# 10.5 CONCLUSIONS

## 10.5.1 Introduction

***Terrestrial Resources includes three subsections***

Ecological land classification (ELC), which includes both terrain (*e.g.*, bedrock, boulders) and vegetation features, forms the basis of the terrestrial resources section. This approach was recommended by the Department of Resources, Wildlife and Economic Development (RWED). Terrestrial Resources has been subdivided into the following three subsections:

- geology and terrain;
- ecological land classification and biodiversity; and,
- wildlife.

***Geology and terrain are addressed first***

The first subsection assesses the direct losses or alteration of terrain units in the local study area (LSA) and the esker quarry located south of the project. This section also addresses geological hazards, such as seismic events, and permafrost.

***Ecological land classification and biodiversity include plant health***

The second subsection assesses the direct losses or alternation of ELC units, rare and traditional plant potential, and biodiversity. The potential impacts of air emissions and water releases on plant health are also assessed.

***Wildlife includes habitat, movement and behaviour, and abundance***

Potential wildlife impacts are subdivided into habitat, movement and behaviour, and abundance impacts. Habitat losses are due to disturbance of the ELC units, but movement and behaviour is affected by noise and barriers (*e.g.*, roads, infrastructure). Changes in wildlife abundance may be due to direct mortality (*e.g.*, collisions with vehicles), or attraction to the project.

***All terrestrial sub-sections use the same regional study area and local study area***

All terrestrial components use the same two study areas: the regional study area (RSA) and the local study area (LSA). The RSA is defined as the area within a 31 km radius of the centre of the active mine site (Figure 10.1-1). The LSA is the area that will be directly disturbed at the active mine site. The LSA consists of the project footprint surrounded by a 500 m buffer (Figure 10.1-2).

***Residual impacts are classified***

The resulting residual impacts are determined based on a classification system that incorporates direction, magnitude, geographic extent, duration, reversibility, and frequency of the impact as described in Section 10.1.5. Environmental consequence provides an overall assessment of the residual effects based on a ranking system that incorporates key criteria.

# 10.5.2 Geology and Terrain

## 10.5.2.1 Terrain Units in the Local Study Area

***Approximately 560 ha of land disturbance will result in the loss or alteration of ELC units in the LSA***

Direct impacts associated with construction and operation of the Snap Lake Diamond Project (*i.e.*, site clearing and surface disturbances) will result in direct losses or alteration to terrain units in the LSA. A total area of 559.5 ha or 30.0% of the LSA will be lost or altered as a result of the Snap Lake Diamond Project. Specifically, there will be permanent or temporary alterations to 414.6 ha boulder, 49.6 ha of moraine, 53.9 ha of shallow organic, 8.9 ha of deep organic, and 32.5 ha of deep water units.

***Although the magnitude is high for moraine and organic units, the extent is 99.7 ha***

The magnitude of impacts to moraine and organic (shallow and deep) units within the LSA is high (Figure 10.5-1). Since the LSA was initially defined as the area of direct impacts, a substantial change from baseline is expected. The total area of moraine and organic units that is lost or altered is 99.7 ha. This area represents 6.9% of the LSA and 0.03% of the RSA.

***Environmental consequence is low to high***

Overall, losses to terrain units in the LSA are ranked as having a low to high environmental consequence. The boulder unit will exceed pre-development areas whereas the moraine, organic, and deep water units will result in some permanent loss. The "loss" of most of the deep water unit is due to the winter road over ice which will have little, if any, effect on the deep water. The Snap Lake Diamond Project will not result in complete removal of any terrain unit within the LSA. There is a high probability that the impacts on terrain will be less than those predicted due to the conservative assumptions (*e.g.*, assuming loss or alteration of the entire footprint when the area of the active mine site is less than the project footprint area).

## 10.5.2.2 Esker Quarry

***A total of 75,000 $m^3$ of esker sand will be needed***

Approximately 25,000 cubic metres ($m^3$) of primarily sand material will be required from the esker, located 9 km south of the project area, during construction. In addition, approximately 50,000 $m^3$ of esker material will be needed periodically (3 or 4 times) during the 22-year mine production period. These materials will be excavated during winter. Following completion of each esker quarry activity, all pit slopes will be re-contoured to ensure minimal potential for erosion or danger to wildlife use.

**Figure 10.5-1 Classification of Residual Impacts to Terrain Units and Esker Loss/Disturbances**

***Environmental consequence is moderate***

Using the on-site quarry located in the north pile footprint will greatly reduce the extent of impact to esker landforms within the regional study area. A total of 0.5 ha of esker will be disturbed over the course of the project operations. This represents 0.09% of the total esker landforms that occur within the RSA. Expressed as a percentage of the one discrete esker that will be used for quarry materials, the 0.5 ha of disturbance represents 5.6% of its total surface area within the RSA. This disturbance of esker landform within the RSA has an overall environmental consequence of moderate because the loss of esker material is irreversible (Figure 10.5-1).

### 10.5.2.3 Seismic Characteristics

***Seismic activity is a potential impact on the project***

The importance of seismic activity and its effects on the mine site installations pertains to structural integrity and subsequent performance of the structures after a large seismic event. In this case, it is the environment that has a potential impact on the proposed development.

***No seismic events have been recorded within 500 km of the site***

A seismic event is unlikely to occur at the Snap Lake Diamond Project based on past events. There were no seismic events of any magnitude recorded within 500 km of the site in the last five years. There were no events exceeding a magnitude 5 (*i.e.*, potentially damaging events) within a distance of approximately 1,000 km in the last 100 years.

***Seismic activity was not assessed***

Based on the 1995 National Building Code of Canada, the area is located in acceleration and velocity zones of zero with a zonal velocity ratio of zero. Consequently, the linkage between the seismic characteristics of the region and the Snap Lake Diamond Project is invalid and no assessment was done.

### 10.5.2.4 Ground Thermal Regime

***Construction of buildings, roads, and pads will locally change the thermal regime***

The construction of heated structures will result in a general warming of the ground below and immediately around the structures. In addition, the removal of natural overburden and rock materials from the area of the structures will result in a change in the thermal conductivity of the area. Construction of site roads, the airstrip, the mill, the north pile, and other facilities will require the placement of fill materials over the natural ground. This fill construction will result in a substantial change in the thermal conductivity of the near surface materials.

***Impacts will occur during the construction and operation phases of the project (26 years) and a change in the depth of the active layer will be irreversible at some locations***

The results of the impact analysis indicate that, during construction and operation, the mine, mill, and ancillary structures will have some impact on the ground thermal regime in the medium-term (26 years). Upon closure of the facilities, the heated structures will be removed and the ground thermal

regime is expected to return to a frozen condition. An active layer will be developed on an annual basis and a permafrost regime will be established. However, because the depth of the active layer will be altered where the subsurface materials have been altered (*e.g.*, crushed granite or sand has been added), the impact is considered irreversible (Figure 10.5-2). The north pile will be completely frozen within about two years after cessation of deposition activities and an active layer will develop in the deposited processed kimberlite. The environmental consequence is low to moderate, but the impacts are limited to locations within the LSA (Figure 10.5-2).

