

INTRODUCTION

De Beers is proposing to develop the Snap Lake Diamond Project

De Beers Canada Inc. (De Beers) owner and operator of the Snap Lake Diamond Project, is proposing to develop an underground diamond mine at Snap Lake, Northwest Territories, located about 220 km northeast of Yellowknife (Figure 1). The diamond-bearing kimberlite deposit was found by Winspear Resources Ltd. in 1997.

Current permit status

The Snap Lake site is currently permitted for advanced exploration. The permits were issued in December 1999 to Winspear Resources and subsequently assigned to De Beers in July 2000. The advanced exploration program has been operating under a Type B water license issued by the Northwest Territories Water Board that is valid until December 2003. The Class A land use permit was received in December 1999 from the Department of Indian and Northern Affairs Canada and will expire in December 2002.

Environmental assessment conducted

In February 2001, De Beers initiated a screening of the Snap Lake Diamond Project under the *Mackenzie Valley Resource Management Act*. The screening was reviewed by the Mackenzie Valley Land and Water Board, which in May 2001, referred the project to the next stage of review – an environmental assessment. De Beers conducted the environmental assessment under the direction of the Mackenzie Valley Environmental Impact Review Board. The environmental assessment reports the predicted effects of the Snap Lake Diamond Project on the biophysical, social, cultural, and economic environments. This executive summary provides an overview of the results of that environmental assessment.

Licensing phase to follow

Assuming the Snap Lake Diamond Project receives approval at the completion of the environmental assessment process, it will enter a second licensing phase under the authorization of the Mackenzie Valley Land and Water Board.

PROJECT ALTERNATIVES

Focus on impact avoidance

Throughout the planning and design of the Snap Lake Diamond Project, De Beers has looked for ways to reduce the project's negative impacts on the natural environment and on people. Because the best way to minimize environmental impacts is to avoid them from the beginning, De Beers focussed on creating a mine plan that will result in as small an impact as possible on the environment. De Beers consulted with Aboriginal communities and northerners to identify their issues, and revised the project plans to respond to the concerns they raised.

Figure 1 Regional Context and Location of Project

Centralized mine facilities

To reduce the extent of disturbance, an option with a small footprint was selected. As a result, the development will be centralized within a core area on the northwest peninsula of Snap Lake. Disturbance outside the core area will be limited to mine ventilation openings on the north shore of Snap Lake, winter roads, and a small quarry.

Underground mining method selected

De Beers considered a number of alternatives to recovering the kimberlite, including options with open pits. De Beers selected a total underground mining method, even though it was not the most economically attractive. The underground option will result in a smaller project footprint, avoid the need for dykes and related aquatic impacts in Snap Lake, reduce the size of the waste rock area, minimize the volume of potentially acid generating rock that would be created, and reduce the dust and noise that would result from surface operations.

Waste disposal options

Options for disposal of waste rock and processed kimberlite were considered. To reduce the volume of material for above-ground disposal, substantial amounts of waste rock and processed kimberlite will be returned underground. The remainder will be placed in the north pile. Two primary alternatives were considered for the north pile. The first alternative was a relatively high pile, which had a smaller area but greater visual impact. The second alternative resulted in a larger footprint but a lower pile that is no higher than other surrounding hills (about 34 metres) and contoured to blend with natural landforms. The second option was selected because it will be less visible.

Quarries

A quarry will be required to provide borrow materials during mine operations. To reduce terrain impacts, most material will be quarried from within the footprint of the area that will be used for the north pile. To meet specific requirements for sand, one small esker quarry located about 9 km south of the project site will be used occasionally.

Water treatment

A number of alternatives for water management were considered. In response to concerns expressed by Elders, all water will be treated before being released into Snap Lake. A sewage treatment plant will treat camp wastewater, and a water treatment plant will treat water from the mine, the north pile and site runoff.

Energy

A number of energy sources were considered for use at the Snap Lake Diamond Project. Wind, fuel cells, and propane were found to be not economically practical based on current technology and site conditions. Energy conservation and capture of waste heat will be the primary method used to reduce fuel requirements and lower emissions. There is some potential for solar heating to reduce energy needs for the project. Diesel

was selected as the primary energy source because of its reliability and cost-effectiveness.

Transportation options

A range of transportation alternatives for the principal bulk cargoes was evaluated. Use of the existing Tibbitt-Contwoyto winter road with a spur to the Snap Lake site was selected because it will be the most cost-effective and environmentally least-disruptive choice.

THE PROJECT

SITE FEATURES

Project components

Most of the above-ground facilities for the Snap Lake Diamond Project will be located in the core area on the northwest peninsula of Snap Lake. Facilities include a process plant, materials and ore storage areas, water and sewage treatment plants, water management pond, fuel storage, power plant, and worker accommodation and offices. The total project footprint, including facilities outside the core area will occupy about 650 hectares (ha) (Figure 2).

North pile

The north pile will be one of the Snap Lake Diamond Project's most noticeable features. It will be located west of this concentration of buildings. Two laydown areas will be situated south of the north pile. These areas will be used to store materials and provide workspace for the mine construction and ongoing operations.

Water management

A ditch and sump system will collect water that drains from the north pile and laydown areas. This water will be directed to settling ponds, and then into the water treatment facility before being released to Snap Lake. The water management pond will provide storage capacity.

