

# 6 RESOURCE USES

## 6.1 SCOPE OF ASSESSMENT

### 6.1.1 Terms of Reference

**Resource uses are included in the Terms of Reference**

The Resource Uses section of the environmental assessment (EA) for the De Beers Canada Mining Inc. (De Beers) Snap Lake Diamond Project provides information required by the Mackenzie Valley Environmental Impact Review Board (MVEIRB) in the Terms of Reference. The Resource Uses section specifically addresses the Terms of Reference shown in Table 6.1-1. The entire Terms of Reference may be found in Appendix I.2.

**Table 6.1-1 Terms of Reference for Resource Uses**

TOR Section	Environmental Assessment or Topic
2.5.2	<p><b>Description of Existing Environment</b></p> <p>De Beers shall provide a brief and clear textual and graphic depiction of the existing environment and its use, as it pertains to the potential impacts of the proposed development. The existing environmental includes the resources being extracted over the life of the mine, and contemporary/past land use and occupancy in the region, whether industrial or aboriginal.</p>
2.7.1 2.7.2	<p><b>Cultural and Heritage Resources</b></p> <p>Describe potential impacts of the proposed development on cultural and heritage resources.</p> <p><b>Land and Resources Use</b></p> <p>Analyse and describe the proposed development's impact on land and resource uses potentially impacted by the proposed development.</p> <p>De Beers shall submit its informed view of "ecologically representative areas" in the ecoregion as defined in the NWT Protected Areas Strategy, as may be required for any adequate monitoring of impacts at a regional scale. Include maps and, or, verbal descriptions of existing and past land and resources uses in relation to the proposed development. For additional clarity, include at least the following land and resource uses:</p> <ul style="list-style-type: none"> <li>I. rare or ecologically significant areas;</li> <li>II. traditionally significant areas;</li> <li>III. seasonal camp areas;</li> <li>IV. permanent camp areas, including the Lupin Winter Road and maintenance camp at Lockhart Lake; and</li> <li>V. hunting, trapping, outfitting, recreational, tourism, commercial and sport fishing areas.</li> </ul>
2.7.8	<p><b>Visual and Aesthetic Resources</b></p> <p>Assess the visual and aesthetic impact of the proposed development. Report design components that mitigate visual and aesthetic impacts.</p>

Source: Terms of Reference and Work Plan for the Environmental Assessment of the De Beers Canada Mining Inc. Snap Lake Diamond Project, September 20, 2001 Issued by: MVEIRB.

## 6.1.2 Component Description and Organization

*There are five components to resource uses*

To address the EA Terms of Reference, the Resource Uses section has been subdivided into five subsections:

- heritage resources;
- traditional land use;
- non-traditional resource use;
- aesthetic quality; and,
- Tibbitt-Contwoyto winter road.

*Each component in Resource Uses is described*

The heritage resource section includes information on archaeological resources. Traditional land use includes information on traditionally significant areas. The non-traditional resource use section includes information on ecologically representative areas; granular resources and other subsurface resources; domestic, sport and commercial hunting, trapping and fishing; recreation and tourism; and access (with the exception of the Tibbitt-Contwoyto winter road). Aesthetic quality includes visual aesthetics. Noise is found in Section 8; however, the effects of noise on resource uses is found in this section. The Tibbitt-Contwoyto winter road includes access associated with this winter road and the Lockhart Lake camp (also called Lockhart Camp).

*The term “traditionally significant areas” is required in the Terms of Reference*

It should be noted that “traditionally significant areas” is a term used by the MVEIRB in the Snap Lake Terms of Reference. Use of the word “significant” in this term is not intended to designate significance with respect to impacts, but is used as directed by the MVEIRB in the Terms of Reference.

*The term “cultural and heritage resources” refers to archaeological resources*

In addition, the term “cultural and heritage resources” has been used by the MVEIRB in the Terms of Reference. The work conducted for the Snap Lake Diamond Project EA and discussed in Section 6.2 consists of archaeological investigations that identify areas where physical evidence has been found. As directed by the MVEIRB, the term cultural and heritage resources is used rather than the more descriptive term archaeological investigations.

*Each subsection has two parts*

Each subsection of Resource Uses is organized under two main headings:

- baseline; and,
- impact assessment.

**CEA is found in  
Section 12.3**

The cumulative effects assessment (CEA) case representing the combined effects of the Snap Lake Diamond Project with other projects that overlap in space and time is addressed in Section 12.3.

## 6.1.3 Assessment Approach

**The assessment  
approach followed  
a number of steps**

The assessment approach followed a number of steps. Key issues were identified and key questions developed based upon the identified issues. The impact of the Snap Lake Diamond Project on each resource component was identified and mitigation measures were applied. Potential impacts after mitigation were identified and a detailed assessment was conducted on these residual impacts. A classification system was developed to assess the residual impacts.

### 6.1.3.1 Key Issues and Key Questions

**Issues were  
identified by a  
variety of means**

The assessment process begins with the identification of issues associated with the Snap Lake Diamond Project that are important to potentially affected stakeholders. Issues were identified by a variety of means:

- EA Terms of Reference;
- traditional knowledge reports and other community reports;
- community consultation;
- discussions with territorial and federal regulators;
- information provided in EAs for similar developments within the North Slave area;
- scientific literature; and,
- experience of De Beers' staff and their consultants.

**People want  
archaeological  
and ancestral  
sites protected**

During consultations, all communities identified the need to ensure artifacts found within the Snap Lake area are not disturbed or removed. Through their traditional knowledge study of Ek'ati, the Yellowknives Dene identified the need to protect archaeological and ancestral sites.

*Birth and burial places are of immense significance to the people because they tie the people irrevocably to the land: they are indigenous in a way that incomers and visitors cannot be (Weledeh Yellowknives Dene 1997).*

***People want traditional land use areas protected***

Issues identified to date relate to the historical importance of the land to the people and wildlife that use it, and the need to continue to have land available to be used as people have always been able to use it. Community members identified the need to protect traditional land use areas related to fishing, hunting, caribou migration routes, burial sites, and sites of cultural and spiritual importance.

***Issues associated with fish and wildlife (i.e., issues not related to their use) are located elsewhere***

The potential loss of fishing and hunting opportunities as a result of mining activities was identified as an issue. The potential loss of these opportunities is clearly linked to traditional land use. Issues associated with fish and wildlife species (e.g., habitat, abundance) are found in Sections 9.5 and 10.4.

*In the old-timers days I used to live around there (Na Yaghe Kue). My uncle Louie and other Drybones. In 1944-45, around MacKay Lake, my uncle Louie had a house. Louie and I used to live there every year. We would trap all around there. I remember it in bits. It's like a dream. I was young then (August Enzo) (Lutsel K'e Dene First Nation 2001b).*

*For Weledeh Yellowknives Dene, their identity, history, and relation to their ancestral lands derives from having been born to the land, having lived with the land since time immemorial, and holding knowledge of evidence that their ancestors remain with the land. Birth and burial places within the people's ancestral lands are of the greatest possible significance to the Dene (Weledeh Yellowknives Dene 1997).*

***Increased access was identified***

The North Slave Métis are concerned that increased access through winter roads will result in unneeded killing of caribou.

*... increased ease of access on the winter road will result in more unnecessary killing of caribou by "weekend warriors", i.e., people who do not value or respect caribou the way the North Slave Métis do (NSMA no date).*

***The Tibbitt-Contwoyto winter road capacity was identified***

During consultations with government agencies, non-government organizations, and communities, the capacity of the winter road has been brought forward. The Yellowknives Dene are concerned that when the winter road is located over currents and channels, trucks might break through because of thin ice in these areas (Weledeh Yellowknives Dene 1997).

**Key questions  
were identified**

Based upon the issues identified, key questions were developed for each component of the Resource Uses section (Table 6.1-2). The purpose of the assessment is to answer the key questions. Two key questions have been developed for heritage resources, two for traditional land use, three for non-traditional resource use, one for aesthetic quality, and two for the Tibbitt-Contwoyto winter road.

**Table 6.1-2 Key Questions Related to Resource Uses**

Question Number	Key Question
HR-1	What impacts will the Snap Lake Diamond Project have on heritage resources?
HR-2	What impacts will the Snap Lake winter access road have on heritage resources?
TLU-1	What impacts will the Snap Lake Diamond Project have on the availability of land for traditional land use purposes?
TLU-2	What impacts will the Snap Lake Diamond Project have on traditionally significant areas?
RU-1	What impacts will the Snap Lake Diamond Project have on existing protected ecologically representative areas?
RU-2	What impacts will the Snap Lake Diamond Project on the potential to establish protected areas?
RU-3	What impacts will the Snap Lake Diamond Project have on natural resource use?
VQ-1	What impacts will the Snap Lake Diamond Project have on the visual quality of Snap Lake and environs?
TCWR-1	What impact will the Snap Lake Diamond Project have on the Lockhart Lake camp?
TCWR-2	What impact will the Snap Lake Diamond Project have on the Tibbitt-Contwoyto winter road?

**6.1.3.2 Impact Assessment****Linkages between  
project activities  
and environmental  
effects are  
analyzed to  
determine if they  
are valid**

Once the key questions were identified, the impact analysis examined ways that the Snap Lake Diamond Project could result in changes to the environment. For a change to occur, a pathway, or linkage, between the project activity and the component of the environment being examined must be present. Section 3, Project Description, and the baseline information in this section were used to determine linkages between the specific activities and resulting changes in the environment (*e.g.*, changes resulting in loss of land, or changes resulting in loss of heritage resources). These changes, in turn, could impact components such as environmentally important areas or traditional land use. Each section contains a diagram showing these linkages and analyzes each link to determine if it is valid or invalid. If the linkage was valid, the assessment proceeded.

**Impacts that may  
persist after  
mitigation are  
residual impacts**

Mitigation measures to minimize potential impacts to the environment were then identified. For some activities, mitigation may have eliminated the

potential impact. Potential impacts that were likely to persist after mitigation were identified as residual impacts.

*A detailed analysis is conducted on the residual impacts*

A detailed analysis was conducted on the residual impacts. The analysis was quantitative where possible, using field studies, literature reviews, and interviews as appropriate. A qualitative approach was used to answer some questions. Traditional knowledge and community information were incorporated wherever available. The impacts were analyzed at local and regional scales.

*The residual impact is described as direction, magnitude, geographic extent, etc.*

Next, the residual impact was classified using the following criteria: direction, magnitude, geographic extent, duration, reversibility, and frequency. The definitions associated with the criteria (*e.g.*, high, moderate, low or negligible magnitude) are provided in Section 6.1.5.2.

### 6.1.3.3 Temporal Considerations

*Construction will begin in 2003 and last three years and the project will continue until closure in 2028*

The Resource Uses section assesses the impacts of the construction, operation, closure, and post-closure phases of the Snap Lake Diamond Project. Assuming the permits for construction and operation are received during the first quarter of 2003, a pre-construction work program will begin the same year. Full construction will begin in early 2004 and be completed by the end of 2005. The production phase will be approximately 22 years from 2005 to 2026, although pre-production mining from underground development will occur from 2003 to 2005. The site closure activities will begin in 2026, but will be carried out primarily in 2027, with limited final clean-up and the continuation of effectiveness monitoring in 2028. Reclamation and monitoring of the effectiveness of reclamation techniques will occur during the operational phase. The total elapsed duration proposed for the project is 26 years. The proposed schedule for the Snap Lake Diamond Project is provided in more detail in the Project Description (Section 3.2).

### 6.1.4 Study Area

*The impacts are assessed regionally and locally*

The impacts of the Snap Lake Diamond Project on resource uses are assessed at two scales. All resource use components, except the Tibbitt-Contwoyto winter road, use two study areas: the regional study area (RSA) and the local study area (LSA) (Figure 6.1-1). The RSA has the same definition for all resource use components using this study area. The LSA shown on Figure 6.1-1 applies to traditional and non-traditional resource uses, and aesthetic quality assessments. The LSA is defined differently for heritage resources and the Tibbitt-Contwoyto winter road.

**Figure 6.1-1 Local and Regional Study Areas for Resource Uses**

*The regional study area, located within a 31 km radius of the site, was selected to assess impacts beyond the local study area*

The RSA is defined as the area within a 31 kilometre (km) radius of the centre of the active mine site (Figure 6.1-1). It includes the major project elements such as gravel source and winter access roads, and is consistent with the area selected for terrestrial resources. The outside southern boundary is situated approximately 180 km northeast of Yellowknife. The RSA was selected to assess and quantify impact areas that are situated outside the LSA but may be affected by the Snap Lake Diamond Project.

*A local study area was established*

For traditional land use, non-traditional land use, and aesthetic quality, the LSA is the area that will be directly disturbed by the active mine site. It is defined as the mine footprint with a 500 metre (m) buffer (Figure 6.1-1). A 500 m buffer around the mine footprint provides suitable area to assess all direct impacts from mine related activities. For example, all direct impacts from mine clearing and landform alteration will be confined to the mine footprint, which is situated within the LSA.

*Heritage resources has its own local study area defined*

For heritage resources, effects will occur directly within the areas scheduled for all land surface disturbance, including parts of the winter roads and gravel extraction from the esker south of the site. Consequently, the LSA adopted for each of the heritage resource studies conducted for the Snap Lake Diamond Project includes only those areas potentially directly affected by the proposed construction of the sequential stages of development of the project. These have been defined in the Northwest Territories (NWT) Archaeologist Permit reports and are summarized in Section 6.2.

*The Tibbitt-Contwoyto winter road has its own local study area defined*

For the Tibbitt-Contwoyto winter road, the LSA is defined as the area adjacent to the winter road from Tibbitt Lake to the point of exit off the Tibbitt-Contwoyto winter road to the Snap Lake winter access road (Figure 6.1-2). This exit point is located at km 222 of the Tibbitt-Contwoyto winter road.

## 6.1.5 General Assessment Method

*Residual impacts are based on a classification system*

The classification of residual impacts identified in all five subsections is based on the direction, magnitude, geographic extent, duration, reversibility, and frequency of the impact as described in Section 6.1.5.1. Determination of overall environmental consequence is described in Section 6.1.5.3.

### 6.1.5.1 Residual Impact Criteria

*The importance of residual effects is assessed by using specific criteria*

The following criteria are listed in Section 2.5.4 of the final Terms of Reference (MVEIRB 2001):

**Figure 6.1-2 Tibbitt-Contwoyto Winter Road Local Study Area**

- magnitude;
- geographic extent;
- timing;
- duration;
- frequency;
- reversibility of impacts;
- ecological resilience; and,
- probability of occurrence and confidence level.

***Classification terms are defined***

This section defines all of the impact classification terms as they are used in the Resource Uses section of this EA. The classification used in this report follows the above list; however, there are some changes and additions that are described below.

***Direction describes the impact predicted***

**Direction** is an addition to the above list. Direction describes a predicted residual impact or effect as being neutral, positive or negative with respect to the key question. For instance, loss of archaeological sites would be considered negative in direction, while increased access or improvement to existing access could be considered a positive impact to non-traditional resource use.

***Magnitude is a measure of the intensity or severity of the impact***

**Magnitude** is 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. For example, the complete removal of a unique archaeological site will have a greater magnitude than the loss of an archaeological site where the types of artifacts are found in abundance elsewhere in the area. Magnitude is classified into four levels as negligible, low, moderate, and high; the definitions of these terms are specific to each component (*e.g.*, traditional land use and aesthetic quality).

***Geographic extent describes the location***

**Geographic extent** refers to the geographical location where the predicted residual impact is expected to occur and is classified as local, regional or beyond regional. A local classification is assigned if the residual impact is predicted to occur within the LSA. A regional classification is assigned if the residual impact is predicted to occur beyond the LSA and in the RSA. If the predicted residual impact is located outside of the RSA, a beyond regional classification is assigned.

***Frequency defines how often the impact occurs***

**Frequency** describes how often the effect occurs and is classified as low, medium or high. The time period is defined by the duration.

*Duration includes timing because the duration is based on project phases*

**Duration** refers to the length of time over which a predicted environmental impact occurs. 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. Short-term is defined as three-years, which is the length of the construction phase. Medium-term is defined as 26 years and includes the operational phase of the project. Long-term is defined as >26 years and is related to post closure of the project. The years in which the durations are expected to occur (*i.e.*, the timing of the project) are provided in Section 6.1.3.3.

*Reversibility is the potential for recovery*

**Reversibility** is an indicator of the potential for recovery from the predicted impact. The reversibility category is classified as reversible in the short term, reversible in the long term or irreversible.

*Ecological resilience is not applicable to resource uses*

**Ecological resilience** is usually defined as the rate of ecosystem recovery following a disturbance, or the capacity of an ecosystem to absorb disturbance. Ecological resilience related to resource use is not applicable, as it is the use of the resources that is being assessed not the capability of the resources to withstand disturbance. Ecological resilience related to Terrestrial Resources is described in Section 10. Ecological resilience related to Aquatic Resources is described in Section 9.

*Probability of occurrence will usually be low*

**Probability of Occurrence** is the likelihood that the environmental consequence indicated in the impact prediction will occur if the project goes ahead. Probability of occurrence will usually be low because most predictions are conservative and, therefore, overestimate the impact.

*Level of confidence is linked to certainty*

**Level of Confidence** is directly related to the degree of certainty in the impact prediction.

### 6.1.5.2 Definitions of Criteria

*Table 6.1-3 defines words such as low or high used to rank impacts*

The criteria described above are ranked for each section of Resource Uses. Definitions for the ranking of some criteria such as geographic extent, duration, reversibility, and frequency have been standardized. However the ranking of magnitude is often specific to the component being examined since there is an element of professional judgement needed to assign the levels. The definitions of each level are provided in Table 6.1-3. This makes the classification process transparent since reviewers can see exactly what is meant by words such as low or high.

**Table 6.1-3 Definitions of Impact Criteria for Resource Uses**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency
<b>Heritage resources</b>	<p><b>Positive:</b> increase in information;</p> <p><b>Negative:</b> loss of resources and/or contextual information.</p>	<p><b>Negligible:</b> no physical impact occurs or no archaeological sites are expected to be present;</p> <p><b>Low:</b> minimal impact to valuable resources, or resources are few and of low value;</p> <p><b>Moderate:</b> partial impact to resources of high or moderate archaeological value;</p> <p><b>High:</b> severe physical impact to resources of high archaeological value.</p>	<p><b>Local:</b> effect restricted to areas of direct physical disturbance (local study area);</p> <p><b>Regional:</b> effect extends to indirect effects of increased access/use in the region.</p>	<p><b>Short-term:</b> &lt;3 years – includes the construction phase;</p> <p><b>Medium-term:</b> 26 years – includes the operation phase;</p> <p><b>Long-term:</b> &gt;26 years.</p>	<p><b>Reversible in the short-term:</b> predicted impact is reversible after mine closure;</p> <p><b>Reversible in the long-term:</b> predicted impact is reversible in 100 years;</p> <p><b>Irreversible:</b> predicted impact cannot be reversed.</p>	Not applicable.
<b>Availability of land for traditional land use purposes</b>	<p><b>Neutral:</b> no change in available land for traditional land use purposes;</p> <p><b>Positive:</b> greater availability of land for traditional land use purposes;</p> <p><b>Negative:</b> loss of land for traditional land use purposes.</p>	<p><b>Negligible:</b> no change in availability of land for traditional land use purposes;</p> <p><b>Low:</b> minimal (&lt;10%) loss of land for traditional land use purposes;</p> <p><b>Moderate:</b> some (10-25%) loss of land for traditional land use purposes;</p> <p><b>High:</b> substantial (&gt;25%) loss of land for traditional land use purposes.</p>	<p><b>Local:</b> loss of land within the local study area;</p> <p><b>Regional:</b> loss of land within the regional study area;</p> <p><b>Beyond Regional:</b> loss of land beyond the regional study area.</p>	<p><b>Short-term:</b> &lt;3 years – includes the construction phase;</p> <p><b>Medium-term:</b> 26 years – includes the operation phase;</p> <p><b>Long-term:</b> &gt;26 years.</p>	<p><b>Reversible in the short-term:</b> predicted impact is reversible after mine closure;</p> <p><b>Reversible in the long-term:</b> predicted impact is reversible in 100 years;</p> <p><b>Irreversible:</b> predicted impact cannot be reversed.</p>	<p><b>Low:</b> occurs once;</p> <p><b>Medium:</b> occurs intermittently;</p> <p><b>High:</b> occurs continuously.</p>

**Table 6.1-3 Definitions of Impact Criteria for Resource Uses (continued)**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency
<b>Ecologically representative areas</b>	<p><b>Neutral:</b> no change in ecologically representative areas or no change in the possibility to establish ecologically representative areas;</p> <p><b>Positive:</b> increase in ecologically representative areas or the possibility to establish ecologically representative areas;</p> <p><b>Negative:</b> decrease in ecologically representative areas or the possibility to establish ecologically representative areas.</p>	<p><b>Negligible:</b> no change in ecologically representative areas;</p> <p><b>Low:</b> minimal (&lt;10%) loss of potential ecologically representative areas;</p> <p><b>Moderate:</b> moderate (10 – 25%) loss of potential ecologically representative areas;</p> <p><b>High:</b> substantial (&gt;25%) loss of potential ecologically representative areas.</p>	<p><b>Local:</b> effect is restricted to the local study area (e.g., mine footprint plus 500 m);</p> <p><b>Regional:</b> effect extends beyond the local study area into the regional study area;</p> <p><b>Beyond Regional:</b> effect extends beyond the regional study area.</p>	<p><b>Short-term:</b> 3 years includes pre-construction and construction phases;</p> <p><b>Medium-term:</b> 26 years includes operation phase;</p> <p><b>Long-term:</b> &gt;26 years following closure.</p>	<p><b>Reversible in the short-term:</b> predicted impact is reversible after mine closure;</p> <p><b>Reversible in the long-term:</b> predicted impact is reversible in 100 years;</p> <p><b>Irreversible:</b> predicted impact cannot be reversed.</p>	<p><b>Low:</b> occurs once;</p> <p><b>Medium:</b> occurs intermittently;</p> <p><b>High:</b> occurs continuously.</p>
<b>Non-traditional resource uses</b>	<p><b>Neutral:</b> no change in resource use, resource availability or access;</p> <p><b>Positive:</b> increase in resource use, resource availability or access;</p> <p><b>Negative:</b> decrease in resource use, resource availability or access.</p>	<p><b>Negligible:</b> no appreciable change in resource use, resource availability or access;</p> <p><b>Low:</b> possible small change (increase or decrease) in resource use, resource availability or access;</p> <p><b>Moderate:</b> some change (increase or decrease) in resource use, resource availability or access;</p> <p><b>High:</b> possible substantial change (increase or decrease) in resource use, resource availability or access.</p>	<p><b>Local:</b> effect is restricted to the local study area (e.g., mine footprint plus 500 m);</p> <p><b>Regional:</b> effect extends beyond the local study area into the regional study area;</p> <p><b>Beyond Regional:</b> effect extends beyond the regional study area.</p>	<p><b>Short-term:</b> 3 years includes pre-construction and construction phases;</p> <p><b>Medium-term:</b> 26 years includes operation phase;</p> <p><b>Long-term:</b> &gt;26 years following closure.</p>	<p><b>Reversible in the short-term:</b> predicted impact is reversible after mine closure;</p> <p><b>Reversible in the long-term:</b> predicted impact is reversible in 100 years;</p> <p><b>Irreversible:</b> predicted impact cannot be reversed.</p>	<p><b>Low:</b> occurs once;</p> <p><b>Medium:</b> occurs intermittently;</p> <p><b>High:</b> occurs continuously.</p>