### 10.5.2.5 Impact of Ground Ice on Containment Structures

***Massive ground ice was not found at the site***

The overburden and near-surface bedrock do not contain any substantial zones of massive ground ice, based on investigations carried out on the site. Nevertheless, potential effects of ground ice will be addressed.

***Foundation preparation will be carried out for the containment structures***

In general, prior to construction of any fills for the containment structures, the foundation area will be prepared. This preparation will include removal of all organic and mineral soils down to the bedrock surface. Highly fractured bedrock which contains substantial quantities of ground ice will also be removed. The initial embankment construction will then be completed on this prepared foundation.

***Linkage is invalid***

Because of these reasons, the link between the presence of ground ice and the stability of containment structures is considered invalid and no assessment was done.

### 10.5.2.6 Freeze-back of the North Pile and Climate Change

***Pore water will be collected and treated***

During operation and closure of the north pile, all pore water expelled from the processed kimberlite will be collected and directed to the water treatment plant for treatment.

***The north pile will freeze within two years of closure***

Thermal modelling of the north pile indicates that the entire pile will be frozen within two years after cessation of deposition of processed kimberlite. After this time, an active layer will develop near the surface of the pile on an annual basis. Provided the perimeter collection system is maintained for this period, no further pore water expulsion should occur as a result of freeze-back of the north pile. Therefore, the link between the freeze-back of the north pile and water quality is considered invalid.

**Figure 10.5-2 Classification of Residual Impacts to Ground Thermal Regime**

***Porewater from the north pile would reach surface waters if the pile thawed in post-closure***

Thawing of the permafrost due to climate change could lead to further consolidation of the processed kimberlite which would ultimately lead to additional expulsion of pore water. If the north pile thaws during post-closure, pore water would seep to surface waters. This linkage is valid, but it is addressed appropriately in water quality (Section 9.4).

***Buildings will not be impacted by thawing of ground ice***

All other structures required for the mill and ancillary facilities on the site will be constructed either on piles socketed into bedrock or on footings or slabs constructed on an non-frost susceptible fill or on bedrock. Therefore, buildings will not be impacted by the thawing of ground ice.

***The linkage between global warming and effects on the project is invalid***

The linkage between impacts of changes due to global warming on the project is not valid, with the exception of porewater mentioned above, for the following reasons:

- the north pile has been designed to be stable if the pile material is unfrozen;
- site roads and the airstrip are constructed of non-frost susceptible fill; and,
- the mill and ancillary facilities are not supported by permafrost surfaces.

# 10.5.3 Ecological Land Classification and Biodiversity

## 10.5.3.1 Direct Loss

***The environmental consequence of direct loss due to disturbance is low for most ELC units***

The Snap Lake Diamond Project will result in the direct loss or alteration of 559.5 ha of ELC units in the LSA and an additional 83.7 ha of ELC units in the RSA during construction and operation of the project. Specifically, eight ELC units will be lost or altered by the Snap Lake Diamond Project, including heath/boulder, esker complex, heath tundra, open spruce forest, birch seep, tussock-hummock, sedge wetland, and deep water. The losses that will result from site clearing and site disturbance represent a relatively small area and will not result in the complete removal of any one ELC unit. Moreover, it is expected that ongoing reclamation and closure initiatives will allow half of these ELC units to be reclaimed in the far future (100 years). The environmental consequence is low for all ELC units except heath/boulder (Figure 10.5-3). Environmental consequence is not assigned to the heath/boulder unit, since the direction is positive (*i.e.*, the area of this unit will increase).

***Heath tundra, heath boulder, birch seep, and esker complex are expected to be reversible in the long-term***

Impacts to heath/boulder, esker complex, heath tundra, and birch seep ELC units are expected to be reversible in the long-term since they will re-establish in the far future (100 years). When borrow materials are no longer needed, the esker will be re-contoured; vegetation communities are expected to re-establish in the far future. As such, the esker should re-establish as a viable ecosystem that will continue to function as suitable habitat for plant species as well as wildlife. The heath tundra unit will re-establish in the far future following road closure. There will be a permanent loss to one small lake in the LSA; as such, the impact to deep water is considered to be irreversible.

***The geographic extent for all ELC units except heath tundra and esker complex is local***

The geographical extent of six ELC units (Table 10.3-14) is considered to be local since the majority of disturbances to these ELC units will occur in the LSA. Heath tundra will be affected by the access roads in the RSA and the esker complex is in the RSA; therefore, the geographical extent for these ELC units is considered regional.

***Impacts to open spruce forests will have a low environmental consequence, although the impact is irreversible***

Impacts to open spruce forests are assigned an environmental consequence of low. Since the majority of disturbance to open spruce forests will occur in the LSA, the geographical extent is considered to be local. The magnitude is negligible since the change to open spruce forests is -0.3% in the RSA. The impacts are considered to be irreversible since there are currently no plans to re-establish open black spruce forests in the far future.

***Impacts to tussock-hummock and sedge wetlands will have a low consequence***

Impacts to tussock-hummocks and sedge wetlands are classified as having a low environmental consequence. The impacts are considered to be negative in direction, negligible in magnitude, medium-term in duration, and irreversible.

***Environmental consequence of impacts to VECs is low to moderate***

The two valued ecosystem components (VECs) identified include rare plant potential and traditional plant potential. The environmental consequence of impacts assigned to rare plant potential and traditional plant potential is classified as moderate and low, respectively.

***ELC units assigned a rare plant potential of high will be lost or altered due to the project***

There will be no known loss to rare plants since the rare plant identified during the field program is not located near any proposed activity. It is possible that other rare plants may be present in the LSA and RSA that were not identified. The loss to areas with a high rare plant potential is negligible in magnitude since the change is -0.3% in the RSA; however, the purposes of this assessment, the impact is considered irreversible.

***Impacts to traditional plant potential is a low consequence***

Impacts to traditional plant potential is considered to have a low environmental consequence. The majority of ELC units having a high traditional plant potential will either not be disturbed or they will be reclaimed in the far future.

**Figure 10.5-3 Classification of Residual Impacts to Ecological Land Classification Units**

### 10.5.3.2 Biodiversity

***The overall effect on landscape level biodiversity is a decrease in mean patch size***

Potential impacts on biodiversity were assessed at the landscape and ecosystem levels. At the landscape level, changes to biodiversity as a result of the Snap Lake Diamond Project were variable and ranged from changes in the number of patches, patch size, and distances between patches (*i.e.*, mean nearest neighbour). In general, the mean patch size in the LSA will decrease as a result of the project. The number of patches of heath/ bedrock/ boulder and open/closed spruce forest will increase, resulting in a decrease in the distance between patches (*i.e.*, mean nearest neighbour). The reverse will occur in tussock-hummock/sedge wetlands.