Airstrip

A 1,900 metre (m) long airstrip will be located about 1.5 km west of the plant site. This airstrip will be capable of handling large aircraft (Boeing 737, C-130 Hercules), and will provide the main mode of transportation for workers and for shipment of rough diamonds to Yellowknife.

Explosive storage

Bulk emulsion and explosives storage areas will be located at the far west end of the project site, about 1.5 km from the main activity area of the project.

Figure 2 Site Plan

GETTING THE MINE UNDERWAY

Underground Development

Underground access

The Snap Lake Diamond Project will be Canada's first underground diamond mine. During the advanced exploration program, which was completed in September 2001, a portal was developed from the surface reaching underground to the kimberlite deposit under Snap Lake. The portal is about 5 m wide and 4.5 m high. It is large enough to accommodate haul trucks and provide for mine ventilation. This portal will provide access for the development of the underground mine workings.

Pre-production phase

Work required to bring the mine into production will begin during the pre-production phase. Underground tunnels will be extended, and underground rooms will be created to house operations such as a crushing plant where the kimberlite will be crushed before being sent by conveyor to the surface. The waste rock that is removed from underground will be hauled to the surface by truck, and deposited within the north pile.

Surface Development

Site preparation

Before the mine is ready to produce diamonds, a number of facilities must be built above-ground. In 2003, site development will include constructing the water treatment facility and preparing the north pile area. Construction equipment, materials, and crews will be moved to the site in early 2004, with construction completed in late 2005. The processing plant will begin operation in late 2005 and reach its full throughput rate in 2006.

Mining the Ore

Kimberlite mining

Kimberlite rock will be blasted from the deposit and hauled by truck to an underground crusher. From there, a conveyor will carry the crushed kimberlite to the surface, where it will go directly to the process plant or to an enclosed ore storage building. Underground mining of the kimberlite will begin in 2005, and extend through to 2026. By mining underground, the noise and dust generated by ore hauling and crushing will be prevented from escaping onto the tundra.

RECOVERING THE DIAMONDS

Recovering diamonds

Diamonds will be extracted from the kimberlite at an on-site processing plant. In the plant, the crushed kimberlite will be washed and screened, then mixed with a water/ferrosilicon mixture to create a slurry. That slurry will then be spun in a cyclone where the mixture will separate into layers. The layer that contains the diamonds will then be dried and put through diamond recovery machines which use x-rays to detect the diamonds. The rough diamonds that are recovered will be cleaned and sorted for valuation, and then transported off-site by aircraft.

STORING WASTE ROCK AND PROCESSED KIMBERLITE

Waste rock disposal

The north pile will be built from waste rock that was produced during the advanced exploration and pre-production phases, and processed kimberlite. Some of the rock that is mined during the pre-production phase will contain sulphide compounds and could be acid-generating. This occurs when water comes into contact with this rock in the presence of air and is chemically changed, resulting in “acid rock drainage”, which can harm lakes and streams if not controlled. Therefore, this waste rock will be managed carefully to ensure that all water that it contacts will be treated before being released.

Processed kimberlite disposal

Processed kimberlite is the material that is left over once the diamonds are removed in the processing plant. Water is drained from the processed kimberlite to form a material about the consistency of toothpaste. About half of the 1.08 million tonnes of processed kimberlite that is produced each year will be mixed with a small amount of cement and pumped through a pipeline back into the mine to be used as backfill. The remainder of the processed kimberlite will be placed in the north pile.

Backfill underground spaces

Once the mine is in production, most of the mine rock will be mixed with concrete and placed underground into the openings and tunnels that are no longer active. Additional rock obtained from a quarry developed within the footprint of the north pile may also be required to backfill underground spaces.

North pile development

The north pile will be built primarily from processed kimberlite which will be pumped as a paste and deposited behind the containment berm built from non acid-generating rock. This paste is not acid-generating and has substantial capacity to neutralize any acid which is generated by other materials in the north pile. During the first year or so, some water will drain

from the processed kimberlite, and within one or two years, the paste will become permanently frozen.

Other uses of the north pile

Also located within the footprint of the north pile is a landfarm for disposal and treatment of petroleum-contaminated soils, a landfill for non-hazardous materials, and quarries for site construction aggregate.

North pile completion

As the north pile is built, it will be capped with about 0.5 m of rock for erosion protection. The north pile will be progressively reclaimed during operations.

WATER MANAGEMENT

Water management overview

Ensuring that water quality is protected is typically one of the most important considerations for mining developments. The Snap Lake Diamonds Project is no exception. To prevent any negative effects to Snap Lake and other surface water bodies, almost all water that comes into contact with the project during construction and operation will be treated before being released into Snap Lake. The exception to this rule is runoff from rain and snow on the airstrip, along some access roads, the esker quarry. Rain and snowmelt will be allowed to drain naturally into nearby low-lying areas near these locations.

Water contact with project

Water comes into contact with the project in four ways:

- water seeps into the underground workings;
- water is withdrawn from Snap Lake to use in the diamond processing plant;
- water is withdrawn from Snap Lake to use for domestic potable water; and,
- surface water from rain and snow falls directly onto the site.