**Table 6.1-3 Definitions of Impact Criteria for Resource Uses (continued)**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency
<b>Aesthetic quality</b>	<p><b>Neutral:</b> no change in the natural aesthetics in the vicinity of the project;</p> <p><b>Negative:</b> a change in the natural aesthetics in the vicinity of the project.</p>	<p><b>Negligible:</b> no appreciable change in aesthetics in the vicinity of the project;</p> <p><b>Low:</b> changes to the environment will not change the general impression in the vicinity of the project; the colour, texture and form of the landforms and objects introduced will not vary much from those already existing in the landscape;</p> <p><b>Moderate:</b> changes to the environment may be noted by an observer, but would be considered innocuous or minor; the colour, texture and form of the landforms and objects introduced differs from those already present;</p> <p><b>High:</b> changes to the environment occur which an observer may consider as making a substantial change to the surroundings; the colour, texture and shape of the landforms and objects introduced differs substantially from those already present.</p>	<p><b>Local:</b> effect is restricted to the local study area (e.g., mine footprint plus 500 m);</p> <p><b>Regional:</b> effect extends beyond the local study area into the regional study area;</p> <p><b>Beyond Regional:</b> effect extends beyond the regional study area.</p>	<p><b>Short-term:</b> 3 years includes pre-construction and construction phases;</p> <p><b>Medium-term:</b> 26 years includes operation phase;</p> <p><b>Long-term:</b> +26 years following closure.</p>	<p><b>Reversible in the short-term:</b> predicted impact is reversible after mine closure;</p> <p><b>Reversible in the long-term:</b> predicted impact is reversible in +100 years;</p> <p><b>Irreversible:</b> predicted impact cannot be reversed.</p>	<p><b>Low:</b> occurs once;</p> <p><b>Medium:</b> occurs intermittently;</p> <p><b>High:</b> occurs continuously.</p>

**Table 6.1-3 Definitions of Impact Criteria for Resource Uses (continued)**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency
<p><b>Tibbitt-Contwoyto winter road</b></p>	<p><b>Neutral:</b> no increase in traffic volume or camp use, no change in access, or no improvement to infrastructure;</p> <p><b>Positive:</b> decrease in traffic volume or camp use, improvement in access, or improvement in infrastructure;</p> <p><b>Negative:</b> increase in traffic volume or camp use, decrease in access, or deterioration of infrastructure.</p>	<p><b>Negligible:</b> no change (&lt;1%) in traffic volumes or camp use, no improvement in access or infrastructure;</p> <p><b>Low:</b> minimal (&lt;10%) change in traffic volumes or camp use, minimal improvement in access or infrastructure;</p> <p><b>Moderate:</b> moderate (10-25%) change in traffic volumes or camp use, moderate improvement in access or infrastructure;</p> <p><b>High:</b> substantial (&gt;25%) change in traffic volumes or camp use, substantial improvement in access or infrastructure.</p>	<p><b>Local:</b> effect is restricted to the local study area.</p>	<p><b>Short-term:</b> 3 years includes pre-construction and construction phases;</p> <p><b>Medium-term:</b> 26 years includes operation phase;</p> <p><b>Long-term:</b> +26 years following closure.</p>	<p><b>Reversible in the short-term:</b> predicted impact is reversible after mine closure;</p> <p><b>Reversible in the long-term:</b> predicted impact is reversible in +100 years;</p> <p><b>Irreversible:</b> predicted impact cannot be reversed.</p>	<p><b>Low:</b> occurs once;</p> <p><b>Medium:</b> occurs intermittently;</p> <p><b>High:</b> occurs continuously</p>

### 6.1.5.3 Environmental Consequence

*The primary choices made in developing this method to predict environmental consequence were to keep the process simple and transparent*

Environmental consequence provides an overall assessment of the residual effects based on a ranking system that incorporates four criteria that represent the most important aspects of the impact. Combining the criteria shown in the residual impact classification into a single answer to the key question involves choices. The choices that have been made in this EA include the following:

- the method is transparent;
- the results will be shown as a bar graph (Figure 6.1-3) and as words in the residual impact classification table;
- the criteria will be added to form the bars of the graph;
- the criteria will be given equal weight except for the following:
  - only one criterion related to time will be used to prevent time from being over-weighted;
  - reversibility and magnitude will be slightly over-weighted due to the greater severity of the consequence of an irreversible impact of high magnitude.

*Numbers have been used only to determine relative positions in the bar graph*

The words (*e.g.*, negligible, low, moderate, high) used to rank the criteria (*e.g.*, magnitude) have been assigned numbers to create the bar graph, but the numbers have no meaning other than to ensure that ranks are shown in the correct relative position to each other. The numbers used are shown in Table 6.1-4. Environmental consequence is only determined for residual impacts that are negative in direction.

**Table 6.1-4 Generic Residual Impact Classification**

<b>Magnitude</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Reversibility</b>
Negligible (0)	local (0)	short-term (0)	reversible (short-term) (0)
Low (5)	regional (5)	medium-term (5)	reversible (long-term) (5)
Moderate (10)	beyond regional (10)	long-term (10)	irreversible (15)
High (15)			

**Figure 6.1-3 Generic Environmental Consequence**

***Environmental consequence is ranked as negligible, low, moderate, or high***

The environmental consequence will be determined by adding the numbers and comparing the sum to the scale determined on the following basis:

- negligible =  $\leq 5$ ;
- low =  $> 5$  to  $\leq 20$ ;
- moderate =  $> 20$  to  $\leq 30$ ; and,
- high =  $> 30$ .

***The ranking of environmental consequence was based on professional judgement***

The relative positions of negligible, low, moderate, and high, are illustrated on a generic graph (Figure 6.1-3). The position of the lines determining the consequence scale is based on professional judgement. For example, an impact that was of moderate magnitude, regional extent, medium-term duration, and irreversible was deemed to be a high environmental consequence. If the same impact was reversible in the long-term, it was deemed to be a moderate environmental consequence. If it was reversible in the short-term, it was deemed to be a low environmental consequence. Professional judgement was used *a priori* to determine the method for ranking consequences. The determination of environmental consequence for each residual impact followed this method and was not modified within individual key questions.

***Methods provide a standardized comparison of environmental consequences throughout the environmental assessment***

The true environmental consequence would occur over a continuum rather than four categories. Because other professionals may have other opinions on the dividing line between low and moderate, or moderate and high, the method used here has been kept as simple and transparent as possible, while still providing a standardized comparison of the consequence of the project across all parts of the EA. This method of determining environmental consequence will be used to summarize the components of Resource Uses and all other residual impacts in the EA.

## **6.1.6 Specific Assessment Methods**

***Some methods are specific to one subsection***

In addition to the general assessment method (described in 6.1.5) used by all five subsections of Resource Uses, each subsection may also have a specific approach, process, or method used for the baseline or impact assessment. These are described below.

## **6.1.6.1 Heritage Resources**

### **6.1.6.1.1 Definitions**

#### ***Heritage resource definition***

Heritage resources include: the sites where events took place in the past or are currently on-going; all of the objects they contain; and contextual information that may be associated with them that will aid in their interpretation. Contextual information can include, but is not limited to, natural specimens and documents, or verbal accounts. Heritage resources are generally divided into two types: prehistoric archaeological; and historic period archaeological and structural.

#### ***Prehistoric archaeological resources***

Prehistoric archaeological resources in northern North America are the archaeological sites, objects, and affiliated materials that represent occupations by Aboriginal peoples prior to the arrival of European goods, people, and the historic records that characterize European culture. In the NWT, these comprise the locations where activities took place and the remains of these activities. The remains usually include stone artifacts and features such as hearths, cairns (stone memorials), and occasionally include bone and other organic artifacts. Prehistoric archaeological resources can span the entire 7,000-year period of recognized prehistory in the NWT.

#### ***Historic and traditional resources***

Historic period resources can include the sites, artifacts, structures, and documents that relate to the Euro-Canadian occupation of the region and date to the last 250 years. However, given the remoteness of the study area, the most important components of the historic period record are likely to be the sites, artifacts, and affiliated resources relating to on-going use of the landscape by Aboriginal people and others. These include archaeological sites and objects such as standing and collapsed cabins, campsites, trails, graves. The record also includes traditional sites and resources, such as special places; hunting, fishing, and plant collecting areas; traplines and their associated remains; oral traditions; and various documents.

### **6.1.6.1.2 Reports**

#### ***Heritage resources component meets both environmental assessment and archaeologists permits requirements***

The heritage resources component of the Snap Lake Diamond Project is intended to address the EA Terms of Reference established by the MVEIRB. In addition to the Heritage Resources section within the EA, several supporting archaeological investigation reports have been prepared for various components of the Snap Lake Diamond Project. These studies were designed to fulfill the requirements of NWT Archaeologists Permits under the NWT Archaeological Sites Regulations issued by the Government of Northwest Territories (GNWT) Department of Education, Culture and Employment. Review of these documents by the Prince of Wales Northern

Heritage Centre (PWNHC) will establish the remaining heritage resources requirements in relation to the Snap Lake Diamond Project.

*Baseline and impact assessment information included in the next section*

The archaeological study reports that are submitted as stand-alone documents to PWNHC contain very detailed baseline information, providing the technical detail necessary for regulatory decisions by the PWNHC. The baseline setting (Section 6.2.1) section of the EA summarizes the information from all investigations in the area. This information provides the background and basis for the archaeological investigations completed for the Snap Lake Diamond Project, the known baseline conditions within the general area, and the results of those studies. This information is presented to provide a basis for understanding the potential impacts to the heritage resources. Section 6.2.2 presents an assessment of the effects of the various components of the Snap Lake Diamond Project on heritage resources.

### **6.1.6.1.3 Management Processes**

*Management processes are applied at several stages*

Concerns for heritage resources in association with developments in the NWT can be addressed at several stages of the planning and development process (PWNHC no date).

*Overview level studies are conducted first*

Overview level studies generally take place during preliminary project planning stages. These studies include reviews of government and community records, and map studies to identify known resources and areas of archaeological sensitivity. These studies are used to forecast potential impacts and to guide project planning and future studies.

*Reconnaissance level studies are done next*

Reconnaissance level studies provide a judgmental appraisal of a particular development area to enable development of specific recommendations in relation to planning more detailed studies. Reconnaissance level studies often entail detailed map and air photo analysis, and community consultation, as well as overflights. A description of the reconnaissance level studies undertaken by De Beers for the Snap Lake Diamond Project can be found in Section 6.2.1.

*Neither require archaeologists permit*

Neither overview nor reconnaissance level studies generally require issuance of an archaeologists permit. Both can be undertaken as one stage in the process.

*Inventory studies are done next*

Inventory level studies are dedicated on-ground investigations conducted when planning has progressed so the likely impact areas can be predicted. The intent of this level of study is to identify specific heritage resource concerns associated with development alternatives. The results of the

background (*i.e.*, overview and reconnaissance) studies and the inventory studies are usually incorporated into a detailed site record. A description of the inventory level studies undertaken by De Beers for the Snap Lake Diamond Project can be found in Section 6.2.1.

***Assessment level studies establish the importance of resources***

The assessment stage requires detailed on-ground studies to establish the importance of resources that may be affected by development. At this stage, predictions of the effects of the development and heritage resource management recommendations are provided.

***Both require archaeologists permit***

Both inventory and assessment levels of study require a NWT archaeologists permit and participation of local community members, if they so wish. They can be undertaken as one stage in the process. A description of the inventory and assessment level studies for the Snap Lake Diamond Project can be found in Section 6.2.1.

***The mitigation stage minimizes or eliminates negative impacts***

The mitigation stage of heritage resource management is implemented to minimize or eliminate the potential negative effects of development. This stage requires the approval of the PWNHC. Mitigative options commonly entail either project redesign to avoid impacts, or systematic recovery and preservation of materials and information to offset negative effects. Other procedures may also be considered acceptable. When it is not possible to fully predict development effects over the long term or to ensure requirements have been met, heritage monitoring or surveillance programs may be included as elements of a required mitigation program. All mitigation programs require approved NWT archaeologists permits. All of the above described management stages require full reporting to the PWNHC.

#### **6.1.6.1.4 Methods**

***Preliminary records review and terrain analysis preceded field studies***

Prior to the conduct of the heritage resource studies associated with the Snap Lake Diamond Project, a site file search of the areas to be affected by the various elements of the Snap Lake Diamond Project and a regional literature review were completed. Files maintained by PWNHC indicate whether there are any known heritage resources in the vicinity of a proposed project that might be affected by development activities. The distribution of known resources also indicates preferred use areas and, therefore, can be used to predict areas of heritage resource potential. Prior to initiation of the Snap Lake Diamond Project studies, no previously recorded sites had been identified in the vicinity of proposed developments. This information, along with the terrain-based potential predictions developed in detailed map and air photo analysis, was used as a basis for structuring in-field assessments.

***Aerial reconnaissance was undertaken to verify terrain analysis***

All reconnaissance level heritage resource studies conducted for the Snap Lake Diamond Project were preceded by helicopter overflights, during which impressions of terrain potential were verified and modified. Based on this information, on-ground examination strategies were refined. Areas selected for inspection typically included esker remnants, bedrock exposures and elevated landforms along the margins of water bodies; low-lying water-saturated rocky or broken terrain is typically considered to have low potential and was omitted or given limited attention. Traditional land use studies conducted for the Snap Lake Diamond Project (Lutsel K'e 2001b) and other projects in this area confirm the potential of the landform types selected for examination during these studies.

***Thorough on-ground inspection was conducted***

On-ground inspection was conducted using judgmental and systematic foot traverses oriented according to the orientation of the landforms inspected. Thorough visual inspection of natural exposures was conducted. Site recording focussed on defining the character and extent of any resources identified, through intensive inspection of the surrounding area. Site areas were sketched, photographs were taken, and global positioning system coordinates were obtained for all heritage sites identified. In one case where vegetation cover may have concealed artifacts, limited scraping of the surface took place. For the most part, artifacts identified were left in-situ. However, limited collection took place under specific circumstances during some of the reconnaissance level studies.

***De Beers' policy of site avoidance has been largely successful***

De Beers' policy of avoiding heritage resource sites whenever possible has been largely successful. However, mitigation procedures have been implemented at two sites in the vicinity of the Snap Lake Diamond Project development. In one case, a single stone artifact was collected to offset the effects of potential gravel extraction activities and, in another case, controlled archaeological test excavations were completed at a site adjacent to Snap Lake winter access road development activities. Some helicopter surveillance has been conducted to confirm sites were avoided by planned development.

***Aboriginal community members have participated in all major archaeological studies***

All inventory and mitigation level studies conducted for the Snap Lake Diamond Project have involved the direct participation of members of local Aboriginal communities. Representatives of the Yellowknives Dene First Nation, and the Lutsel K'e Dene First Nation participated in various stages of the studies completed.

## 6.1.6.2 Traditional Land Use

***Research, literature reviews, and consultation occurred to determine traditional land use***

The traditional land use section assesses the availability of land for traditional land use purposes. To determine traditional land use, background research and literature reviews were conducted. As well, direct consultation with Aboriginal groups was undertaken.

***Issues associated with resource use are also found elsewhere***

Issues associated with impacts on the resources are found in Terrestrial Resources (Section 10) and Aquatic Resources (Section 9). Issues associated with heritage resources are found in Section 6.2. Issues associated with impacts on traditional lifestyles and the wage economy are found in Socio-economic Impact Assessment (Section 5).

***This section includes traditionally significant areas***

The traditional land use section includes traditionally significant areas. Traditionally significant areas is the term De Beers has been directed to use in the Terms of Reference by the MVEIRB. A traditionally significant area can include, but is not limited to, sites where ancestral evidence has been found, burial sites, migration trails, and places of spiritual and/or cultural importance.

***Spiritual, cultural, and social significance to land is not assessed***

This section does not assess the spiritual, cultural, and social significance of land to Aboriginal people. Although this element of traditional land use is recognized and acknowledged by De Beers, it is also recognized that it is best described and assessed by the people themselves.

***Lutsel K'e produced a report for Snap Lake***

The Lutsel K'e Dene First Nation produced an assessment for the Snap Lake Diamond Project (Lutsel K'e Dene First Nation 2001b) which describes in their own words their association with the land. This report is found in Appendix IV.3.

***Use of existing information***

As a result of consultation, Dogrib Treaty 11 and the North Slave Métis Alliance (NSMA) directed De Beers to use existing documentation to help determine traditional land use. This is outlined in Section 6.3.1.1 The Yellowknives Dene First Nation, in their response to the MVEIRB's draft Terms of Reference for Snap Lake requested that De Beers use existing studies that have been prepared for other developments.

***Use of existing information has limitations***

Although these studies have been drawn upon by De Beers, it is important to recognize that use of this information does have some limitations. They were developed in response to the EKATI™ and Diavik developments and not specifically to respond to the Snap Lake proposal.

### 6.1.6.3 Aesthetic Quality

***Visual impact evaluation considers many factors***

In evaluating the visual impact of a potential project, many factors relating to perceptual and culture issues must be considered. Traditional knowledge, local history, and current use patterns may affect the appreciation of a natural landscape. Responses to a visual representation of a landscape will depend on the demographic, social, cultural, and economic composition of the group viewing the landscape. For example, a smokestack or cooling tower can be perceived as either a symbol of progress or a source of visual pollution. When conducting a visual impact assessment, it must be acknowledged that issues of aesthetics are influenced by individual and collective preference.

***The viewshed is defined***

Visual impact assessments begin by defining the study area or viewshed affected by a proposed development. Delineation of the viewshed begins by considering that portion of the landscape that can be observed from a single point, such as a hunting lodge; or along a curved line, such as a migration or hunting route. In constructing a reference frame for a visual impact assessment, the limitations of human vision must be taken into account. Though our peripheral vision is approximately 180 degrees, a 2.5 degree cone of vision describes the main focus of most humans. We may be able to perceive an object that is a few centimetres in diameter from a distance of 300 metres (m) in a single instant; however, we can focus on multiple objects only if they are very close.

***The level of light is important***

The ability to discern a single object within the landscape will also be greatly affected by the interaction of colour, texture, and reflectivity of the object within its surroundings. Because of these factors, lighting and atmospheric conditions have an impact on our ability to differentiate individual objects. Under bright daylight we can see 40 times better than at dusk. When viewing natural landscapes, there is also a psychological factor that affects whether or not an object appears out of place. We expect to see barns when travelling through a rural farm district. However, if we encounter an industrial structure of similar size in the same setting that is different in colour and architectural detail, our attention is strongly drawn to it. The same structure placed back in its industrial setting will go completely unnoticed as it merges with the visual patterns of its surroundings.

***Other factors affect vision***

Other factors that affect human vision are altitude and distance, and the two are sometimes interrelated. When viewing a building from the air, as from a low-flying aircraft, we can ascertain shape, size, colour, and detail. If we are viewing the same building from high altitude, as from a commercial jetliner, the building appears as a tiny dot in the landscape, barely

discernable. Altitude and distance can effect viewshed to a greater degree on the ground, due to topographical differentiation and the curvature of the earth's surface. At a distance of 500 m, a two story building is plainly visible unless the viewer is in a low lying spot and intervening topography screens the view. From a distance of 10 km we can see the same building, although it would appear small on the horizon and the chance of it being screened from our view completely by changes in topography is much greater.

## 6.2 HERITAGE RESOURCES

### 6.2.1 Baseline

#### 6.2.1.1 Introduction

*Regional environmental factors have affected the character and condition of heritage resources*

To a great extent, environmental factors condition man's behavioural and cultural adaptations both prehistorically and in the recent past. These include patterns of settlement, resource exploitation, seasonal movement, and travel routes. The material evidence of these use patterns constitutes the heritage resource record of the Subarctic Shield region in which the Snap Lake Diamond Project is situated. The Subarctic environment also influences the character of this record of use and its accessibility to discovery. The lack of soil development in this region and the sparse vegetation often result in high levels of site visibility but tend to degrade large portions of the originally deposited record.

*The five heritage resource studies completed have focussed on areas to be directly affected*

Five heritage resource studies have been completed in conjunction with the proposed Snap Lake Diamond Project. These studies spanned a period between 1998 and 2001 and have been undertaken in response to evolving development plans and schedules. As a result, each study has had somewhat different objectives. These have been defined in the NWT Archaeologist Permit Reports prepared for the projects but are summarized here.

*A number of archaeological studies were completed for Snap Lake*

Heritage resource studies completed for the Snap Lake Diamond Project include the following:

- A 1998 reconnaissance level study of the general Snap Lake Diamond Project development area included four potential exploration areas, portions of the west arm of Snap Lake, two potential winter access routes to the Tibbitt-Contwoyto winter road on MacKay Lake, and the existing Snap Lake winter access road on MacKay Lake (Bussey 1998a). During this study, limited ground level examination augmented helicopter reconnaissance.
- A 1998 reconnaissance and inventory level study was completed for two potential borrow sources, one within the Snap Lake Diamond Project area and one to the south, and along two proposed access routes to the southern borrow source (Bussey 1998b). On-ground inspection of the northern proposed borrow source augmented helicopter reconnaissance.
- A 1999 inventory level assessment of the Snap Lake Diamond Project area provided more information on the two potential borrow sources and

the access routes (Bussey 2000). This study focussed on intensive on-ground inspection of selected high and moderate potential areas within and adjacent to proposed development areas. Although dedicated site assessment was not conducted due to De Beers' commitment to avoid disturbance to identified sites, one site was assessed and mitigated by collection of a single artifact.

- A 2000 inventory level assessment was completed for the winter access route between the Snap Lake Diamond Project and the Tibbitt-Contwoyto winter road at MacKay Lake (Thomson 2001). This study included examination of a portage (overland route) along the existing Tibbitt-Contwoyto winter road on Warburton Bay at MacKay Lake. A helicopter reconnaissance of the proposed route preceded intensive on-ground inspection of eight portages and some additional nearby areas. During this study, five archaeological sites were flagged in the field to ensure avoidance.
- A 2001 inventory level assessment, mitigation, and surveillance program of selected Snap Lake Diamond Project development areas took place in two stages (Bussey in prep.a). During the first stage, activities included aerial and ground reconnaissance of the expanded mine footprint and the winter access road for the quarry south of the mine area; aerial surveillance of this quarry; aerial and ground reconnaissance along the Snap Lake winter access road to MacKay Lake; and archaeological mitigation studies at one site near the Snap Lake winter access road. Monitoring was also conducted during the 2001 field season. The second stage involved ground reconnaissance of several proposed facility sites, including the proposed bulk emulsion plant site, a storage area to the south, the ammonium nitrate storage area, and two optional access roads to these facilities.

