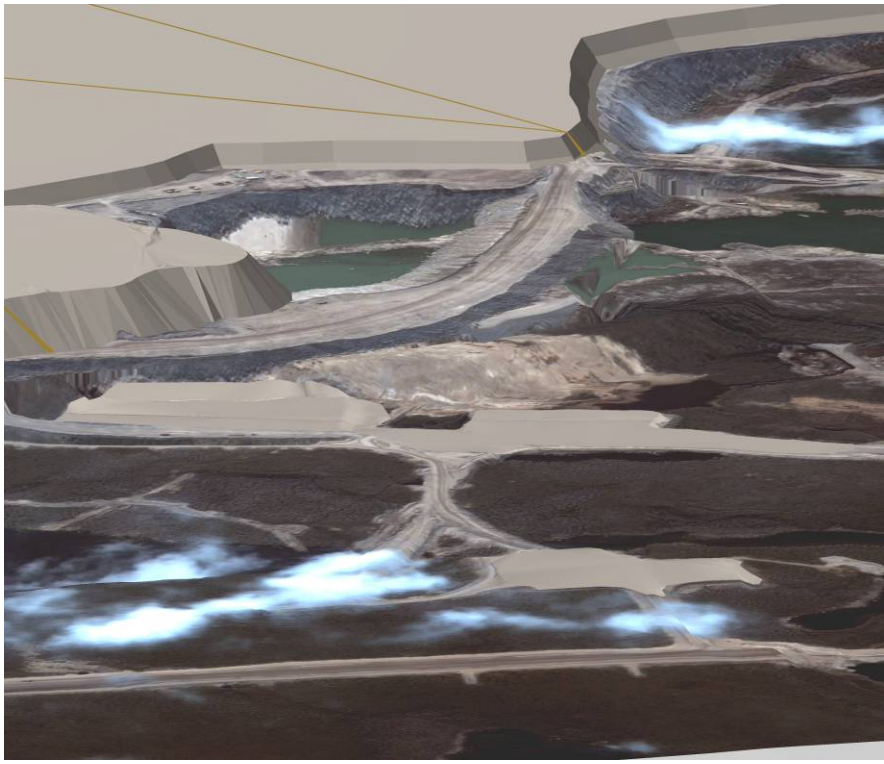


- Main site with most infrastructure removed. Main accommodations, a power house and a fuel tank remain.



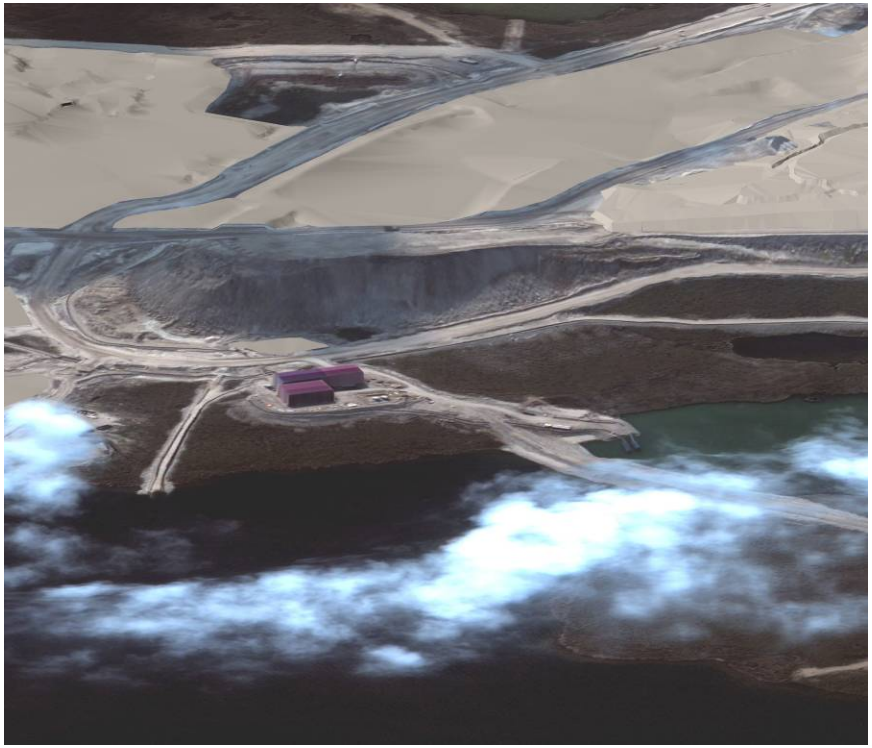
- Main site with all facilities removed, including accommodations, fuel storage and power generation.

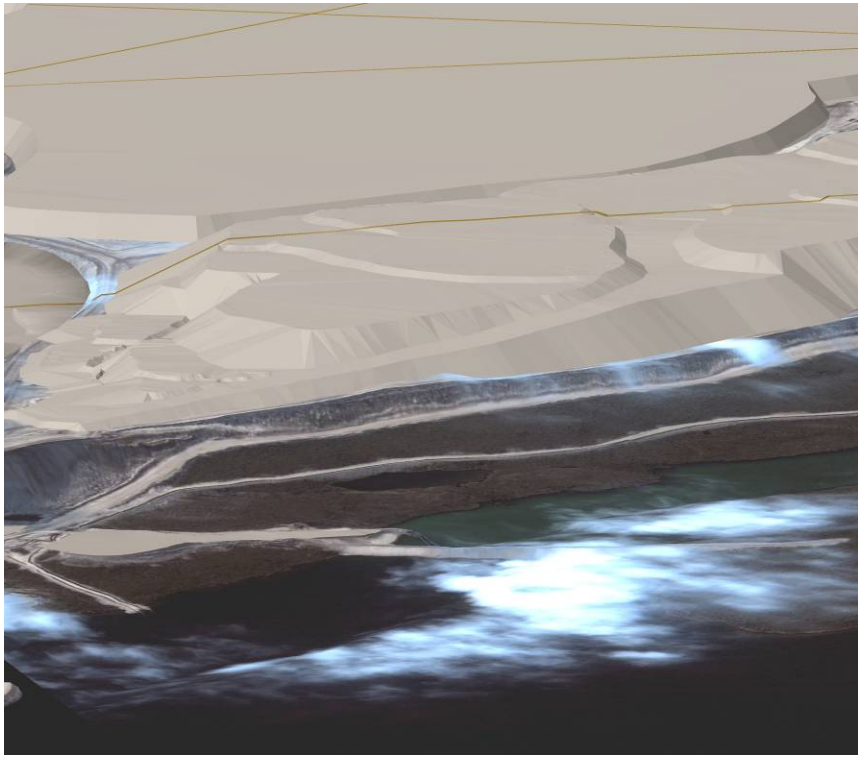




- Airstrip, airport building & roads remain (left)
- Airport building removed, roads and airstrip re-contoured (right)

Rio Tinto





- Water treatment plant (full size) remains at site (left)
- Water treatment plant removed (right) – smaller plant could be installed if required

Rio Tinto

- A154 and A418 pits filled with water from Lac de Gras, dikes not breached

Appendix B

Slides - Wildlife Movement Options Post-closure

Rio Tinto

Diavik closure planning

Interim closure and reclamation plan

Wildlife movement – post-closure

- Closure design for wildlife movement is current focus
- Communities workshop at site 17-21 August 2009
- Outcome was three main options:

Option 1: Leave rock pile and PKC dam as is

What it means: Little to no access to PKC or rock piles

Wildlife movement – post-closure

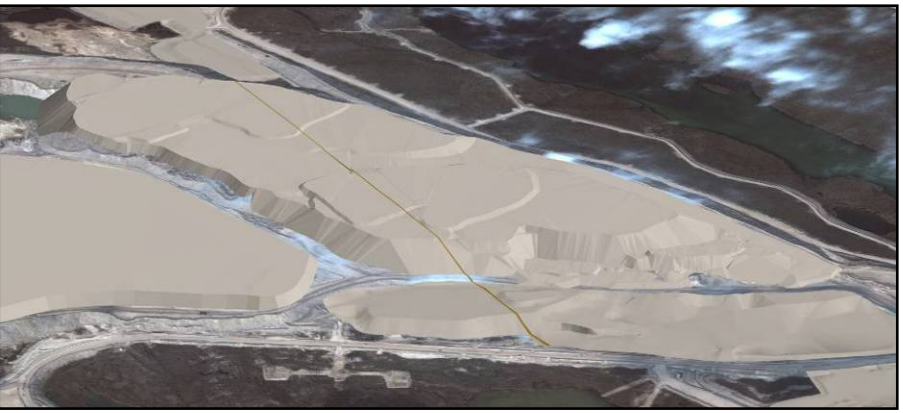
Option 2: Contour the rock pile and PKC dams