Underground seepage water

Water that seeps into the underground workings will be pumped to the water treatment plant on the surface, where it will be treated before being released back into Snap Lake. Underground mine water will account for most of the total water generated by the project.

Process plant water

The process plant will use water from Snap Lake to separate the diamonds from the kimberlite. Most of this water will be recycled back into the process but a portion of it will be included in the processed kimberlite paste. This portion will be replaced by water from Snap Lake.

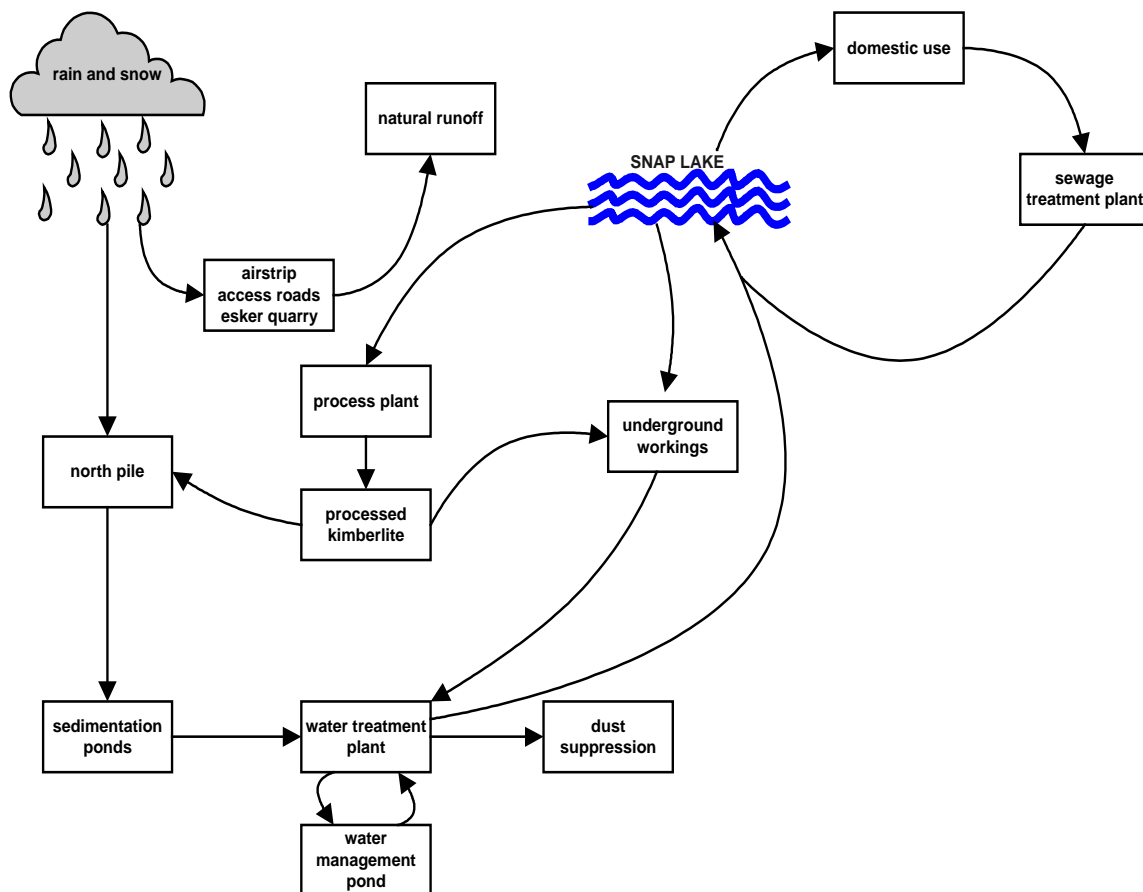
Camp water

Water will also be withdrawn from Snap Lake for use in the camp and other areas where potable water is required. Once used in the camp, this water will be treated in the sewage treatment plant before being released back into Snap Lake. Wetlands will not be used for treatment.

North pile drainage

Drainage from the north pile includes surface run-off from rainfall and snowmelt, as well as water that drains from the processed kimberlite before it becomes permanently frozen. Water from the north pile will be collected in sumps and drainage ditches. Then it will be directed to settling ponds where most of the sediment in the water will settle out. From there, the water will be pumped to the water treatment plant and, once treated, will be released back into Snap Lake or used for dust suppression along access roads and at the airstrip. A water management pond will be located next to the water treatment plant. This pond will be used to store excess water in case inflows exceed the water treatment facility's capacity or the treatment facility shuts down.

Figure 3 Water Management at the Snap Lake Diamond Project



CONSULTATION

***Consultation
overview***

Consultation about the Snap Lake Diamond Project was started by Winspear Resources Ltd. in 1998. Following acquisition of the project, De Beers has continued consulting with communities, territorial and federal government departments and non-government organizations, and promoted the collection and use of traditional knowledge in the project design and environmental assessment.

COMMUNITIES AND OTHER GROUPS

***Community
consultation***

Consultation has included regular visits, information sessions, and public (open house) meetings by De Beers. In addition, community members have regularly visited the Snap Lake site, and had access to information about the project through the regularly-published Snap Lake News newsletter, and the project website.