### 6.2.1.2 Archaeological Sites

*53 archaeological sites have been recorded and are listed in Table 6.2-1*

During the heritage resource investigations conducted for the Snap Lake Diamond Project, 53 archaeological sites were recorded and investigated. Table 6.2-1 lists these sites, providing information on their topographic associations, their type, the study during which investigations occurred, the action taken during the study, the development facility with which they are most closely associated, potential impacts, and the recommendations made as a result of the study. In reviewing this table, it should be noted that reference to sites situated adjacent to the proposed Snap Lake winter access road are to a numbered series of land portages that start in the northwest and progress southeast to the project area.

***Figures 6.2-1 to 6.2-5 display site locations in relation to proposed developments***

Figure 6.2-1 displays the general locations of these sites in relation to the proposed developments associated with the Snap Lake Diamond Project. Figures 6.2-2 to 6.2-5 provide detailed views of the locations of heritage resource sites in relation to local topography and the numbered portages along the Snap Lake winter access road as well as the proposed Snap Lake Diamond Project facility areas. These figures, along with GPS coordinates, in-field flagging placed by archaeologists in select locations, and monitoring by a professional archaeologist will allow planning and construction personnel to ensure sites are avoided during construction and operations stages of the Snap Lake Diamond Project.

***Site types identified***

All but six of the sites identified are of a prehistoric archaeological character. Two possible sites reflecting the traditional land use practices of Aboriginal peoples, a possible hunting blind and a camp, were identified. A single recent mineral claim marker cairn was also identified as were two sites with markers/cairns that may be older. One site is an exploration camp with a potentially historic tent ring locus (ring of rocks at former tent location).

***Prehistoric sites were identified***

The prehistoric sites identified include the following types:

- isolated finds, consisting of a single stone (lithic) artifact (number [N] = 5);
- large and small scatters of artifacts representing areas where stone was processed to produce or modify tools (N=31);
- quarry/workshops where quartz outcrops may have been exploited as sources of raw material (N=7), but four of these sites may be the result of natural fracturing; and,
- areas where small groups were believed to have camped (N = 4).

***Detail relating to the characteristics of the sites can be found in the archaeological permit reports***

The assigned scientific importance of these sites varies considerably, from relatively low in the case of isolated finds and recent non-traditional sites to high in the case of large scatters and campsites. Information relating to site evaluation and other site characteristics can be found in the archaeological reports prepared for the Snap Lake Diamond Project under NWT Archaeologists Permit requirements (Bussey 1998a, 1998b, 2000, in prep. a; Thomson 2001).

**Table 6.2-1 Archaeological Sites Identified in the Snap Lake Diamond Project Development Area**

<b>Borden Number</b>	<b>Location</b>	<b>Type</b>	<b>Study</b>	<b>Action Taken</b>	<b>Associated Development</b>	<b>Potential Impact</b>	<b>Recommend.</b>
KkNv-1	Gravel terrace on knoll south of lake	Lithic quarry	Thomson 2001	Recording	Snap Lake winter access road (portage 1)	None	Avoid - NFW
KkNv-2	Interior ridge	Lithic quarry and/or workshop	Thomson 2001	Recording	Snap Lake winter access road (portage 1)	None	Avoid - NFW
KkNv-3	Ridge on north shore of lake	Lithic scatter	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 1)	None	Avoid - NFW
KkNv-4	Ridge on north shore of lake	Collapsed cairn or marker	Thomson 2001	Recording	Snap Lake winter access road (portage 1)	None	Avoid - NFW
KkNv-5	Knoll on peninsula on north shore of lake	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 1)	None	Avoid - NFW
KkNv-6	Low rise between two lakes	Lithic scatter	Thomson 2001 Bussey in prep.a	Recording - flagging, revisit, testing, collection	Snap Lake winter access road (portage 2)	Possible direct	Impact mitigated - NFW
KkNv-7	Ridge between two lakes	Lithic scatter	Thomson 2001 Bussey in prep.a	Recording - flagging revisit	Snap Lake winter access road (portage 2)	None	Avoid - NFW
KkNv-8	Low rise between two lakes	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 2)	None	Avoid - NFW
KkNv-9*	Esker near small pond	Lithic scatter	Thomson 2001 Bussey in prep.b	Recording - revisit	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KkNv-10*	Esker north of lake	Lithic scatter	Thomson 2001	Recording	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW

**Table 6.2-1 Archaeological Sites Identified in the Snap Lake Diamond Project Development Area (continued)**

<b>Borden Number</b>	<b>Location</b>	<b>Type</b>	<b>Study</b>	<b>Action Taken</b>	<b>Associated Development</b>	<b>Potential Impact</b>	<b>Recommend.</b>
KkNv-11*	Esker north of lake	Lithic scatter	Thomson 2001	Recording	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KkNv-12*	Knoll on esker	Lithic quarry, possibly natural	Thomson 2001 Bussey in prep.b	Recording - revisit	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KkNv-13*	Esker south of large lake	Lithic scatter	Thomson 2001 Bussey in prep.b	Recording - revisit	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KkNv-14*	Esker south of large lake	Large scatter/camp	Thomson 2001 Bussey in prep.b	Recording - revisit	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KkNv-15*	Esker south of large lake	Lithic scatter	Thomson 2001 Bussey in prep.b	Recording	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KkNv-16*	Esker south of large lake	Traditional camp and lithic scatter	Thomson 2001 Bussey in prep.b	Recording	Tibbitt-Contwoyto winter road – not this project	None this project *	Avoid - NFW
KjNv-1	Ridge to east of large lake	Hunting blind	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-2	Knoll north of small pond	Claim marker cairn	Thomson 2001 Bussey in prep.a	Recording - flagging revisit	Snap Lake winter access road (portage 3)	Possible direct	Avoid - NFW
KjNv-3	Gravel terrace north of small lake	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-4	Camsell Lake island esker	Tent camp	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-5	Camsell Lake island esker	Lithic scatter	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-6	Camsell Lake island esker	Lithic scatter	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-7	Camsell Lake island esker	Large scatter/camp	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-8	Camsell Lake island esker	Lithic scatter	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-9	Camsell Lake island esker	Lithic scatter	Thomson 2001	Recording	None	None	Avoid - NFW

**Table 6.2-1 Archaeological Sites Identified in the Snap Lake Diamond Project Development Area (continued)**

<b>Borden Number</b>	<b>Location</b>	<b>Type</b>	<b>Study</b>	<b>Action Taken</b>	<b>Associated Development</b>	<b>Potential Impact</b>	<b>Recommend.</b>
KjNv-10	Camsell Lake island esker	Lithic scatter	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-11	Camsell Lake island esker	Lithic scatter	Thomson 2001	Recording	None	None	Avoid - NFW
KjNv-12	Ridge east of large lake	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-13	Gravel exposure between bedrock outcrops	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-14	Gravel terrace east of large lake	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-15	Bedrock and gravel ridge east of large lake	Lithic scatter	Thomson 2001 Bussey in prep.a	Recording - flagging revisit	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-16	Ridge overlooking two ponds	Lithic scatter	Thomson 2001 Bussey in prep.a	Recording - flagging revisit	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNv-17	Bedrock ridge overlooking two ponds	Lithic quarry, possibly natural	Thomson 2001 Bussey in prep.a	Recording - flagging revisit	Snap Lake winter access road (portage 3)	None	Avoid - NFW
KjNu-1	Esker on east side of a small lake	Lithic scatter	Bussey 2000	Recording	Gravel source 1	None	Avoid - NFW
KjNu-2	Esker north of a shallow gully and esker crest	Lithic scatter	Bussey 2000	Recording	Gravel source 1	None	Avoid - NFW
KjNu-3	Esker in centre of broad area	Lithic scatter	Bussey 2000	Recording	Gravel source 1	None	Avoid - NFW
KjNu-4	Esker on east side of a small lake	Large scatter/camp	Bussey 2000 Bussey in prep.a	Recording - revisit	Gravel source 1	None	Avoid - NFW
KjNu-5	Ridge like landform on esker south of crest	Lithic scatter	Bussey 2000	Recording	Gravel source 1	None	Avoid - NFW
KjNu-6	Terrace, west side of small creek	Isolated find	Bussey 2000	Recording	Gravel source 1	None	Avoid - NFW
KjNu-7	Esker located south of a large kettle in the centre of a broad area	Isolated find	Bussey 2000	Recording - collection	Gravel source 1	Possible direct	Impact mitigated - NFW
KjNu-8	Esker remnant north of a small lake	Isolated find	Bussey 2000	Recording	Esker access winter road	None	Avoid - NFW

**Table 6.2-1 Archaeological Sites Identified in the Snap Lake Diamond Project Development Area (continued)**

<b>Borden Number</b>	<b>Location</b>	<b>Type</b>	<b>Study</b>	<b>Action Taken</b>	<b>Associated Development</b>	<b>Potential Impact</b>	<b>Recommend.</b>
KjNu-9	Esker west of a creek/river drainage	Lithic scatter/camp	Bussey 2000	Recording - collection	Gravel source 2	None	Avoid - NFW
KjNu-10	Esker west of a creek/river drainage	Isolated find	Bussey 2000	Recording	Gravel source 2	None	Avoid - NFW
KjNu-11	Esker north of a large lake and east of drainage	Lithic scatter	Bussey 2000	Recording - testing	Gravel source 2	None	Avoid - NFW
KjNu-12	Knoll north of lake	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 4)	None	Avoid - NFW
KjNu-13	Ridge north of lake	Lithic scatter	Thomson 2001	Recording	Snap Lake winter access road (portage 4)	None	Avoid - NFW
KjNu-14	Bedrock ridge between two lakes	Cairns (possibly recent)	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 4)	None	Avoid - NFW
KjNu-15	Bedrock/gravel terrace on inlet south of large lake	Lithic quarry and/or workshop	Thomson 2001	Recording	Snap Lake winter access road (portage 4)	None	Avoid - NFW
KjNu-16	Gravel and bedrock outcrop south of large lake	Lithic scatter	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 5)	None	Avoid - NFW
KjNu-17	Gravel exposure above north shore of lake	Isolated find	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 6)	None	Avoid - NFW
KjNu-18	Bedrock outcrop west of lake	Lithic quarry – possibly natural	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 6)	None	Avoid - NFW
KjNu-19	Bedrock outcrop west of large lake	Lithic quarry – possibly natural	Thomson 2001 Bussey in prep.a	Recording - revisit	Snap Lake winter access road (portage 6)	None	Avoid - NFW
KjNu-25	Slightly elevated point, south shore of large lake	Lithic scatter	Bussey in prep.a	Recording	Mine expansion	None	Avoid - NFW

\* To be re-examined in relation to the Joint Venture's Tibbitt-Contwoyto winter road re-application. Not related to the Snap Lake Diamond Project permitting; NFW = No further work.

**Figure 6.2-1 Heritage Resources in the Vicinity of Snap Lake Diamond Project Development**

**Figure 6.2-2 Heritage Resource Sites Close to the Warburton Bay Portage of the Tibbitt-Contwoyto Winter Road and Portage 1 of the Snap Lake Winter Access Road**

**Figure 6.2-3 Heritage Resource Sites Close to Portage 2 of the Snap Lake Winter Access Road**

**Figure 6.2-4 Heritage Resource Sites Close to Portages 3 to 6 of the Snap Lake Winter Access Road**

**Figure 6.2-5 Heritage Resources in the Vicinity of the Snap Lake Diamond Project  
Potential Gravel Sources**

***Management recommendations for these sites reflect current development plans***

As indicated above, the archaeological studies undertaken for the Snap Lake Diamond Project focussed investigations in the general areas where potential land disturbance might occur. Because of the nature of some of the developments, particularly winter access roads, and because of De Beers' stated intent to avoid heritage resources wherever possible, almost all of the sites occur outside the direct impact zones proposed in this EA. Consequently recommendations provided in Table 6.2-1 reflect the currently proposed on-ground configuration of the various elements of the Snap Lake Diamond Project.

## **6.2.2 Impact Assessment**

### **6.2.2.1 Introduction**

***Two key questions were developed***

The EA process involved formulation and assessment of the following two key questions related to heritage resources.

**HR-1: What impacts will the Snap Lake Diamond Project have on heritage resources?**

**HR-2: What impact will the Snap Lake winter access road have on heritage resources?**

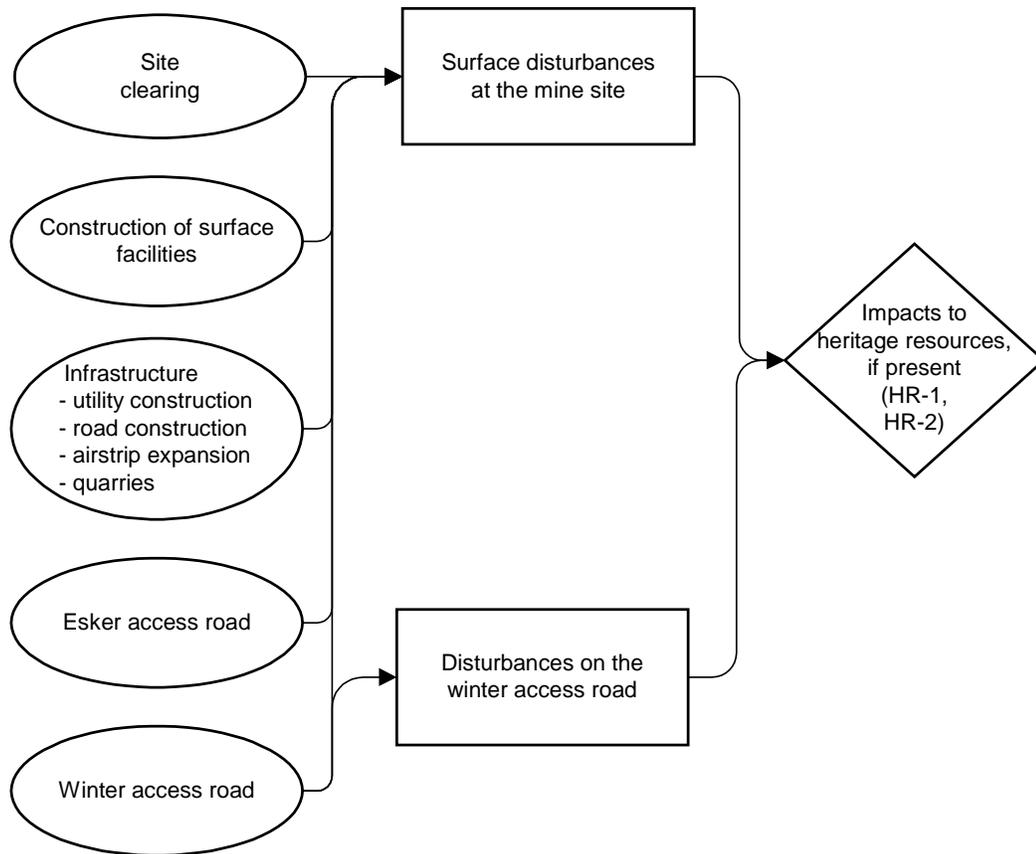
***A linkage diagram was developed***

Key questions are used to develop cause and effect pathways or linkage diagrams (Figure 6.2-6). Project activities, environmental changes, and effects to heritage resources are shown as ovals, rectangles and diamonds, respectively.

***The approach consists of a series of steps***

The following approach was used for the assessment of impacts:

- development of linkage diagrams for each key question;
- determination of the validity of each linkage within each key question;
- proposed mitigation options;
- analysis of residual impacts;
- classification of residual impacts; and,
- monitoring (if necessary).

**Figure 6.2-6 Heritage Resources Linkage Diagram**

## 6.2.2.2 Key Question HR-1: What Impacts Will the Snap Lake Diamond Project Have on Heritage Resources?

### 6.2.2.2.1 Linkage Analysis

*Heritage resources are generally located directly on existing land surfaces*

The Snap Lake Diamond Project is situated in the Subarctic Canadian Shield. In this environment, generally limited soil development and vegetative cover exists over bedrock or glacially deposited materials, except in specific circumstances such as adjacent to active watercourses or where wind and erosion have been prevalent. Heritage resources are generally located directly on existing land surfaces and are non-renewable resources that are especially sensitive to land surface disturbances.

*Developments have a range of effects, most of which are negative*

The linkages between the effects of these disturbances and heritage resource impacts are permanent, and generally entail complete destruction of any resource within these zones of development. However specific types of development, such as winter road segments that occur on lake ice or low

lying terrain, generally pose little or no threat to heritage resources. On land, it is unlikely that heritage resources would remain intact in association with development activities, with the exception of limited cases where vehicle traffic takes place under winter conditions involving heavy snow cover. Loss of vegetation as a result of winter road activity can result in indirect impacts since the site, or buried portions, could be exposed through soil erosion.

*All development associated with Snap Lake was considered*

The developments associated with the Snap Lake Diamond Project considered for this linkage analysis and subsequent assessment are the following:

- site clearing;
- construction of all surface facilities, including ventilation raises;
- all site infrastructure development, including site roads, utilities, airstrips, and quarries; and,
- esker access winter road.

*Heritage resource impact linkages are shown in Figure 6.2-6*

The potential impacts of the Snap Lake Diamond Project activities on heritage resources are identified in a linkage diagram (Figure 6.2-6). Most types of development result in complete removal of heritage resources within direct impact zones. The linkages between these activities and heritage resources are valid.

#### **6.2.2.2.2 Mitigation**

*Avoidance is the preferred form of mitigation*

The heritage resource studies undertaken to-date represent the initial stages of a multistage management process that may be required by the PWNHC in relation to the Snap Lake Diamond Project. Avoidance of impact to heritage resource is the preference of De Beers and eliminates the need for detailed impact assessment as well as subsequent mitigation activities. Avoidance also constitutes the preferred mitigation strategy advocated by the PWNHC. Avoidance is the primary method of mitigation to be employed for the Snap Lake Diamond Project.

*Monitoring and surveillance procedures will ensure successful site avoidance*

To ensure avoidance is successful, monitoring and/or surveillance will be implemented. Prior to construction, final development plans will be reviewed by a professional archaeologist familiar with the Snap Lake Diamond Project. Construction personnel will also be made aware of the locations of heritage resource sites identified in the development area. As a final check, surveillance of the in-place facilities will be conducted by a professional archaeologist, focussing on sensitive locations.

***Information recovery procedures will be implemented if necessary***

If important resources cannot be avoided by facility relocation, subsequent stages of archaeological study could be required to offset the potential negative effects of the Snap Lake Diamond Project. Information or data recovery represents the most commonly applied of numerous active mitigation options to offset these potential effects. To undertake successful information recovery programs, it is important to have a clear understanding of the location and character of the development as well as project development schedules to ensure sufficient time is allocated to complete studies in advance of surface disturbance.

***Staff and contractors will receive heritage awareness training***

De Beers will continue to educate staff and contractors about the need to protect heritage resources. Awareness for heritage resources will form one component of general environmental awareness for De Beers staff and contractors under the environmental management system. Should sites be identified by staff and contractors, the artifact(s) will not be disturbed and the PWNHC archaeologists will be notified.

***Artifact collection has occurred***

The results of the heritage resource studies completed for the Snap Lake Diamond Project developments indicate that all but one of the heritage resources identified during these programs currently lie outside proposed development areas. That site (KjNu-7) consisting of an isolated find, was collected and sent to the PWNHC to offset potential disturbance due to quarrying activities (Bussey 2000).

***As proposed, developments will avoid direct and indirect impacts***

With this exception, if development plans for Snap Lake Diamond Project proceed as proposed, direct development impacts will be avoided and mitigative activities in the form of further information recovery programs or other procedures need not be implemented. Indirect impacts will be avoided by making project personnel aware of the location of heritage resources situated in proximity to development zones and encouraging avoidance of these locations both during and after working hours.

***Changes require reconsideration of management needs***

If development configurations were to change such that any of the sites listed were to be potentially directly affected by construction activities, the PWNHC would be consulted to determine any remaining assessment or mitigation requirements. In most cases, the archaeological study reports prepared for the Snap Lake Diamond Project provide site-specific recommendations to assist determination of additional requirements should they be deemed necessary.

***Many landforms near proposed development zones have heritage site potential and may require additional study if affected in the future***

While studies have taken place in association with developments for which on-ground locations could be specified, reconnaissance level investigations within and adjacent to proposed development areas indicate that many

unexamined landforms with potential for the occurrence of heritage resource exist (Bussey 2000). These include elevated areas adjacent to the shores of Snap Lake, eskers and remnants that occur within the proposed study area and a major esker complex south of the Snap Lake Diamond Project area, a portion of which was utilized for gravel extraction. In addition, numerous heritage resource sites and high potential landform have been identified in proximity to the winter access road (Thomson 2001; Bussey in prep. a, in prep. b). Should development plans change and result in proposed disturbances in these areas, professional archaeologists will assess the potential effects of these changes and the PWNHC will be consulted to determine study and mitigation requirements.

### **6.2.2.2.3 Impact Analysis**

#### ***Direct and indirect impact definitions***

Impacts to heritage resources as a result of developments are generally described as falling into two categories: direct and indirect. Direct impacts occur during the construction and operations stages of any project and are an immediate result of activities associated with the project. Some of the activities likely to directly disturb heritage resources during development of the Snap Lake Diamond Project include terrain modification necessary in preparation for facility development; facility construction; construction material storage; access road construction; gravel resource extraction and transport; and reclamation. Indirect impacts occur as a result of the development, but are not directly related to it and are generally unanticipated. They can take place outside direct impact zones. For example, development of an industrial project of this nature can result in increased use of nearby undeveloped areas as a result of accidents or for recreational purposes, causing surface disturbance and an increased possibility for impact to heritage resources.

### **6.2.2.2.4 Residual Impact Classification**

#### ***The impact classification focuses on recorded sites***

Heritage resources are non-renewable resources that may be located at or near ground level. The impact classification (Table 6.2-2) will focus on resources at or near ground surface and will be limited to the heritage resources identified during studies conducted for the Snap Lake Diamond Project.

#### ***Direct project impacts will have a low environmental consequence***

Direct impacts on heritage resources are expected to be negative in direction. However, the results of the archaeological studies completed to date indicate that, provided development proceeds as planned, no heritage resources are likely to be encountered during construction and operation stages. The magnitude is negligible. The geographical extent is local, as direct impacts can occur within the disturbed area of the mine footprint and the esker quarry. The LSA for heritage resources includes the winter roads

and the quarry. The duration is medium-term, as any impact would occur during the construction and operation of the mine. The impacts are irreversible. The overall environmental consequence is low.

**Table 6.2-2 Classification of Residual Impacts of the Snap Lake Diamond Project on Heritage Resources**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Environmental Consequence
Heritage: direct	negative	negligible	local	medium-term	irreversible	low
Heritage: indirect	negative	low	regional	medium-term	irreversible	moderate
Increase in heritage information	positive	moderate	local	long-term	irreversible	n/a

Note: Frequency is omitted since it is not applicable to heritage resources.

n/a = not applicable since environmental consequence is not determined for positive impacts.

***Indirect impacts are expected to have a moderate environmental consequence***

Indirect impacts on heritage resources are expected to be negative in direction. Given the size of the workforce, the minimal use by other users of lands and resources near the mine and its infrastructure, and the lack of archaeological sites expected near the development, these effects are expected to be low in magnitude. The geographical extent will be regional, as impacts would be found outside the LSA. The duration would be medium-term, because the potential for indirect impacts occur only during the operational phase. The environmental consequence of indirect impacts is moderate.