***Landscape level biodiversity differs between the winter and summer, due to the use of access roads in the winter***

Landscape level biodiversity indices differ between the winter and summer months in the RSA due to the use of winter access roads. This assessment includes both the mine footprint and the access roads. In general, the mean patch size in the RSA will decrease. The number of patches of heath tundra, open/closed spruce forest and deep/shallow water will increase in both the summer and winter, while the number of patches of birch seep/tall riparian shrub and tussock-hummock/sedge wetlands will decrease in both seasons. Some of the differences between summer and winter may not affect functional biodiversity due to the surficial nature of winter roads compared to permanent roads (*e.g.*, winter road on ice over deep water). Heath/bedrock/boulder ELC units will show the greatest seasonal change.

***Environmental consequence will be low***

The overall environmental consequence on landscape level biodiversity is predicted to be low since the size of the impact is relatively small (Figure 10.5-4). Moreover, ongoing reclamation and closure planning will allow landscape level biodiversity to be reclaimed in the far future.

***The environmental consequences assigned to the biodiversity potentials are considered low***

Ecosystem level biodiversity was assessed in terms of high, moderate, and low biodiversity potentials that were assigned to each ELC unit (Figure 10.5-4). The environmental consequences assigned to the biodiversity potentials are considered low since the magnitude of change in the RSA is <10% and the effects are considered reversible in the long-term since reclamation and closure initiatives will ensure that the impact area will be reclaimed to an equivalent capability in the far future.

### 10.5.3.3 Vegetation Health

***Impacts on plant health from air emissions will be limited to road dust***

Impacts on plant health from air emissions will be limited to dust since impacts from potential acid input and other emissions will only occur within the mine footprint, which will be disturbed by site clearing and site disturbance. Overall, the environmental consequence from road dust on plant health (*i.e.*, ELC units) is low (Figure 10.5-5). There is, however, a potential for a decline in plant health in some of the species that comprise

these ELC units. The potential effects on plant health will not continue once the Snap Lake Diamond Project area is reclaimed and therefore, the effects are considered reversible in the short-term.

***Overall, the environmental consequence on ecological land classification units potentially affected by water releases is considered negligible***

Overall, the environmental consequence of water releases on plant health (*i.e.*, ELC units), that include open spruce forest, birch seep, tussock hummock, sedge wetlands, and deep water, is considered negligible (Figure 10.5-6). The amount of runoff and disruption of natural drainage patterns are expected to be minimal. Moreover, closure planning will ensure that pre-development drainage patterns will be reclaimed. Impacts are considered reversible in the short-term since reclamation measures will reclaim drainage patterns to pre-development patterns.

# 10.5.4 Wildlife

## 10.5.4.1 Wildlife Habitat

***Direct and indirect loss of habitat may occur***

Several activities associated with the Snap Lake Diamond Project are predicted to result in either a direct or indirect loss of habitat for wildlife VECs. Direct habitat loss occurs through the physical removal or alteration of vegetation communities. Indirect habitat loss can occur through the effects of dust on vegetation. The potential impacts of direct and indirect loss are summarized below.

***Habitat loss reduces the landscape's capacity to support wildlife***

Of all possible sources of impact from the Snap Lake Diamond Project construction and operations, habitat loss is one of the most important as it reduces the landscape's capacity to support wildlife. A direct loss of habitat is predicted to occur as a result of site clearing.

***The loss of suitable habitat is predicted to be negligible to moderate in magnitude***

Based on estimates of home range size, the proportion of suitable habitat lost from an individual's home range due to construction of the mine is predicted to be negligible to moderate in magnitude for all wildlife VECs (Figure 10.5-7). Due to the large home range size of caribou, for example, the proportion of quality forage and travel habitats lost from the home range of one individual was determined to be less than 0.01%. Similarly, the fraction of suitable habitat types lost from the home range of grizzly bears and wolves was calculated to be less than 0.5%, while the proportion of habitat types lost from an individual wolverine home range was less than 9%. Since 28% of the fox home range may be lost, the magnitude of the impact is classified as moderate. For waterfowl, the loss of sedge wetland and deep water habitats is expected to account for less than 9% of the home range of an individual. Habitat loss within the LSA is expected to have little or no impact on foraging opportunities for a raptor, and the impact to breeding habitat is negligible given the paucity of suitable nest sites within the project area.

**Figure 10.5-4 Classification of Residual Impacts to Biodiversity**

**Figure 10.5-5 Classification of Residual Impacts of Air Emissions to Vegetation Health**

**Figure 10.5-6 Classification of Residual Impacts of Water Releases to Plant Health**

**Figure 10.5-7 Classification of Residual Impacts of Site Clearing to Wildlife Habitat**

***Magnitude of habitat loss for upland breeding birds is expected to be low***

An analysis of the impact of direct habitat loss for upland breeding birds indicated that habitat losses equalling the home range (0.5 to 5 ha) of a number of individuals is anticipated within the LSA. Thus, it is expected that the abundance of upland breeding birds within the LSA will decrease, but the effective loss from the local population within the RSA should be minimal. It is estimated the nesting and foraging habitat for about 52 individuals would be lost within the LSA. But given the density of upland breeding birds, the number of potential breeding pairs lost by the removal of habitat should not influence the year-to-year change in abundance of any population. Overall, it is anticipated that the impacts are highly likely to be local in extent and for relatively few individuals, and the environmental consequence of the impact is predicted to be low (Figure 10.5-7).

***The environmental consequence of direct habitat loss is predicted to be low for all wildlife VECs***

The geographic extent of direct impacts to habitat will be local. Although direct habitat loss will be of medium-term duration, reclamation will continue beyond mine closure. Re-vegetation of disturbed areas is expected to be reversible within the successional time frame of native plant species. Therefore, the impact on wildlife habitat will be reversible in the long-term (100 years). Therefore, the overall environmental consequence of direct habitat loss from construction of the mine is predicted to be low for all wildlife VECs.

***The most adverse effects of dust will occur adjacent to the dust source***

Dust could reduce the quantity or health of vegetation and, therefore, reduce the quality of habitat. The magnitude of the impact from dust on wildlife habitat is predicted to be negligible to low, when the home range size is considered (Figure 10.5-8). The geographic extent is expected to be regional. Analysis of air emissions indicated that the accumulation of dust within 500 m of the project footprint (*i.e.*, LSA) and a small area beyond the LSA near the quarry will be above NWT standards for total suspended particulates. Dust will blow more or less continuously beyond this area, but vegetation studies concluded that the most adverse effects will occur immediately adjacent to the dust source and should be reversible over the short-term. The wildlife habitat assessment of this information considers the relative importance of dust effects compared to the home range sizes.

***Reclamation produces a positive impact***

The objective of reclamation for the Snap Lake Diamond Project is to return wildlife habitat to an equivalent capacity. The direction of the impact is positive; therefore, the environmental consequence of reclamation activities is not calculated.

***There is a large degree of uncertainty associated with climate change predictions***

The uncertainty of predictions related to climate change models and potential effects on the Snap Lake site is high. One prediction is that over the next 100 years, the ideal range from some forest species could shift

northward by as much as 500 km. If this were to occur, the boreal forest would occupy a substantial portion of what is now tundra habitat, increasing the importance of reclamation to prevent additional losses of habitat associated with the mine footprint in the future.

