



WILDLIFE ROAD MITIGATION PLAN FOR THE JAY PROJECT

DRAFT

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Abbreviations

Abbreviation	Definition
Dominion Diamond	Dominion Diamond Ekati Corporation
Ekati Mine	Ekati Diamond Mine
EMF	Environmental Management Framework
GNWT	Government of the Northwest Territories
NWT	Northwest Territories
RSA	Regional Study Area (Ekati Mine)
WEMP	Wildlife Effects Monitoring Program
WLWB	Wek'èezhii Land and Water Board
WRMP	Wildlife Road Mitigation Plan
WRSA	waste rock storage area

Units of Measure

Unit	Definition
km	kilometres
km/h	kilometres per hour
m	metres

1 INTRODUCTION

1.1 Background

The Ekati Diamond Mine (Ekati Mine), owned and operated by Dominion Diamond Ekati Corporation (Dominion Diamond), is located in the Slave Geological Province of the Northwest Territories, approximately 300 kilometres (km) northeast of Yellowknife. Construction at the Ekati Mine began in 1997 and production began in October 1998. The current mine plan predicts a further four years of production to 2019. Dominion Diamond is proposing to develop the Jay kimberlite pipe (Jay pipe) located beneath Lac du Sauvage. The Jay Project (Project) will be an extension of the Ekati Mine, and is expected to extend the life of the mine by 10 years or more.

The Project is located in the southeastern portion of the Ekati Mine claim block approximately 25 km from the main facilities and 7 km northeast of the Misery Pit. The Jay Project will also require a haul road, pipelines, and power lines. The Jay Road will be constructed to connect the Jay Project to the existing Misery Road and to the Ekati Mine camp and processing plant. The Jay Road will be the only road crossing the Lac du Sauvage esker; however, the following site roads will be constructed for the Jay Project:

- a road from the Misery Road to the south abutment of Jay Dike referred to as the Jay Road, which will be approximately 5.1 km long;
- a road from the Jay Road to the north abutment of the Jay Dike and Jay waste rock storage area (WRSA), which will be approximately 3.16 km long; and,
- a road from the Jay Road to the Misery camp, which will branch off from the Jay Road just north of King Pond and will be approximately 1.86 km long.

The traffic volumes on the Misery and Jay roads associated with hauling kimberlite from the Jay Project to the processing plant will depend on truck size and configuration. As is currently the case for the transport of Misery Pit kimberlite to the processing plant, long-haul trucks, which are different from the short-haul trucks used in the open pits, will be used. The Developer's Assessment Report (DAR) conservatively assumed an average of 56 round trips per day by long-haul trucks with a fleet of seven trucks making approximately eight trips each per day. Assuming the trucks are evenly spaced, there would be an average of 12 minutes between trucks, not including seasonal traffic from the Tibbitt to Contwoyto Winter Road.

Other traffic will include the bulk explosives trucks, crew transport vehicles, road maintenance equipment, garbage trucks, low-bed trucks to transport larger equipment, water trucks, emergency vehicles, and light vehicles. The final design of this road is not yet complete and is subject to further refinement based on ongoing data collection, regulatory and community engagement, and design iteration.

Historically Bathurst caribou have been observed annually in the area surrounding the Ekati Mine during the post-calving to fall-rut period (July until November), and the timing has varied by year and herd size. Caribou may also encounter the Ekati Mine and the Jay Project during the northern migration (May) to calving areas. It is during these times when caribou have the potential to interact with the Jay and Misery roads.

During the Jay Project Technical Sessions in April 2015, Dominion Diamond made the commitment to provide a Wildlife Road Mitigation Plan (WRMP) that gives further details on strategies to reduce the impacts from the Jay and Misery roads to wildlife. Following a review period, Dominion Diamond will host a workshop to discuss the WRMP and comments will be considered for the finalization of the Plan. Based on the framework of adaptive management, it is important to note that the WRMP will likely evolve through time and should not be considered a 'final' plan.

1.2 Objective

The WRMP will describe the mitigation for the Jay and Misery roads with respect to caribou and wildlife. Although this plan is specifically for the Jay Project, it is anticipated that the WRMP will be included in the Ekati Mine Wildlife Effects Monitoring Program (WEMP) and will apply to other roads at Ekati Mine, including the Misery Road and future Sable Road.

The objective of the WRMP is to:

- avoid and minimize (reduce) the risk of caribou and other wildlife mortalities from traffic; and,
- avoid and minimize the barrier effect of the Jay and Misery roads (and other Ekati Mine roads) to caribou movement and migration.