Recurring themes

A broad range of questions were raised by community representatives, with some themes re-occurring. For example:

- training and recruitment of local people for a wide variety of jobs is important;
- priority should be given to local people for jobs;
- pollution should be prevented so that air, water, habitat, fish, and wildlife do not become contaminated;
- caribou are important and their health, migration routes, and habitat need to be protected;
- traditional knowledge should be an important part of planning and mitigation; and,
- involvement by Elders and youth in various programs (including mine monitoring, studies, *etc.*) should be encouraged.

***Future
consultation***

De Beers will continue consultation throughout future project phases, with consultation plans linked to regulatory and project milestones.

TRADITIONAL KNOWLEDGE

Four Aboriginal groups consulted for traditional knowledge

Four Aboriginal communities were consulted regarding traditional knowledge. They are the Lutsel K'e Dene First Nation, the North Slave Métis Alliance, the Yellowknives Dene First Nation, and the Dogrib Treaty 11 Council.

Lutsel K'e

Discussions with the Lutsel K'e regarding traditional knowledge resulted in the preparation of a traditional knowledge assessment of the Snap Lake area developed by the Lutsel K'e.

North Slave Métis Alliance

The North Slave Métis Alliance noted that their focus would be to contribute their traditional knowledge to environmental monitoring, and expressed interest in developing a decision-making mechanism that allowed for the direct input of traditional knowledge into the development and implementation of environmental monitoring.

Yellowknives Dene First Nation

De Beers' discussions with the Yellowknives Dene First Nation were initiated in spring 1999. From 1999 to 2001, De Beers has continued to interact with the Yellowknives Dene First Nation, although formal traditional knowledge discussions or contributions have not been completed. In the absence of traditional knowledge specific to the Snap Lake Diamond Project, the Yellowknives Dene First Nation suggested that De Beers refer to the traditional knowledge studies completed for adjacent developments (*i.e.*, EKATITM mine).

Dogrib Treaty 11

In spring 2000, De Beers initiated discussions with the Dogrib Treaty 11 regarding a specific traditional knowledge study of the Snap Lake Diamond Project. The study has not yet been completed. In its absence, De Beers has relied on information provided by traditional knowledge holders during community consultation and a review of previously published reports of Dogrib Treaty 11.

Traditional knowledge integrated into project

Traditional knowledge was integrated into the project design as well as the environmental assessment. Examples include:

- selecting options for sewage treatment and water treatment at the Snap Lake Diamond Project mine site based on input from Elders;
- using mitigations for project components (*e.g.*, fencing of water management pond) that were identified through traditional knowledge; and,

- focussing the environmental assessment on valued ecosystem components and issues of concern that were raised through traditional knowledge.

SOCIO-ECONOMICS

Primary communities and employment catchment communities

The socio-economic impact assessment for the Snap Lake Diamond Project considered two groups of communities: the primary communities, and the employment catchment communities.

Primary Communities	Employment Catchment Communities
- Lutsel K'e	- Fort Resolution
- N'Dilo	- Hay River
- Dettah	- Hay River Reserve
- Gameti	- Fort Smith
- Wha Ti	- Fort Providence
- Rae/Edzo	- Enterprise
- Wekweti	
- Yellowknife	

Employment, training, and income

The Snap Lake Diamond Project will have both direct and indirect positive impacts in the primary communities, on an individual, family, and community basis. These direct positive impacts will include increased employment, mining job training, and increased family income. There will be about 500 operational jobs during the 22-year mine life, and many spin-off indirect and induced jobs. Direct and indirect employment will provide 38,440 person-years of employment over the life of the project, with over \$3.26 billion dollars of impact to the Canadian gross domestic product (GDP).

Positive and substantial socio-economic impacts

Overall, it is expected that the socio-economic impacts of the project will be positive and substantial. However, some pre-existing social problems in communities, such as substance abuse, drug and alcohol addictions, teen pregnancy, and sexual abuse could be made worse by wage employment. The extent of these impacts will be influenced by the effectiveness of impact management measures, and the choices made by individuals.

De Beers to provide catalyst for partnerships

A partnership approach involving De Beers, the primary communities, the territorial and federal governments, Aboriginal organizations, and learning institutions is critical to the implementation and success of impact

management measures. De Beers and the Snap Lake Diamond Project can be a catalyst for the development of these partnerships.

Impact Management Measures

Proposed impact management measures

De Beers is committed to doing things that will mitigate the potential negative social effects of the Snap Lake Diamond Project. De Beers has proposed a number of impact measures, which will be revised to meet changing needs over time and to respond to differences among communities and individual needs.

Recruitment, training, and employment

To increase the proportion of mine employment opportunities awarded to the Aboriginal and northern workforce, De Beers will develop a long-term strategic approach to the recruitment, training, employment, and advancement of Aboriginal and northern individuals. It will be an on-going process, aimed at ensuring continuous skills upgrading and employment. The approach will address:

- hiring priorities;
- recruitment and employment strategies;
- literacy training;
- on-site learning centre; and,
- employment training programs.

Health and wellness

De Beers recognizes that the health and wellness of individuals and families is fundamental to the social, economic, and cultural sustainability of communities. In order to promote a healthy and stable workforce, De Beers is committed to working with others to address issues of individual, family, and cultural wellness:

- substance abuse prevention and treatment;
- community liaison personnel;
- family support services;
- money management training;
- transportation to the site;
- cultural awareness programs; and,
- Aboriginal traditional practice support.