### 10.5.4.2 Wildlife Movement and Behaviour

***Several activities may potentially have an impact on the movement and behaviour of wildlife VECs***

Traditional knowledge and Elders from communities have maintained that wildlife movements may be affected through noise and the creation of physical or psychological barriers such as roads, airstrips, and building infrastructure. Likewise, sensory disturbance effects, such as noise and ground vibrations from blasting, may be a factor in displacing the movement of wildlife and altering energy budgets. Alternatively, the presence of infrastructure (landfill site, buildings) can potentially attract wildlife species, such as grizzly bears, wolverines and foxes, from adjacent areas by offering food rewards and shelter. Disturbance from mining activities may then lead to changes in the feeding and mating behaviour of animals attracted to the project.

***All activities are predicted to be regional in geographic extent***

Activities linked to changes in wildlife movement and behaviour are predicted to be regional in geographic extent as the zone of influence from each activity will extend beyond the LSA. The duration of blasting, vehicle and aircraft traffic, and winter and esker access roads is anticipated to be medium-term, terminating with the closure of the mine, and will be reversible in the short-term. Duration and reversibility of potential habitat fragmentation, however, is expected to occur over the medium-term and long-term, respectively, as vegetation studies have indicated that re-vegetation will likely take many decades following closure of the mine.

***Magnitude, frequency, and consequence are addressed***

The magnitude, frequency and subsequent environmental consequence of each mining activity on the movement and behaviour of wildlife VECs are summarized below.

***Blasting is predicted to have minimal impact on the movement and behaviour of wildlife VECs***

Because all blasting will occur underground, the magnitude of blasting effects on the movement and behaviour of wildlife VECs is predicted to be negligible to low (Figure 10.5-9). The frequency of sound waves generated from blasting is typically less than 20 Hz and will likely be inaudible or masked by noise from other mining activities. A distance of 1 km, ground vibrations from a blast will be largely undetectable.

**Figure 10.5-8 Classification of Residual Impacts of Dust to Wildlife Habitat**

**Figure 10.5-9 Classification of Residual Impacts of Blasting to Wildlife Movement and Behaviour**

***The magnitude of blasting is predicted to be negligible to low for wildlife VECs***

For wolves, foxes, raptors and waterfowl, the magnitude of the impact of blasting is predicted to be negligible. Baseline studies indicated that no wolf and fox dens, or raptor nest sites were found within 8 km of the mine footprint, and the density of waterfowl was extremely low. For caribou, grizzly bears, wolverines, and upland breeding birds, the magnitude of impact from blasting is predicted to be of low magnitude. This is due to the potential presence of these species adjacent to the LSA. Although baseline surveys indicated that upland breeding birds were nesting within 1 to 2 km of the LSA, ground vibrations from blasting should only minimally affect bird movements and behaviour.

***The environmental consequence of blasting on all wildlife VECs is predicted to be low***

Because blasting will occur periodically during construction and operation of the mine, the frequency of effects from this activity on wildlife VECs is expected to be moderate. Taking all criteria into consideration, the environmental consequence of blasting on all wildlife VECs is anticipated to be low.

***The impact of traffic will be low***

The magnitude of the impact from vehicle and aircraft traffic for all VECs is anticipated to be low (Figure 10.5-10).

***The environmental consequence of vehicle and aircraft traffic is predicted to be low***

The frequency of potential disturbance from vehicles on all-weather roads and aircraft traffic is predicted to be moderate for all wildlife VECs, except for wolverines and foxes. This is due to the seasonal residency of most VECs in the area. However, because wolverines and foxes are annual residents of the RSA, they may be continually exposed to vehicle and aircraft traffic throughout the year. Therefore, a high frequency of potential impact from vehicle and aircraft traffic for wolverines and foxes is predicted. Overall, the environmental consequence of vehicle and aircraft traffic is predicted to be low for all VECs.

***Roads are predicted to have no influence on the movement and behaviour of grizzly bears and all bird species***

Because the operation of the winter and esker access roads will occur when grizzly bears are hibernating, it is anticipated that the winter roads will have no influence on this species. Likewise, because all bird species migrate south before the roads become operational and return subsequent to closure of the roads in spring, the roads are predicted to have no effect on the movement and behaviour of all bird species.

***The magnitude of the impact of the roads for caribou, wolves, wolverines, and foxes is low***

Although the winter and esker access roads are anticipated to have some influence on caribou, wolves, wolverines and foxes, the magnitude of the impact of the roads for these species is predicted to be low (Figure 10.5-11).

***The environmental consequence of the winter and esker access roads is predicted to be low***

The frequency of the potential impact from the winter and esker access roads on the movement and behaviour of caribou, wolves, wolverines and foxes is predicted to be moderate. This is due to the seasonal use of the winter access road (*i.e.*, about 11 weeks per year), and the infrequent use of the esker access road. Consequently, the environmental consequence of the winter and esker access roads on the movement and behaviour of caribou, wolves, wolverines and foxes is predicted to be low.

***The environmental consequence of habitat fragmentation is predicted to be low***

The magnitude of the impact from habitat fragmentation due to the mine site and winter roads, for all VECs is predicted to be negligible (Figure 10.5-12). This prediction is based on the large home range size of several VECs, and vegetation/ biodiversity studies which showed that there was a limited amount of suitable habitat available on the peninsula and that fragmentation effects would be low. The frequency of habitat fragmentation is predicted to be low, occurring once during the initial construction of mine site facilities. Subsequently, the overall environmental consequence of habitat fragmentation on the movement and behaviour of wildlife VECs is predicted to be low.

### 10.5.4.3 Wildlife Abundance

***Several activities/ facilities are considered to have a potential influence on wildlife abundance***

The following activities/facilities are considered to have a potential influence on wildlife abundance:

- direct and indirect mortality from attraction to project footprint;
- direct mortality from wildlife-human interactions;
- direct mortality from vehicle/aircraft collisions;
- potential toxicity from north pile seepage (Section 11.3);
- direct and indirect mortality from fugitive dust (Section 11.3);
- direct and indirect mortality from inhalation of toxic air emissions (Section 11.3);
- direct and indirect mortality from toxic spills (*e.g.*, antifreeze); and,
- increase in legal and illegal hunting and trapping activities from increased access due to the winter and esker access roads.

***Potential impacts are classified***

The magnitude, geographic extent, duration, frequency, reversibility and environmental consequence of the potential effects on the abundance of wildlife VECs is summarized below.

**Figure 10.5-10 Classification of Residual Impacts of Vehicle and Aircraft Traffic to Wildlife Movement and Behaviour**

**Figure 10.5-11 Classification of Residual Impacts of Winter and Esker Access Roads to Wildlife Movement and Behaviour**

**Figure 10.5-12 Classification of Residual Impacts of Habitat Fragmentation to Wildlife Movement and Behaviour**

***The geographic extent of each effect is either local or regional, the duration is medium-term, and the frequency is moderate***

The geographic extent of each effect is either local or regional. Attraction of wildlife to the project is local in extent (*i.e*., limited to the LSA). Effects determined to be regional in geographic extent (*i.e*., limited to the RSA) included wildlife-human interactions, vehicle/aircraft-wildlife collisions, toxic spills and increased access for hunting and trapping. The duration of each effect is anticipated to be medium-term as all mine-related activities will terminate upon closure of the mine. It is expected that a potential moderate frequency of mortality will be associated with each activity for all wildlife VECs. Since there may be more than one fatality during construction and operations and the definition for low frequency is once, the frequency was raised to moderate even though the impact is expected to be infrequent.