This WRMP is focused on caribou; however, it is anticipated that successful mitigation of caribou will also extend to protect other wildlife from the effects of the Jay and Misery roads (and other Ekati Mine roads). Although dust is caused by vehicles driving on roads, mitigating dust will not be addressed in this plan. Past mitigation to control dust from roads at the Ekati Mine has included watering and applying dust suppressant to the roads, and more detail regarding dust mitigation can be found in the Ekati Mine Air Quality Monitoring and Management Program.

2 MITIGATION AND MONITORING

Bathurst caribou movements through the area surrounding the Ekati Mine have historically occurred from July through October annually, but the timing has varied by year. Results from aerial surveys indicate that Bathurst caribou tend to move through the Ekati Mine area in pulses where large numbers of caribou are present for approximately two weeks (Figure 1). From 1998 to 2005, when herd size was likely greater than 100,000 individuals (Adamczewski et al. 2009), peak numbers of caribou were typically observed during July (Figure 2). Since then, peak caribou movements have occurred later from September to mid-October.

Caribou in the Ekati Mine area are typically from the Bathurst herd, and some seasonal patterns are evident in their behaviour and distribution. The first caribou arrivals of the year are typically cows on their way from the wintering grounds south of the treeline to the calving grounds near Bathurst Inlet. These caribou travel quickly, feed little, and have a clear directional movement northward regardless of lakes and topography. Their presence in the Ekati Mine regional study area (RSA) is typically confined to a few weeks in May. Bulls begin to arrive from the wintering grounds in July. The bulls typically move less, feed frequently, and are solitary or in small groups.

Nursery groups (cows with calves) begin to arrive in July. They usually travel in groups and frequently stop for feeding, but development, large lakes, insect abundance, and other environmental factors influence their movement and behaviour. As the rut begins in late September, and as the caribou begin to leave the barren lands for the forest for winter, groups become mixed with cows and bulls. Caribou are not typically present in the Ekati RSA during winter.

Sensitivity of caribou to disturbance varies with life history and seasons. Caribou are likely most sensitive to development during the northern migration (May) when females are pregnant and need to get to the calving grounds, and the initial post-calving period (June) after calves have been born and are the most vulnerable to environmental stressors (e.g., predators and weather) and highly dependent on the cow for protection and energy. Sensitivity to development likely decreases during the summer (July and August) and fall/rut period (September and October). The WRMP has been designed to consider all seasons or periods to be equally sensitive in terms of the effects on caribou encountering the Ekati Mine. Thus, the mitigation proposed is to be equally protective of caribou regardless of the time of year that they may interact with the Jay and Misery roads (and other Ekati Mine roads). Dominion Diamond's strategy for managing risks to caribou associated with the Jay and Misery roads is to increase mitigation and monitoring as caribou approach the Ekati Mine (Figure 3). The levels of mitigation and monitoring are based on defined action levels (triggers).

Four levels of mitigation and monitoring are proposed (Figure 4), and the intensity of mitigation and monitoring increases when specific action levels (triggers) are met (Table 1). Level 1 mitigation and monitoring will occur continually throughout the year and the life of the Ekati Mine, and higher levels will be implemented when the associated action levels are met. For example, if Level 2 mitigation and monitoring is underway when Level 4 is triggered (e.g., 40 nursery groups or 2,000 caribou are within 100 m of the Jay or Misery roads) then there will be an immediate escalation from Level 2 to Level 4 mitigation and monitoring, and caribou observations will be compared continuously to the action levels. All mitigation from the previous lower level will be applied to the next higher level. Thus, escalation from Level 2 to Level 4 would include mitigation in Level 3.

Figure 1 Annual Temporal Distributions of Bathurst Caribou in the Ekati Mine Regional Study Area from Post-calving Aerial Surveys, 1998 to 2012