***Economic
development***

The construction and operation of the Snap Lake Diamond Project will provide potential for development of economic activities and related increased employment opportunities. To encourage local economic activity, De Beers is committed to implementing two impact management measures to support local economic development:

- business development support; and,
- contract and contact lists.

RESOURCE USE

HERITAGE RESOURCES

***Archaeological
sites recorded***

During heritage resource investigations conducted for the Snap Lake Diamond Project, 53 archaeological sites were recorded. All sites but one lie outside the proposed development area, and no heritage resources are expected to be directly affected by the proposed development. The single site that was identified within the development area was an isolated find which was collected and deposited with the Prince of Wales Northern Heritage Centre, increasing the heritage resource information for the area.

***Heritage
resources
awareness***

There is the potential that increased human activity in the area could affect heritage resources located beyond the project site. Therefore, heritage resources awareness will be a component of employee environmental awareness training, and monitoring and surveillance will be implemented to ensure avoidance is successful.

TRADITIONAL LAND USE

***Limited traditional
use in area***

The Snap Lake Diamond Project is located within an area that is not regularly used for traditional land use purposes, and little fishing occurs. In the past, the region has been used for trapping, and travelling through to hunt wolves. Caribou harvesting occurs north of the project area. Impacts to traditional land use will be low because the area occupied by the project is small, and the area is not intensely used for traditional land use purposes.

NON-TRADITIONAL LAND USE

Types of non-traditional land use

Existing and potential non-traditional land uses within the area affected by the Snap Lake Diamond Project include ecologically representative areas, extraction of subsurface minerals, domestic hunting, trapping, commercial and recreational fishing, recreation and tourism, permanent and seasonal camps, and access.

Ecologically representative areas

The Snap Lake Diamond Project will not affect existing protected areas because none occur within the area affected by the project. The project is situated in an area of little potential interest as a protected area. However, De Beers, through the Northwest Territories Chamber of Mines, will participate in initiatives to establish protected areas elsewhere in the Coppermine River Uplands Ecoregion.

Domestic hunting, trapping, fishing, recreation, and tourism

Because the Snap Lake Diamond Project area is remote, little domestic hunting, trapping, or commercial and recreational fishing occurs in the area. A limited amount of recreation and tourism is serviced at three camps/lodges that are located approximately 30 to 35 km from the mine site: MacKay Lake Lodge, Lac du Rocher Outpost Camp, and Warburton Bay Lodge.

Access

The winter access road to Snap Lake will improve surface access into the Snap Lake Diamond Project. Because of its remote location and the short time that it is open, the winter access road is unlikely to have a notable influence on use of the area.

AESTHETIC QUALITY

Site visibility

Camp buildings, steam plumes, and outside lighting will be visible during the operating life of the project from locations within the regional study area. After closure, the north pile will remain visible. The north pile will cover approximately 92 ha, and be up to 34 m high, the height of the highest landforms in the area. It will be capped with quarried granite to help it blend with the surrounding landscape in terms of colour and texture.

TIBBITT-CONTWOYTO WINTER ROAD

Snap Lake Diamond Project traffic will increase demands on the Lockhart Lake Camp by 13%, and increase traffic on the Tibbitt-Contwoyto winter

***Increased demand
on winter road***

road by about 28% of current volumes. Necessary upgrades to the Lockhart Lake Camp sewage treatment, and improvements to the Tibbitt-Contwoyto winter road have been identified by Joint Venture operators.

BIOPHYSICAL ENVIRONMENT

AIR QUALITY

Dust

To a large degree, air emissions from the Snap Lake Diamond Project will be controlled because most of the mining activity will occur below-ground in a wet environment. Dust will be below guideline concentrations outside the active mine site except for small areas near quarrying.

***Sulphur dioxide,
oxides of nitrogen***

Concentrations of sulphur dioxide and oxides of nitrogen were predicted to be below recommended guidelines.

***Air emissions
related to
acidification***

A number of chemicals can contribute to air emissions that can cause acidification of soil, and vegetation, lakes and streams. Beyond the active mine area, emissions from the Snap Lake Diamond Project will not result in deposition levels that are of concern to sensitive vegetation, soils or water bodies.

***Greenhouse gas
emissions***

The Snap Lake Diamond Project will result in an increase of 2.3% to 5% in greenhouse gas emissions for the NWT. The Snap Lake Diamond Project greenhouse gas emissions are about 0.02% of the actual Canadian (1996) emissions.

NOISE

***Noise at tourist
sites***

Noise from air traffic will be audible to all three tourist sites: MacKay Lake Lodge, Warburton Bay Lodge and Lac du Roche Camp. Traffic travelling to Snap Lake on the Tibbitt-Contwoyto winter road will also be audible at Warburton Bay Lodge. Otherwise, noise from the Snap Lake site, including continuous noise from operations, will not be audible at tourist sites.

TERRAIN

General terrain features

The topography of the area in which the Snap Lake Diamond Project is located is gently sloping with occasional bedrock knolls. Large scattered boulders and frost-shattered rocks dominate the ground. Permafrost features occur in small pockets where poorly drained, peat-filled depressions are present.