***The increase in heritage information provides moderate positive effects***

There is an increase in heritage resource information as a result of the Snap Lake Diamond Project. The direction is positive. Given the numbers and types of sites identified, this increase in information is moderate in magnitude, local in geographic extent, long-term in duration and irreversible. Overall environmental consequences are not calculated for positive impacts.

***The probability of direct or indirect impacts occurring is negligible***

Although the environmental consequences are low to moderate, the probability that direct and indirect impacts will occur is considered to be negligible. If direct or indirect impacts do occur, the environmental consequences of these are considered to be low and moderate respectively, mostly because any impact would be irreversible, even though the magnitude of that impact is negligible or low. Given the fact that no heritage resources are likely to be encountered during construction and operation, and given that the lands in the vicinity of the Snap Lake site (*e.g.*, traditional land use and non-traditional recreational use) have not been

intensely used, the probability of any direct or indirect impacts occurring is negligible.

*Level of confidence is high*

Due to the mitigation and monitoring initiatives planned, there is a high level of confidence that the impacts will not be greater than predicted.

#### **6.2.2.2.5 Monitoring**

*The success of avoidance measures will be monitored*

Monitoring will be conducted to ensure that the mitigation measures are successful. A professional archaeologist will review the final selected alignment prior to construction, as well as conducting surveillance of in-place facilities.

### **6.2.2.3 Key Question HR-2: What Impacts Will the Snap Lake Winter Access Road Have on Heritage Resources?**

#### **6.2.2.3.1 Linkage Analysis**

*Heritage resources are sensitive to disturbance by road construction*

As indicated above, heritage resources are non-renewable resources that are especially sensitive to land surface disturbances such as those that might be associated with development of the Snap Lake winter access road. These resources are generally situated at or near the surface and can be affected by many construction processes. However, several factors limit the potential negative effects of development of this component of the Snap Lake Diamond Project.

*The proposed winter access road follows an existing road and generally traverses lake ice*

Firstly the Snap Lake winter access road follows an existing winter road alignment, most of which has been used since 2000. While some level of upgrading may take place adjacent to the existing alignment, most of the disturbance associated with winter road development and use will have taken place previously. In addition, the majority of the alignment (approximately 29 km of a 35 km winter access road, or 83%) is situated on ice formed in open water. Heritage resource sites do not occur in such locations. On land, the proposed alignment typically traverses less elevated terrain where heritage resources are less likely to be present.

*Impacts could occur on segments that traverse land*

Nevertheless, portions of the winter access road traverse elevated landforms that have high potential for the occurrence of heritage resource. Archaeological studies conducted for this component of the Snap Lake Diamond Project have identified numerous heritage resource sites in proximity to the winter access road and potential for additional finds has been reported. In addition, alternate routes for small segments of the

alignment may be necessary. In these cases, disturbances within these potential alternate routes may represent new impacts.

***Impact linkage is valid***

The potential impacts of the Snap Lake Diamond Project winter access road on heritage resources is identified in the linkage diagram (Figure 6.2-6) presented above for the development area. The linkage between the Snap lake winter access road and heritage resources is valid.

### **6.2.2.3.2 Mitigation**

***Site avoidance will be implemented wherever possible***

Avoidance of heritage resources adjacent to the proposed winter access road has been and will continue to be the focus of De Beers' heritage resource management process. This approach will eliminate the need for detailed impact assessment as well as subsequent mitigation activities and will constitute adequate mitigation of any potential impacts.

***Monitoring and surveillance will be conducted to ensure avoidance if plans change***

To ensure avoidance procedures continue to be successful, monitoring and/or surveillance procedures will be implemented. Prior to construction, the final selected alignment plans will be reviewed by a professional archaeologist familiar with the heritage resources. If deviations from the existing alignment are proposed, these will be examined in the field prior to construction by a professional archaeologist operating under the provisions of an approved NWT Archaeologists Permit. If important resources cannot be avoided by alignment relocation, subsequent stages of study could be required as described in Section 6.2.2.2.2. De Beers will implement development plans in accordance with the results of any necessary study but will maintain the intent of avoiding important heritage resource impacts.

***Construction personnel will be made aware of heritage resources***

Construction personnel will continue to be made aware of the locations of heritage resource sites identified close to the proposed alignment. In addition, surveillance of the in-place facilities will be conducted by a professional archaeologist, focussing on sensitive locations.

***Potential impacts to one site have been completed***

The results of the heritage resource studies completed for the Snap Lake winter access road indicate that all but one of the heritage resources identified during these programs currently lie outside the proposed alignment. This site, KkNv-6, is located at portage 2 along the proposed winter access road (Figures 6.2-7 and 6.2-8). It was found immediately adjacent to the existing winter access road and was subject to information recovery procedures including test excavation and surface collection to offset potential impacts (Bussey in prep. a).

**Figure 6.2-7 View Northeast of Archaeological Investigations at KkNv-6 on the North Side of Portage 2 Along the Snap Lake Winter Access Road**

**Figure 6.2-8 View Northeast of Lithic Scatter in East-central Portion of KkNv-6**

### 6.2.2.3.3 *Impact Analysis*

***Potential direct impacts could occur***

Impacts to heritage resources as a result of development of the Snap Lake winter access road fall into two categories: direct and indirect. Some of the activities likely to directly disturb heritage resources during development of the Snap Lake winter access road include: terrain modification necessary to maintain grade; development of pullout or turning areas; terrain modification to develop snow storage areas; and reclamation where necessary. Again it is important to note that these types of disturbances have potential to affect heritage resources only when they take place on land.

***Potential indirect impacts are less likely***

Indirect impacts occur as a result of the development, but are not directly related to it and are generally not anticipated. They can take place outside direct impact zones. However given the fact that use of the winter access road will take place under winter conditions when recreational opportunities are severely limited, it is expected that indirect impacts are likely only to occur in the case of accidents.

### 6.2.2.3.4 *Residual Impact Classification*

***Impact classification was conducted for known resources***

The impact classification (Table 6.2-3) will focus on resources at or near ground surface and will be limited to the heritage resources identified during studies conducted for the Snap Lake Diamond Project winter access road.

**Table 6.2-3 Classification of Residual Impacts of the Winter Access Road on Heritage Resources**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Environmental Consequence
Heritage: direct	negative	negligible	local	medium-term	irreversible	low
Heritage: indirect	negative	negligible	regional	medium-term	irreversible	moderate
Increase in heritage information	positive	moderate	local	long-term	irreversible	n/a

Note: Frequency is omitted since it is not applicable to heritage resources.

n/a = not applicable since environmental consequence is not determined for positive impacts.

***Direct project impacts are expected to have negligible magnitude***

The results of the archaeological studies completed to date for the Snap Lake Diamond Project indicate that, provided the final alignment selected for the winter access road corresponds with alignments examined during these studies, no residual impacts to heritage resources are predicted during development and use of this facility. Consequently, direct project impacts are expected to have negligible magnitude.

*Indirect impacts are expected to have negligible magnitude*

Given the avoidance procedures proposed, it is predicted that the potential for indirect impact to identified historical resources is negligible. These indirect effects are expected to be negligible given the restricted use proposed for the road, and the limited recreational potential during its season of use.

*The archaeological studies conducted provide moderate positive effects*

Thus, the environmental consequences of the predicted negative direct effects and the potential negative indirect effects of the Snap Lake Diamond Project are considered low and moderate, respectively. Heritage resource studies undertaken for the Snap Lake winter access road also provide benefits. Given the numbers and types of sites identified, the increase in information provided by the winter access road archaeological studies is considered a positive effect of moderate magnitude that will benefit the region over the long-term.

*The probability of direct or indirect impacts occurring is negligible*

Although the environmental consequences are low to moderate, the probability that direct and indirect impacts will occur is considered to be negligible. If direct or indirect impacts do occur, the environmental consequences of these are considered to be low and moderate respectively, mostly because any impact would be irreversible, even though the magnitude of that impact is negligible or low. Given the fact that no impacts to heritage resources are predicted based on the archaeological studies to date, the probability of direct impacts occurring is considered to be negligible. As well, given the brief period of time for the operation of the winter road, the time of year the winter road is in operation, and the remoteness of the winter road, the probability of indirect impacts occurring is also considered to be negligible.

*The level of confidence is high*

Based on the mitigation and monitoring recommended, the level of confidence that the impacts will not be greater than predicted is high.

#### **6.2.2.3.5 Monitoring**

*Avoidance measures will be monitored*

Monitoring will be conducted to ensure that the mitigation measures are successful. A professional archaeologist will review the final selected alignment prior to construction, as well as conducting surveillance on in-place facilities.

## 6.3 TRADITIONAL LAND USE

### 6.3.1 Baseline

*The project is located where people have historically used the land*

The Snap Lake Diamond Project will be located in an area where other land uses have and continue to occur. Prior to contact with Europeans, the entire territory east, north, and west of Great Slave Lake, including the Snap Lake Diamond Project RSA, was inhabited by Athapascan-speaking peoples. The most easterly ranging of these were the Chipewyan and the more westerly were the Dogrib and the Yellowknives. The membership of the NSMA may also have used this area. Aboriginal peoples continue to use the land today.

*Traditional land use is described*

This section reports on the past and recent traditional land use in the vicinity of the Snap Lake Diamond Project and identifies traditionally significant areas.

#### 6.3.1.1 Historical Land Use

*The Chipewyan, Yellowknives, Dogrib, and Métis have used the land*

The Dene using the land in the vicinity of the Snap Lake Diamond Project are Chipewyan, Yellowknives, and Dogrib. The membership of the NSMA may also have used the area. Snap Lake is in an area of overlap between Treaty 11 and Treaty 8 land claims processes. Because of this, some information on traditional land use is considered confidential.

*Historical land use is documented in traditional knowledge and other studies*

Until very recently, historical land use from the land users perspective had not been documented. The following recent studies document historical land use in the vicinity of the Snap Lake Diamond Project:

- Traditional Knowledge in the Na Yaghe Kue Region: An Assessment of the Snap Lake Project. Final Assessment Report. Lutsel K'e Dene First Nation. July 2001b.
- Towards Protecting the Waters of Desnedhé Che. Report Submitted NWT Protected Areas Secretariat/World Wildlife Fund. Lutsel K'e Dene First Nation. 2001a.
- Weledeh Yellowknives Dene: a Traditional Knowledge Study of Ek'ati. Yellowknives Dene First Nation Council. 1997.
- Can't Live Without Work: North Slave Métis Alliance Environmental, Social, Economic and Cultural Concern. A Companion to the Comprehensive Review Study on the Diavik Diamonds Project. NSMA. No date.

- The Habitat of Dogrib Traditional Territory: Place Names as Indicators of Bio-Geographical Knowledge. Final Report. Dogrib Treaty 11 Council. March 2001b.
- Caribou Migration and the State of Their Habitat: Final Report. Dogrib Treaty 11 Council. March 2001a.

***Traditional knowledge and other studies demonstrate past use of the regional study area***

The studies referenced above (and quoted below) and the literature reviews conducted demonstrate that there has been traditional use of the study area by the membership of the NSMA, and the Yellowknives, Dogribs, and Chipewyan of the North Slave.

*At fall hunting camps, enough caribou had to be killed and butchered to feed the people throughout the winter, with the addition of some small game. More than food and fat, caribou also provided the people with most of the shelter, clothing, and tools they required to survive (Weledeh Yellowknives Dene 1997).*

*Not long ago I remember people stayed around here on the north shore of McLeod Bay. Louie Drybones and his two brothers Michel and Morris Baniya – they were the last ones to stay here. They stayed at the Waldron River along the shoreline. People used to take care of what they gained and had in the olden days. Some people starved around here because of the meat shortage. Sometimes it was hard and difficult because of the cold winter weather, the lack of food. When there was no caribou it was tough. Able Nitah also stayed here. He had a cabin at Bedford Bay. These canoe routes and trails into the barrenlands have been here for generations. Our ancestors used these routes and trails. Now we still use them to go hunting for caribou. It has been passed on from our great ancestors to today – from Taltheilei to Fort Reliance (Maurice Lockhart) (Lutsel K'e Dene First Nation 2001a).*

***Archaeological investigations also identify traditional land use practices***

During archaeological investigations associated with the Snap Lake Diamond Project, prehistoric sites were identified that possibly reflect traditional land use practices in the area. These include a possible hunting blind, located in the RSA, and a camp located outside the RSA, where small groups were believed to have camped. In addition, within the RSA a large lithic scatter/camp was found within the vicinity of the gravel source (Section 6.2).

***No burial sites were identified***

During consultations and through archaeological investigations, there were no burial sites identified in the RSA.

### 6.3.1.2 Recent Traditional Land Use

*Traditional knowledge studies and community consultation were used to obtain recent land use in the regional study area*

Recent traditional land use in the Snap Lake RSA was obtained from reviewing existing traditional knowledge reports and from information obtained during community consultations. Information gathered by the Yellowknives Dene First Nation for the traditional knowledge study of Ek'ati was gathered from Elders between 1995 – 1997. However, many of the maps were based on traditional knowledge collected as part of the Dene Mapping Project in the 1970s in support of the Dene-Métis Land Claim negotiations. This information is not distinguished by community, and could include information from people who are now members of the NSMA. As well, this study concentrated on the Lac de Gras area, not Snap Lake.

*Little fishing occurs in the regional study area*

Although Lutsel K'e stated that little fishing occurs in the area they refer to as the Na Yaghe Kue region<sup>1</sup>, they have identified that the waters of the region flow through their most important fishing areas (Lutsel K'e Dene First Nation 2001b). The Weledeh Yellowknives Dene work for Ek'ati does not identify use of the Snap Lake RSA for fishing (Weledeh Yellowknives Dene 1997). During consultations with the NSMA, the MacKay Lake area was identified as being important for fishing, but no fishing areas within the RSA were identified. During consultation in Dogrib communities, no comments were made with respect to fishing within the RSA.

*No existing traplines were identified in the regional study area*

No existing traplines were identified within the RSA by the Lutsel K'e Dene Elders, however they did identify the Na Yaghe Kue region as important habitat for fur bearing animals for hunting and trapping. The traditional knowledge study for Ek'ati (Weledeh Yellowknives Dene 1997) reveals that the area in and around Snap Lake has been used heavily for trapping activities. No existing traplines in the vicinity of Snap Lake were identified during site visits to Snap Lake by Elders from the Yellowknives Dene, Dogrib Treaty 11, and NSMA. However, people currently trapping have not confirmed this information.

*The Yellowknives Dene have travelled through the area during the winter*

The northern land use information series map of MacKay Lake identifies the southeast quadrant of the RSA as an area that has traditionally been used by the Yellowknives Dene. It has been part of a route used in the winter by several trappers from Yellowknife and Dettah while travelling farther northeast to the MacKay Lake area (INAC 1975). As well, this map series has identified that prior to the 1960s, four or five trappers from Lutsel K'e spent the winter months in the far southeast quadrant of the RSA (INAC 1975).

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<sup>1</sup> Na Yaghe Kue is the region used by Lutsel K'e for their traditional knowledge assessment of the Snap Lake Diamond Project. It is roughly bordered by MacKay Lake to the north, the East Arm of Great Slave Lake to the south, Camsell Lake to the west, and Margaret Lake to the east (see Appendix IV.3).

***People have travelled through the regional study area to reach hunting areas***

During winters, people from Lutsel K'e would travel by dogsled or snowmobile through the Snap Lake area to hunt wolves in the MacKay Lake area. The traditional knowledge study for Ek'ati (Weledeh Yellowknives Dene 1997) also identifies the Snap Lake area as having wolf harvesting trails. During consultations, no community identified recent wolf hunting within the Snap Lake RSA. Archaeological investigations conducted for the Snap Lake Diamond Project identified a cairn, that is possibly recent, in the vicinity of the Snap Lake winter access road (Section 6.2).

***People hunt caribou in the north section of the regional study area, by MacKay Lake***

People hunt caribou in the MacKay Lake area, north of Snap Lake. Elders from Lutsel K'e identified four major caribou crossings in the Na Yaghe Kue region: three on MacKay Lake and one on the western side of Aylmer Lake (Lutsel K'e Dene First Nation 2001b). Two of the crossings on MacKay Lake are located within the RSA, but well outside of the LSA. During their traditional knowledge work at Snap Lake, no recent hunting was identified within the RSA or LSA. The Dogrib Elders have identified harvesting caribou in the vicinity of the Snap Lake Diamond Project over the last 20 years (Dogrib Treaty 11 Council 2001a).

***No camps were identified***

During consultations, no permanent or seasonal camp was identified within the Snap Lake RSA.

***No place names in the vicinity of Snap Lake were identified by the Dogrib***

During their work related to place names as indicators of bio-geographical knowledge (Dogrib Treaty 11 Council 2001b), there were no Dogrib place names identified near the Snap Lake Diamond Project. The only Dogrib place name identified in this area is the name for MacKay Lake.

***The regional study area is not intensely used***

In summary, the Snap Lake Diamond Project RSA does not appear to be intensely used for traditional land use purposes. This, however, in no way diminishes the importance of the RSA for traditional land use purposes.

*Dene use of the lands is traditional, but it is not frozen in the past: the people today continue to rely on meat and other things the land provides. For that reason, the people continue to need access to the expansive lands where the animals and fish have always sustained them (Weledeh Yellowknives Dene 1997).*

### 6.3.1.3 Traditionally Significant Areas

**No traditionally significant areas in the RSA were identified by the Yellowknives Dene**

The Yellowknives Dene, through their traditional knowledge study of Ek'ati, have developed a sensitivity map which identifies significant sites including burials, places where ancestral evidence has been found, migration trails and fish spawning grounds (Weledeh Yellowknives Dene 1997). All sites are located north of MacKay Lake, outside the Snap Lake Diamond Project RSA. It should be noted that only a portion of the Snap Lake RSA appears to be in the boundaries of the map that identifies important areas to the Yellowknives Dene. There may be traditionally important areas to the Yellowknives Dene located within the Snap Lake RSA; however, during consultation associated with site visits, no traditionally significant areas within the RSA were identified by the Yellowknives Dene.

**No traditionally significant areas in the RSA were identified by the North Slave Métis**

The NSMA has identified a number of burial sites on shores and islands of Lake of the Enemy. These sites are outside the RSA and will not be disturbed. During community consultation, no traditionally significant areas within the RSA were identified by the North Slave Métis.

**Lutsel K'e considers all water flowing into Great Slave Lake as sacred**

The Elders of Lutsel K'e consider all the waters flowing into Great Slave Lake as sacred. Snap Lake lies at the headwaters of the Lockhart River, which is an important drainage basin draining into Great Slave Lake. Although located well outside the RSA, Old Lady of the Falls is particularly sacred. It is located near the mouth of the Lockhart River where it drains into Great Slave Lake (Lutsel K'e Dene First Nation 2001a). During consultation, no traditionally significant areas within the RSA were identified by Lutsel K'e.

*The Lockhart River has been here a long time, our ancestors (Old Lady sitting in the falls)... She helps people in every which way she can. Today we still visit her every summer to pay our respect for our people, our health and to be strong in our spirit. The Denesoaine (Lutsel K'e Dene) believe she's a spirit that helps all walks of life, even nature and animals ... (Maurice Lockhart) (Lutsel K'e Dene First Nation 2001a).*

**No traditionally significant areas in the RSA were identified by the Dogrib**

During consultation, people in the Dogrib communities did not identify any traditionally significant areas within the RSA. The Dogrib Treaty 11 Council has identified the Mowhi Trail, a traditional travel route from the Dogrib Communities to the barrenlands, as an area of interest. The Mowhi Trail is located outside the RSA.

## 6.3.2 Impact Assessment

### 6.3.2.1 Introduction

*Two key questions and a linkage diagram were developed*

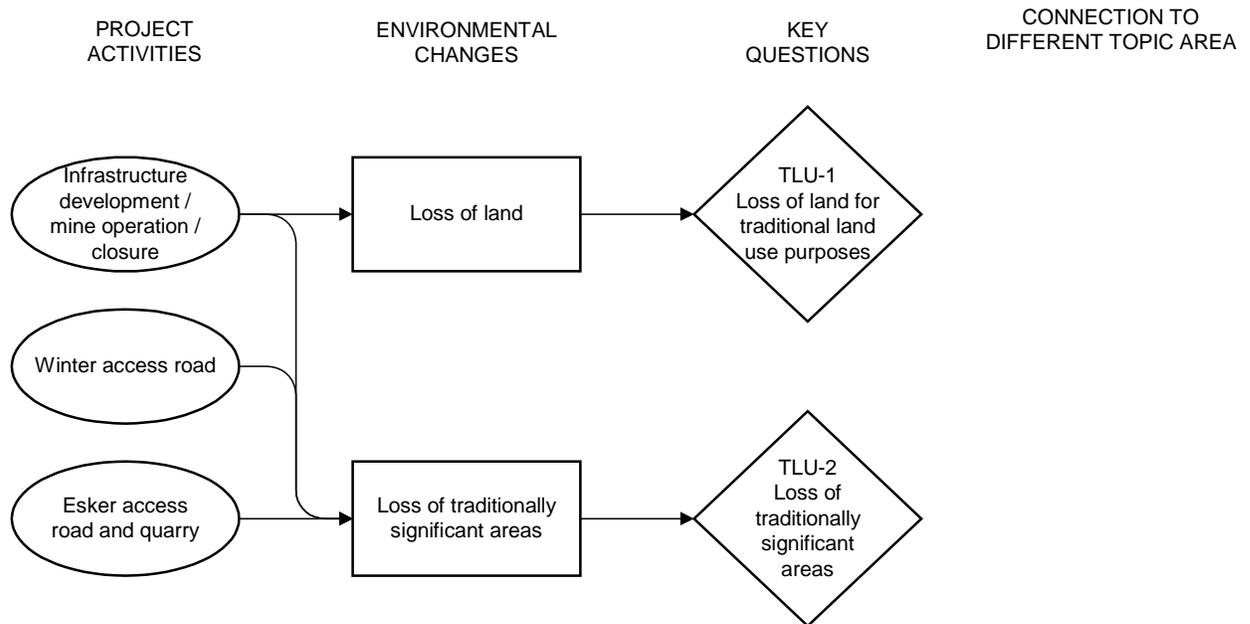
The EA process involved formulation of the following two key questions related to traditional land use:

**TLU-1: What impacts will the Snap Lake Diamond Project have on the availability of land for traditional land use purposes?**

**TLU-2: What impacts will the Snap Lake Diamond Project have on traditionally significant areas?**

Key questions were used to develop cause and effect pathways, or linkage diagrams (Figure 6.3-1).

**Figure 6.3-1 Traditional Land Use Areas and Traditionally Significant Areas Linkage Diagram**



### 6.3.2.2 Key Question TLU-1: What Impacts Will the Snap Lake Diamond Project Have on the Availability of Land for Traditional Land Use Purposes?

#### 6.3.2.2.1 Linkage Analysis

*The link between the project and loss of land for traditional land use is valid*

Infrastructure development and the operation of the mine requires the use of land. Land will be required for access to the Snap Lake Diamond Project over a winter road, and materials will be quarried from an esker located south of the mine site. The linkage between the Snap Lake Diamond Project and potential loss of land for traditional land uses is valid and is shown in Figure 6.3-1.