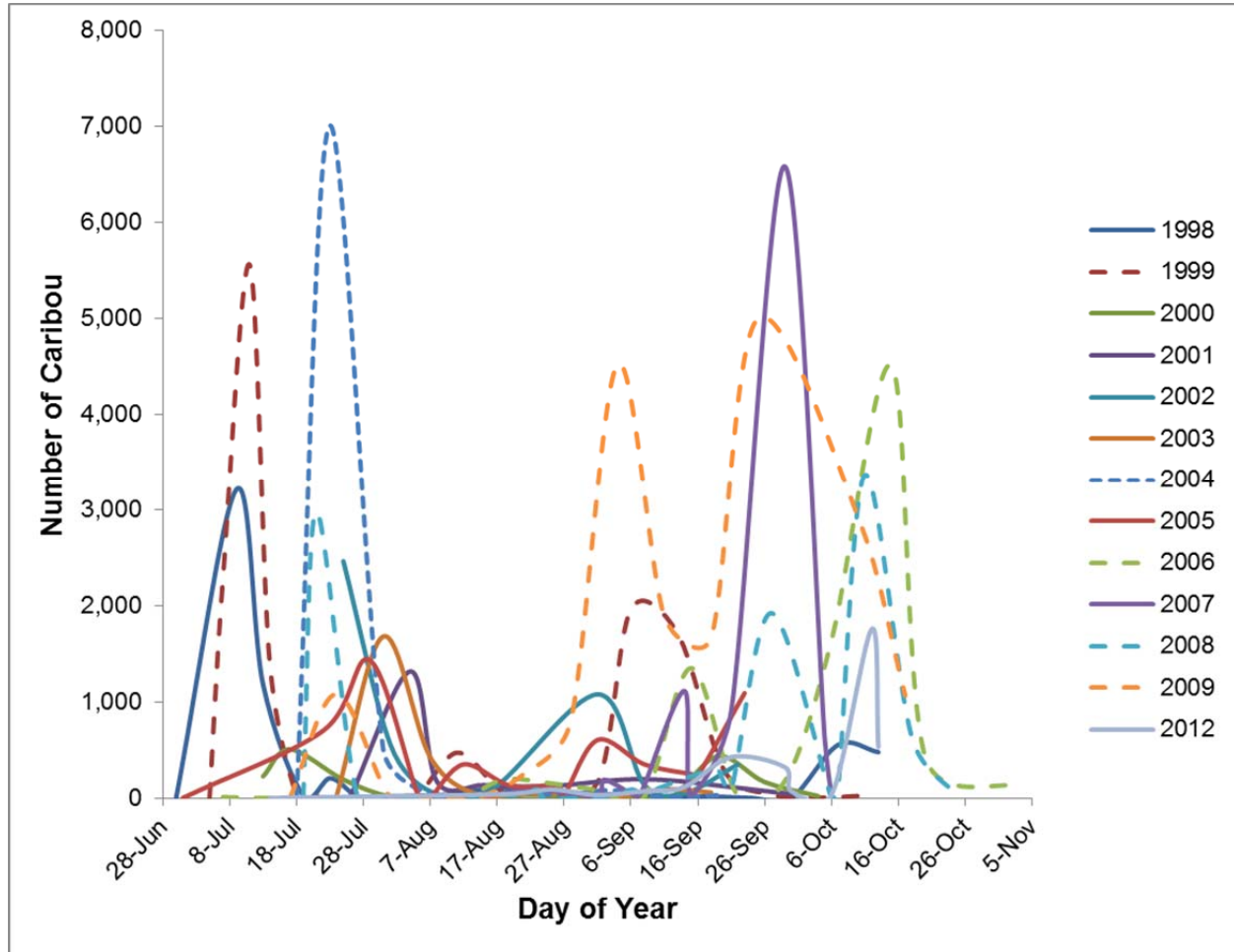


Figure 2 **Dates of Annual Peak Abundance of Bathurst Caribou in the Ekati Mine Regional Study Area during Post-calving Aerial Surveys, 1998 to 2012**