Types of affected terrain

Most of the area affected by the project will be boulder (415 ha), with lesser amounts of moraine (50 ha), shallow organic (54 ha), deep organic (9 ha) and deep water (32 ha). In addition to terrain impacts near the mine, winter roads and a small quarry south of the mine, will directly effect an additional 90 ha, including about 0.5 ha of esker.

Frozen ground

To reduce effects to frozen ground and ensure stability of facilities, insulating material will be installed beneath roads and airstrip, and structures will be constructed on bedrock or on piles. These methods, together with a general absence of ice-rich lenses, will reduce the likelihood of subsidence related to thawing. Within a couple years of material placement, the north pile is expected to be frozen except for a surface active layer. The north pile has been designed to be stable under thawed conditions, so global climate change will not affect pile stability.

ECOLOGICAL LAND CLASSIFICATION

Ecozone overview

The Snap Lake Diamond Project will be situated within the Taiga Shield Ecozone in the High Subarctic Ecoclimatic Region. The climate is cold, there is a short growing season, and few plants thrive. The Snap Lake area is predominantly boulder fields with little plant growth except for rock lichens, interspersed with mats of heath tundra. Very stunted stands of black spruce and tamarack with white spruce, and ground cover of dwarf birch, willow, cottongrass, lichen and moss are interspersed among the boulders. Tussocks of sedge, cottongrass, and sphagnum moss can be found in poorly drained sites.

Reclamation

Most of the area that will be occupied by the Snap Lake Diamond Project is covered by boulder fields and heath tundra. Whenever the mine no longer requires an area, it will be recontoured to be similar to its previous shape. Extremely harsh growing conditions and lack of natural soil create very difficult growing conditions. Re-establishment of natural vegetation will take many years.

Ecological land classification

Information about vegetation is based on ecological land classification (ELC) units that combine characteristics of terrain, soils, and vegetation. The relatively small size of the area affected by the Snap Lake Diamond Project will result in a negligible impact to ELC units as a result of direct impacts, or as a result of indirect impacts from dust or drainage changes.

Dust effects on vegetation

There is some concern that dust from the project will affect vegetation, and therefore also reduce habitat value for wildlife. Because much of the dust-producing activity will be occurring in wet conditions underground (*e.g.*, crushing, hauling ore), relatively little dust will be produced by the project. However, it is expected that vegetation next to haul roads and the airstrip will be exposed to dust. Therefore, because of Elders' concern about the effects of dust on vegetation and wildlife, monitoring is planned during construction and operation of the mine.

Biodiversity

Biodiversity refers to the variety of species, and how plant and animal communities are distributed across the landscape. In the Snap Lake Diamond Project environmental assessment, ELC units were the basis of the assessment of the project's effects on biodiversity. The project will influence biodiversity by directly affecting some ELC units, as well as changing some characteristics about the size and distribution of ELC units on the landscape.

WILDLIFE

Variety of wildlife species

The Snap Lake Diamond Project is situated in an area that provides habitat for wildlife, including caribou, grizzly bears, Arctic and red foxes, wolves, and wolverines. A variety of birds also occur in the Snap Lake area, including small perching birds, shorebirds, gulls, ravens, ptarmigan, raptors (*e.g.*, peregrine falcons and gyrfalcons), and waterfowl.

Caribou

Even though Snap Lake is within the range of the Bathurst caribou herd, on-site observations and the traditional knowledge of the Lutsel K'e Elders indicate that relatively few caribou migrate through the Snap Lake Diamond Project area. Caribou tend to avoid the area where the project will be located because of the boulder-strewn terrain, particularly east of the mine site. Therefore, the project will have a limited effect on caribou.

Impacts to small site in overall large region

The area occupied by the mine site, access roads, and esker quarry will be essentially lost to wildlife for the duration of the project and for a number of decades following project closure because of the length of time it will take for reclamation to occur. In the overall context of the region, this is

expected to be a relatively minor impact to wildlife because of the extent of similar habitat throughout the region. Nevertheless, De Beers has limited the size of area that the project will use, and will use the esker access road and esker quarry site as little as possible.

Food and waste management

An important potential impact of the project relates to the attraction of grizzly bears, wolverines, and foxes to food and wastes. To avoid wildlife/human conflicts, food and food wastes will be stored so that wildlife cannot get to it. This issue will be included in environmental awareness training.

Wildlife abundance

The project will have little effect on wildlife abundance because wildlife mortality related to the project will be minimized by preventing wildlife from being attracted to the project site, minimizing wildlife-human interactions, prohibiting hunting for employees, and preventing spills.

AQUATIC RESOURCES

Groundwater flows after closure

Managing the water that comes into contact with the Snap Lake Diamond Project has been one of the key focuses of De Beers' environmental protection program. Through the use of complex computer models, scientists have been able to predict how water will move below ground and on the surface. They have predicted that groundwater that moves through the abandoned areas after the closure of the mine will come into contact with the cemented backfill. This water will be alkaline (pH or 11.9) and have higher concentrations of aluminum, chromium, and molybdenum than baseline groundwater.