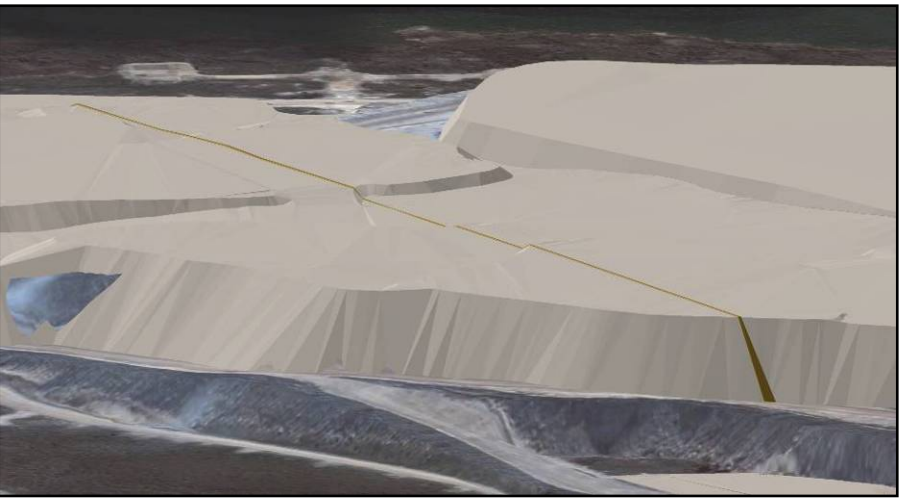
What it means: Full access for wildlife to PKC and rock piles

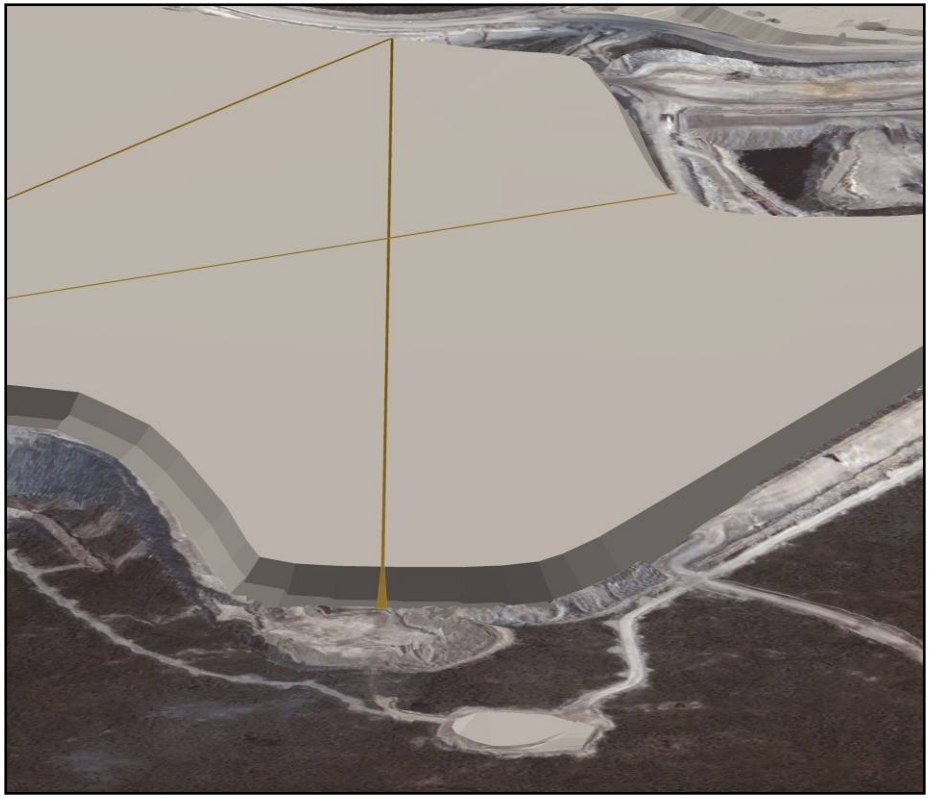
Wildlife movement – post-closure

Option 3: Use traditional trails to develop defined paths

What it means: Controlled access to PKC and rock piles







Appendix VI

Waste Management Plan

Rio Tinto

Waste Management Plan

Operational Phase, Version 13

1 April 2010

Diavik Diamond Mine

Health, Safety and Environment Department

REVISION HISTORY

REVISION VERSION	AUTHOR	MANAGERIAL APPROVAL	DATE: (MM/DD/YY)	Reason for Change
A	BJK		9/2/98	Initial issue
1	EM		8/15/99	Regulatory Application
2	BJK		8/30/00	Water License Submission
3	EM		1/31/01	Construction Phase Submission
4	CW		03/31/02	Construction Phase Submission
5	EM/DH		10/01/02	Operational Phase
6	EM/DH		03/31/03	Update Operational Phase
7	CE/SM		03/31/04	Annual Update
8	CE		03/31/05	Annual Update
9	CE		03/31/06	Annual Update
10	SM		03/31/07	Annual Update
11	SM/CE		03/31/08	Annual Update
12	CE		03/31/09	Annual Update
13	JP		01/04/10	Annual Update

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Contents page

Introduction

Diavik Diamond Mines Inc. (DDMI) is committed to taking all necessary steps to ensure that collection, storage, transportation and disposal of all wastes generated by the project are conducted in a safe, efficient and environmentally compliant manner. The fundamental basis of the plan is the practical and positive management of wastes, incorporating the implementation of a sound waste minimization program.

The main objectives of the plan are to:

- create a system for proper disposal of waste
- minimize potentially adverse impacts on the physical and biological environment
- comply with Federal and Northwest Territories (NWT) legislation

Along with the ideals of the four R's embodied in the Waste Management Plan - namely reduction, recovery, reuse and recycling of waste - appropriate mitigation measures are identified to counteract adverse environmental effects.

This plan will be reviewed annually and revised as required. The Waste Management Plan is an integral part of Diavik Diamond Mines' Environmental Management System (EMS).

Objectives and General Strategies

The Waste Management Plan focuses on minimizing generation of wastes, optimizing usage of materials before disposal and facilitating the collection and processing of wastes with the least adverse effects on the physical and biological conditions at site. The minimum standards of acceptability of the plan are to:

Establish compliance with Federal and Government of the Northwest Territories (GNWT) environmental legislation via:

- GNWT Public Health Act
- GNWT Environmental Protection Act (EPA)
- Canadian Environmental Protection Act (CEPA)
- Transportation of Dangerous Goods Act and Regulations (TDGA & TDGR)
- Workplace Hazardous Materials Information System (WHMIS) Safety Act
- Northwest Territories Waters Act
- Territorial Lands Act
- GNWT Pesticide Act

Establish compliance with the American Petroleum Institute (API) and Canadian Standards of Practice via:

- Design, Construction, Operations, Maintenance, and Inspection of Terminal & Tank Facilities, API-2610.
- Standard for Aboveground Steel Tanks for Fuel Oil and Lubrication Oil, CAN/ULC-S602M.
- Lining of Aboveground Petroleum Storage Tank Bottoms, ANSI/API 652.
- Environmental Code of Practice for Aboveground Storage Tank Systems Containing Petroleum Products, National Task Force on Storage Tanks for Canadian Council of Ministers of the Environment (CCME).

Other objectives of the Waste Management Plan are as follows:

- Prevent and reduce adverse impacts on the environment, including wildlife and wildlife habitat
- Protect the environmental integrity of soil, surface water and groundwater in the immediate area of the plant site
- Reduce site waste disposal costs
- Ensure due diligence

Objectives of the plan are achieved by using proven strategies and applying modern technological developments to ensure that materials are used efficiently when brought to the site and then disposed of in an environmentally compatible manner. General strategies chosen to achieve the objectives are:

Proactive Procurement Policy: Any tender documents notify prospective bidders of the environmental sensitivity of the site and solicit the use of the most environmentally suitable materials, equipment and products.