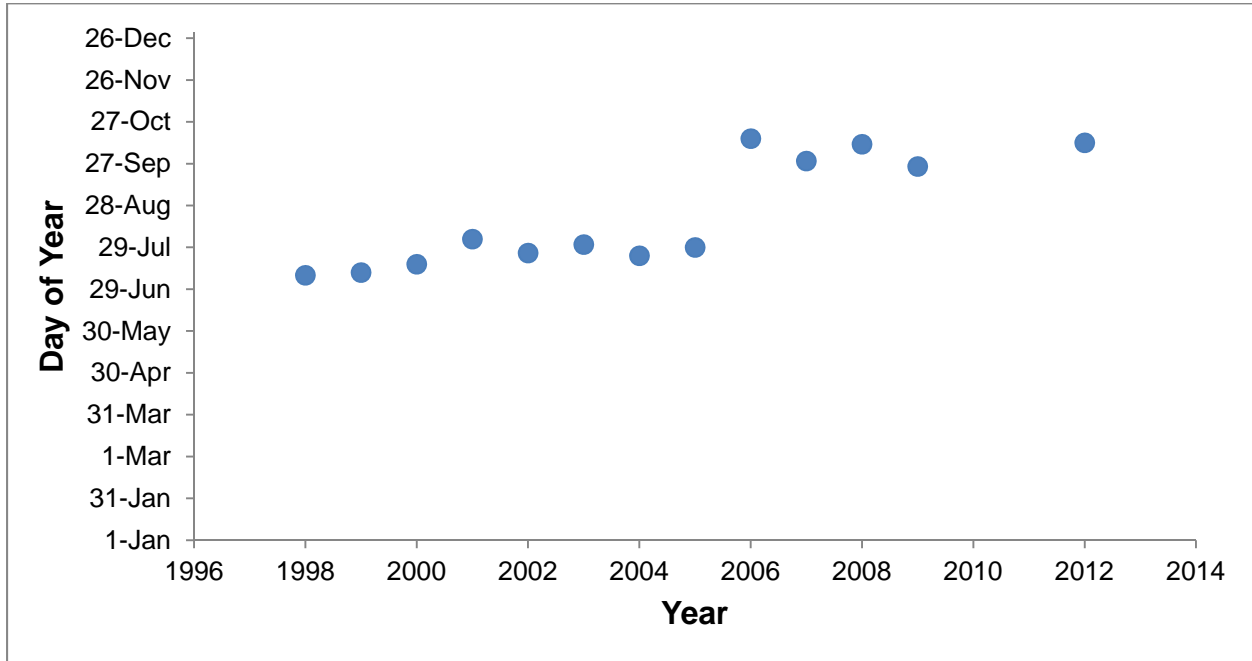


Figure 3 Mitigation and Monitoring Intensity for Ekati Mine and Jay Project Roads