Groundwater effects to other lakes

Eventually, this groundwater will flow into lakes north and north east of Snap Lake. As a result, long-term exposure to the maximum predicted pH and concentrations of some compounds in the groundwater (*e.g.*, chromium) could affect the health of some aquatic species in a small area (less than 10%) of two small lakes north of the site. Guidelines related to drinking water quality would not be exceeded at any of the lakes. Because the computer model that was used presents a very conservative (*i.e.*, worst-case) scenario, further studies to refine the computer model will result in a more accurate impact prediction. There is a high level of confidence that the impact is not greater than predicted, but further studies may show that it is less.

Effects to Snap Lake

Computer models were also used to predict how the Snap Lake Diamonds Project would affect lake water levels. Flows will increase at the outlet from Snap Lake but decrease at the outlet from the lake north of Snap Lake.

Any change that the project may have to water levels at Snap Lake will be within the range of natural variation of the lake. In addition, run-off from the project site will not result in sediment concentrations in Snap Lake that are different than would occur naturally. The overall aquatic community in Snap Lake will be protected, but sensitive invertebrates located near the water treatment plant discharge may be affected.

ENVIRONMENTAL HEALTH

Substances of concern

Through releases to water and air, the Snap Lake Diamond Project will release metals and polycyclic aromatic hydrocarbons (PAHs) into the environment. At high enough concentrations, these substances can affect human and wildlife health. Therefore, the environmental assessment evaluated whether health effects would occur to people and wildlife.

Benchmark levels used

The assessment estimated the levels of metals and PAHs that people and wildlife might be exposed to. These levels were then compared to benchmark levels derived from scientific studies that are protective of human and wildlife health.

No health impacts predicted

Based on the findings of the assessment, no impacts are predicted for human and wildlife health. Exposures to chemicals emitted from the Snap Lake Diamond Project are less than benchmark levels, with the exception of aluminum for wildlife health. However, aluminum exposure is the same with or without the project, and is related to the naturally occurring aluminum in the soils. No incremental effects to human or wildlife health are predicted as a result of the project.

CUMULATIVE EFFECTS

Effects of all projects considered

In addition to considering the social and environmental effects of the Snap Lake Diamond Project by itself, the environmental assessment also investigated how the Snap Lake Diamond Project, in addition to other current and foreseeable projects and activities in the region would cumulatively affect people and the environment. The following projects and activities were considered in the cumulative effects assessment:

- BHP EKATI™ Diamond Mine;
- Diavik Diamond Mine;

- Tahera Jericho Diamond Mine;
- Lupin Gold Mine; and,
- Tibbitt-Contwoyto winter road.

Employment

It is estimated that mining projects in the Slave Geological Province and the NWT alone could provide between 1,250 and 2,300 jobs while the projects are active. Potentially, 60% of these jobs could be filled by northern or Aboriginal people, if people have the necessary skills and are interested in employment with the mines. These projects will compete for employees and, since there won't be enough employees available in the north, they will also likely recruit labour from outside the NWT. When these mines close, likely in 20 or 30 years, there may be increased unemployment and need for social services unless the increased economic growth generates additional opportunities.

Traditional lifestyles

It is unclear how opportunities in the wage economy will affect traditional lifestyles. Individuals' and communities' choices will greatly influence how the mine employment affects traditional culture. On one hand, wage earnings enable people to buy equipment that can be used in traditional activities (e.g., hunting and trapping), as well as create business activities based on local culture (e.g., arts and crafts; traditional foods catering). On the other hand, time spent working at the mines takes away from time doing traditional activities, and also increases the "western" influence.

Archaeological sites

As a result of the mine projects, a number of archaeological assessments have been undertaken, significantly increasing the inventory of archaeological sites in the region. Along with this increased knowledge, however, is the loss to sites that are within areas that cannot be avoided by development. Although the Snap Lake Diamond Project and winter access road will affect only two of the 521 sites that have been identified, all the projects together will affect about 100 sites.

Air emissions

The Snap Lake Diamond Project represents a minor component (20%) of regional emissions of chemicals into the air. Except for total suspended particulates measured over the year, and maximum nitrogen oxide concentrations measured over both one hour and a year, concentrations of chemicals in the air were the same when emissions from all the projects were compared to emissions from the Snap Lake Diamond Project.

Noise

The Snap Lake Diamond Project will contribute to cumulative effects of noise, because it will contribute to activity on the Tibbitt-Contwoyto winter road. This additional traffic will increase the frequency that traffic can be heard at the Warburton Bay Lodge, although other lodges and communities will not be affected.