Pollution prevention: Pollution prevention methods to eliminate the generation of wastes continue to be evaluated and, where feasible, methods are being implemented. This is achieved by adopting reduction, substitution, segregation, reuse, recycle and recovery methodology discussed below.

Strategic material substitution: At the purchasing stage, the possibility of material substitution with less pollutant varieties is examined for materials that are hazardous to handle, generate hazardous wastes or create environmental problems.

Strategic chemical substitution: A policy of using cost effective chemicals that accomplish the same result as an originally desired chemical, while resulting in less or no hazardous waste generation.

Waste segregation: Categorical segregation of all waste streams to avoid undesirable synergistic effects and promote reuse, recycling, recovery and disposal of various wastes. All waste categories are analyzed and the principals of the following four R's applied:

> ***Reduction initiatives***: Reducing raw material consumption is the first step to reducing waste generation. To practice this principle, processes and material used will be evaluated on the basis of possibly reducing raw material usage.
>
> ***Reusing initiatives****:* Reuse of the material in other applications and/or by other parties is examined using waste material exchange.
>
> ***Recycling initiatives***: Recycling involves processing used materials for use in creating new products and is considered, where feasible, for successful management of waste streams.
>
> ***Recovery initiatives***: Recovery of usable material or energy as a by-product is a part of the four R's of the waste minimization process. For example, redistributing waste heat from generators to heat other buildings is a process for recovering energy that would otherwise be wasted.

Disposal: Disposal becomes the final option when the four R's are no longer applicable or practical. However, hazardous wastes are only stored temporarily on site and are ultimately transported to a licensed hazardous waste handling facility for possible recovery, treatment and/or disposal.

The following sections of the waste management plan provide specific information on waste sources and how various wastes generated are handled. This information is reviewed when significant changes are made to the waste streams, and at minimum on an annual basis.

Definition of Waste

A material is considered waste when it can no longer be used for its original intended purpose. This Waste Management Plan addresses solid and liquid wastes expected to be generated on site.

The types of solid wastes considered at right include inert wastes of various kinds such as: cans, filters, belts, scrap metals, non-hazardous wastes such as sewage sludge, domestic garbage, etc. Or hazardous wastes like: used oils, solvents, paints, used/unused chemicals, old batteries and chemical based sludge from wastewater treatment plants. Waste classifications are shown in Figures 1 and 2 (Appendix A).

Liquid wastes such as waste chemicals and waste petroleum products are considered as hazardous wastes within this plan.

The GNWT Department of Environment and Natural Resources (ENR, formerly RWED) "Guideline for General Management of Hazardous Waste" (February 1998) and "Guideline for Industrial Waste Discharges" (April 2004) defines hazardous wastes and non-hazardous wastes as follows:

The definition of 'solid waste' includes:

- ✓ any garbage, refuse, sludge from a waste or water treatment plant
- ✓ discarded material including solid, liquid, semi-solid or contained gaseous materials resulting from industrial, commercial, mining, and from domestic activities, but does not include solid or dissolved materials in irrigation, return flows or industrial liquid effluent discharges.

Hazardous Waste*: A contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal or storage. A hazardous waste does not include a contaminant that is:*

- Household in origin
- Included in class 1 Explosives, or class 7 Radioactive materials, of Transportation of Dangerous Goods Regulations (TDGR)
- An empty container
- Exempted as a small quantity
- Intended for disposal in a sewage system or landfill that meet the applicable standards set out in schedules I, III or IV of the "Guideline for Industrial Waste Discharges in the NWT."

The considerations for small quantity hazardous wastes that can be classified under non-hazardous wastes are as follows:

Small Quantity*:* Hazardous waste that is generated in an amount less than 5 kilograms per month of a solid, or 5 litres per month of a liquid; and where the total quantity accumulated at any one time does not exceed 5 kilograms or 5 litres. This does not apply to mercury or in classes 2.3, 5.1 or 6.1 of TDGR. These wastes must be generated in an amount less than 1 kilogram per month of a solid or 1 liter per month of a liquid; and where the total quantity accumulated at any one time does not exceed 1 kilogram or 1 litre.

Waste Sources

The sources and types of wastes generated at the mine site are presented in the following table:

Sources of Waste Generation

Source of Waste	*Type of Waste*
Chemical Handling and Storage Operations	Waste petroleum products, used chemicals
Sewage Treatment Plant	Biological sludge and grey water
Equipment Maintenance	Used batteries, engine oil, oil & air filters, tires, scrap metal, glass, hydraulic hoses, aerosol cans, etc.
Building Maintenance	Used transformers, fluorescent lighting ballasts, glycol, material scraps (partitions, carpets, plumbing, electrical, glass, insulation, etc.)
Laboratory	Chemical lab wastes, toxic substances, crucibles
Domestic waste from: accommodation building administration offices kitchens	Biological sludge, domestic garbage, oil & food wastes, paper, cardboard, aerosol cans, used alkaline batteries
Operational area	Inert waste: cement, sand, used materials (i.e. metals, pipes, glass, styrofoam, insulation, etc.)
First Aid Facility	Sharps (needles, syringes, scalpel blades), biological wastes (blood, human tissue, gauze pads)

Identification, Description, Classification and Disposal Plan

Waste containers are labeled at each facility, and hazardous waste signs are displayed in the applicable storage/transfer/disposal facilities. All wastes are to be segregated at point source. The Table below shows general treatment and disposal plans for wastes generated at the site.

The Waste Transfer Area (WTA) was relocated in 2008 and is now adjacent to the perimeter road to the explosives storage area on the south part of the island (Figure 4). The purpose of this facility is to store and dispose of site wastes in a practical, safe manner that reduces potential attractants for wildlife.

Treatment and Disposal Plan

WASTE TYPE	TREATMENT STRATEGY	HANDLING AND DISPOSAL METHOD
Petroleum Based:		
Used Oil	Reuse/ Recycle	Collect in trays, drums or pumped via pipeline. Transfer to large 467 000 liter storage tank at lube storage building, adjacent to the maintenance shop. Ship off-site for reuse/recycle. 20 L plastic pails or larger that contained oil are collected and sent to the WTA. The Site Services representative will inspect the container and, if drained, will dispose plastic container within the inert landfill. Containers that cannot be drained will be stored in a sea can at the WTA and shipped off site for cleaning and disposal.
Used Hydraulic Fluid	Reuse/ Recycle	Collect in trays, drums or pumped via pipeline. Transfer to 467 000 liter storage tanks adjacent to lube storage building or in drums to the waste transfer area. Ship off-site for recycling. Used hydraulic hoses will be disposed of in the landfill.
Used Grease	Reuse/Dispose off- site	Scrubber grease from the Process Plant and used cardboard grease tubes are collected in drums, stored at the WTA and shipped off-site for disposal.
Contaminated or Expired Fluids	Reuse/Recycle	Transfer to storage tanks and reuse where possible. Also used for Mine Rescue Team spill scenarios. If reuse not possible, ship off-site for recycling.
Oil Filters	Recycle/ Recovery	Oil filter canisters will be drained and crushed and placed in labeled drums. Drums will be taken to the waste transfer area and shipped off-site.
Contaminated Soil & Rock	Bioremediation	Spread in lined landfarm within the Waste Transfer Area (crush), or in the Type III rock pile (large rocks).
Contaminated Water	Recovery/Reuse	Absorbent pads are used to collect any free product on