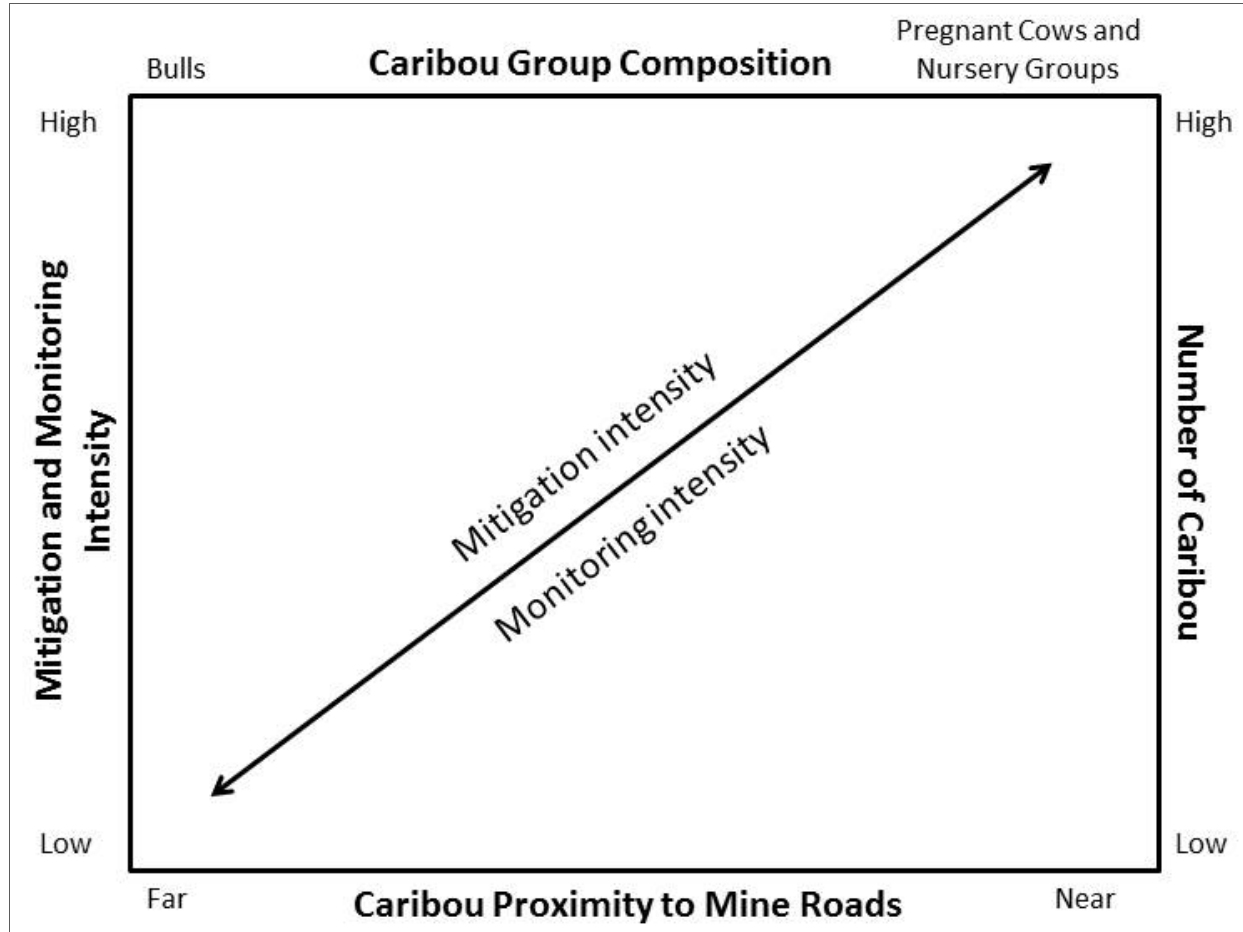


Figure 4 Decision Tree for Jay and Misery Roads Traffic Mitigation and Monitoring