#### 6.3.2.2.2 Mitigation

*Mine footprint is limited*

In developing the Snap Lake Diamond Project, De Beers has consistently tried to limit the size of the footprint. This approach will be carried through construction and operation. The overall project footprint is 550 hectares (ha); the footprint of the active mine site is 250 ha.

*Quarries on site are used as much as possible*

Quarries located within the mine site footprint will be used to the greatest extent possible to limit the need for accessing and extracting material from the esker located south of the mine site. Of the estimated 1.05 million cubic metres (m<sup>3</sup>) of material quarried over the life of the mine, only 75,000 m<sup>3</sup>, or less than 7%, will be obtained from the esker. The remaining material will be quarried from within the footprint of the north pile.

*The esker will be reclaimed properly*

A quarry management plan has been developed for extraction of material from the esker (Appendix III.5). At the completion of each quarrying program from this location, the quarry will be progressively recontoured for final abandonment.

*Cultural and heritage resources will be avoided*

Avoidance of impacts to heritage resources and traditional land uses is the preferred mitigation strategy. If impacts to heritage resources cannot be avoided by facility relocation, information recovery would take place. Impacts to an individual's traditional use of the land (e.g., future loss of traps) will be avoided if possible. Where a loss is demonstrated, De Beers will negotiate a settlement.

*Mine reclamation will occur progressively*

Reclamation of the mine site will occur throughout the operations phase of the project. All facilities and infrastructure not required for post-closure monitoring will be decommissioned and restored.

### 6.3.2.2.3 *Impact Analysis*

*The regional study area has not been intensely used for traditional land use purposes*

The Snap Lake Diamond Project RSA is not intensely used for traditional land use purposes. Little fishing occurs in the RSA. No existing traplines were identified; however, the region has been used in the past for trapping activities. Lutsel K'e identified that they have travelled through the RSA to hunt wolves, although this activity does not seem to have occurred in the recent past. Caribou harvesting is associated with the area north of Snap Lake, in the vicinity of MacKay Lake. Although no one identified recent hunting for caribou within the RSA, it is possible that this could occur here. There were no permanent or seasonal camps identified within the RSA. The total loss of land within the RSA is 550 ha, or less than 1% of the RSA.

### 6.3.2.2.4 *Residual Impact Classification*

*The environmental consequence of the project on loss of land for traditional land use is predicted to be low*

The impact of the Snap Lake Diamond Project on the availability of land for traditional land use purposes is negative in direction, since there will be loss of land associated with the development. The magnitude will be low, because it is a small area of land (maximum 550 ha) that appears not to have been intensely used for traditional land use purposes. The impact will have a regional geographic extent because the Snap Lake winter access road, esker gravel source, and esker access winter road are located in the RSA. The duration of the impact will be 26 years, or medium-term. The impacts are expected to be reversible in the short-term, as the land will be available for traditional land use purposes after closure. The frequency of the impact would be continuous during the life of the mine. The overall environmental consequence of the Snap Lake Diamond Project on the availability of land for traditional land use purposes is anticipated to be low. A summary of the residual impact classification is found in Table 6.3-1.

**Table 6.3-1 Classification of the Residual Impact on Traditional Land Use Areas**

Resource	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
Traditional land use areas	negative	low	regional	medium-term	reversible (short-term)	high	low

*Probability of occurrence and level of confidence are both high*

The probability of occurrence is considered high since construction and operation of the Snap Lake Diamond Project will result in a loss of land for traditional use. The level of confidence is high, since the impact will occur if the project goes ahead.

### **6.3.2.3 Key Question TLU-2: What Impacts Will the Snap Lake Diamond Project Have on Traditionally Significant Areas?**

#### **6.3.2.3.1 Linkage Analysis**

*The link between the project and loss of traditionally significant areas is not valid*

No traditionally significant areas were identified within the RSA. Therefore, no cause/effect link can be made. The linkage between the Snap Lake Diamond Project and loss of traditionally significant areas is not valid. No further analysis is necessary.

## 6.4 NON-TRADITIONAL RESOURCE USE

This non-traditional land and natural resource use section considers:

- ecologically representative areas;
- subsurface resources;
- domestic and sport hunting;
- domestic trapping;
- sport and commercial fishing;
- recreation and tourism;
- permanent and seasonal camp areas; and,
- access.

Analysis related to the Tibbitt-Contwoyto winter road is presented in Section 6.6.

### 6.4.1 Baseline

#### 6.4.1.1 Ecologically Representative Areas

##### 6.4.1.1.1 *Existing Protected Areas*

###### *Protection of natural and cultural areas*

The NWT PAS was developed to, among other things, provide a framework and set of criteria to guide the work of identifying and establishing protected areas in the NWT (NWT Protected Areas Advisory Committee 1999). The two major goals of the PAS are to protect special natural and cultural areas in the NWT, and to protect core representative areas within each ecoregion of the NWT. The PAS has identified the following tools that can be used for the protection of natural and cultural areas:

- National Park & National Park Reserve;
- National Marine Conservation Area;
- National Historic Park and National Historic Site;
- National Wildlife Area;
- Marine Wildlife Area;
- Migratory Bird Sanctuary;
- Marine Protected Area;

- Territorial Wildlife (Game) Sanctuaries and Preserves;
- Caribou Protection Measures;
- Critical Wildlife Area;
- Special Management Area;
- Territorial Natural Environment Park and Territorial Historic Park;
- Forest Management Area;
- Travel Restricted Area/Zone Travel Development Area;
- Area Development Zone;
- Canadian Heritage Rivers System;
- Biosphere Reserve;
- RAMSAR Site – Wetland of International Significance; and,
- World Heritage Site.

***There are four types of protected areas in the NWT***

Currently there are four types of protected areas in the NWT. These are National Park and National Park Reserve, Wildlife Sanctuary, Territorial Park, and Migratory Bird Sanctuary (NWT Protected Areas Strategy Committee 1999). None are located within the RSA.

***Snap Lake is in the Coppermine River Upland Ecoregion***

The Snap Lake Diamond Project is situated within the Coppermine River Upland Ecoregion of the Taiga Shield Ecozone (Figure 6.4-1). There are no protected areas including national historic sites and heritage rivers within this ecoregion.

***No existing protected areas are located near Snap Lake***

The nearest protected area to the RSA is the Thelon Wildlife Sanctuary (located in the NWT and Nunavut), approximately 250 km to the east, and well beyond the RSA. The Thelon River has also been designated a heritage river. Other environmentally important areas include Wood Buffalo National Park (located in the NWT and Alberta), approximately 350 km to the southwest, and the Hidden Lake Natural Environment Park, near Yellowknife. All are located well outside the RSA.

***No lands have been withdrawn within the RSA***

Pursuant to the *Territorial Lands Act and Regulations*, the Federal Minister of the Department of Indian and Northern Affairs Canada (INAC) can withdraw lands in the NWT for a number of reasons: for environmental protection, for the protection of lands prior to the finalization of a land claim, and for other reasons such as recreational purposes (*i.e.*, cabins) or because the land is contaminated. There are no lands withdrawn pursuant to the *Territorial Lands Act and Regulations* within the RSA.

**Figure 6.4-1 Coppermine River Upland Ecoregion and Proposed Protected Area  
in the Vicinity of the Snap Lake Diamond Project**

### **6.4.1.1.2 Proposed Protected Areas**

***There are no proposed protected areas in the RSA***

There are no proposed protected areas within the RSA. Beyond the boundary of the RSA, there is one candidate area for protection, the proposed East Arm National Park.

***The proposed East Arm National Park is partly in the Coppermine River Uplands Ecoregion***

Lands within the proposed boundary of the East Arm National Park have been withdrawn. The area includes the peninsulas in the East Arm of Great Slave Lake, approximately 80 km to the south of Snap Lake, and extending northeast to include Artillery Lake and parts of Walmsley Lake (approximately 100 km to the southeast of Snap Lake) (J. Cozzetto, Parks Canada, pers. comm.). The proposed East Arm National Park is partially located within the Coppermine River Upland Ecoregion (Figure 6.4-1) and the land has been withdrawn pursuant to the *Territorial Lands Act and Regulations*.

***Withdrawn Dogrib Treaty 11 lands are located west of Snap Lake***

A second area to the west of the Snap Lake area, also outside the RSA, has had lands withdrawn. These lands have been withdrawn pursuant to the *Territorial Lands Act and Regulations* pending settlement of the Dogrib Treaty 11 Comprehensive Land Claim and Self Government Agreement. These lands surround the Dogrib communities of Wekweti, Gameti, Wha Ti, and Rae-Edzo. At the nearest point around Snare Lake, these lands are approximately 130 km from Snap Lake. No other lands have been withdrawn pending settlement agreements in the North Slave area (A. Stadel, Indian and Northern Affairs Canada, pers. comm.).

### **6.4.1.1.3 Potential Protected Areas**

***Strategy protects representative areas***

One of the goals of the Northwest Territories PAS is to protect core representative areas within each ecoregion.

***Protection of representative areas contributes to diversity protection***

Each of the western NWT's natural regions, called ecoregions, is made up of a unique combination of landscape features, plants, and animals. The Snap Lake Diamond Project is situated in the Coppermine River Upland ecoregion (Figure 6.4-1). Establishing representative protected areas in these ecoregions contributes to the conservation of the entire diversity of life forms and their habitats in the NWT.

***Areas of interest have been identified under the Protected Areas Strategy***

The drainage of the Desnedhé Che (Lockhart River) and the Mowhi Trail have been identified by the community of Lutsel K'e and the Dogrib Treaty 11 Council, respectively, as areas of interest under the PAS. Both proposals are in a preliminary stage and their actual boundaries have not been determined. No land has been withdrawn. They are located at least

partially within the Coppermine River Upland Ecoregion and both are located well outside the RSA.

#### **6.4.1.1.4 Other Areas of Interest**

***The caribou migration route north of Snap Lake is of ecological interest***

There are two areas within the RSA that are not ecologically representative of the area but could be considered of ecological interest. The first is the caribou corridor area located south of MacKay Lake (Figures 10.4-6 to 10.4-8). This corridor represents an important route for the caribou moving around the southern shores of MacKay Lake during the southern migration.

***The boulder fields east of Snap Lake are of interest***

The second is the boulder fields located east of Snap Lake (Figure 10.3-1). These boulder fields create a barrier to wildlife movement that influences how the rest of the RSA is used by wildlife.

***Two IBP sites are found within the Coppermine River Uplands Ecoregion***

Outside the RSA, but within the Coppermine River Uplands Ecoregion, there are two International Biological Program (IBP) sites. IBP sites were identified between 1964 and 1975. The main objective of the IBP was to study the biological productivity of the earth's ecosystems and relate that productivity to human adaptability and welfare (Eng *et al.* 1989). A scientific advisory panel, whose primary mission was the identification and designation of specific locations and boundaries for preferred sites, recommended the sites for the program based on the main IBP objective. The recommendations did not receive any government sanction and the sites have no legal status (Eng *et al.* 1989). Based on recent consultations with government (J. Jensen, INAC, pers. comm.), it appears that IBP sites still do not have a legal status.

***Beniah Lake is an IBP site***

The 907 km<sup>2</sup> Beniah Lake IBP site is located approximately 45 km from Snap Lake at its nearest point. It was identified as an IBP site because the area is a representative sample of the spruce lichen habitat at the edge of the tundra (Beckel 1975).

***Discovery Mine is an IBP site***

The 8 km<sup>2</sup> Discovery Mine IBP site is located approximately 160 km from Snap Lake. The site was chosen because it typifies the degree and extent of ecological modifications that accompany mining activities in the transition forest portion of the Canadian Shield (Beckel 1975).

## 6.4.1.2 Subsurface Resources

### 6.4.1.2.1 Granular Resources

*There is no granular inventory in the RSA*

Eskers are often used as a source of granular material. INAC, as the regulatory agency responsible for issuing quarry permits, has conducted some inventories of eskers within the NWT. However, no inventory has been completed in the RSA. A number of major esker systems are found within the RSA, all in an east-west direction (Figure 6.4-2). Three of these esker systems pass within 10 km of Snap Lake.

*One esker has been used*

An esker located approximately 9 km south of Snap Lake that runs the entire width of the RSA was used in 1999/2000 as a source of granular material for the Snap Lake advanced exploration program (Figure 6.4-2). A total of 15,288 m<sup>3</sup> of material was removed from this esker.

*No other quarry permits have been issued*

As of November 2001, no land use permit for gravel extraction from eskers has been issued in the RSA with the exception of the Snap Lake advanced exploration program. No permits for bedrock quarrying have been issued in the RSA.

### 6.4.1.2.2 Mineral Claims

*There are 13 owners of mineral claims in the RSA*

Since the mid 1980s, there have been 13 owners of mineral claims in the RSA, including four owned by De Beers (INAC 2001). As of November 2001, the most current electronic information available from the Mining Recorder's office regarding mineral claims is dated August 2000 and is not verified. However, historically all of the RSA has been staked for mineral claims (S. Bradbury, INAC, pers. comm.). Currently, there are active, lapsed, leased, and withdrawn claims covering the RSA (INAC 2000).

### 6.4.1.2.3 Mineral Exploration and Extraction

*Gold and silver have historically been important*

Historically, the western NWT has been mined for its metal deposits, primarily gold and silver. Following the discovery of diamonds at the EKATI™ mine site, there has been an increase in diamond claim staking in the Slave Geological Province. Subsequently, exploration activities have shifted to the search for diamonds.

*Diamond exploration now occurs*

Within the past five years, De Beers, Diamondex Resources, Winspear Resources, and Southern Era Resources have been approved for mineral exploration and associated permits within the RSA. An exploration camp for Diamondex Resources is presently operating within 10 km of Snap Lake.

**Figure 6.4-2 Granular Resources in the Vicinity of the Snap Lake Diamond Project**

*The nearest activity is Diavik and EKATI™*

The nearest active mine sites to the Snap Lake Diamond Project are the Diavik diamond mine (under construction), located 105 km to the north, and the EKATI™ diamond mine 130 km to the north. Both are well outside the RSA.

*No oil and gas activity occurs near Snap Lake*

As the Archean/Proterozoic shield rock of the western NWT is not associated with petroleum products, there has been no oil or gas exploration or extraction in the area (C. Cambell, GNWT, pers. comm.).

### **6.4.1.3 Access**

*The Tibbitt-Contwoyto winter road is presented elsewhere*

The Tibbitt-Contwoyto winter road and the Snap Lake winter access road provide road access to Snap Lake (Figure 6.4-2). The Tibbitt-Contwoyto winter road is presented in Section 6.6.

*The Snap Lake winter access road is inside the regional study area*

The Snap Lake winter access road is located within the RSA. The winter road is approximately 35 km long, exits at km 222 of the Tibbitt-Contwoyto winter road, and was constructed annually from 1999 to 2001. Although its primary use is to resupply Snap Lake, it is also open for public use. Since it has been in operation, there is no record of public use on this road. The Snap Lake winter access road is approximately 325 km from Yellowknife. This is an approximate 13-hour drive from Yellowknife to Snap Lake.

*Two airstrips are located inside the regional study area*

Two permanent airstrips are located within the RSA, one at Snap Lake and a second at the MacKay Lake Lodge. Currently the Snap Lake airstrip is 914 m long and 30 m wide, but will be improved to accommodate C-130 Hercules, Boeing 737 or equivalent aircraft. The airstrip is not and will not be available for public use, except in the case of emergencies. The MacKay Lake airstrip services MacKay Lake Lodge. Aircraft on floats in the summer or skis in the winter have access to the lakes and rivers within the RSA.

*Snowmachines are not used regularly to reach Snap Lake*

Although it is possible to reach Snap Lake by snowmachine from either Yellowknife or Lutsel K'e, regular access was not identified by the Great Slave Snowmobile Association (M. Byrne, Great Slave Snowmobile Association, pers. comm.).

### **6.4.1.4 Hunting**

#### **6.4.1.4.1 Introduction**

*This section addresses hunting by non-Aboriginal hunters*

This section addresses hunting by non-aboriginal hunters. Activity related to subsistence hunting by Aboriginals is discussed in the traditional land use

component of this EA (Section 6.3). Aboriginal hunters do not require big game or small game hunting licences.

***Hunting is regulated by RWED***

Hunting in the NWT is regulated by the Department of Resources, Wildlife and Economic Development (RWED) of the GNWT, and is divided into two categories: big game hunting and small game hunting. Each type of hunting requires a separate license.

***Big game hunting is regulated on a tag system***

Big game hunting in the NWT is regulated on a tag system. The RSA lies within the North Slave region and quotas for all big game are set for the entire region. Big game hunting includes domestic hunting that is conducted by non-aboriginal residents for subsistence and sport (trophy) hunting usually conducted by non-residents. The most common big game animals hunted in the North Slave Region are caribou, wolves, black bear, and wolverine.

***Small game hunting is regulated on a bag limit system***

Small game hunting is regulated on a bag limit system. A license is required for all non-aboriginal hunters, which allows the hunter to take home the bag limit for all species (*i.e.*, ptarmigan, grouse, hare, and squirrel can all be hunted with a small game license, with bag limits for each).

***Hunting is limited in the regional study area***

Availability of wildlife for hunting in the RSA is likely limited by low wildlife abundance. This is primarily because of the large boulder fields present in the area (Lutsel K'e Dene First Nation, 2001a, 2001b). The exception to this is a wildlife corridor along the south shore of MacKay Lake that is accessible from the Tibbitt-Contwoyto winter road.

***The northwest corner of the regional study area is most frequented by caribou***

Based on traditional knowledge, aerial caribou surveys, historic trail densities, and satellite collared caribou, the northern and western portion of the RSA is the area most frequently used by caribou (Section 10.4.1.4.1). However, caribou use in the northwest corner of the study area is variable (Table 10.4-1).

***No hunting has occurred in the local study area***

A no hunting policy for De Beers' employees and contractors is enforced and will continue to be enforced. Therefore hunting associated with this workforce does not occur in the RSA. It is unlikely that hunting occurred in the LSA prior to the advanced exploration program because of the difficult access and lack of resources.

#### **6.4.1.4.2 Domestic Hunting**

*Hunting for food by non-aboriginal NWT residents is domestic hunting*

Domestic hunting is considered hunting for food by non-aboriginal residents of the NWT. This differs from sport hunting (Section 6.4.1.4.3) and traditional hunting (Section 6.3.1).

*No data on domestic hunting in the regional study area are available*

The most common method of domestic hunting is fall fly-in hunting trips by small groups or spring hunting by truck and snowmachine using the Tibbitt-Contwoyto winter road. No data on the domestic hunting effort within the RSA are available. However, because of the distance to the nearest communities and the availability of hunting opportunities closer to communities, hunter numbers in the RSA are likely to be low. In 1998, only 12 non-commercial vehicles were recorded travelling north of Gordon Lake, approximately half way from Tibbitt Lake to MacKay Lake (UMA and Associates 1998). Further, the road is open for an average of 67 days a year, so hunting access is limited. No fly-in hunting groups were observed during the 1999, 2000, and 2001 baseline environmental programs (R. Johnstone, De Beers, pers. comm.).

*No snowmobile tracks or trails were identified in the regional or local study areas*

No snowmobile tracks or trails were encountered during the 2001 wildlife fieldwork within the RSA (C. Pilon, Golder Associates, pers. comm.), nor were any snowmobile tracks or privately-owned trucks observed during the 2001 winter road season by the De Beers' contractor responsible for monitoring the Snap Lake winter access road.

#### **6.4.1.4.3 Sport Hunting**

*Sport hunting is conducted by non-resident hunters*

Sport hunts usually consist of five days at a remote camp for the purpose of hunting big game trophies. Sport hunters are almost always non-resident hunters.

*Three sport hunting lodges hunt within the regional study area*

MacKay Lake Lodge, located approximately 30 km from Snap Lake on the far northeast boundary of the RSA, is the closest lodge to Snap Lake. It is a commercial establishment that conducts sport hunting. In addition, the Lac du Rocher Outpost Camp and Warburton Bay Lodge are both located west of Snap Lake and just outside the RSA (Figure 6.4-2). Lac du Rocher Outpost Camp is about 31.9 km from Snap Lake, and Warburton Bay Lodge is about 33 km from Snap Lake. All of these camps hunt within the boundaries of the RSA.

*Data on the number of tags used in the regional study area are not available*

Big game hunting in the NWT is managed on a tag system. The GNWT issues tags to the outfitter for use by their clients. Identification of the number of tags used at each individual camp is difficult, as outfitters will

often move clients between lodges according to the availability of caribou. Therefore it is not possible to obtain the number of tags used by the three establishments in or near the RSA.

#### **6.4.1.4.4 Trapping**

*There are no registered traplines*

Traplines operated by non-aboriginal trappers in the NWT must be registered with RWED. No traplines are registered within the LSA or RSA (E. Campbell, GNWT, pers. comm.).

#### **6.4.1.5 Fishing**

##### **6.4.1.5.1 Commercial Fishing**

*There is no commercial fishing in the regional study area*

Currently, there is no commercial fishing in the RSA or in adjacent waters (MacKay Lake) and no plans to develop a commercial fishery were identified. Historically, MacKay Lake was fished commercially in 1966-1967 (Northern Land Use Information Series Map 1975). No other information on this commercial fishery could be obtained.

##### **6.4.1.5.2 Sport Fishing**

*Sport fishing occurs at the lodges*

Sport fishing, mainly by non-NWT residents, occurs at MacKay Lake Lodge, Warburton Bay Lodge and Lac du Rocher Outpost Camp. The water bodies associated with these lodges are partially located within the RSA (Figure 6.4-2).

*The level of recreational fishing is unknown*

Recreational fishing by residents may take place within the RSA at MacKay Lake, but the level is unknown, as the sport fishery is not managed on the basis of location. It is likely that this type of fishing is limited because access is only by floatplane in the summer and winter road in the winter.

*No fishing occurs in the local study area*

A no fishing policy for De Beers' employees and contractors is enforced. Therefore, fishing associated with this workforce does not occur in the LSA.

##### **6.4.1.5.3 Natural History Viewing**

*Airborne caribou viewing may take place over the regional study area*

Wildlife viewing is one aspect of tourism in the NWT. Some of these tourists take excursions by small aircraft for caribou viewing. A tour usually consists of a three hour excursion, including a 20 minute landing on a lake (T. Melander, pers. comm.). The caribou viewing flights are usually conducted as close to Yellowknife as possible depending on weather and the location of caribou herds. No records on the location of each caribou

viewing site were available. However, the RSA is a 60 minute flight from Yellowknife and it is possible that caribou viewing occasionally takes place within the RSA.

**Photography is a minor aspect of tourism**

Photography plays a minor role in the tourism industry in the RSA. MacKay Lake Lodge usually hosts around five photographers per year, compared with 110 hunters at the same camp (D. Zoe, True North Safaris, pers. comm.).

#### **6.4.1.5.4 Snowmobiling**

**Most snowmobiling occurs near communities**

Generally, most recreational snowmobiling occurs near communities. For instance, there is a network of trails surrounding Yellowknife, but no trails extend into the Snap Lake Diamond Project RSA. Typically, it is unusual for recreational snowmobilers to go beyond the treeline (M. Byrne, Great Slave Snowmobile Association, pers. comm.).