WASTE TYPE	TREATMENT STRATEGY	HANDLING AND DISPOSAL METHOD
		top of the water. Remaining water is collected with a vacuum truck and taken to the PKC for disposal.
Contaminated Snow	Recover/Reuse	Snow is collected and deposited in the contaminated soils area. During thaw, absorbent pads are used to collect any free product on top of the water and the remaining water is collected with a vacuum truck and taken to the PKC for disposal.
Oily Rags	Reduce/ Incinerate	Collected in drums, store at the Waste Transfer Area and incinerate on site.
Used Absorbent Pads	Reduce/ Incinerate	Collected in drums, store at the Waste Transfer Area and incinerate on site.
Used Absorb-all	Reduce/ Incinerate	Collected in drums, store at the Waste Transfer Area and incinerate on site.
Chemicals:		
Used Glycol	Recycle	Collect in trays, drums or pumped via pipeline. Transfer to drums or 50 000 L storage tank located adjacent to lube storage building or power plant. Ship off-site for recycle or disposal.
Acids	Dispose off-site	Store in enviro-packs at the Waste Transfer Area and shipped to off-site disposal facility.
Solvents/EnSolv	Reduce/Dispose off-site	Use non-toxic solvents when feasible. Store in drums in Waste Transfer Area. Ship to disposal facility off-site.
Flocculant	Reduce/Dispose off-site	Collected in drums, stored at the WTA and shipped off-site for disposal.
Freon	Recycle/Dispose off-site	Collected in drums, stored at the WTA and shipped off-site for recycling/disposal.
Laboratory Products	Dispose off-site	Store at WTA. Dispose off-site.
Waste Batteries	Recycle	Label and store in Waste Transfer Area. Crate appropriately and ship off site for recycle/disposal.
Toxic Chemicals	Reduce/Dispose off site	Plastic containers that formerly held toxic chemicals in < 20 L containers will be collected in drums, stored in the WTA and shipped off-site for disposal. Any containers of this size that held benign products will be disposed of in the landfill.
Aerosol Cans	Recycle	Store in drums or crates in Waste Transfer Area. Ship off site for recycle or disposal.
Fluorescent Light Bulbs	Dispose off-site	Collected in trays, crates or boxes, stored at the WTA and shipped off-site for disposal.
Paint	Dispose off-site	Collected in a sea can or crate and allowed to dry. Cans incinerated (latex) and disposed of in landfill or shipped off-site for disposal (oil-based).
Domestic Wastes:		

WASTE TYPE	TREATMENT STRATEGY	HANDLING AND DISPOSAL METHOD
Food	Incinerate	Collect in plastic bags, store inside in designated containers. Incinerate immediately.
Paper and Cardboard	Recycle/ Incinerate	Burn dry, unstained materials in designated burn pit. Incinerate any paper or cardboard that has been in contact with food.
Cooking grease	Dispose off-site	Collected in plastic drums in the camp, packaged and transferred to the warehouse for immediate shipment for off-site disposal.
Inert Bulk Wastes:		
Conveyor Belts and Tires	Reuse	Re-use tires where feasible on site. Dispose in landfill.
Vehicles	Recycle	Store in laydown area parking lot. Drive or haul off-site.
Buildings and Bulk Debris	Reuse on/off-site	Relocate to other areas of site or dismantle and haul off-site.
Incinerator Ash	Burn Pit/Landfill	Store in bins in Waste Transfer Area. Use in burn pit then transfer to landfill.
Scrap Metal	Landfill	Store in non-burnable bins and transfer to inert landfill.
Scrap Copper	Recycle	Collecting in a sea can for off-site recycling opportunity.
Wood, Paper & Cardboard	Burn Pit/Incinerator	Clean cardboard, paper and wood products are taken to the WTA and are burned in the burn pit for disposal. Any of these products that are contaminated with food are incinerated.
Plastics	Burn Pit/Incinerator/ Landfill	Plastic containers that held non-hazardous materials are disposed of in the landfill. Those containing hazardous products are collected in drums, taken to the WTA and shipped off site for disposal. Those that contained food are incinerated.
Air Filters	Burn Pit/Landfill	Collected in bins, burned at the waste transfer area and disposed of in the landfill.
Sandblasting residues	Landfill	For small jobs, collect at source and store in drums at Waste Transfer Area. For large sandblasting jobs, contain residues in a designated area, transfer to truck and dispose in approved inert landfill.
Organic Waste:		
Sewage Sludge and grey water	Sludge Containment Area & PKC	Sewage sludge is collect from screens at the Sewage Treatment Plant (STP) & disposed of at approved sludge disposal area in WTA (solids). Grey water and treated sludge from the STP is disposed of in the PKC pond.
Biological Wastes	Incinerate	Store in special waste receptacles in first aid centre. Trained medical technicians ensure proper handling.

WASTE TYPE	TREATMENT STRATEGY	HANDLING AND DISPOSAL METHOD
		Needles, scalpels, syringes, gauze pads and blood are incinerated.

Hazardous Recyclable and Non-Recyclable Wastes

Hazardous wastes generated at Diavik are classified in the Hazardous Materials Management Plan. This plan outlines the methodology for identification, classification and storage of such materials. The plan also defines the safety protocols to be followed and records to be maintained by personnel handling such wastes, including final disposal practices. This Waste Management Plan discusses the generation of solid wastes, which also includes hazardous wastes, and their storage and final disposal methodologies.

Petroleum Waste Stream

The petroleum wastes generated at site consist of used oil, diesel fuel, lubricants and solvents. These wastes are segregated in order to make the individual waste streams easier to reuse or recycle, or to permit recovery of any by-products. Special precautions are exercised when handling these materials since their improper release or disposal could adversely affect the environment. Personnel working with these products receive specific safety training for their handling.

Used Oil

The used oil generated from servicing vehicles, equipment, and generators is stored in marked, aboveground tanks adjacent to the lube storage building beside the maintenance shop (467 000L) and the power plant (96 000L). Any smaller amounts collected in drums are stored at the Waste Transfer Area. All connecting pipes are aboveground, making it easy to inspect for leaks. The Diavik Surface Operations department undertakes regular monitoring.

Transfer of used petroleum products is performed in the lined area of the storage facility. Used petroleum products not suitable for reuse are ultimately back-hauled to an off-site licensed facility for recycling.

Used oil pails that are 20 L or larger are collected separately and will be inspected by Site Services to determine requirements for draining and disposal. Plastic containers that are drained will be placed within the inert landfill, while others that cannot be cleaned will be stored in a sea can(s) at the Waste Transfer Area and shipped off site for disposal.

Hydraulic Fluid

Hydraulic fluid that is not reused is disposed of along with waste petroleum products to an off-site registered facility. Used hydraulic fluid is placed in labeled drums and stored in the waste transfer area or the bulk lube storage area and back hauled to an off-site facility for reuse or recycling.

Used hydraulic lines are disposed of in the landfill.

Oil Filters

Filters are required to be drained for 48 hours. A designated location has been made in the maintenance shop for the draining of oil filters. Once drained, they are crushed and stored in

labeled drums. Full drums are then picked up by the Site Services department, transported to the waste transfer area and inventoried. The crushed filters are then shipped off-site to a licensed disposal facility for recycling.

Contaminated or Out-of-Date Fuels

For safety, some fuels such as Jet B aviation fuel may be condemned because of contamination, or an expired shelf life. These drums are labelled in this manner and may be reused within other fuel burning devices at site that do not have the same specifications as aviation. If fuel cannot be reused on site, it is shipped off-site and recycled as low-grade fuels at appropriate facilities.

Soil & Rock Contaminated with Petroleum Product

This plan emphasizes and facilitates the reduction of soil contamination through the lining of storage facilities, inspection and maintenance of equipment, use of trays for draining, lining of loading and unloading zones, and using secondary containment such as a berm around the tank farm areas. In spite of these measures, spills, leaks or pipe/hose ruptures can occur, resulting in hydrocarbon contamination of the soil.

The waste transfer area has a large lined area to deal with contaminated soils, referred to as a landfarm. Contaminated soil is spread in the designated area to facilitate sub-aerial bioremediation that could occur during the summer months.

Large rocks that become contaminated with petroleum products are disposed of in the Type III rock pile. Due to the size of the rocks, a puncture to the lining in the landfarm could occur and landfarming is less effective as there is little or none of the organics necessary for bioremediation. Surrounding rock piles and collection ditches prevent leachate from the Type III pile from entering the environment.

Snow Contaminated with Petroleum Product

Snow that is contaminated with petroleum products is collected in drums and taken to the Waste Transfer Area. Here it is added to the contaminated soils area. During spring thaw, water is contained within the lined, bermed area. Absorbent pads are placed on top of the water and a primitive oil water separator is used to collect any free product. The remaining water is collected with a vacuum truck and taken to the PKC pond for disposal.