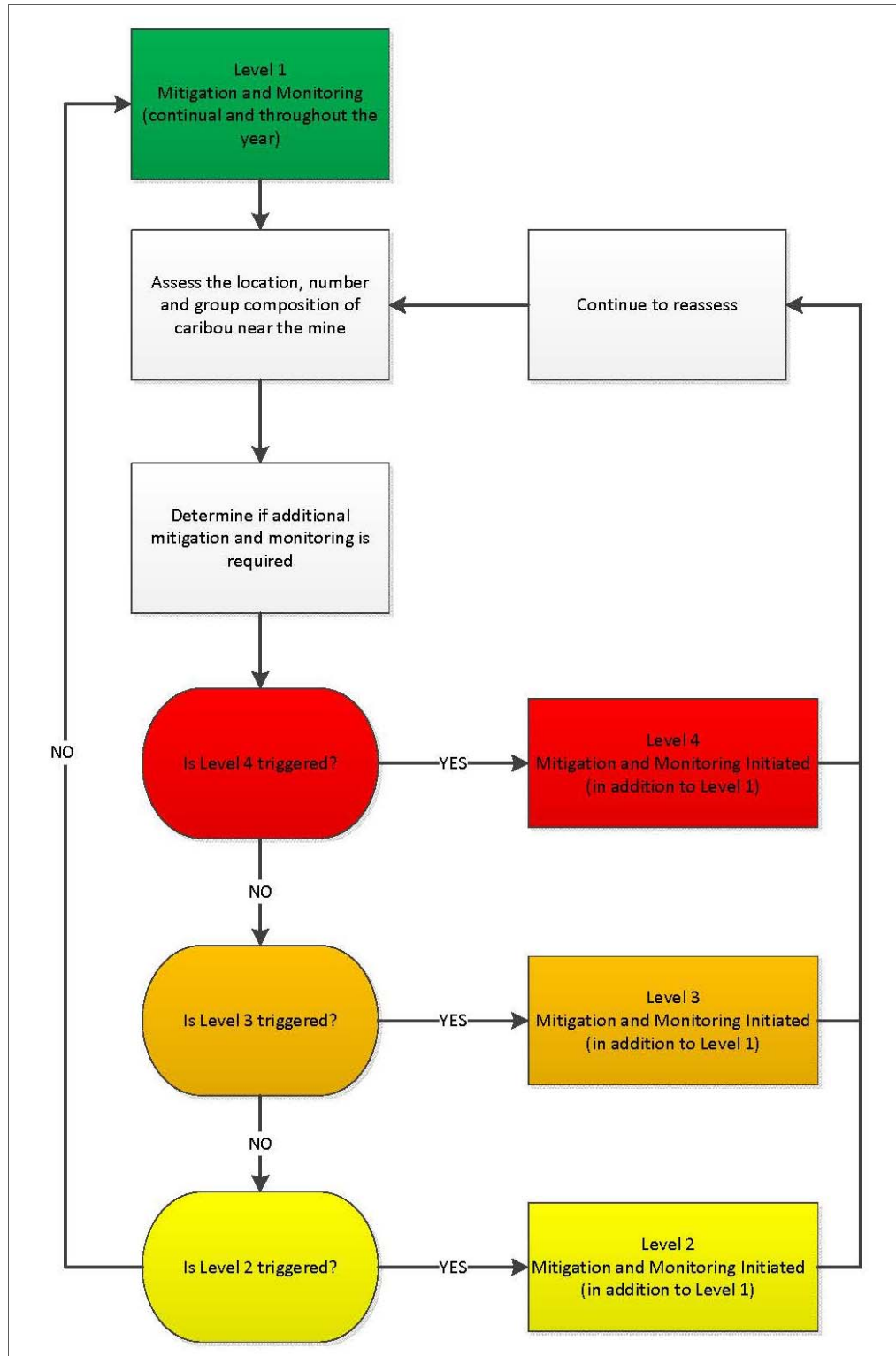


Table 1 Action Levels (Triggers) and Associated Caribou Road Mitigation and Monitoring for the Jay Project and Ekati Mine

Level (Alert)	Action Level (Triggers) to Initiate	Wildlife Road Mitigation	Caribou Monitoring
1 (Green)	<ul style="list-style-type: none"> Continual and throughout the year 	<ul style="list-style-type: none"> Design road to incorporate caribou crossings Wildlife have right-of-way on all roads Speed limits are posted and enforced Observations of wildlife on roads will be communicated to the Environmental Department and other drivers in the area Wildlife carcasses on or near roads will be removed Road snow berm height will be managed during winter 	<ul style="list-style-type: none"> Collared caribou monitoring Incidental wildlife sightings Road surveys (once per week)
2 (Yellow)	<ul style="list-style-type: none"> One or more collared caribou or caribou observations within 30 km of the Ekati Mine (i.e., RSA) 	<ul style="list-style-type: none"> Site-wide notifications of caribou approach to Ekati Mine Signage indicating caribou could be encountered (Yellow) 	<ul style="list-style-type: none"> Collared caribou monitoring Incidental wildlife sightings Frequency of road surveys increased (two to three times per week)
3 (Orange)	<ul style="list-style-type: none"> One or more collared caribou or caribou observations within 14 km of the Ekati Mine 	<ul style="list-style-type: none"> Increased signage in areas where caribou might encounter the road Signage indicating caribou are likely to be encountered (Orange) 	<ul style="list-style-type: none"> Collared caribou monitoring Incidental wildlife sightings Frequency of road surveys increased (daily) Environment Technicians dispatched to provide caribou safety
4 (Red)	<ul style="list-style-type: none"> 40 nursery groups or 2,000 caribou are within 100 m of the Jay or Misery roads 	<ul style="list-style-type: none"> Signage indicating caribou are highly likely to be encountered (Red) Speed limits will be decreased and posted Short-term road closures Long-term road closures 	<ul style="list-style-type: none"> Collared caribou monitoring Incidental wildlife sightings Road surveys (daily) Environment Technicians dispatched to provide caribou safety Behavioural surveys (scan and focal sampling)

RSA = regional study area for the Ekati Mine; km = kilometres; m = metres.

2.1 Mitigation

The mitigations listed below are based on those that have been used at the Ekati Mine over the past 16 years of mine operations and are demonstrated to be effective. There has never been a caribou mine-related mortality resulting from a vehicle collision at the Ekati Mine despite annual interaction of caribou with the Mine site, particularly when the Bathurst herd was larger in size in the late 1990s. This result demonstrates that existing mitigation, such as giving wildlife the right-of-way, signage and road closures, is effective at avoiding and limiting wildlife injury and mortality.

2.1.1 Level 1 Mitigation (Green)

This level of mitigation is the baseline for all higher levels, and is continuous throughout the year and life of the Mine and when no collared caribou or caribou observations are recorded within the Ekati Mine RSA.

- *Design Road to Incorporate Caribou Crossings*

Dominion Diamond's community engagement program has indicated that the Jay Road area is important for caribou movement. In response to the feedback received through community engagement, Dominion Diamond proposes to construct caribou crossings along the Jay Road that respect the communities' identification of the importance of this area for caribou movement. While the design of the Jay Road has not been finalized, Dominion Diamond plans to construct road crossings for caribou (caribou crossings) on the Jay Road. Caribou crossings will not be built in areas where raised safety berms are required, or at locations where there are necessary joints and valves in the pipelines that must be accessible. Caribou crossings will be designed so that the side slopes of the road are flatter and have finer crushed rock particles. In the caribou crossing areas the pipelines will also be covered with fine crushed rock. Valves and pipeline joints must be accessible and will not be covered. Once the road is constructed, monitoring, which will include Aboriginal community members, will be implemented to assess the effectiveness of the caribou crossings.