<i>Water and fish</i>	The effects that the Snap Lake Diamond Project may have on aquatic resources (<i>e.g.</i> , groundwater, surface water quantity and quality, and fisheries) will be limited to the Snap Lake watershed. The other projects in the area are not contained within the same watershed, so there will be no cumulative effects to aquatic resources.
<i>Terrain, soils, vegetation, and biodiversity</i>	Because of the distances separating the Snap Lake Diamond Project from other projects in the region, and because the Snap Lake Diamond Project is situated in a different ecozone than the other projects, no cumulative effects to vegetation, soils, terrain, and biodiversity are predicted.
<i>Cumulative effects to wildlife home ranges</i>	For wildlife species with concentrated home ranges (<i>i.e.</i> , foxes, raptors, waterfowl, and songbirds), the large distances between the Snap Lake Diamond Project and other projects will not produce cumulative effects. However, for caribou, grizzly bears, wolves, and wolverines, the chance that cumulative impacts from the Snap Lake Diamond Project will occur is high. However, because the amount of habitat and zone of impact associated with the Snap Lake Diamond Project is small, the cumulative impact of the Snap Lake Diamond Project on caribou, grizzly bears, wolves, and wolverines is anticipated to be low. There is a large amount of uncertainty in this prediction. Moreover, the ability to detect a cumulative effect for these populations is very limited.
<i>Environmental health</i>	The cumulative effects of all the projects on wildlife and human health were investigated. Based on the use of risk assessment principles, and what is known about the likely exposure of wildlife and humans to concentrations of chemicals of concern, effects on health will be highly unlikely.

ACCIDENTS AND MALFUNCTIONS

<i>Accidents and malfunctions considered</i>	The potential environmental effects of accidents or malfunctions associated with the Snap Lake Diamond Project were assessed. This risk assessment included the construction and operation of all facilities on the Snap Lake site and transportation to the site via both aircraft and winter access roads.
<i>Emergency response plans</i>	Management systems will be in place to mitigate most environmental risks and limit consequences. An ISO 14001 registered environmental management system will include emergency response plans to mitigate potential environmental effects when malfunctions or accidents occur.

Severe risks

The focus of the assessment was on risks with the potential to impact the off-site environment or the long-term viability of the Snap Lake Diamond Project. Risks were estimated according to their predicted frequencies (*i.e.*, How often would the event occur?) and the seriousness of the environmental consequence that could result.

Risk evaluation process

To evaluate the risks of accidents and malfunctions, a project team systematically identified potential accident and failure scenarios that could be associated with the operations and facilities identified on the facilities site plan. The frequency and environmental consequence of the failure were then estimated and placed within one of four risk categories, ranging from negligible to high.

Risks of events at site

All risks from accidents and malfunctions were associated with negligible or low environmental consequence levels with the exception of the scenario of a major failure of Dam 1, which retains the water in the water management pond. This failure would result in a moderate environmental consequence. The likelihood of the event is, however, extremely unlikely, with a predicted frequency of 1/10,000 years.

Evaluation of truck spill risk

The risk assessment of accidents on the winter road was based on the spill probability and the potential effects of spills on aquatic life. Information about truck spill accidents on the winter road since 1983 was used to estimate future spill incidents. Risk of a spill on the winter road affecting water bodies was defined by the potential for an accident and spill, the type and amount of hazardous material spilled, the effectiveness of the spill cleanup, and the environmental effect of the residual material remaining. Risks of spills to aquatic life were considered low-risk because of a combination of low frequency and negligible to low environmental consequences.

CORPORATE COMMITMENTS

Corporate commitments

De Beers has a global history of community investment, good corporate citizenship, environmental responsibility, and economic development. De Beers is committed to continue operating and doing business in the NWT in a socially and environmentally responsible manner.

Community relationships

De Beers is committed to building long-term relationships with the communities in which it operates, and recognizes and respects cultural and regional diversity. Community input contributed to changes to the original project design, helped identify the issues that were examined in the

	<p>environmental impact assessment, and was used to identify impacts and develop mitigations. Continuing community input is critical to the success of the Snap Lake Diamond Project. De Beers is committed to continuing the process of consultation and community involvement throughout the life of the project.</p>
<i>Mine management advisory committee</i>	<p>De Beers is committed to a number of initiatives as part of its mine operations. De Beers will set up a mine management advisory committee. Membership on the committee will be determined through consultation, and likely composed of De Beers personnel and representatives of each of the directly affected communities.</p>
<i>Hiring priorities and training</i>	<p>De Beers is committed to maximizing the Aboriginal and northern content of the workforce, and will recruit and hire as many Aboriginals and northerners as possible. De Beers recognizes that a key component of this priority hiring strategy is a training program. De Beers will tailor training programs to take advantage of employment opportunities at Snap Lake.</p>
<i>Northern business opportunities</i>	<p>De Beers is committed to working with communities and individuals to increase business capacity for businesses located in the NWT.</p>
<i>Safe and healthy work environment</i>	<p>De Beers will provide all personnel at the Snap Lake Diamond Project with a safe and healthy work environment. De Beers has established a loss control policy which guides the company in health and safety matters through all phases of the project. Accidental losses will be controlled through best management practices and systems, combined with the active participation of the workforce.</p>
<i>Environmental stewardship</i>	<p>De Beers is committed to the concept of sustainable development, which requires balancing good environmental stewardship with economic growth. De Beers has established an environmental policy which will guide the company in all phases of the Snap Lake Diamond Project. Throughout the environmental impact assessment, De Beers has proposed mitigation measures to minimize possible negative effects and enhance positive effects for all components of the environment.</p>
<i>Environmental management system and monitoring</i>	<p>De Beers will develop a formal environmental management system (EMS) as part of its environmental policy. A comprehensive monitoring system that identifies, measures and reports on all aspects of environmental performance is one of the elements of the EMS. De Beers' monitoring program for the Snap Lake Diamond Project will address components of the biophysical and socio-economic environment that are important to northerners.</p>