Water Contaminated with Petroleum Product

Water may become contaminated with petroleum products in the event of a spill or leak. Free petroleum products tend to float on top of water, facilitating collection using absorbent materials such as berms and pads. These pads are then collected and disposed of as outlined below. Because the Diavik water treatment plant does not treat for hydrocarbons, any of the remaining water that may have come into contact with the product is collected using a vacuum truck and disposed of within the lined and contained PKC pond.

Oily Rags and Used Absorbent Materials

All materials used to clean up petroleum products are collected in drums around site, transported to the waste transfer area and stored for on site incineration.

Grease

Scrubber grease is used as part of the recovery process for diamonds and is mixed with a granular material. Once it is no longer possible to reuse the scrubber grease, it is collected in drums, transported to the waste transfer area and stored for off-site disposal.

Cardboard grease tubes are collected in drums from various areas around site and are taken to the WTA for storage until being shipped off site for disposal.

Chemicals

The site does not generate large amounts of chemical wastes. However, processing of anticipated chemical waste products is described below.

Glycol

Ethylene glycol is used for heating, vehicles, equipment, and at the airstrip as antifreeze. If spilled, the sweet smell of the material could attract and affect wildlife, and have a negative impact on the environment. The glycol waste stream is segregated from other wastes and is stored in marked, aboveground tanks to the lube storage building beside the maintenance shop (50 000L) and the power plant (28 000L). Any smaller amounts collected in drums are stored at the Waste Transfer Area. All connecting pipes are aboveground, making it easy to inspect for leaks. The Diavik Surface Operations department undertakes regular monitoring.

Transfer of glycol is performed at the lube storage building. Product not suitable for reuse is ultimately back-hauled to an approved off-site facility for recycling.

Waste Batteries

The types of batteries used include lead acid, potassium hydroxide (alkaline) and nickel-cadmium. Use of rechargeable batteries is promoted wherever possible, and provides an example for minimizing wastes. Rechargeable batteries are regularly maintained while in service, and tested prior to disposal to confirm that it is spent. Spent batteries are labelled and stored in a designated location in the Waste Transfer Area until being crated or drummed and shipped off site for recycling (where possible) or disposal. The Site Services department is responsible to deliver the spent batteries to the waste transfer area and inventory them regularly.

Acids

Used acids are stored in lined drums that are contained within enviro-packs at the Waste Transfer Area. They are then shipped off-site to an approved facility for disposal or recycling, if feasible.

Solvents

Most solvents around site have been replaced with non-toxic, citrus-based detergents and are primarily used as degreasing agents in the maintenance shops and other service buildings. An example is the use of EnSolv which is an environmentally-friendly, non-hazardous solvent specifically used within the Recovery plant. These wastes, along with any small amounts of specialty degreasing solvents which are usually toxic petroleum based chemicals, are collected and stored on site for disposal. Residual or used solvents are stored in labeled leak-proof containers or drums and/or are transferred to larger storage containers in the waste transfer area. The drums/containers are shipped off-site to a licensed disposal facility.

Flocculant
Minimal amounts of flocculants are used in the process, sewage and water treatment plants as a thickener for tailings or sludge. Any flocculants that may be spilled is collected in drums, stored at the Waste Transfer Area and shipped off site for disposal.

Freon
Freon is commonly used in refrigeration and tends to be re-circulated within equipment. However, should a leak or spill of this product occur during operations or servicing, it is collected in drums and stored at the Waste Transfer Area until it can be shipped off site for disposal.

Fluorescent Light Bulbs
Fluorescent light bulbs contain trace amounts of mercury. For this reason, they are collected in trays or boxes around site, stored at the Waste Transfer Area and shipped off site for disposal.

Aerosol Cans
The use of aerosol cans on site is discouraged because of the potential damage they represent to the ozone layer. Aerosol cans are difficult to handle as a waste because they cannot be incinerated directly. The cans are collected separately in marked containers, stored in the Waste Transfer Area and shipped off site to a licensed disposal facility. Camp occupants are advised about this procedure and cleaning staff alerted to separate them from the general waste stream. To comply with the waste minimization policy, aerosol cans are substituted wherever possible with refillable pump/spray bottles. DDMI is investigating the possibility of using an aerosol crusher to reduce bulk aerosol disposal requirements.

Paint
Used paint cans are collected and allowed to dry in a sea can within the Waste Transfer Area. Cans containing latex paints are incinerated and taken to the landfill for disposal. Containers that held oil-based paints are properly stored within the sea can and back-hauled in a crate to an approved off-site recycle/disposal facility.

Laboratory Chemical Wastes
Any chemical wastes which cannot be safely incinerated or landfilled at site are stored in appropriate containers at the waste transfer area and back-hauled to an approved treatment/disposal facility off site.

Biological Waste
Small amounts of hazardous biological wastes and other medical materials, such as needles, syringes, scalpels and blood and tissue contaminated items, are generated in the first aid areas. These wastes are properly contained, labeled and stored in a secure area marked “Biohazard” in the first aid centre until they are removed and incinerated. Since the contracted medical staff is most aware of the potential risks involved, these wastes are to be left under their supervision until they can be incinerated or transported off-site.

Inert Solid Waste
Throughout operations, inert wastes will be generated on site. The bulk of these wastes can be disposed of on site, but some do require shipment off site for reuse or disposal. This

category includes items such as vehicles, buildings, plastics, clean paper and wood products, and air filters.

Conveyor Belts and Tires

Re-use of tires is encouraged; some alternate uses for tires are to store materials in the parts lay-down area and to protect roads in turning areas. Research is being done to try and find alternative uses or recycling options for conveyor belts and tires. Used conveyor belts and tires are disposed of in the landfill and eventually covered with large quantities of waste rock or coarse processed kimberlite.

Vehicles

Vehicles and equipment will be driven or back-hauled for reuse/recycle when they are no longer useable for the project. While awaiting backhaul, salvageable vehicles will be stored in a laydown area.

Plastics

Plastic wastes generated are mainly from food packaging, cleaning products and lubricants. Plastic containers that originally contained toxic or hazardous materials are fully drained before being stored in the WTA for off site disposal. Plastic containers that contained non-toxic, non-hazardous materials will be disposed of in the inert landfill. Plastic waste from food containers is incinerated to prevent animal attraction.

In accordance with the waste minimization policy, use of disposable dishes is discouraged in an effort to reduce waste generation.

Corrugated Cardboard

Clean, corrugated cardboard waste is generated mainly from packaging. Cardboard is burned in the designated burn pit within the waste transfer area.

Paper

Paper waste generated consists of office paper, newsprint, and packaging. Shredders shred confidential paper, which may then be re-used as packaging material. Paper reduction is achieved by using e-mail, voice message devices, telephone or verbal communications rather than written whenever possible, and using both sides of the paper when photocopying or printing. Intermediate collection points for recyclable paper are established in office areas. Paper materials are incinerated or burned in the burn pit.

Scrap Metal

This waste stream consists of ferrous and nonferrous scrap metals of various types, which have low recycling price and are hard to recycle. Metal scraps are generated from siding, piping, and other similar items. Scrap metal is disposed of in the landfill.

Waste Lumber

Waste lumber is burned in the designated burn pit in the waste transfer area. Larger pieces are salvaged and temporarily stored in laydown areas until condemned by site staff. Once condemned, they are also burned within the burn pit. DDMI will be considering stockpiling used lumber materials and will evaluate the use of backhauls to communities for use as building materials.

Air Filters

Air filters are collected in burnable garbage collection bins around site. These filters are taken to the burn pit at the Waste Transfer Area and are burned to reduce their volume prior to being disposed of at the landfill.

Buildings & Bulk Debris

Old buildings no longer required, or any other large sized debris, will be relocated for reuse to other areas on site, where possible.

Sandblasting Residue

Sandblasting operations are carried out to prepare some metal surfaces for coatings. During sandblasting activities, the surrounding areas are shrouded for dust control and all residual materials resulting from the sandblasting are collected and stored in drums in the waste transfer area. For large sandblasting activities, the sandblast residue is stockpiled in a designated area, transferred to a truck and disposed of in the inert landfill. Any stored material is placed in the approved landfill or is shipped off-site for disposal.