- *Wildlife Have the Right-of-way on All Roads*

All employees operating vehicles will be responsible for stopping for caribou and other wildlife on the Jay and Misery roads (and other Ekati Mine roads). Employees must wait until wildlife move a safe distance from the road (e.g., 100 m) before vehicles can proceed at a reduced speed to limit disturbing animals.

- *Speed Limits are Posted and Enforced*

Speed limits are 60 kilometres per hour (km/h) along haul roads and 20 km/h or 40 km/h on other roads. This mitigation is considered effective because driving slowly gives drivers more reaction time and reduces the distance required to stop.

- *Observations of Wildlife on Roads will be Communicated to the Environmental Department and other Drivers in the Area*

This mitigation alerts other drivers and the Environment Department of wildlife presence, and is required by all employees operating a vehicle at all times. The Environment Department can respond according to the perceived threat to human or wildlife safety by issuing site wide notifications or closing roads.

- *Wildlife Carcasses on or near Roads will be Removed*

This mitigation is considered effective at reducing the presence of predators and scavengers near roads. It is expected that all employees will report wildlife carcasses to the Environment Department for removal.

- *Road Snow Berm Height will be Managed during Winter*

During winter, snow berms present along roads will be reduced to provide safe driving conditions, improve visibility and reduce the berms as obstacles for migrating caribou.

2.1.2 Level 2 Mitigation (Yellow Alert)

This level of mitigation occurs when one or more collared caribou or caribou observations occur within 30 km of the Ekati Mine (i.e., within the Ekati RSA).

- *Site-wide Notifications of Caribou Approach to the Ekati Mine*

Notifications are communicated through site-wide email, during morning safety meetings or department-specific radio channels by the Environment Department. Notification will include signage alerting drivers departing on the Jay and Misery roads that migrating caribou are approaching Ekati Mine.

- *Signage Indicating Caribou could be Encountered (Yellow)*

The Environment Department will post warning signs for drivers that caribou could be encountered in the area. This provides drivers with reminders to be vigilant.

2.1.3 Level 3 Mitigation (Orange Alert)

This level of mitigation occurs when one or more collared caribou or caribou observations occur within the 14 km of the Ekati Mine (i.e., within the predicted zone of influence for changes in caribou distribution).

- *Increased Signage in Areas where Caribou might Encounter the Road*

The Environment Department will post warning signs for drivers that caribou are present at relevant sections of the road. This will remind drivers to slow down if caribou are seen within 200 m of the road or stop if caribou are on the road. The location of the signs will be based on long-term monitoring data and caribou observations

- *Signage Indicating Caribou are Likely to be Encountered (Orange)*

The warning signs posted in Level 2 Mitigation will change from yellow to orange.

2.1.4 Level 4 Mitigation (Red Alert)

This level of mitigation occurs when 40 nursery groups or 2,000 caribou are within 100 of the Jay or Misery roads or caribou are crossing the road.

- *Signage Indicating Caribou are Highly Likely to be Encountered (Red)*

The warning signs posted in Level 3 Mitigation will be increased from orange to red.

- *Speed Limits will be Decreased and Posted*

The maximum speed limit on portions of the Misery haul road is 60 km/h. Speed limits will be decreased to 40 km/h along sections of the Jay or Misery roads when caribou nursery groups are observed at 300 m from the road. When caribou are observed within 200 m of the road the speed limit will be decreased to 20 km/h. The length and section of the road that the speed limit decrease will apply to will be determined by the Environment Department. The speed limit decrease will be in effect until caribou are at least 200 m from the road. If at any point the caribou start to cross the road they will have the right-of-way.

- *Short-term and Long-term Road Closures*

This mitigation is intended to reduce hazards of traffic to caribou and allow them to move across the road. Dominion Diamond will construct additional kimberlite stockpile areas so that the Jay Project can continue to operate throughout road closures. Short-term closures will involve closing sections of the road from anywhere between one minute to six hours. Long-term closures will involve closing the entire Jay and/or Misery roads for at least six hours and until caribou are at least 500 m from the road. Whether a long-term or short-term road closure is required will be determined by the Environment Department and will depend on the number and group composition of caribou near the road. A road closure will be initiated at any time if the criteria of 40 nursery groups or 2,000 caribou are within 100 m of the Jay or Misery roads.