**No snowmobile tracks were encountered in the regional study area**

It is possible for snowmobilers to haul snow machines on a truck 222 km over the Tibbitt-Contwoyto winter road and drive onto the Snap Lake winter access road to access the RSA by snow machine. However, no snowmobile tracks or trails were encountered during 2001 wildlife fieldwork within the RSA (C. Pilon, Golder Associates, pers. comm.), nor were any snowmobile tracks or trucks observed during the 2001 winter road season by the De Beers' contractor responsible for monitoring the Snap Lake winter access road. There is no record of public use of this road.

**The regional study area is generally too rocky for snowmobiling**

In the spring of 2001, during a trip by the Lutsel K'e Wildlife and Environment Committee to monitor the Tibbitt-Contwoyto winter road, it was observed that the land in the vicinity of Snap Lake was generally too rocky for snowmobiling (Lutsel K'e Dene First Nation 2001b).

*This land is very rocky, it is hard to travel on. We came here by ski-doo this April, was it ever hard to drive on these rocks. We had to travel mostly on the lakes (Antoine Michel) (Lutsel K'e Dene First Nation 2001b).*

#### **6.4.1.6 Permanent and Seasonal Camps**

**There are three tourist lodges**

There are two tourist lodges and one tourist outpost camp located in the vicinity of Snap Lake (Figure 6.4-2). All lodges may use resources located within the RSA.

**MacKay Lake Lodge is inside the regional study area**

MacKay Lake Lodge, operated by True North Safaris, is located in the RSA approximately 30 km from Snap Lake. It is a commercial hunting and fishing lodge and caters to summer sport fishing, early fall big game sport hunts, staging of spring wolf hunts, and some needs of exploration camps. In 2001, it accommodated 110 hunters (D. Zoe, True North Safaris, pers. comm.). Transportation to the lodge is by the permanent airstrip located at MacKay Lake Lodge, or by floatplane. Fuel, equipment, and supplies are resupplied via the Tibbitt-Contwoyto winter road.

**Warburton Bay Lodge is outside the regional study area**

Warburton Bay Lodge, also operated by True North Safaris, is located about 33 km from Snap Lake outside the RSA. It caters to summer sport fishing, early fall big game sport hunts, staging of spring wolf hunts, and some needs of exportation camps. In 2001, it accommodated 36 hunters in permanent cabins (D. Zoe, True North Safaris, pers. comm.). Transportation to the lodge is by float plane, or via boat from MacKay Lake Lodge. Fuel, equipment, and supplies are resupplied via the Tibbitt-Contwoyto winter road.

**Lac du Rocher Outpost Camp is outside the regional study area**

Lac du Rocher Outpost camp, operated by Warner's Arctic World, is located about 31.9 km from Snap Lake, outside the RSA. It caters to early fall caribou hunts and summer sport fishing, and has room for up to eight guests in hard walled tents (B. Warner, Warner's Arctic World, pers. comm.). Data on annual use is not available. Transportation to the site is by float plane. Fuel, equipment, and supplies are resupplied via the Tibbitt-Contwoyto winter road.

**Permanent cabins are likely within the regional study area**

During consultation, some people identified that they knew of permanent cabins located on MacKay Lake. Some could be included within the RSA, but these data are difficult to obtain because of the lack of land use records relating to this use.

## 6.4.2 Impact Assessment

### 6.4.2.1 Introduction

**There are three key questions**

The EA process involved formulation and assessment of the following three questions related to non-traditional resource use:

**RU-1: What impacts will the Snap Lake Diamond Project have on existing protected ecologically representative areas?**

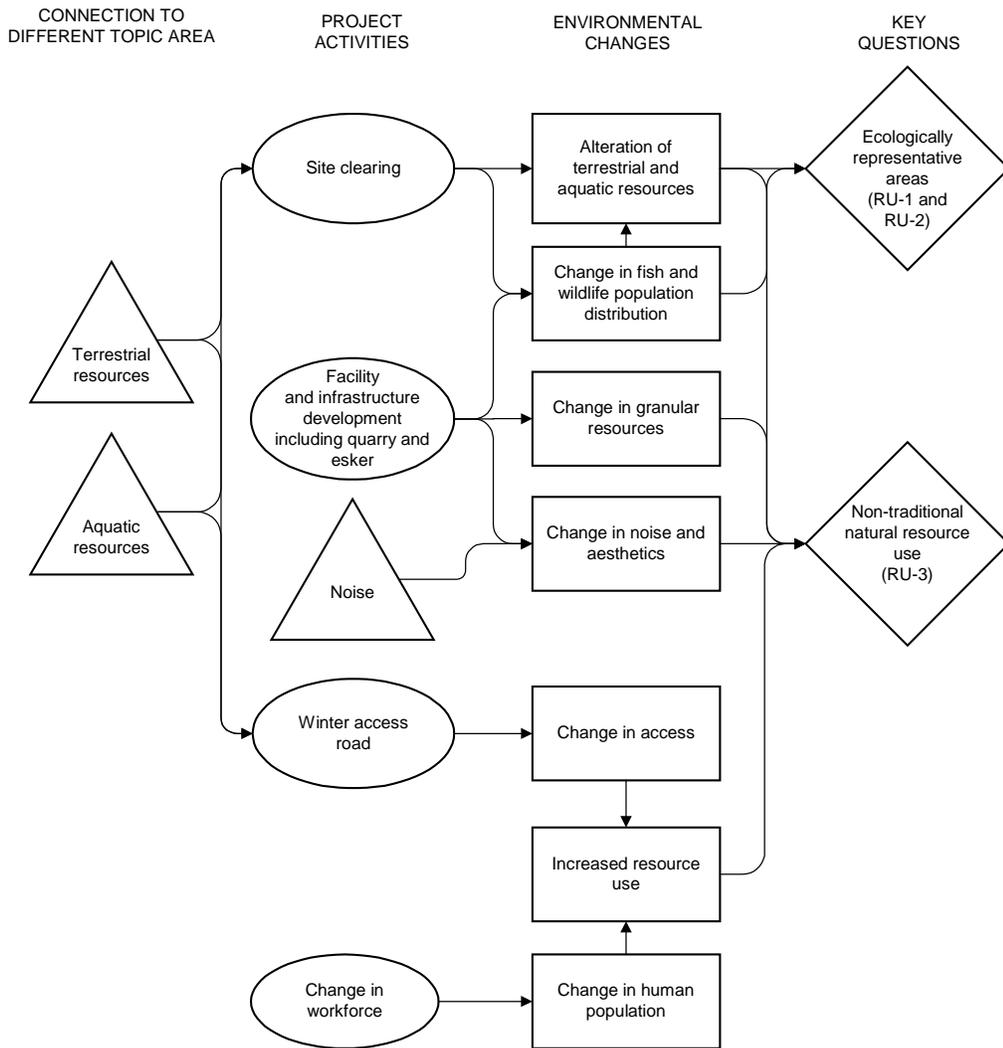
**RU-2: What impacts will the Snap Lake Diamond Project have on the potential to establish protected areas?**

**RU-3: What impacts will the Snap Lake Diamond Project have on natural resource use?**

*A linkage diagram was prepared*

Key questions were used to develop cause and effect pathways, or linkage diagrams (Figure 6.4-3). Project activities, environmental changes, effects to natural resources, and connections to other components of the EA are shown as ovals, rectangles, diamonds, and triangles, respectively.

**Figure 6.4-3 Non-traditional Natural Resource Use Linkage Diagram**



The following approach was used for the evaluation of impacts to non-traditional resource use:

- development of linkage diagrams;
- determination of the validity of each linkage within each key question;
- proposed mitigation options;
- determination of residual impacts for each valid linkage;
- classification of residual impacts; and,
- monitoring, if necessary.

#### **6.4.2.2 Key Question RU-1: What Impacts Will the Snap Lake Diamond Project Have on Existing Protected Ecologically Representative Areas?**

##### **6.4.2.2.1 Linkage Analysis**

*No link is found between existing protected areas of Snap Lake*

There are no existing protected areas within the RSA or near Snap Lake. The Snap Lake Diamond Project will not directly alter existing protected areas. Therefore, the linkage between Snap Lake Diamond Project activities and impacts to existing protected areas is not valid. No further assessment is required.

#### **6.4.2.3 Key Question RU-2: What Impacts Will the Snap Lake Diamond Project Have on the Potential to Establish Protected Areas?**

##### **6.4.2.3.1 Linkage Analysis**

*The link between the potential to establish protected areas and Snap Lake is valid*

Site clearing, facility and infrastructure development and operation, and the winter access road will alter the vegetation and terrain, and displace wildlife (Figure 6.4-3). Therefore, lands occupied by the Snap Lake Diamond Project will be unsuitable as an ecologically representative area. The linkage is valid.

##### **6.4.2.3.2 Mitigation**

*Terrestrial and aquatic mitigation measures are found elsewhere*

The impacts to aquatic and terrestrial resources can be mitigated through a variety of methods. Discussions of specific mitigation methods are provided in Sections 9 and 10.

*The NWT and Nunavut Chamber of Mines sits on the Protected Areas Strategy Advisory Committee*

There are no areas proposed for protective designation within the RSA. The NWT and Nunavut Chamber of Mines has established membership on the Protected Areas Strategy Advisory Committee. Through their membership on the NWT and Nunavut Chamber of Mines, De Beers will work with the Protected Areas Strategy Advisory Committee in the establishment of a protected area in the Coppermine River Upland Ecoregion.

#### **6.4.2.3.3 Impact Analysis**

*Protection in the Coppermine River Uplands Ecoregion*

The approach to the impact assessment was two fold. First, an assessment was completed on the physical availability of land for the establishment of ecologically representative areas. Secondly, the impact assessment determined the extent to which designation of suitable ecologically representative areas within the Coppermine River Uplands Ecoregion would be compromised by the Snap Lake Diamond Project.

*Snap Lake RSA occupies 5.8% of the ecoregion; the footprint occupies < 0.01%*

There will be land loss associated with the development of the Snap Lake Diamond Project. However, the Snap Lake Diamond Project will occupy approximately 550 ha within the approximate 5.1 million ha Coppermine River Upland Ecoregion (0.01%). The RSA occupies approximately 300,000 ha within this region (5.8%). No areas of outstanding environmental importance were identified in the RSA. No potential or proposed protected areas have been identified within the RSA. It is unlikely, should an environmentally protected area be established within this Ecoregion, that it would be established within the RSA.

*One candidate area for protection, two areas of interest, and two IBP sites have been identified in the ecoregion*

Beyond the boundaries of the RSA, one candidate for protection has been identified. This is the East Arm National Park. Two areas of interest have been identified through the PAS. These are the drainage of the Desnedhé Che and the Mowhi Trail. Two IBP sites have been identified. All five are partially located within the Coppermine River Uplands Ecoregion.

*De Beers can be a positive factor in establishing a protected area*

De Beers has representation, through the NWT and Nunavut Chamber of Mines, on the Protected Areas Strategy Advisory Committee and can be a positive factor in the establishment of a suitable protected area in the Coppermine River Uplands Ecoregion.

#### **6.4.2.3.4 Residual Impact Classification**

*Positive and negative impacts*

The impact of the Snap Lake Diamond Mine on ecologically representative areas is both positive and negative in direction (Table 6.4-1).

***Loss of land will be associated with the development***

There will be a loss of land associated with the development of the Snap Lake Diamond Project during construction and operation; therefore, the direction will be negative. However, within the Coppermine River Uplands Ecoregion, the mine footprint comprises only 0.01% of the Coppermine River Uplands Ecoregion and the RSA comprises 5.8% of the region. As well, no areas of outstanding environmental importance have been identified within the RSA. Therefore the magnitude is negligible. The geographic extent is regional, as the loss of land will extend into the RSA. The duration is medium-term because the development will likely make the footprint unsuitable as a candidate for an ecologically representative area during the operation of the mine. The potential impact would be reversible in the long-term and the frequency would be low, since the impact would occur once. The overall environmental consequence would be low.

***De Beers can be a positive factor in the establishment of a protected area in the ecoregion***

The impact of the Snap Lake Diamond Mine on the potential to establish protected areas within the Coppermine River Uplands Ecoregion is positive in direction (Table 6.4-1). De Beers, through their membership on the NWT and Nunavut Chamber of Mines, can be a positive factor in the establishment of protected areas in the Coppermine River Uplands Ecoregion.

***Some criteria are not applicable***

Because the issue being assessed is the potential for establishing an ecologically representative area, the area has not yet been determined. Therefore, information related to assessment criteria such as magnitude, geographic extent, duration, reversibility and frequency are not available.

**Table 6.4-1 Classification of the Residual Impact on Ecologically Representative Areas**

<b>Resource</b>	<b>Direction</b>	<b>Magnitude</b>	<b>Geographic Extent</b>	<b>Duration</b>	<b>Reversibility</b>	<b>Frequency</b>	<b>Environmental Consequence</b>
Availability of land for ecologically representative areas	negative	negligible	regional	medium-term	reversible (long-term)	low	low
Potential for establishing ecologically representative areas	positive	n/a	n/a	n/a	n/a	n/a	n/a

Note: n/a = not available.

## 6.4.2.4 Key Question RU-3: What Impacts Will the Snap Lake Diamond Project Have on Natural Resource Use?

### 6.4.2.4.1 Linkage Analysis

*A number of potential links were analyzed*

A number of potential linkages were analyzed (see also Figure 6.4-3):

- linkage between site clearing and terrestrial and aquatic resources;
- linkage between change in access and recreational and domestic renewable resource harvesting levels, recreational use, and non-renewable resource exploitation;
- linkage between facility construction and operation and loss of known granular resources;
- linkage between landscape aesthetics and noise levels, and recreational and tourism use; and,
- linkage between change in population (workforce) in the area and change in recreational use and renewable resource harvesting levels.

*The site clearing link is valid*

Site clearing for development will alter the vegetation community and natural terrain in the LSA. Because of the habitat alteration and modification, terrestrial and aquatic resources may be affected. The linkage between site clearing and natural resource use is valid.

*The facility development link is valid*

Facility development and operation will alter access to renewable and non-renewable resources. The addition of the Snap Lake winter access road and upgrading of the airstrip may potentially alter access, potentially improve access to resources, and potentially change recreational use of the area. The development of Snap Lake infrastructure will restrict the use of subsurface by others. The linkages are valid.

*The granular resources link is valid*

Facility development and operations requires granular resources. Granular resources will be used for construction and maintenance. The linkage is valid. The impact of the Snap Lake Diamond Project quarrying on the esker and, therefore, granular resources may be found in Section 10.2.2.3 in Geology and Terrain (Section 10.2 of the EA). It is not addressed further in this section.

*Aesthetic links are valid*

Facility development and operation of the Snap Lake Diamond Project will include the development of structures and landscape alterations that will be visible and audible to resource users (*i.e.*, recreational users). The linkage to aesthetics is valid, but noise is covered in Section 8.3 and visual effects are addressed in Section 6.5. Aesthetics is not addressed further in this section.

***Workforce links are valid*** The addition of a workforce for the Snap Lake Diamond Project represents a potential change in population in the area. The increased number of people within the LSA could potentially increase resource use. The linkage is valid.

***Overall linkage is valid*** Overall, the linkage between the Snap Lake Diamond Project activities and potential impact on natural resource use is valid.

#### **6.4.2.4.2 Mitigation**

***Terrestrial and aquatic mitigation are found elsewhere*** Mitigation associated with aquatic and terrestrial resources is presented in Sections 9 and 10, respectively.

***Airstrip will not increase access to the general public*** Access to the RSA may be increased by the construction of the Snap Lake winter access road and airstrip expansion. Travel to the Snap Lake area by winter road for recreational use and domestic hunting is uncommon. No mitigation is required. Access to the airstrip will be restricted to flights required for mine operations and for emergency purposes. As a result of this decision, the airstrip will not increase access for other resource users (e.g., hunters).

***No mitigation is needed for snowmobiling*** There are no regularly used snowmobile trails within the RSA, and snowmobiling in the area is unusual due to the remoteness of the RSA and the difficult terrain. Therefore, no mitigation for the impacts on recreational snowmobiling is necessary.

***Quarries on site will be used as much as possible*** De Beers will quarry on site, and use waste rock as a source of granular material whenever possible. This practice will reduce the amount of granular material taken from eskers.

***Visual and noise mitigation are found elsewhere*** Mitigation for aesthetic visual quality and noise impacts are presented in Sections 6.5.2.2.2 and 8.3, respectively.

***Snap Lake is fly-in-fly-out*** The Snap Lake Diamond Project is designed as a fly-in-fly-out operation. There will be no increase in permanent residents and, therefore, no increase in recreational use by residents in the vicinity of the mine as a result of the Snap Lake Diamond Project.

***No hunting and fishing policy for staff and contractors*** De Beers will continue to enforce the no fishing and no hunting policy for employees and contractors at Snap Lake. There will be no additional pressures on renewable resource harvesting in the vicinity of Snap Lake as a result of the Snap Lake Diamond Project workforce.

#### **6.4.2.4.3 Impact Analysis**

***Impacts on resources are addressed elsewhere***

Impacts to aquatic and terrestrial resources (*e.g.*, impacts on habitat abundance, *etc.*) are assessed in Sections 9 and 10, respectively.

***Access for domestic hunters and fishers is not expected to improve substantially***

Access to the RSA for domestic hunters and fishers will be improved by the presence of the Snap Lake winter access road. However, the Snap Lake winter access road is located about 325 km from Yellowknife, which is the closest community with road access. Given the opportunities for successful hunting and fishing much closer to Yellowknife, it is unlikely that domestic hunters and fishers would travel this far by winter road to hunt and fish. Further, patrol vehicles on the Snap Lake winter access road observed no private vehicles in 2001. In addition, given the 20 kilometre per hour (km/hr) speed limit on the Tibbitt-Contwoyto winter road, it would take people approximately 13 hours to reach the RSA from Yellowknife.

***Access by fly-in hunters and fishers will not be affected***

Access by fly-in domestic hunters and fishers will not be affected, because the improved airstrip at Snap Lake will not be available for use by the general public. As the only sport hunting camps are located along the outside perimeter of the RSA, it is unlikely that hunting opportunities at these camps will be changed.

***Access for exploration is not expected to change substantially***

There is improved winter access to the RSA as a result of the Snap Lake winter access road. This may increase opportunities for exploration in the area. However, exploration has occurred throughout the area prior to the Snap Lake Diamond Project proposal, and it is unlikely the construction of this winter access road will substantially alter levels of exploration in the RSA. There will be some restrictions to exploration within the LSA as a result of infrastructure development.

***Mineral development by others within the mine lease area will be restricted***

Exploration and mineral development by companies other than De Beers will be restricted within the mine footprint. This restriction will be limited to the mine lease area.

***Access to the regional study area is increased when wildlife availability is low***

The winter road is open an average of only 67 days/year during the months of January, February, and March. During this time of increased access to the RSA, the species most frequently hunted are not widely available in the RSA. Keeping in mind the temporal variation in migration patterns and variation among individuals, caribou and wolves may be available in the RSA, but are more likely to be found below the treeline. Wolverine will likely be present in the RSA (Section 10.4.1.4.3).

*There are no registered traplines*

The extension of the winter road into the RSA will provide better access and opportunity for trapping. However, there are no registered traplines in the RSA.

*Recreation and tourism should not be affected*

Recreation and tourism are potentially sensitive to disturbance. Important sources of tourism that occur in the RSA include hunting and fishing. Photography and wildlife viewing also occur, but to a much lesser extent. For the most part, these activities are associated with the three tourist facilities located in or near the RSA. Snowmobiling is a popular recreational activity, but no recreational snowmobiling has been observed within the RSA. Given the distance of Snap Lake to the areas used for recreation and tourism, impacts on these activities (other than noise) are not anticipated.

*The tourist lodges will hear some noise associated with Snap Lake*

Average noise from the site will not be audible at the three tourist sites. Truck traffic noise will be audible at MacKay Lodge and the Warburton Bay Lodge from the Tibbitt-Contwoyto winter road. Because of its location, only Warburton Bay Lodge will be affected by traffic noise from the Snap Lake Diamond Project and the Snap Lake winter access road. Traffic noise will not be audible from the Lac du Roche Outpost Camp. The short-term sound of large aircraft taking off from Snap lake will be barely audible at the tourist sites. However, aircraft fly-over noise will normally be audible at all three sites, particularly for short intervals when the aircraft are closest to each location (Section 8.3.3.2). Since these tourist facilities are resupplied by air, aircraft noise occurs currently, albeit less frequently. In addition, all sites are resupplied via the Tibbitt-Contwoyto winter road.

*Much of the RSA is not suitable for camps*

Due to extended boulder fields (Figure 10.2-1), large areas of the RSA would be unsuitable for camps. Boulder fields are avoided by caribou, and make travelling difficult in both summer and winter (Lutsel K'e Dene, 2001b).

#### **6.4.2.4.4 Residual Impact Classification**

*Overall, impacts on non-traditional resource use is low*

Overall, the Snap Lake Diamond Project is predicted to have a negligible to low impact on non-traditional natural resource use.

**Overall environmental consequence to subsurface minerals is expected to be negligible**

Impacts to other subsurface minerals (*i.e.*, other than the diamonds to be extracted by De Beers) are expected to be negative in direction. There may be some restrictions to mineral development and exploration by others in the development footprint. Because this is limited to the mine lease area, the geographic extent is local, located within the LSA. The impact continues throughout the life of the mine, and is reversible after closure. After closure, it is likely access to these resources will return to pre-development levels. The environmental consequence to other subsurface minerals is therefore negligible. The probability of occurrence and level of certainty for this prediction are high. There is a low level of uncertainty associated with this prediction.

**Table 6.4-2 Classification of the Residual Impact on Non-traditional Natural Resource Use**

Resource Use	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
Domestic hunting	negative	negligible	local	medium-term	reversible (short-term)	medium	negligible
Trapping	positive	negligible	regional	medium-term	reversible (short-term)	medium	n/a
Commercial and recreational fishing	negative	negligible	local	medium-term	reversible (short-term)	medium	negligible
Recreation and tourism	negative	low	beyond regional	medium-term	reversible (short-term)	medium	low
Permanent and seasonal camps	negative	low	beyond regional	medium-term	reversible (short-term)	medium	low
Other subsurface minerals	negative	negligible	local	medium-term	reversible (short-term)	medium	negligible
Access	positive	low	regional	medium-term	reversible (short-term)	medium	n/a

n/a = not applicable. Environmental consequence of positive impacts is not determined.

**The direction of impact for access is positive**

Overall, the direction of the impact of increased access is positive, but of low magnitude. The improved access due to the construction of the Snap Lake winter access road, will only slightly increase the opportunity for resource use in parts of the RSA. The impacts will be regional in extent because it is located in the RSA. The duration of the winter road is medium term, lasting only for the duration of the mine. Once the winter road is no longer constructed, any impacts will be reversible. Frequency is moderate, as it will only be in operation seasonally. Environmental consequence is not calculated where the impacts are predicted to be positive. The probability of occurrence and level of certainty for this prediction are high.