Incinerator Ash

Ash from the incinerators is collected in bins adjacent to the incinerators themselves. This ash is then transferred to the burn pit to assist in burning operations. When the burn pit is cleaned out, contents are placed in the landfill.

Solid Domestic Waste

The solid domestic waste stream consists of food waste, recyclable containers (cans, bottles), inert non-combustible domestic waste, packaging, corrugated cardboard, paper, and paper products. These materials are incinerated daily to prevent the attraction of wildlife. All non-recyclable solid wastes, which cannot be incinerated, will be transported to the landfill and buried there.

Food Waste

Kitchen staff collects all food waste indoors. Waste transfer staff collects this waste and incinerates it as soon as possible. This is done throughout each day in order to minimize potential attraction of and its negative impacts on wildlife in the area. Bag lunches are collected daily from remote offices and trailers for incineration. An employee-driven recycling program for pop cans and bottles was initiated in 2007, and proceeds from this program are donated to charity.

Paper and Cardboard

Any paper or cardboard products that may have come into contact with food, or was used as food packaging, is disposed of in the incinerators.

Cooking Grease

Oil and grease from the kitchen is collected in plastic drums and packaged indoors. Once the drums are full, they are transferred to the warehouse for immediate shipment off site to Yellowknife for disposal.

Sewage Sludge

The biodegradable organic components removed by screening in the sewage treatment plant are dewatered and stored in the designated sludge storage area within the waste transfer

area. Grey water and non-biodegradable sludge, such as chemically precipitated sludge or sludge settled from the wastewater treatment plants with the aid of flocculants or coagulants, is pumped into the Processed Kimberlite Containment (PKC) area.

Miscellaneous Waste

Various kinds of waste other than those mentioned above are collected and sorted in the waste transfer area. These other wastes are then either stored in designated locations for back hauling, burnt in the incinerators or burn pit, or disposed of in the landfill. All the wastes will be handled and transported by trained personnel employed by the Site Services department.

Site Facilities

The waste transfer area (WTA) has been established to ensure the proper handling of wastes on site. Contained within this area are the following facilities:

- Contaminated soil containment area;
- Incinerators;
- Burn pit;
- Sewage sludge containment area;
- Storage areas and sheds for drums, crates, bins, totes, etc.; and,
- Office, lunchroom & washroom facilities.

An approved landfill is also used for the disposal of clean, inert waste. Location of the facility is shown in Appendix A, Figure 4.

Waste Transfer Area

The facility was relocated in 2008 and is now adjacent to the perimeter road to the explosives storage area on the south part of the island (Figure 4). The whole area is lined with HDPE material and is surrounded by a gated, chain link and barbed-wire fence erected to control wind transportation of any litter and wildlife intrusion. The majority of wastes are stored and inventoried here while awaiting backhaul. Sea cans and sheds are used for storage of labelled items that will be back hauled to recycling or disposal facilities. This helps to prevent items being buried by drifting snow, and ensures year-round accessibility. Drums are labelled appropriately, inventoried, manifested and eventually transported off site. The burn pit is operated here, as are the incinerators for food waste. Sewage sludge is collected in an approved area within this facility for future use in reclamation. An approved landfarm is also located within the facility for deposition and remediation of petroleum contaminated soils. The possibility of a new incinerator building is being considered to assist in segregating, storing, and taking inventory of waste in the future.

Land Farming

Hydrocarbon contaminated soils from spills or other releases are land-treated in two designated areas on site: one within the Waste Transfer Area and one atop the Type III rock pile. The WTA cell is designed and constructed with a berm and arctic geomembrane liner. The geomembrane was placed on a sand cushion and covered with two layers of select material.

Hydrocarbon-contaminated soil is placed in rows or piles during summer months to allow for remediation to acceptable levels by using natural microbiological processes (bioremediation). Depending on the concentration of contaminant, additional soil may be added. To enhance the turn around time, fertilizers such as ammonium nitrate or sewage sludge could be applied to aid the bioremediation process and improve the efficiency of the landfarm. Once hydrocarbons have degraded to the CCME Industrial level for coarse-grained surface soils,

the soil will be transferred to the landfill where it will be encapsulated within the rock pile or PKC area.

Petroleum Waste Storage Facilities

Design and Location

Individual departments are responsible for collecting all petroleum-based waste in leak proof containers within their workshops or laydown areas. The Surface Operations department periodically collects and transports these waste products, stores them in properly labeled, lined and sealable containers in the Waste Transfer Area or transfers them to aboveground bulk storage tanks on site.

A lined, bermed bulk storage area is located beside the lube storage building adjacent to the maintenance complex. A 467 000 liter aboveground used oil tank is located in this area as well as a 50,000 litre waste coolant tank. Adjacent to the power plant, inside a concrete bermed area is a 28 000 litre used glycol tank and a 96 000 litre used oil tank. Also in this area is a day tank for diesel fuel.

Manifest Requirements

Manifests are compiled to accompany hazardous recyclables or wastes when they are transported to approved facilities. Information on the manifest includes type of waste, amount shipped, how the material is contained and facility to which it is being transferred. The Surface Operations department is responsible for preparation and tracking of these manifests, as well as arranging methods of transportation of the materials to the off-site licensed facility.

Incompatible Wastes and Container Requirements

The risk of mixing various wastes that could react to produce heat, gas, fire, explosion, corrosive or toxic substances is reduced by segregating all chemical waste according to their hazard classification, and leaving outdated chemicals in their original, labeled containers. Chemicals requiring special containers remain in the containers in which they were purchased (e.g. acids) with additional appropriate empty containers available for emergency purposes.

Training

There are designated operators for handling hazardous material/waste. All operation personnel involved in the handling of hazardous waste are fully trained for personal safety and protection. They are also trained in spill response. Responsibility for waste management is assigned to the Surface Operations department. In addition, all personnel entering the camp are given basic instructions for complying with the waste management system during site orientation and environmental awareness training sessions.

Surveillance and Monitoring

Personnel using the vehicles, machinery and equipment for the various facilities on site identify any requirements for maintenance work and report the need for repairs. Routine scheduled inspections are performed to minimize the potential for leaks or atmospheric pollution and a record is kept of maintenance needs and servicing performed. The Site Services department maintains the various waste collection transfer and disposal points, inventories of bulk wastes, waste management datasheets, and status of protective

equipment and spill kits. This assists in evaluating the capacity of waste management facilities, planning for logistics associated with back hauling and requirements for any modifications to the system. In addition to this, the Environment department conducts waste inspections at the waste transfer area and landfill every other day, as well as a site-wide compliance inspection on a weekly basis.

Landfill

Site Selection and Design

The approved inert landfill at the former quarry was closed in January 2008. The new inert landfill location was approved by the INAC Inspector and is located within the country rock pile. Any future requirements for additional landfill sites would be selected in consultation with the INAC Inspector and given full consideration of environmental criterion required for site selection.

The landfill site is to be used to dispose of inert solid waste as well as ash from the incinerator. The landfill will be regularly covered with either course kimberlite material or Type I (clean) rock. A two to three meter layer of till and waste rock will be applied as a cap before abandoning the landfill, ensuring that the contents of the landfill will remain permanently frozen. This will restrict the production and movement of leachate. The fill for the cover will be obtained from the till stockpile in the northeast sector of the north country rock pile. The cover will be applied as the landfill progresses, with most of the capping done during the summer so that at closure only a small area would require capping. During the winter months only a thin cover will be applied. The layer will be re-compacted during the spring and built up during summer.

Signs will be posted to identify the disposal area. The landfill will be operated by trained personnel from the Surface Operations department, with inspection and monitoring being performed regularly. Records will be kept regarding findings and recommendations will be evaluated and executed.

Contingency Planning

Improper Disposal

Any improperly disposed material identified by waste management crews are removed and transferred for proper disposal. For example, non-burnable material will be removed from the incinerator waste stream and transferred to the designated area in the landfill. Hazardous wastes are stored in the waste transfer area until they can be shipped to licensed facilities off-site.