This mitigation is considered effective at avoiding vehicle-caribou collisions, and providing caribou with the opportunity to move across the roads and migrate through the area. The mitigation can be implemented under the authority of the Environment Department or Mine Operations. Environment personnel will be present at all times to monitor road closures so that the caribou are able to safely cross the road and continue with migration. Roads will re-open once caribou have reached at least 5,000 m from the road and the Level 4 action level is no longer applicable.

2.2 Monitoring

Monitoring is expected to provide early detection of caribou approaching the Jay and Misery roads and to assist in managing appropriate levels of mitigation to protect caribou and other wildlife. The monitoring techniques discussed below are to be considered in sequence.

Monitoring will be completed and assessed by the Environment Department and will be used to manage mitigation levels. Monitoring informs the Environment Department if action levels have been met and whether or not a mitigation and monitoring level change is necessary.

2.2.1 Level 1 Monitoring

This level of monitoring is the baseline for all higher levels, and is continuous throughout the life of the Mine and when no collared caribou or caribou observations are within the Ekati Mine RSA.

- *Collared Caribou Monitoring*

The location of collared caribou provided by the Department of Natural Resources, Government of the Northwest Territories will be monitored to determine the broad-scale proximity of caribou relative to the Ekati Mine.

- *Incidental Wildlife Sightings*

Ekati Mine employees are required to report all incidental wildlife sightings to the Environment Department, which are recorded in an Incidental Wildlife Sightings log. Incidental wildlife sightings reported by site staff allows the Environment Department to understand areas where wildlife are present or of high use so that mitigation can be adaptively managed.

- *Road Surveys (Once per Week)*

Road surveys will be completed by truck along the Jay and Misery roads and include other selected viewpoints to identify the location and numbers of caribou. The frequency of surveys will begin at one per week and will become more frequent as higher action levels are met. All observations from the road surveys will be documented and included in the annual Ekati Mine WEMP report.

2.2.2 Level 2 Monitoring

This level of monitoring occurs when one or more collared caribou or caribou observations occur within the 30 km from the Ekati Mine (i.e., within the Ekati RSA).

Level 2 monitoring will include all of the monitoring in Level 1; however, the frequency of road surveys will be increased (two to three times per week). All observations from the road surveys will be documented and included in the annual Ekati Mine WEMP report.

2.2.3 Level 3 Monitoring

This level of monitoring occurs when one or more collared caribou or caribou observations occur within 14 km from the Ekati Mine (i.e., within the predicted zone of influence for changes in caribou distribution).

Level 3 monitoring will include all of the monitoring in Level 1; however, the frequency of road surveys will be increased (daily), and the monitoring listed below will also be added.

- *Environment Technicians Dispatched to Provide Caribou Safety*

Environment Technicians will be dispatched to the location of any caribou observations to monitor and adaptively manage caribou safety.

2.2.4 Level 4 Monitoring

This level of mitigation occurs when 40 nursery groups or 2,000 caribou are within 100 m of the Jay or Misery roads or caribou are crossing the road.

Level 4 monitoring will include all of the monitoring in Level 3, with the addition of scan and focal behavioural monitoring.

- *Behavioural Surveys (scan and focal sampling)*

Ground-based scan and focal sampling will be initiated to document caribou crossings and response to stressors.

3 ADAPTIVE MANAGEMENT

Adaptive management is a structured process of decision making to deal with uncertainty.

The objective of adaptive management is to reduce uncertainty through monitoring, or “learning by doing” (WLWB 2010). In the case of wildlife monitoring, the “doing” is the environmental monitoring, and the “learning” is continual improvements to environmental management and the monitoring programs.

This requires the monitoring program to be adaptive and flexible. The monitoring program must be flexible enough to incorporate comments, suggestions, and information based both on science and local and Traditional Knowledge. Monitoring programs in the Ekati Mine WEMP have and will continue to be adaptively managed. Changes to the WRMP and WEMP will occur as monitoring results are analyzed and assessed over time. If negative effects are detected, the actions available to Dominion Diamond include the following:

- increase monitoring effort;
- implement special studies to further understand the effects; or,
- implement additional mitigation to reduce the effects.

More information regarding adaptive management will be provided in the Ekati Mine WEMP.

4 REFERENCES

- Adamczewski J.Z., Boulanger J, Croft B, Cluff D, Elkin B, Nishi J, Kelly A, D'Hont A, Nicholson C. 2009. Decline of the Bathurst Caribou Herd 2006-2009: A technical evaluation of field data and modeling. Draft technical report December 2009. GNWT.
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