*Environmental consequences to domestic and sport hunting, and recreational and commercial fishing are expected to be negligible*

Impacts to domestic and sport hunting, and commercial and recreational fishing are expected to be negative in direction. These activities do not occur with any frequency in the vicinity of the proposed development. Impacts are negligible in magnitude, local in extent, and would occur over the life of the mine. The effects would be reversible, but would be continuous throughout the life of the mine. Therefore, the environmental consequence of these activities is expected to be negligible. The probability of occurrence and level of certainty for this prediction are moderate.

*Environmental consequence to recreation, tourism, and camps is expected to be low*

Impacts to recreation and tourism, and permanent and seasonal camps are expected to be negative in direction but of low magnitude. People at tourist sites will not hear continuous noise, but they will hear winter road and/or air traffic periodically. The impacts will be beyond regional in extent because large aircraft will be heard as they fly over areas beyond the RSA boundary. They will be reversible, but will occur throughout the life of the mine. The environmental consequence of these impacts is expected to be low. The probability of occurrence and level of certainty for this prediction are moderate.

*Impacts to trapping are expected to be positive, with a high level of uncertainty*

Impacts to trapping are predicted to be positive in direction. It is possible that improved access to portions of the RSA will provide better access and opportunity for trapping. The magnitude is expected to be negligible. Even though wolverine, a species of interest to trappers, are expected to be in the RSA during the time of increased access (January to March), the RSA is remote, and is an approximate 13-hour drive from Yellowknife, which is the nearest community with road access. The geographic extent is regional, because the winter access road is located within the RSA. The duration would be medium term, as impacts would last over the life of the mine. The impact is reversible after closure of the mine. The frequency of the impact is medium, as it would occur intermittently. Environmental consequence is not calculated where impacts are predicted to be positive. The probability of occurrence for this prediction is medium, but the level of confidence is low. For instance, an increase in fur prices may increase the likelihood of trapping within the RSA, and it is difficult to predict where trappers may choose to trap.

#### **6.4.2.4.5 Monitoring**

*Monitoring of trapping is proposed*

Trapping activity of non-traditional resource users will be monitored in the RSA by monitoring registered trapline activity.

## 6.5 AESTHETIC QUALITY

### 6.5.1 Baseline

*Snap Lake is in an isolated area*

The Snap Lake Diamond Project site is located in an isolated area characterized by rolling terrain and open water. The rock-strewn surfaces harbour sporadic low growing vegetation, with low trees and shrub patches located in topographic depressions and along shorelines.

*No permanent dwellings exist*

The closest community is Lutsel K'e, located approximately 140 km south of the project site. There are no permanent dwellings in the RSA.

*Three lodges are located in or near the regional study area*

MacKay Lake Lodge is located just inside the RSA, approximately 30 km from the project site. Facilities at MacKay Lake Lodge include cabins, kitchen facilities, and an airstrip. Warburton Bay Lodge and Lac du Rocher Outpost Camp are located just outside the RSA, 33 km and 31.9 km from Snap Lake respectively (Figure 6.4-2). Facilities at Warburton Bay Lodge include only cabin facilities. Lac du Rocher includes hardwall tent camp facilities. Peak times for the use of these facilities are during the summer sport fishing season (July/August) and the fall sport hunting season (August/September).

*Snap Lake has existing infrastructures*

There is an existing airstrip, mine camp, and other mine related structures on the northwest peninsula of Snap Lake.

### 6.5.2 Impact Assessment

#### 6.5.2.1 Introduction

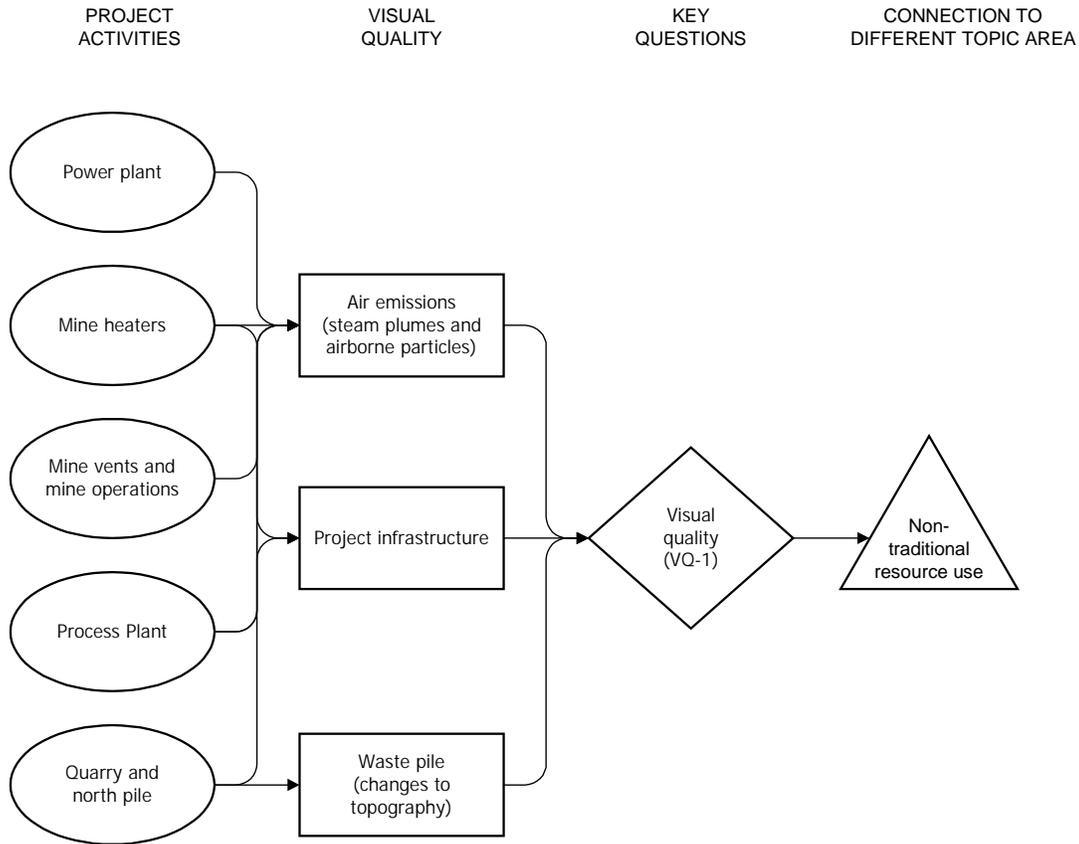
*One key question and a linkage diagram have been developed*

One key question addresses issues related to visual aesthetics. Noise is addressed elsewhere (Section 8.3). The following key question is assessed in this section.

**Key Question VQ-1: What impacts will the Snap Lake Diamond Project have on the visual quality of Snap Lake and environs?**

This key question was used to develop cause and effect pathways in a linkage diagram (Figure 6.5-1).

**Figure 6.5-1 Visual Quality Linkage Diagram**



**6.5.2.2 Key Question VQ-1: What Impacts Will the Snap Lake Diamond Project Have on the Visual Quality of Snap Lake and Environs?**

**6.5.2.2.1 Linkage Analysis**

*Links between Snap Lake and visual aesthetics are valid*

Development and operation of the Snap Lake Diamond Project can result in changes to the natural landscape that may adversely affect the appearance of the northwest peninsula and environs. The linkages between the Snap Lake Diamond Project and potential impacts to visual quality are considered valid.

**6.5.2.2.2 Mitigation**

*Snap Lake infrastructure will be dismantled*

At the conclusion of mining operations, buildings will be dismantled, sedimentation ponds will be decommissioned, and the mining area reclaimed.

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<i>The amount of processed kimberlite in the north pile will be minimized</i>	The amount of processed kimberlite to be stored in the north pile will be minimized. Approximately half the processed kimberlite will be used underground as mine backfill. The remainder will be placed in the north pile.
<i>Dust abatement techniques will occur</i>	During placement of the processed kimberlite in the north pile, dust abatement techniques will be employed to reduce wind erosion. The exposed working area will be kept to a minimum and watering will be done to maintain the upper surface of the processed kimberlite damp.
<i>Granite will cap the north pile</i>	Quarried granite will be used to cap the north pile to minimize the potential for erosion. The capping layer will be placed progressively as the design elevations are reached.
<i>The north pile height will not be higher than surrounding landforms</i>	The north pile will be contoured to produce localized terrain consistent with the surrounding topography. The final height of the north pile will not exceed that of the highest surrounding landforms in the LSA.
<i>Lighting will be kept to a minimum</i>	Outside lighting will be kept to a level to meet safety requirements. Outside lighting will be properly adjusted and shielded to minimize surrounding light pollution. For safety purposes, the airstrip lighting cannot be shielded, but the use of coloured lights will reduce light pollution.

### **6.5.2.2.3 Impact Analysis**

<i>Snap Lake infrastructure will be visible</i>	Buildings such as the power plant, processing plant, camp complex and other structures such as sedimentation ponds will be highly visible in the landscape since there is no other development in the RSA. The land area developed for mining operations, including building sites and sedimentation ponds, will be decommissioned, cleaned up, contoured generally to pre-development conditions to facilitate natural revegetation to the extent possible with indigenous plant species. Due to harsh climatic conditions and short growing seasons, it will be many years for the reclaimed area to become completely renaturalized.
<i>Steam plumes will be seen from a distance</i>	Steam plumes rising from the power plant, mine heaters, and mine exhausts will be highly visible, especially in winter months when, due to cold calm air, plumes will reach 270 m. In summer months with warmer air and more frequent winds, plumes will be less than 50 m in height.
<i>Steam plumes will be most noticeable in winter</i>	Steam plumes will be higher in winter months; however, as there will be fewer land users in the surrounding area expected during the colder months, the visual impact may be considered less important in the winter season. Section 7, Air Quality indicates that wind speeds are higher in the summer

months and the frequency of calms is greatly reduced. This will help to disperse steam plumes and airborne particles during the summer months when the concentration of users in the surrounding area will be higher. Following mine closure and decommissioning of the power plant and mine heaters, the steam plumes will cease.

*The north pile will be large, but will not be higher than surrounding landforms*

The north pile will be relatively large, covering 92 ha at the time of mine closure. The footprint of the waste pile will be approximately 1.5 km east/west and 0.75 km north/south. Depth of the waste material will vary up to approximately 40 m but will not exceed the height of the highest surrounding landforms within the LSA. The finished surface of the north pile will be graded to imitate surrounding topography with localized mounding and variation in surface levels. The waste pile will be capped with quarried granite to prevent wind erosion and help blend the new landforms with the surrounding landscape in terms of colour and texture. Figure 6.5-2 shows a view of the fully developed north pile from the boundary of the LSA from 55 m off the ground. Figure 6.5-3 shows a view of the fully developed north pile, from ground level, at the location of one vent raise on the north shore.

*Outside lighting will be visible to the tourist camps under certain conditions*

Outside lighting from the minesite can be highly visible, especially throughout the winter months. It is also likely that under overcast conditions, the glow from the minesite will be seen from the tourist lodges. During the late fall and winter, people at the tourist camps will likely see light from Snap Lake. The use of the tourist lodges corresponds with long daylight hours, decreasing the potential impact of light pollution on these facilities. Outside lighting is not required during the summer. There are few users of the tourist sites during the winter months when this impact is most noticeable.

#### **6.5.2.2.4 Residual Impact Classification**

*The overall environmental consequence of infrastructure development is low*

The visual impact of infrastructure development is negative in direction and moderate in magnitude because there will be development in an area where there has been none previously (Table 6.5-1). The impact classified in Table 6.5-1 has a regional geographic extent because the infrastructure will be seen beyond the LSA, although it will not be seen beyond the RSA. The impact will occur up to 26 years; therefore, it is medium-term. It is reversible upon closure. The frequency of the impact is low, because it occurs once upon construction of the facilities. The overall environmental consequence of this impact is low. The probability of occurrence and level of confidence for these predictions are high.

**Figure 6.5-2 View of Fully Developed North Pile from the Boundary of the Local Study Area (Looking West)**

**Figure 6.5-3 View of Fully Developed North Pile from the North Shore Vent Raise  
(Looking Southwest)**

**Table 6.5-1 Classification of the Residual Impacts On Visual Quality**

Project Component	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
Infrastructure	negative	moderate	regional	medium-term	reversible (short-term)	low	low
North pile	negative	moderate	regional	medium-term	reversible (short-term)	low	low
Steam plumes	negative	low	regional	medium-term	reversible (short-term)	medium	low
Light	negative	low	beyond regional	medium-term	reversible (short-term)	medium	low

***The environmental consequence of the visual impact of the north pile is low***

The visual impact of the north pile will be negative in direction, because it will alter the physical form of the landscape within the footprint of the mine operation. The magnitude of the impact will be low. Even though there will be some visual impact as a result of the development, it will be moderated by closure procedures which will result in the north pile imitating surrounding landscapes. The geographic extent is regional as the north pile will be seen beyond the LSA, but not beyond the RSA. The duration is medium-term and is reversible in the short-term. This is due to the contouring that will take place, the height limitations on the north pile and the natural material used to cover the north pile. The frequency of the impact is medium because it occurs intermittently throughout the development (due to the progressive reclamation). The overall environmental consequence is low. The probability of occurrence for this prediction is high. The level of confidence is moderate because there is level of uncertainty for the mitigation measures incorporating the north pile into the surrounding landscape.

***The environmental consequence of the visual impact of steam plumes is low***

Visual impact of steam plumes emanating from the Snap Lake Diamond Project will be negative in direction, but the magnitude of this impact will be low. This is because of the large distance to any permanent or seasonal facility from Snap Lake. The geographic extent of this impact is regional, as the plumes will be visible beyond the LSA, but not beyond the RSA. The duration is medium-term and the impact is completely reversible upon closure. The frequency of the impact is medium because steam plumes will occur intermittently throughout the length of the development. The overall environmental consequence is low. The probability of occurrence and level of certainty for this prediction are both high.

***The overall environmental consequence of Snap Lake lighting is low***

The visual impact of light emanating from the Snap Lake Diamond Project is negative in direction but the magnitude of this impact will be low. Although Snap Lake light will be visible under certain conditions, the use of the tourist

sites is greatest when the impact of light from the site is the least. The geographic extent is beyond regional because light may be seen beyond the RSA under certain conditions. The duration will be medium-term as it will last during the operational phase of the mine, and it is completely reversible upon closure. The frequency will be medium, as the impact will occur intermittently throughout the project. The overall environmental consequence is low. The probability of occurrence and level of certainty for this prediction are both high.

## 6.6 TIBBITT-CONTWOYTO WINTER ROAD

*Snap Lake resupply is over the Tibbitt-Contwoyto winter road*

The resupply of the Snap Lake Diamond Project will require the use of the Tibbitt-Contwoyto winter road. Currently this winter road is operated by the Tibbitt-Contwoyto Winter Road Joint Venture (Joint Venture) under a Licence of Occupation that expires in April 2003. The Licence of Occupation regulates the general route, operation, and clean-up of the winter road. The Joint Venture has recently applied to INAC to renew the Licence of Occupation.

*The winter road capacity is addressed*

This section addresses the capacity of the Tibbitt-Contwoyto winter road and the Lockhart Lake camp with respect to the associated increase in traffic generated by the Snap Lake Diamond Project. Potential spills related to Snap Lake traffic on the winter road are presented in Accidents and Malfunctions (Section 13). Wildlife issues related to the Tibbitt-Contwoyto winter road are presented in Terrestrial Resources (Section 10).

### 6.6.1 Baseline

*Baseline is pre-construction conditions*

Baseline conditions are considered pre-construction conditions associated with the use of the Tibbitt-Contwoyto winter road.

#### 6.6.1.1 Lockhart Lake Camp

*Lockhart Lake camp is located at km 170*

Lockhart Lake Camp is located near km 170 along the winter road and is operated under a land lease held by Echo Bay Mines and administered by INAC (Figure 6.6-1). It is a designated truck stop on the winter road. All trucks designated for Snap Lake are required to stop at this camp either on their outbound or inbound journey. Trucks designated for sites north of Snap Lake are required to stop at this camp on both their outbound and inbound journeys.

*The camp provides different functions*

The camp provides housing for winter road staff, maintenance facilities for winter road equipment, and fuel storage. The camp is not designed to provide sleeping accommodations for truck drivers. Meal service is provided and the truck drivers use the sanitation facilities at the Lockhart Lake camp.

*235 people used the camp daily in 2001*

Maximum daily personnel using the Lockhart Lake camp in 2001 was 235. Current water use at the camp is 36 m<sup>3</sup> per day.

**Figure 6.6-1 Tibbitt-Contwoyto Winter Road and Lockhart Lake Camp Locations**

### 6.6.1.2 Tibbitt-Contwoyto Winter Road

*The winter road has operated since 1982 to resupply mines*

The Tibbitt-Contwoyto winter road has been constructed annually since 1982 from the end of Highway #4 near Yellowknife to the Lupin mine, and is usually open from January to March, for an average of 67 days (Figure 6.6-1). The primary use of this winter road is the resupply of mines and exploration camps near the winter road. The Lupin, Diavik, and EKATI™ mines are the primary users of the road. Forty-four km (7.7%) of the Tibbitt-Contwoyto winter road is located within the RSA.

*Traffic volumes have increased*

The winter road operated primarily as a resupply route for the Lupin Mine and regional exploration activities until the mid 1990s. Development of EKATI™ Diamond Mine, north of Lac de Gras, resulted in a threefold increase in traffic volumes during the peak construction period in 1997. Resupply of EKATI™ and Lupin Mines, combined with construction of the Diavik Diamond Mine saw a further doubling of road traffic during the 2001 winter season (Figure 6.6-2).

*The general public also uses the winter road*

In addition, lodges and outfitters located near the road use it to resupply their sites. Although the winter road is primarily used for commercial purposes, it is open to the general public for use. Public use is usually limited to domestic and traditional hunters and fishers.

*The winter road operates an average of 67 days/year*

The historic operating period for the winter road dating to 1983 is presented in Table 6.6-1. Since opening, the road has operated for an average of 67 days per year. Prior to 1995, the primary winter road user was Echo Bay Mines. During this time period, their annual requirements were less than 1000 loads. As a result, their operating window was not determined by climate but by the time required to move the supplies. As soon as the last load was delivered, the winter road was closed regardless of weather conditions. Since 1995, traffic volumes have increased substantially due to the construction and operation of the EKATI™ Mine and the construction of the Diavik Diamond Mine. This traffic volume increase occurred at a time when the region was experiencing unusually warm winters. The operating window during this period (1995 – 2000) is considered to reflect current climactic realities (EBA 2001).

**Figure 6.6-2 Actual and Projected Traffic Volume Estimates 1995 – 2020 Tibbitt-Contwoyto Winter Road**

**Table 6.6-1 Tibbitt-Contwoyto Historic Operating Window**

Year	First Day	Last Day	Operating Days
2001	February 5	April 15	70
2000	February 1	April 5	65
1999	January 28	March 31	63
1998	January 19	April 4	76
1997	January 21	April 15	85
1996	January 15	April 15	91
1995	January 25	April 13	79
1994	January 18	April 3	76
1993	February 2	April 1	59
1992	January 28	March 22	54
1991	January 23	March 13	50
1990	February 1	March 22	50
1989	February 14	April 7	53
1988	February 12	April 9	57
1987	No Data	No Data	No Data
1986	January 14	April 1	78
1985	January 22	April 7	76
1984	January 30	April 8	69
1983	February 17	April 14	57
<b>Average:</b>			<b>67</b>

Source: EBA 2001.

The historic operating window period reflects an operating window based on traffic volume, not climatic conditions.

***The annual operating window is determined to be 60 to 90 days***

The annual schedule and operating window for the winter road has been examined by the Joint Venture (EBA 2001). Based upon climactic records from 1944 to 2000, the freezing index (as expressed as degree-days below zero) trend line was determined. This freezing index shows a winter warming trend. However, there is a reasonable correlation between the five-month winter freezing index and the actual operating window for the years 1995 – 2000. Extrapolation of the trend line into the future produces a median operating window of 78 days, which the Joint Venture considers to be an appropriate operating window over the period of anticipated maximum traffic. For planning purposes, the Joint Venture is using an operating window of between 60 to 90 days, with an estimated median of 78 days (EBA 2001).

## 6.6.2 Impact Assessment

### 6.6.2.1 Introduction

*Two key questions and a linkage diagram have been developed*

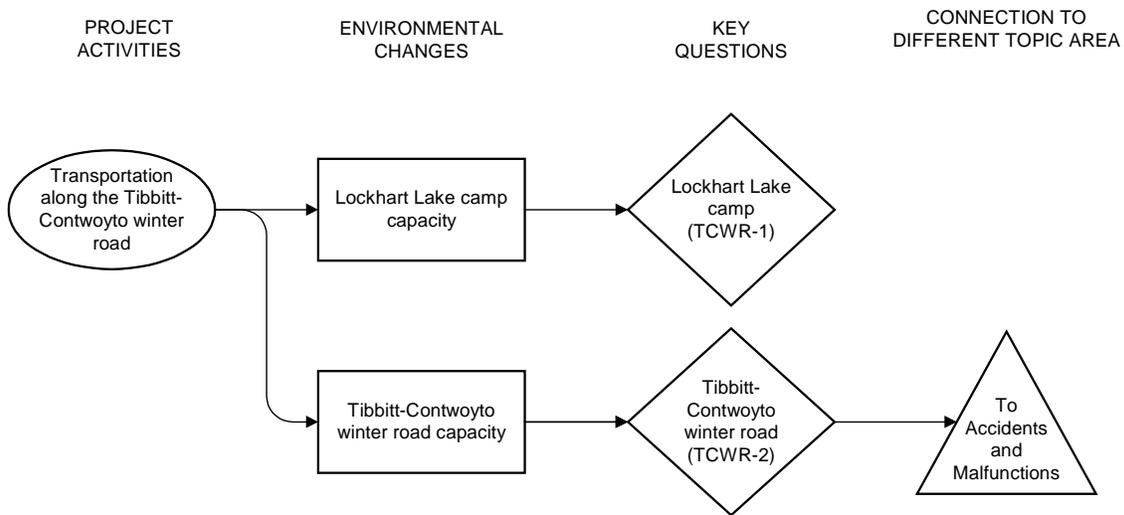
The EA process involved formulation and assessment of the following two key questions related to the Tibbitt-Contwoyto winter road:

**TCWR-1: What impact will the Snap Lake Diamond Project have on the Lockhart Lake camp?**

**TCWR-2: What impact will the Snap Lake Diamond Project have on the Tibbitt-Contwoyto winter road?**

These key questions were used to develop cause and effect pathways, or linkage diagrams (Figure 6.6-3). Project activities, environmental changes, effects to the winter road and camp, and connections to other EA components are shown as ovals, rectangles, diamonds, and triangles, respectively.

**Figure 6.6-3 Tibbitt-Contwoyto Winter Road Linkage Diagram**



*The approach used consists of a series of steps*

The following approach was used for the evaluation of impacts to the winter road and camp:

- development of a linkage diagram;
- determination of the validity of each linkage within each key question;

- proposed mitigation options;
- analysis of residual impacts;
- classification of residual impacts; and,
- monitoring, if required.