***The potential impact of each activity should be reversible within the short-term***

It is predicted that the potential impact of each activity on the abundance of wildlife VECs should be reversible within the short-term. Mitigation should result in minimal losses of individuals, and any change in abundance due to mine-related effects should be compensated by the reproductive potential of the population within the period of construction and operation of the mine.

***Effective mitigation should maintain the environmental consequence of wildlife attraction to the project at a low level***

A key aspect of determining the environmental consequence for wildlife attracted to the project is the implementation of the waste management program, and education and enforcement of policies pertaining to the handling and disposal of food waste. It is anticipated that rigorous application of these programs and policies will result in minimal numbers of wildlife, particularly wolverines and grizzly bears, being attracted to the Snap Lake Diamond Project. If these mitigation measures are effective, then the environmental consequence from attraction to the project on the abundance of grizzly bears, wolverines, wolves, foxes, and upland breeding birds is expected to be low (Figure 10.5-13).

***There is a high degree of uncertainty associated with the reversibility of impacts for grizzly bears and wolverines due to attraction to the project***

However, without information to test the efficacy of these mitigation measures, the success of the waste management program is currently uncertain. Given the uncertainty with mitigation, and the low reproductive rates of grizzly bears and wolverines (*i.e.*, low ecological resilience), there is a high degree of uncertainty associated with the reversibility of impacts in the short-term. If the loss of individuals during construction and early phases of operation approaches natural mortality then the impact of the attraction to the project footprint may not be reversible in the short-term, and would increase the environmental consequence for these species.

***The magnitude of wildlife-human interactions is anticipated to be negligible to moderate for all wildlife VECs***

For all avian species, the magnitude of the impacts from wildlife-human interactions was anticipated to be negligible as upland breeding birds, raptors and waterfowl typically do not interact with humans (Figure 10.5-14). For caribou, wolves, and foxes, the magnitude of the impact was predicted to be low. Because grizzly bears and wolverines are

designated as "species of special concern" (COSEWIC 2001), the loss of even one individual from the local population may be considered an impact of moderate magnitude. The overall environmental consequence of wildlife-human interactions is low for all VECs (Figure 10.5-14).

***The environmental consequence of vehicle/aircraft collisions and toxicity from project-related activities is anticipated to be low***

The environmental consequence of vehicle/aircraft collisions and accidental spills on changes to wildlife abundance is expected to be low (Figures 10.5-15 and 10.5-16). There is a high degree of certainty associated with these predictions; however, the probability of accidental spills resulting in a change in wildlife abundance is low due to the implementation of the spill response plan.

***Increased access for hunting and trapping from winter roads is expected to have low environmental consequence on the abundance of wildlife VECs***

The impact of increased access for hunting and trapping from the winter and esker access roads on the abundance of caribou, wolves, wolverines, and foxes is also anticipated to have a low environmental consequence (Figure 10.5-17). For most VECs, potential losses from increased access will likely be replaced by the population (*i.e.*, high ecological resilience). However, because the reproductive rate and associated ecological resilience of wolverines is low, the confidence in this prediction is only moderate.

***Traditional and scientific knowledge are important in filling current information gaps on terrestrial components***

Traditional knowledge on the distribution of plant and animal species, and the movement and behaviour of caribou and carnivores is well established in northern communities and culture. On the other hand, scientific knowledge of the patterns and processes of Arctic terrestrial ecosystems is currently at the initial stages of development. Several recent advances have been made towards understanding the biology of species such as grizzly bears, wolverines and wolves in the SGP, and the potential impacts of diamond mines on caribou, upland breeding birds and raptors. However, there is still a large degree of uncertainty regarding the potential impacts of human development on vegetation, and the movement and behaviour of wildlife species. By integrating traditional knowledge with scientific knowledge, the number and size of information gaps, and associated uncertainty, should decrease.

***Monitoring studies and community consultation are an important mandate for the Snap Lake Diamond Project***

Due to the limited amount of confidence and associated uncertainty of some of the impact predictions on terrestrial resources, De Beers has implemented several monitoring studies in 2001 for the Snap Lake Diamond Project. Such studies include the potential effects of fugitive dust on vegetation, and the distribution and movement of caribou, grizzly bears, wolves, wolverines, upland breeding birds, and raptors. In addition, visits to the Snap Lake Diamond Project by Elders, and meetings between De Beers and communities are expected to continue. Such proactive involvement will provide continued traditional and scientific knowledge on the potential impacts of the Snap Lake Diamond Project on the terrestrial environment and its resources.

**Figure 10.5-13 Classification of Residual Impacts of Wildlife to the Site to Wildlife Abundance**

**Figure 10.5-14 Classification of Residual Impacts Attractions of Wildlife-Human Interactions to Wildlife Abundance**

**Figure 10.5-15 Classification of Residual Impacts of Vehicle and Aircraft Traffic to Wildlife Abundance**

**Figure 10.5-16 Classification of Residual Impacts of Toxic Spills to Wildlife Abundance**

**Figure 10.5-17 Classification of Residual Impacts of Increased Access for Hunting and Fishing to Wildlife Abundance**

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# 10.7 UNITS, ACRONYMS, AND GLOSSARY

## UNITS

| | |
|---|---|
| θ | volumetric water content; a proportion of volume of water (Vw) to volume of soil or rock (VT); θ=Vw/VT |
| μg/m$^3$ | microgram per cubic metre |
| g | Gram |
| ha | Hectare |
| Hz | Hertz |
| keq/ha/yr | kiloequivalent per hectare per year; keq refers to the number of equivalent hydrogen ions (1 keq = 1 kmol $H^+$) |
| kg | Kilogram |
| km | Kilometre |
| km/hr | kilometre per hour |
| km$^2$ | square kilometre |
| m | Metre |
| m/s | metre per second |
| m/yr | metre per year |
| m$^3$ | cubic metre |
| Mg/m$^3$ | mega grams per cubic metre |
| MJ/m$^3$ °C | mega joules per cubic metre per degree Celsius |
| mm | Millimetre |
| mm/s | millimetre per second |
| $^o$C | degrees Celsius |
| W/m °C | watts per meter per degree Celsius |
| W/m$^2$ | Watt per square metre |