Fire

In case of an accidental disposal of oxidizing, reactive or flammable material, members of the Emergency Response Team (ERT) are notified immediately and the emergency response unit is dispatched in accordance with the procedures outlined in the Contingency Plan.

Extreme Weather Conditions

During extreme winds and blizzards, the disposal of ash will be curtailed. Mitigative procedures such as cover and containment work in the landfill are initiated to shield materials from winds or disposal is curtailed until weather conditions improve.

Incinerators

Two incinerators are located at the waste transfer area to incinerate burnable materials, including food wastes, as required. The incinerated ash is stored inside a bin capable of holding 1.2 cubic meters. Ash is then used in the burn pit and finally disposed of in the landfill area.

Appendix A

Figures

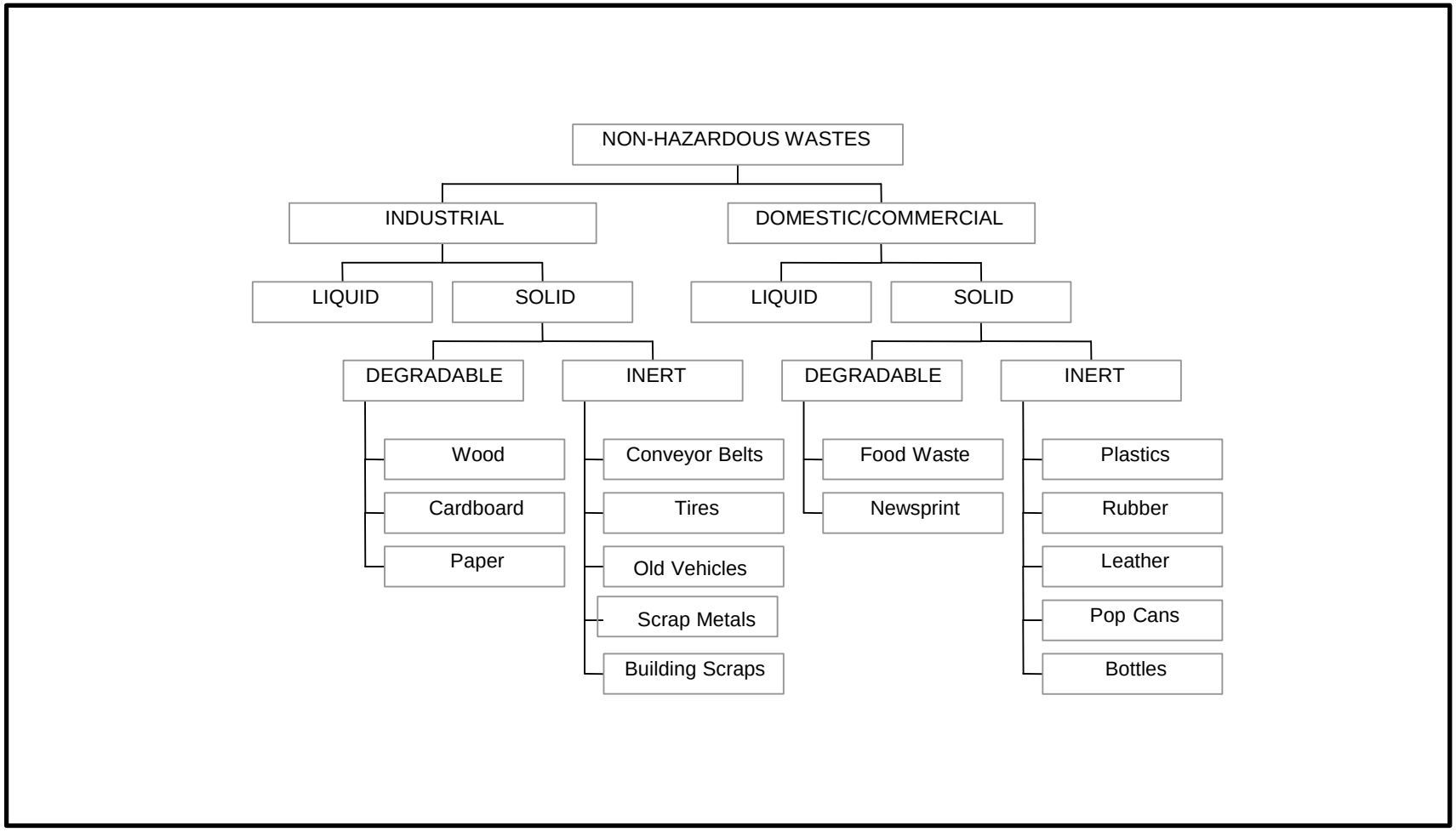

Figure 1: Classification of Non-hazardous Waste Generated at Diavik Mine Site

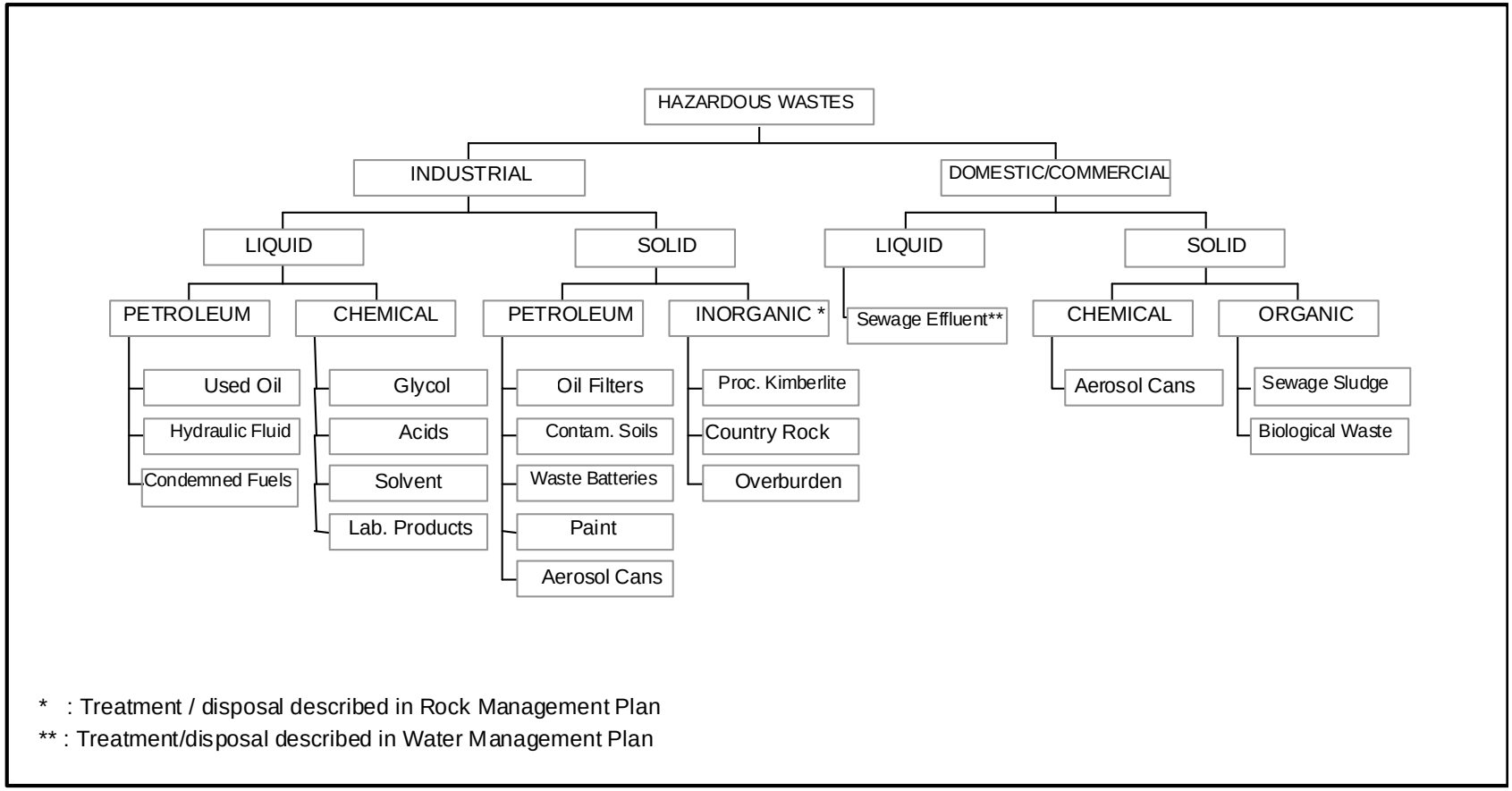

Figure 2: Classification of Hazardous Waste Generated at Diavik Mine Site

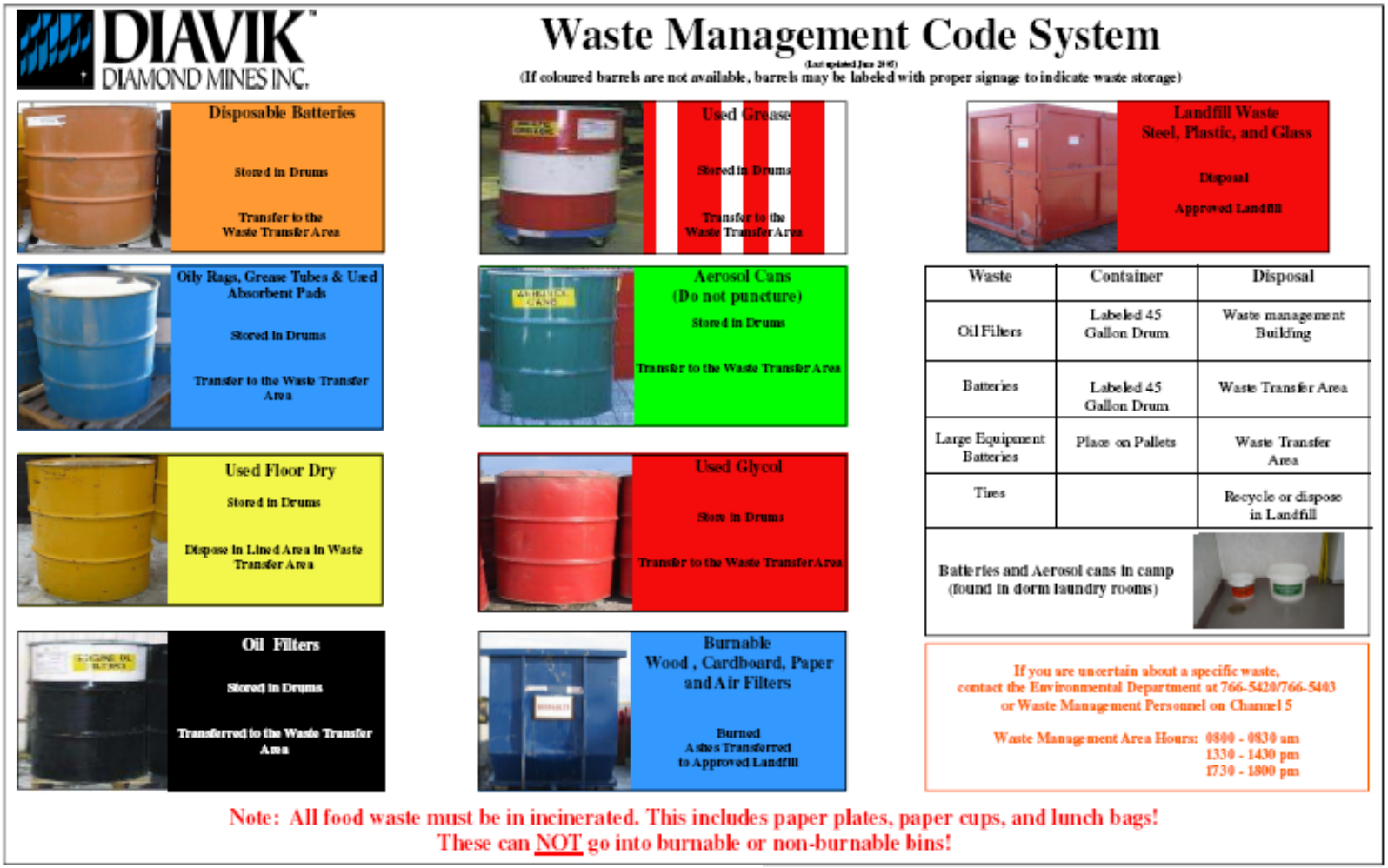

Figure 3: Waste Management Code System

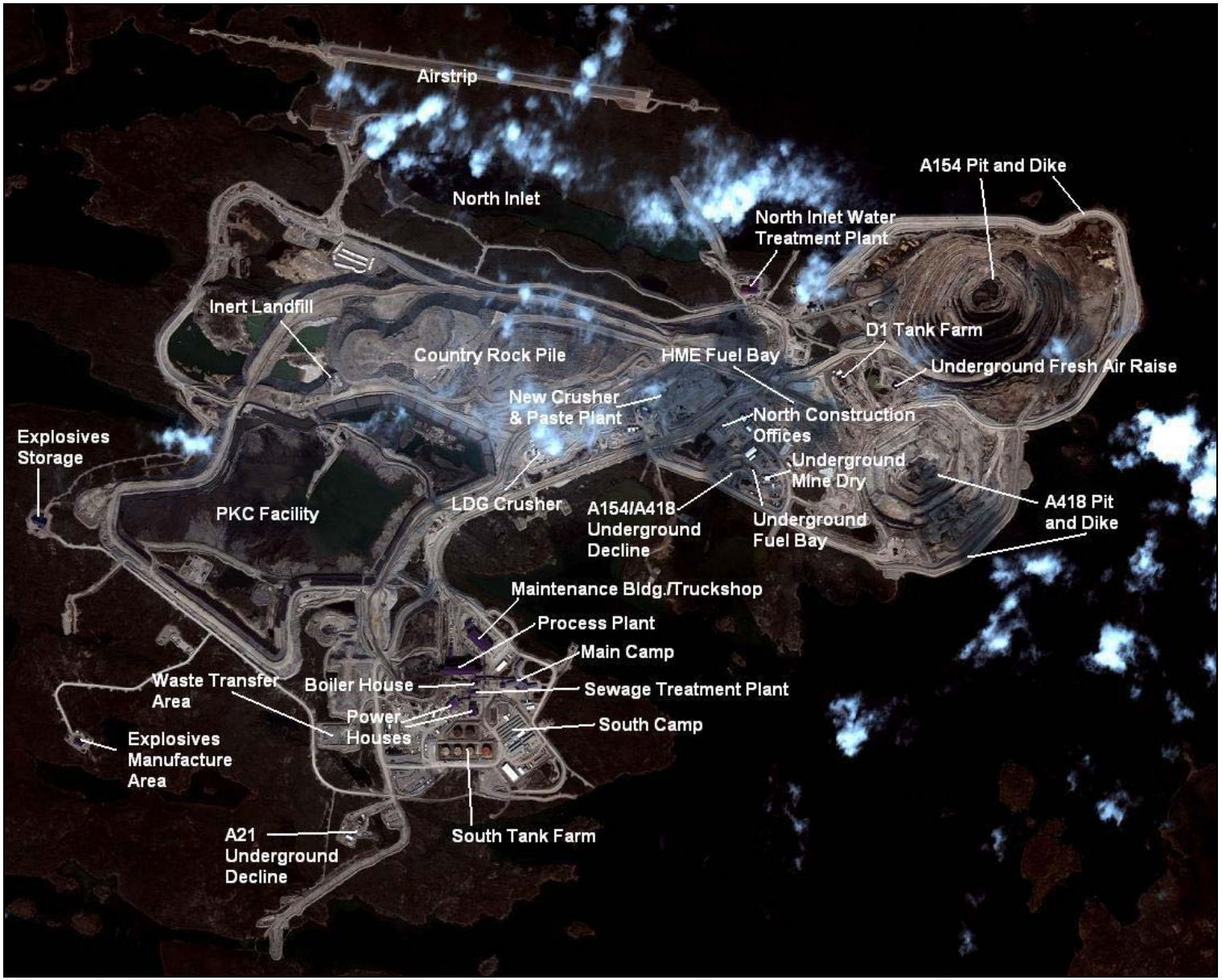

Figure 4: Diavik Mine Site Layout