## 6.6.2.2 Key Question TCWR-1: What Impact Will the Snap Lake Diamond Project Have on the Lockhart Lake Camp?

### 6.6.2.2.1 Linkage Analysis

*The Lockhart Lake camp link is valid*

The construction and operation of the Snap Lake Diamond Project will result in an increase in traffic on the Tibbitt-Contwoyto winter road, thus resulting in increased use of the Lockhart Lake camp. The linkage between the Snap Lake Diamond Project and the Lockhart Lake camp is valid.

### 6.6.2.2.2 Mitigation

*Improvements to the Lockhart Lake camp are planned by the Joint Venture*

No mitigation is planned by De Beers. However, the Joint Venture has indicated a number of improvements to the Lockhart Lake camp are planned. These include minor upgrading of the sewage system and truck staging areas (EBA 2001).

### 6.6.2.2.3 Impact Analysis

*Snap Lake will contribute 13% of the daily camp load during peak traffic volumes*

All trucks bound for Snap Lake will be required to stop at the Lockhart Lake camp either northbound or southbound. All truckers provide their own accommodations. In 2001, 235 people per day used the camp (EBA 2001). At the peak of the traffic volumes of approximately 10,000 trucks/year, this is expected to rise to 287 people per day (J. Clarke, EBA Engineering, pers. comm.). Based on a 78-day operating window, Snap Lake truckers will contribute about 36 stops a day, or 13% of the camp load.

*The sewage lagoon will be upgraded*

The need to upgrade the sewage lagoon has already been identified by the Joint Venture (EBA 2001). The current lagoon is not large enough to hold the total volume of sewage generated in a single winter operating season. This improvement will occur regardless of the increased use of this camp as a result of the Snap Lake Diamond Project.

### 6.6.2.2.4 Residual Impact Classification

*Improvements will occur regardless of Snap Lake*

The direction of the impact of the Snap Lake Diamond Project on the Lockhart Lake camp is negative (Table 6.6-2). This is because there will be

an increase in use of this camp that is attributable to the Snap Lake Diamond Project. The magnitude of the impact will be moderate because the project will increase the use of the camp by 13%. However, improvements to the camp have already been identified as being required by the Joint Venture regardless of the increase in use attributed to Snap Lake.

**Table 6.6-2 Classification of the Residual Impact on Lockhart Lake Camp**

Project Component	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
Lockhart Lake camp	negative	moderate	local	medium-term	reversible (short-term)	medium	low

*The environmental consequence is expected to be low*

The extent of the impact will be local, as it will only occur at the Lockhart Lake camp. The duration of the impact will be medium term, as it will occur during the construction and operational phases of the project. The impact is reversible in the short term because any impacts contributed by the Snap Lake Diamond Project will cease upon closure of the mine. The frequency will be medium because, although it will take place annually for the life of the mine, it will occur only during the winter road season and Snap Lake traffic will be intermittent during the season. The overall environmental consequence is expected to be low.

*The probability is high and the confidence level is medium*

The probability of the impacts occurring is high. The confidence level is medium because in estimating the traffic volumes on the winter road, a conservative estimate has been used. It is possible that there will be less traffic volume on the road during the operational phase than predicted.

### 6.6.2.3 Key Question TCWR-2: What Impact Will the Snap Lake Diamond Project Have on the Tibbitt-Contwoyto Winter Road?

#### 6.6.2.3.1 Linkage Analysis

*The link between the winter road and the Snap Lake Diamond Project is valid*

The construction and operation of the Snap Lake Diamond Project will result in an increase in traffic on the Tibbitt-Contwoyto winter road. This could affect the winter road capacity. The linkage between the Snap Lake Diamond Project and the Tibbitt-Contwoyto winter road is valid. This is shown in Figure 6.6-3.

### 6.6.2.3.2 Mitigation

*A number of improvements are planned by the Joint Venture*

No mitigation is planned by De Beers. However the Joint Venture has indicated that the following improvements to the Tibbitt-Contwoyto winter road are in the planning stages:

- Operating safety and efficiency of trucking operations over lake ice will be thoroughly reviewed. The objective is to develop improved guidelines for determining load capacity and speed restrictions (EBA in prep).
- Selected portages will be upgraded to improve the running surface, reduce grades, and increase sight distance using a phased approach. The objective is to reduce the risk of accidents and road closures.
- Support infrastructure, such as camps and communication facilities, will be improved.
- Traffic management practice, driver awareness training, and communication systems will be revised progressively.
- Public road access during early and late season operations will be controlled more rigorously.
- Updated ice capacity guidelines will be developed for implementation in the 2002 season.
- Data management and documentation of daily activities related to road operations and maintenance will be improved.

### 6.6.2.3.3 Impact Analysis

*The Joint Venture is re-permitting the winter road*

The Joint Venture believes that the winter road is currently the only viable supply route for the diamond mines in the Slave Geological Province. They have initiated a planning and permit renewal process that takes into account the next 30 years of winter road use, which represents the predicted life of the winter road based on known operating, reclamation, and closure schedules for existing (EKATI™, Diavik, Lupin and miscellaneous users) and reasonable foreseeable future projects (Snap Lake, Tahara, and exploration). The Joint Venture has developed their application based on future traffic of 12,000 loads/year (EBA 2001).

*Snap Lake will increase traffic volumes on the winter road*

Projections indicate that traffic volumes on the winter road will increase from 8,391 loads per year in 2003 to a peak of about 10,000 loads per year between the years of 2004 and 2015 (Figure 6.6-2). Snap Lake will contribute 2,800 loads per year or approximately 28% of the traffic volume during this time period. The peak traffic loads are below the Joint Venture's winter road design base of 12,000 loads per year.

**Traffic volumes will decrease on closure of EKATI™**

In 2016 when EKATI™ diamond mine is currently planned for closure, the traffic volume decreases to approximately 5,000 loads per year (Figure 6.6-2). The Snap Lake contribution would increase to approximately 55%.

**Traffic increase does not increase the risk of ice failure**

The capacity of lake ice to sustain the current and projected traffic volume has been examined by the Joint Venture (EBA in prep). The projected traffic frequency does not substantially increase the risk of ice failure from fatigue loading. The Tibbitt-Contwoyto Road, south of Lockhart Lake camp is characterized by frequent small, shallow lakes and a few larger lakes that are also shallow with many islands. The greatest risk of ice failure has been associated with shallow bays, shoals that are common near islands and approaches to shore crossings. At these locations, the hydrodynamic wave initiated in the water by a moving vehicle deflects the ice sheet. Its magnification can result in overstress and wet cracking. These incidents can be managed by optimizing on-ice route location and controlling vehicle speed. New ice capacity guidelines are currently in preparation and plan to be implemented for the 2002 season.

**The annual operating window is determined to be 60 to 90 days**

The annual schedule and operating window has been examined by the Joint Venture. Based upon climactic records, the Joint Venture has identified an operating window of 60 to 90 days, with an estimated median of 78 days (EBA 2001).

**6.6.2.4 Residual Impact Classification**

**Impact direction is positive and negative**

The direction of the impact of the Snap Lake Diamond Project is both positive and negative (Table 6.6-3). It is negative in the context of an increase in traffic on the winter road, but positive in the context of planned improvements to the winter road.

**Table 6.6-3 Classification of the Residual Impacts on the Tibbitt-Contwoyto Winter Road**

Project Component	Direction	Magnitude	Geographic Extent	Duration	Reversibility	Frequency	Environmental Consequence
Tibbitt-Contwoyto winter road – increase in traffic volume	negative	high	local	medium-term	reversible (short-term)	medium	low
Tibbitt-Contwoyto winter road – improvements	positive	high	local	medium-term	reversible (short term)	high	n/a

*The magnitude of traffic increase is high*

With respect to increase in traffic, the magnitude of the impact is high because Snap Lake traffic will comprise over 25% of the traffic on the winter road until the EKATI™ closure. After the EKATI™ closure, the overall traffic volumes will decrease dramatically from a peak of about 10,000 trucks per year to about 5,000 trucks per year. The Snap Lake proportion will increase to about 55%.

*The impact will be local, medium-term, and reversible*

The extent of the impact will be local, as it will only occur on the winter road alignment. The duration of the impact will be medium term, as it will occur during the construction and operational phases of the project. The impact is reversible in the short term because traffic contributed by the Snap Lake development will cease upon closure of the mine. The frequency will be medium as it will occur only during the winter road season and Snap Lake traffic will be intermittent during the season.

*The probability of occurrence is high*

The probability of the impacts occurring is high. The confidence level is medium because in estimating the traffic volumes on the winter road a conservative estimate has been used. It is possible that there will be less traffic volume on the road during the operational phase than has been predicted.

*The magnitude of winter road improvements is high*

With respect to the winter road improvements, these cannot be attributed solely to the Snap Lake Diamond Project. However, the magnitude will be high, since the project will contribute over 25% of the traffic volume on the winter road during the peak traffic volume years and Snap Lake can, in part, contribute to the need for improvements to the winter road. The extent of the impact will be local, as it will only occur on the winter road alignment. The duration of the impact will be long term, as the improvements will extend beyond mine closure. However, upon final closure of the winter road the improvements are reversible in the long term. The frequency of the improvements will be high, as they will continue until the road is no longer used. Environmental consequence is not determined for positive impacts. The probability and level of confidence for this prediction is medium because the approval of the implementation of improvements depends upon a separate regulatory process.

### 6.6.2.5 Monitoring

*No monitoring by De Beers is proposed*

No monitoring is proposed by De Beers. However, the Joint Venture has identified the following monitoring to take place on the Tibbitt-Contwoyto winter road (EBA 2001):

- Sewage lagoon levels will be monitored regularly, annual summer inspections will be carried out, and plans will be prepared for future expansion as necessary.

- Winter road monitoring is an ongoing process. An independent security firm enforces rules and regulations established by the Joint Venture.
- Maintenance records relating to route location over ice, ice thickness variability, and portage upgrades will continue to be documented. These data bases will be used for future planning and will provide feedback for annual review of the operation rules and guidelines.

## 6.7 CONCLUSIONS

### 6.7.1 Heritage Resources

*Impacts to heritage resources can be direct or indirect*

Impacts to heritage resources can occur directly, from disturbance related to the development, or indirectly. Indirect impacts can be related to increased use of the area as a result of the project. They usually occur outside direct impact zones and are generally unanticipated. Any impacts to heritage resources are permanent and irreversible.

*53 archeological sites were recorded and investigated*

Activities related to the construction of the mine site and associated infrastructure, including the winter roads and esker quarry, have the potential to impact heritage resources. During the heritage resource investigations, 53 archaeological sites were recorded and investigated. All but six sites identified are of prehistoric archaeological character. The assigned scientific importance of these sites varies considerably, from relatively low in the case of isolated finds and recent non-traditional sites to high in the case of large scatters and campsites.

*Almost all sites occur outside direct impact zones*

Because of the nature of the development, particularly winter roads, and because of De Beers' intent to avoid heritage resources wherever possible, almost all of the sites recorded occur outside the direct impact zones.

*The environmental consequence to heritage resources is low to moderate*

The overall environmental consequence of the residual impact of the Snap Lake Diamond Project on heritage resources is low to moderate. However, the probability of direct impacts occurring, based on the studies undertaken, is negligible. The classification is shown in Figure 6.7-1. Monitoring has been proposed.

*There is now an increase in heritage resource information*

There is a positive effect on heritage resources as a result of the Snap Lake Diamond Project. As a result of the archaeological studies undertaken in preparation for the development, there is an increase in information related to heritage resources. This increase in information provides moderate positive effects.

**Figure 6.7-1 Classification of Residual Impacts to Heritage Resources and Traditional Land Use Areas**

## 6.7.2 Traditional Land Use

*The RSA is not intensely used for traditional land use purposes*

The RSA is not intensely used for traditional land use purposes. Little fishing was identified in the RSA. No existing traplines were identified; however, the area has been used in the past for trapping activities. As well, people have travelled through the area to hunt wolves. Recent hunting for caribou in the RSA was not identified. No permanent or seasonal camps were identified in the RSA. No traditionally significant areas were identified within the RSA.

*A number of mitigation measures will be implemented*

De Beers has limited the size of the footprint of the project to a total of 550 ha. Quarries will be developed within the footprint of the north pile to limit the use of esker material found south of the project site. Esker quarry sites will be progressively recontoured and reclaimed. Heritage sites will be avoided.

*The overall environmental consequences on traditional land use is low*

The overall environmental consequence of the residual impacts of the Snap Lake Diamond Project on traditional land use is low. The classification is shown in Figure 6.7-1. Monitoring is not proposed.

## 6.7.3 Non-traditional Resource Use

*The Snap Lake RSA is not a likely candidate for establishing a protected area*

The Snap Lake Diamond Project occurs within the Coppermine River Uplands Ecoregion. There are no existing protected areas within the RSA and it is unlikely that land within the RSA would become a candidate for a protected area. There is one candidate area for protection outside the RSA and partially within the Coppermine River Uplands Ecoregion; the proposed East Arm National Park. Two potential protected areas have been identified through the PAS. These are the drainage of the Desnedhé Che and the Mowhi Trail. Two IBP sites have been identified: Beniah Lake and Discovery Mine. All are located outside the RSA and partially within the Coppermine River Uplands Ecoregion. Two other areas of interest occur within the RSA: the migratory route of the Bathurst caribou herd, located south of MacKay Lake, and the boulder fields located east of Snap Lake. However, there are no areas of outstanding environmental importance identified in the RSA.

*Project footprint comprises only 0.01% of the Coppermine River Uplands Ecoregion*

There will be a loss of land associated with the development of the Snap Lake Diamond Project; however, the project footprint comprises only 0.01% of the Coppermine River Uplands Ecoregion and the RSA comprises 5.8% of the region. Therefore, the magnitude of the impact of this loss of land on

the availability of land for ecologically representative areas is negligible. The overall environmental consequence would be low (Table 6.7-2).

***De Beers can be a positive factor in the establishment of a protected area***

As a result of De Beers' involvement with the NWT and Nunavut Chamber of Mines on the Protected Areas Strategy Advisory Committee, De Beers can be a positive factor in the establishment of a protected area within the Coppermine River Uplands Ecoregion.

***The overall environmental consequences to other subsurface minerals is negligible***

There will be restrictions on other mineral development and exploration in the LSA. This will be reversed upon closure of the Snap Lake Diamond Project. However, overall it is expected that the residual impact on the extraction of other subsurface minerals, if present, will be negligible. The classification is shown in Figure 6.7-2.

***Increased access is expected to have a positive effect but be low in magnitude***

The construction of the Snap Lake winter access road will improve access into the RSA and access for trapping. This is considered a positive effect. However, access for domestic hunters and fishers is not expected to improve substantially. This is because of the distance to the RSA from Yellowknife, the length of time it would take to travel over the winter roads to reach the RSA, the availability of wildlife closer to established communities, and the relative low abundance of wildlife in the RSA during the time the Snap Lake winter access road is open. Exploration activities in the RSA are expected to continue regardless of improved access over a three-month period. Access by fly-in hunters and fishers will not be substantially affected because the airstrip at Snap Lake will not be open for public use. Overall, it is expected that the positive effects of the improved access will be low in magnitude.

***Minimal resource uses were identified in the RSA***

No domestic hunting was identified in the RSA. Minimal natural history viewing takes place, and is associated with the three lodges. There are no commercial fisheries in the RSA. No recreational snowmobiling was identified in the RSA. One lodge is located in the RSA, approximately 30 km from Snap Lake. Two other lodges, both located just outside the RSA, are located 33 and 31.9 km respectively from Snap Lake. The lodges are used during the summer and early fall for fishing and sport hunting. The three lodges located in or near the RSA, likely use resources inside the RSA.

***Environmental consequences to hunting, fishing, recreation and tourism are negligible to low***

Impacts to domestic hunting, commercial and recreational fishing, and recreation and tourism are expected to be negative in direction. However since these activities either do not occur or do not occur with any frequency in the RSA, the overall environmental consequences of these residual impacts are expected to be negligible to low. The classifications are shown in Figure 6.7-2.

**Figure 6.7-2 Classification of Residual Impacts to Ecologically Representative Areas and Natural Resource Use**

*The environmental consequence to permanent and seasonal camps is low*

Although there are likely cabins located in the RSA, no records could be found of their location. People at all three lodges will not hear continuous noise from the site, but will hear winter road and/or air traffic periodically. The overall environmental consequence of this residual impact on permanent and seasonal camps is expected to be low. The classification is shown in Figure 6.7-2.

*Impacts on trapping is expected to be positive with a high degree of uncertainty*

No registered traplines are found in the RSA. However, it is predicted that improved access to the RSA may provide better access and opportunity for trapping in the RSA. The magnitude of this impact is expected to be negligible, however, because of the long distance from Yellowknife, which is the closest community with road access. The level of uncertainty for this prediction is high. Monitoring of registered traplines within the RSA is proposed.

## 6.7.4 Aesthetic Quality

*The environmental consequence of infrastructure development is low*

Buildings and other structures will be highly visible. These structures will be removed upon closure. The overall environmental consequence of the residual effects of infrastructure development is expected to be low. The classification is shown in Figure 6.7-3.

*The environmental consequence of the north pile is low*

The north pile will be relatively large, covering 92 ha at the time of mine closure. Reclamation of the north pile will proceed progressively and the final height will not exceed that of surrounding landforms. The overall environmental consequence of the residual effects of the north pile is expected to be low. The classification is shown in Figure 6.7-3.

*The environmental consequence of the steam plumes is low*

Steam plumes will be visible, and this effect will be most noticeable during the winter months when fewer land users are expected. The overall environmental consequence of the residual effects of steam plumes is expected to be low. The classification is shown in Figure 6.7-3.

*The environmental consequence of lighting is low*

Outside lighting will be highly visible, especially during the winter months. It is also likely that, under overcast conditions, the glow from the minesite will be seen by people at the tourist sites. The use of properly shielded and aimed lights, and the fact that the tourist sites are not used during the winter months when the effects are greatest will minimize the impact. The overall environmental consequence of the residual effects of lighting from the Snap Lake Diamond Project is expected to be low. The classification is shown in Figure 6.7-3.

**Figure 6.7-3 Classification of Residual Impacts to Visual Quality, the Lockhart Camp, and the Tibbitt-Contwoyto Winter Road**

## 6.7.5 Tibbitt-Contwoyto Winter Road

*The winter road is run by a Joint Venture*

The Tibbitt-Contwoyto winter road has been in operation since 1982. It is primarily used for re-supplying mines; however, the public also uses the road. The Lockhart Lake camp, located on the winter road, is either an outward or inward bound stop-off point for trucks bound for Snap Lake. The winter road is operated by a Joint Venture, which is in the process of re-permitting the winter road. The Joint Venture has indicated that a number of improvements will occur at the Lockhart Lake camp and on the winter road. As well, the Joint Venture has indicated that a number of winter road monitoring initiatives will continue. These improvements and monitoring activities will occur regardless of the Snap Lake Diamond Project development.

*28% of the traffic and 13% of the load to the Lockhart Lake camp will be attributable to Snap Lake during the years of peak traffic on the winter road*

Between 2004 and 2005, the years of peak traffic volumes, the Snap Lake Diamond Project will contribute 28% of the traffic load. The estimated peak traffic volume of 10,000 vehicles/year is below the Joint Venture's design standard of 12,000 vehicles/year. At peak traffic volumes, the project will contribute 13% of the daily load to the Lockhart Lake camp. In 2016 when EKATI™ is currently planned for closure, traffic volumes on the winter road will decrease dramatically.

*The environmental consequence to Lockhart Lake camp is low*

The overall environmental consequences for the residual impacts associated with the Snap Lake Diamond Project on the Tibbitt-Contwoyto winter road and the Lockhart Lake camp are both expected to be low. The classification is shown in Figure 6.7-3.

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## 6.9 UNITS, ACRONYMS, AND GLOSSARY

### UNITS

ha	hectare
km	kilometre
km/hr	kilometre per hour
m	metre
m <sup>3</sup>	cubic metre

### ACRONYMS

CEA	cumulative effects assessment
De Beers	De Beers Canada Mining Inc.
INAC	Indian and Northern Affairs Canada
EA	environmental assessment
GNWT	Government of Northwest Territories
IBP	International Biological Program
LSA	local study area

MVEIRB	Mackenzie Valley Environmental Impact Review Board
N	number
NFW	no further work
NSMA	North Slave Métis Alliance
NWT	Northwest Territories
PAS	Protected Areas Strategy
PWNHC	Prince of Wales Northern Heritage Centre
RSA	regional study area
RWED	Department of Resources, Wildlife and Economic Development

## **GLOSSARY**

a priori	relating to or derived by reasoning from self-evident propositions
alignment	the ground plan (as of a railroad or highway)
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
baseline case	describes the current environmental setting, against which changes in the environment from the Snap Lake Diamond Project could be assessed
cairn	a heap of stones piled up as a memorial or as a landmark
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
direction	describes an impact or effect as being neutral or negative; the direction reflects the change, if any, from baseline
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

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ecological resilience	usually defined as the rate of ecosystem recovery following a disturbance or the capacity of an ecosystem to absorb disturbances
environmental consequence	the overall effect on the environment when the magnitude, geographic extent, duration, and irreversibility of the project's impact are considered together
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
freezing index	indicator expressed as degree-days below zero
frequency	refers to how often an effect will occur
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
heritage resources	non-renewable resources that may be located at or near ground level or may be deeply buried; include the sites where events took place in the past or are currently on-going, all of the objects they contain, and contextual information that may be associated with them that will aid in their interpretation; contextual information can include, but is not limited to, natural specimens and documents, or verbal accounts
historic period resources	include the sites, artifacts, structures and documents that relate to the Euro-Canadian occupation of the region and date to the last 250 years; also the sites, artifacts and affiliated resources relating to on-going use of the landscape by Aboriginal people including: archaeological sites and objects such as standing and collapsed cabins, campsites, trails, graves; and traditional sites and resources, such as special places, hunting, fishing and plant collecting areas, trap lines and their associated remains, oral traditions and various documents
level of confidence	directly related to the degree of certainty in the impact prediction
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

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lithic artifact	a single stone artifact
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
mine footprint	the area covered by the mine site
palaeontological resources	consist of physical remains representing the evidence of extinct multicellular plants and animals that inhabited the region in prehistoric times, together with related contextual information; includes fossils, bone deposits, shells and the impressions of these remains
portage	on a winter road alignment, the route followed overland from one body of water to another
prehistoric archaeological resources	in northern North America, defined as: the archaeological sites, objects and affiliated materials that represent occupations by Aboriginal peoples prior to the arrival of European goods, people, and the historic records that characterize European culture; in the Northwest Territories (NWT) these consist of the locations where activities took place and the remains of these activities, usually stone artifacts and features such as hearths, cairns and occasionally bone and other organic artifacts; prehistoric archaeological resources can span the entire 7,000-year period of recognized prehistory in the NWT
probability of occurrence	the likelihood that the environmental consequence indicated in the impact prediction will occur if the project goes ahead
reconnaissance study	collection of additional, but non-systematic, assessment data
reversibility	refers to changes that occur after the impact ceases allowing the environment to return to a capability or condition equivalent to the baseline
tent ring locus	ring of rocks that defines the former location of a tent
traditional knowledge	information obtained more often through observations primarily by Aboriginal people during extensive time spent in one geographic location than through information obtained formally by the scientific method