# ACRONYMS

| | |
|---|---|
| 1-D | one-dimensional |
| 2-D | two-dimensional |
| agl | above ground level |
| CA | class area |
| CASA | Clean Air Strategic Alliance |
| CEA | cumulative effects assessment |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| DA | disturbance area |
| De Beers | De Beers Canada Mining Inc. |
| EA | environmental assessment |
| ELC | ecological land classification |
| EMS | environmental management system |
| GIS | geographic information system |
| GNWT | Government of Northwest Territories |
| GPS | global positioning system |
| H | High |
| L | Low |
| LSA | local study area |
| M | Magnitude |
| M | Moderate |
| MNN | mean nearest neighbour |
| MPS | mean patch size |
| MVEIRB | Mackenzie Valley Environmental Impact Review Board |
| N | No |
| $NO_X$ | oxides of nitrogen |

| | |
|---|---|
| non-PAG | non acid generating |
| NP | total number of patches |
| NTS | national topographic system |
| NWT | Northwest Territories |
| PAG | potential acid generating |
| PAH | polycyclic aromatic hydrocarbons |
| PAI | potential acid input |
| PK | processed kimberlite |
| PR | patch richness |
| RSA | regional study area |
| RWED | Resources, Wildlife and Economic Development |
| SE | standard error |
| SGP | Slave Geological Province |
| SHEI | Shannon's evenness |
| $SO_2$ | sulphur dioxide |
| TSP | total suspended particulate |
| VEC | valued ecosystem component |
| WHO | World Health Organization |
| WMP | water management pond |
| Y | Yes |
| YDFNC | Yellowknives Dene First Nation Council |
| YK | Yukon |
| Za | acceleration zone |
| Za/Zv | zonal velocity ratio |
| Zv | velocity zone |

# GLOSSARY

| | |
|---|---|
| *a priori* | relating to or derived by reasoning from self-evident propositions |
| active zone | the near surface portion in permafrost, which is subject to melting during the summer |
| adaptability | ability of individuals within a population to respond to or absorb the effects of a disturbance |
| adaptive management | management method that incorporates change resulting from new research and reclamation approaches that have been developed; is an iterative and ongoing process |
| aerial surveys | the collection of data in a fixed-wing aircraft or helicopter |
| amphibolites | a crystalloblastic (metamorphic) rock consisting mainly of amphibole and plagioclase with little or no quartz |
| analysis of covariance | a statistical procedure used to control for the effect of an independent variable (which covaries with other independent variables) while examining the variation explained by other independent variables |
| analysis of variance | a statistical procedure used to analyze the effect of one or more independent variables on a dependent variable. Determines the amount of variation in a response variable (*e.g.,* density) explained by one or more explicatory variables (*e.g*., habitat, season) |
| antiformal | a fold, convex upward in strata with an unknown stratigraphic sequence |
| application case | represents the impact predicted to occur due to the Snap Lake Diamond Project; this case is based on impact when the project is fully developed and the activities at the mine site will be at a maximum |
| Archean | of, relating to, or being the earliest eon of geological history or the corresponding system of rocks |
| aspect | the direction toward which a slope faces with respect to the compass or the rays of the sun (*e.g.,* the southern aspect of a hill) |
| barren-ground | a term used to describe the Arctic tundra landscape |
| barriers | impediment to wildlife movement or behaviour, *e.g.*, roads, airstrips, facilities |
| baseline case | describes the pre-development environmental setting, against which changes in the environment from the Snap Lake Diamond Project could be assessed |

| | |
|---|---|
| bedrock knoll | a small, low, rounded hill composed of a rock that is usually solid and underlies soil or other unconsolidated, superficial material |
| biodiversity | the variety of life at all levels of organization from gene to landscapes, and the ecological and biological processes through which these levels are connected |
| body condition | health of an organism, particularly relating to the amount of fat |
| boreal | of, relating to, or comprising the northern biotic area characterized especially by dominance of coniferous forests |
| borehole | a circular hole made by boring; a deep vertical hole of small diameter, such as a well (an exploratory oil well or a water well), or a hole made to ascertain the nature of the underlying formations, to obtain samples of the rocks penetrated, or to gather other kinds of geologic information |
| boulder unit | pertaining to the class of boulder sized materials; boulders are larger than a cobble, having a diameter greater than 256 mm, being somewhat rounded or otherwise distinctively shaped by abrasion in the course of transport, the largest rock fragment recognized by sedimentologists |
| brine | water saturated or strongly impregnated with common salt |
| chlorophyll | the green photosynthetic pigment found chiefly in the chloroplasts of plants |
| chlorosis | a diseased condition in green plants marked by yellowing or blanching |
| class area (CA) | area of each patch type |
| connectivity | the degree of connectedness, or cohesion among units |
| contaminants | a general term referring to any chemical compound added to a receiving environment in excess of natural concentrations; the term includes chemicals or effects not generally regarded as “toxic,” such as nutrients, colour and salts |
| critical load | the highest load that will not cause chemical changes leading to long-term harmful effects on the most sensitive ecosystems |
| crustose lichen | a lichen that has a thin thallus adhering closely to a substrate (as of rock, bark, or soil) |
| cryoturbated | resulting from or the product of the stirring, churning, modification, and all other disturbances of soil resulting from frost action; involves frost heaving, solifluction, and differential and mass movements, and has a characteristic patterned ground |

| | |
|---|---|
| cumulative effect assessment (CEA) | presents the predicted ambient environmental quality in the region at some future date; it includes an assessment of the cumulative impacts from the Snap Lake Diamond Project in combination with other existing, approved, or reasonably foreseeable developments in the region |
| deciduous trees | having leaves that shed seasonally or at a certain stage of development in the life cycle |
| diabase | an intrusive rock whose main components are labradorite and pyroxene and which is characterized by ophitic texture |
| direction | describes an impact or effect as being neutral or negative; the direction reflects the change, if any, from baseline |
| dispersal/migration corridors | wildlife habitat used by organisms for dispersal and or migration |
| disturbance | a natural or human-induced process that influences the patterns of species, populations and/or individuals |
| duration | defined as the length of time that an impact will occur; duration and timing have been combined within the definition of duration used in this EA; duration is defined by the timing of the phases of the project |
| dyke | a tabular igneous intrusion that cuts across the planar structures of the surrounding rock |
| dystric brunisol | acid brunisolic soils that have a well developed mineral-organic surface horizon, brunisols are well drained soils found under forest, alpine or tundra vegetation |
| ecological resilience | usually defined as the rate of ecosystem recovery following a disturbance or the capacity of an ecosystem to absorb disturbances |
| emergent vegetation | vegetation in a water body that protrudes above the water surface |
| energy balance | the balance of resources and activities to allow reproduction and survival of wildlife (*e.g.,* time spent feeding, resting, travelling) |
| environmental consequence | the overall effect on the environment when the magnitude, geographic extent, duration, and irreversibility of the project's impact are considered together |
| ericaceous | of, relating to, or being a heath or the heath family |

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| esker | a long, low, narrow, sinuous, steep-sided ridge or mound composed of irregularly stratified sand and gravel that was deposited by a subglacial or englacial stream flowing between ice walls or in an ice tunnel of a continuously retreating glacier, and was left behind when the ice melted; it may be branching and is often discontinuous, and its course is usually at a high angle to the edge of the glacier; eskers range in length from less than a kilometre to more than 160 kilometres, and in height from 3 to 30 metres |
| evenness | measures the distribution or proportions of ELC units across a landscape, which is referred to as the composition of a landscape; a low evenness values would indicate that only a few ELC units are dominant in the landscape; a high evenness values would indicate that all ELC units are evenly distributed across the landscape and are not dominated by one or two ELC units |
| exposure | the contact reaction between a chemical and a biological system, or organism |
| far future scenario | 100 years after closure |
| felsenmeer | a flat or gently sloping area covered with a continuous veneer of large angular and subangular blocks of rock derived from well-jointed underlying bedrock by intensive frost action and usually occurring in situ on high, flat-topped mountains or plateaus above timberline in middle and high latitudes |
| fly-overs | birds identified outside the sample plot |
| forb | a herb other than grass*; e.g.,* flase asphodel, saxifrage and Arctic harebell |
| fragmentation | examines the changes in landscape patterns as a result of natural or human disturbances; the process of reducing size and connectivity of habitats composing a landscape |
| frequency | refers to how often an effect will occur |
| frequency of exposure | number of times within a duration that an animal is in contact with an effect |
| fugitive dust | dust that is difficult to grasp or retain |
| genetic diversity | the variety in the genetic makeup and phenomena of an organism, type, group, or condition |

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| geographic extent | refers to the geographic location where the impact is predicted to occur; a local geographic extent is assigned if the effect is restricted to the LSA; a regional geographical extent is assigned if the effect extends beyond the LSA into some part of the RSA |
| glacial erratics | large rocks transported from other areas and deposited during glacial retreat |
| graminoid | grass like plant |
| granite | any igneous or metamorphic rock occurring below the sedimentary sequence in a particular area; granitoid = adjective |
| granodiorite | a group of coarse-grained plutonic rocks intermediate in composition between quartz diorite and quartz monzonite, containing quartz, plagioclase, and potassium feldspar, with biotite, hornblende, or, more rarely, pyroxene, as the mafic components; also, any member of that group |
| ground survey | the collection of data on land |
| ground thermal regime | the ground's temperature or heat regime |
| heath | any of a family (Ericaceae, the heath family) of shrubby dicotyledonous and often evergreen plants that thrive on open barren usually acid and ill-drained soil |
| high subarctic ecoclimatic region | region characterized by cool air temperatures and a short growing season; geology and recent glaciation have resulted in lower biological productivity and diversity than in the more southerly parts of Canada |
| home range | the area to which an animal usually confines its daily activities |
| hummock | a rounded knoll or hillock |
| hypabyssal | pertaining to an igneous intrusion, or to the rock of that intrusion, whose depth is intermediate between that of abyssal or plutonic and the surface |
| ice lense | a discontinuous layer of ground ice tapering at the periphery; ice lenses in soil commonly occur parallel to each other in repeated layers |
| igneous | relating to, resulting from, or suggestive of the intrusion or extrusion of magma or volcanic activity; igneous rock is formed by the solidification of magma |
| interstitial | relating to or situated to a space that intervenes between things |

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| isopleth | a curve joining points of equal maximum concentrations or deposition values |
| kimberlite | an agglomerate biotite-peridotite that often occurs in pipes and that often contains diamonds |
| lacustrine | pertaining to, produced by, or formed in a lake or lakes; *e.g.*, "lacustrine sands" deposited on the bottom of a lake |
| land classification unit | units of land categorized based on specific properties or suitability for specific purposes |
| landscape scale | consideration of wildlife preferences at the level of a region's landforms |
| leucogabbro | a white variation of gabbro igneous rock, generally found as a black coarse grained intrusive igneous rock similar to basalt |
| level of confidence | directly related to the degree of certainty in the impact prediction |
| lichen | any of numerous complex thallophytic plants made up of an alga and a fungus growing in symbiotic association on a solid surface (as a rock) |
| linkage diagrams | diagram that is used to depict cause and effect pathways |
| linkage pathway | illustrates how various project activities of the Snap Lake Diamond Project can contribute to environmental changes; also demonstrates linkages among different topic areas in the EA |
| macrocrystic | a texture of a rock consisting of or having crystals that are large enough to be distinctly visible to the unaided eye or with the use of a simple lens; also, said of a rock with such a texture |
| macrophyte | plant life especially of a body of water, that is large enough to be seen with the unaided eye |
| magnitude | a measure of the intensity or severity of an impact; it is a measure of the degree of change in a measurement or analysis endpoint |
| mean nearest neighbour (MNN) | mean of the shortest distance between each patch and each adjacent patch of the same type |
| mean patch size (MPS) | average area of each patch type in a landscape |
| mesic | characterized by, relating to, or requiring a moderate amount of moisture |
| metavolcanic | consists mainly of well-foliated high-grade amphibolites |

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| microtopography | topography on a small scale; the term has been applied to features having relief as small as 1-10 centimetres as well as to those involving amplitudes of 50-100 metres and wavelengths of a few kilometres |
| mine footprint | the area covered by the mine site |
| moraine | a mound, ridge, or other distinct accumulation of unsorted, unstratified glacial drift, predominantly till, deposited chiefly by direct action of glacier ice in a variety of topographic landforms that are independent of control by the surface on which the drift lies |
| N-factor | a standard factor applied to air temperatures to estimate the temperature at the ground surface (ground surface temperature = N factor × air temperature) |
| natural variation | disparity in an environmental condition that occurs under natural conditions, without human-induced disturbance |
| necrosis | usually localized death of living tissue |
| non-nursery | group of animals composed of adult females, adult males, adult females and males |
| non-PAG | pure granitic rock that does not have structures containing visible sulphides |
| nursery | group of animals composed of adult females with calves, adults with calves |
| oligo-mesotrophic | low to moderate nutrient productivity |
| opportunity study | a feasibility study in which several options are investigated to determine the most effective strategy |
| organic cryosol | developed primarily from organic material and are underlain by permafrost within 1m of the surface |
| PAG | metavolcanic rock and granitic rock with visible sulphides |
| passerines | small perching birds |
| patch | a specified area of the landscape; can be delineated at various scales |
| patch richness (PR) | number of patches in each ELC unit |
| patch type | the ELC unit (*e.g.*, spruce forest, heath tundra) |
| permafrost | a permanently frozen layer at variable depth below the surface in frigid regions of a planet; permafrost reduces soil water infiltration |

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| phenology | periodic biological phenomena of a kind of organism that are correlated with climatic conditions (*e.g.*, plant flowering period) |
| photosynthesis | synthesis of chemical compounds with the aid of radiant energy; especially formation of carbohydrates from carbon dioxide and a source of hydrogen (as water) in the chlorophyll-containing tissues of plants exposed to light |
| physiological | of or relating to the branch of biology that deals with the functions and activities of life or of living matter (as organs, tissues, or cells) and of the physical and chemical phenomena involved |
| polycyclic aromatic hydrocarbon(s) PAH(s) | a chemical byproduct of petroleum-related industry; aromatics are considered to be highly toxic components of petroleum products; PAHs, many of which are potential carcinogens, are composed of at least two fused benzene rings; toxicity increases along with molecular size and degree of alkylation of the aromatic nucleus |
| potential acid input (PAI) | a measure of the total deposition of sulphur and nitrogen species in both wet and dry forms, minus base cations, and represents an estimate of acid deposition from all sources |
| probability of occurrence | the likelihood that the environmental consequence indicated in the impact prediction will occur if the project goes ahead |
| Proterozoic | the more recent division of the Precambrian; of, relating to, or being the eon of geologic time or the corresponding system of rocks that includes the interval between the Archean and Phanerozoic eons, perhaps exceeds in length all of subsequent geological time, and is marked by rocks that contain fossils indicating the first appearance of eukaryotic organisms (as algae) |
| pseudo-static | dynamic, potential for an earthquake |
| quasi-quantitative analysis | an analysis that possess both a quantitative and qualitative assessment |
| Quaternary | the second period of the Cenozoic era, thought to cover the last two or three million years; of, relating to, or being the geological period from the end of the tertiary to the present time or the corresponding system of rocks |
| rare plant potential | a ranking based on the abundance of rare plant species present in an area |
| reconnaissance flight | collection of additional, but non-systematic, assessment data in a fixed-wing aircraft or helicopter |

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| relative abundance | an estimate of the number of individuals within an area relative to the number of individuals within a larger area |
| residual impact | the amount of impact remaining after mitigation |
| reversibility | refers to changes that occur after the impact ceases allowing the environment to return to a capability or condition equivalent to the baseline |
| riparian | a band of terrestrial habitat that is adjacent to and directly influenced by streams, rivers or lakes |
| risk | the likelihood or probability that the toxic effects associated with a chemical or physical agent will be produced in populations of individuals under their actual conditions of exposure; risk is usually expressed as the probability of occurrence of an adverse effect, *i.e.*, the expected ratio between the number of individuals that would experience an adverse effect at a given time and the total number of individuals exposed to the factor |
| sample plot | a sampling unit used to estimate variables within a patch |
| sedge | any of a family (Cyperaceae, the sedge family) of usually tufted marsh plants differing from the related grasses in having achenes and solid stems; especially: any of a cosmopolitan genus (*Carex*) |
| seismic | of, subject to, or caused by an earthquake |
| sensory disturbance | mining activities that change the behaviour of wildlife; can lead to increased levels of stress and energy expenditure in wildlife, and disruption of feeding and/or mating behaviour |
| serpentinized | to be turned into serpentine, a common rock forming group of minerals with a greasy or silvery lustre and soapy feel, found in both igneous and metamorphic rocks; serpentines are usually compact but may be granular or fibrous, and are always secondary minerals, derived by alteration of magnesium-rich silicate minerals |
| Shannon's evenness (SHEI) index | plant species diversity; a measure of the distribution of plants within an ELC unit |
| sill | tabular body of igneous rock injected while molten between sedimentary or volcanic beds or along foliation planes of metamorphic rocks |
| sinuous ridge | winding, 'snake' like ridge |
| species distribution | the geographic range of an organism |

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| species diversity | the variety of organisms and ecosystems that comprise both the communities of organisms within particular habitats and the physical conditions under which they live; a function of species richness and density; *i.e.*, Shannon-Wiener index |
| species richness | number of unique species |
| spectral signature | the spectral reflective characteristics for a given material |
| sphagnum | any of an order (Sphagnales, containing a single genus *Sphagnum*) of atypical mosses that grow only in wet acid areas where their remains become compacted with other plant debris to form peat |
| stratified sampling approach | sampling from a series of identified subgroups (strata), this ensures that all subgroups are represented in the sample |
| sub-populations | a group of local populations that do not interbreed, but are connected by dispersal (*i.e.*, together they form a metapopulation); the distance between local or sub-populations may be large enough that they experience different environmental factors |
| surficial | of or relating to a surface, *i.e.,* surficial geologic processes |
| systematic and unbounded | not fixed width transects; all animals seen were recorded |
| taiga | a moist subarctic forest dominated by small conifers (spruce and fir); represents the transition zone between the boreal forest and the Arctic tundra |
| talik | a layer of unfrozen ground above, within, or beneath the permanent or temporary permafrost |
| thermistor | an electrical resistor making use of a semiconductor whose resistance varies sharply in a known manner with the temperature; monitors thermal regime |
| topography | the configuration of a surface including its relief and the position of its natural and man-made features |
| toxicity | the inherent potential or capacity of a material to cause adverse effects in a living organism |
| traditional knowledge | information obtained more often through observations during extensive time spent in one geographic location than through information obtained formally by the scientific method, *e.g.*, Aboriginal traditional knowledge |
| traditional plant potential | a ranking based on the abundance of traditional plant species present in an area |

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| trophic levels | one of the hierarchical strata of a food web characterized by organisms which are the same number of steps removed from the primary producers |
| tundra | a level or rolling treeless plain that is characteristic of Arctic and subarctic regions, consists of black mucky soil with a permanently frozen subsoil, and has a dominant vegetation of mosses, lichens, herbs, and dwarf shrubs |
| turbic brunisol | well drained brunisolic soil forming under forest, alpine or tundra vegetation that has been cryoturbated |
| turbic cryosol | develops in mineral material and is markedly cryoturbated, generally occurs on patterned ground such as polygons |
| turbid | thick or opaque with or as if with roiled sediment, *e.g.,* a turbid stream |
| tussock | a compact tuft especially of grass or sedge; *also*: an area of raised solid ground in a marsh or bog that is bound together by roots of low vegetation |
| uncertainty | imperfect knowledge concerning the present or future state of the system under consideration; a component of risk resulting from imperfect knowledge of the degree of hazard or of its spatial and temporal distribution |
| understory | the vegetative layer and especially the trees and shrubs between the forest canopy and the ground cover |
| upland breeding bird species | passerines, ptarmigan, and shorebirds |
| valued ecosystem component (VEC) | a component of the environment that is representative of traditional, public and scientific values, *e.g.*, rare plant potential and traditional plant potential |
| vascular colonizer | plants which have a channel for the conveyance of sap or to a system of such channels |
| veneer | a thin sheet of a material |
| wetland | term for a broad group of wet habitats; wetlands are transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water; wetlands include features that are permanently wet, or intermittently water-covered such as swamps, bogs, muskegs, potholes, swales, glades, slashes and overflow land of river valleys |
| wildlife corridors | corridors of habitat which facilitate the movement of animals between larger patches of habitat |

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| worst-case | a semi-quantitative term referring to the maximum possible exposure, dose or risk, that can conceivably occur, whether or not this exposure, dose, or risk actually occurs is observed in a specific population; it should refer to a hypothetical situation in which everything that can plausibly happen to maximize exposure, dose, or risk does happen; the worst-case may occur in a given population, but since it is usually a very unlikely set of circumstances in most cases, a worst-case estimate will be somewhat higher than what occurs in a specific population |
| xeric | characterized by, relating to, or requiring only a small amount of moisture |
| zone of influence | the geographic area where animal behaviour and activities may be influenced by mining activities |