3 PROJECT DESCRIPTION

3.1 INTRODUCTION

3.1.1 Terms of Reference

This section meets the Terms of Reference for the project description

The Project Description section of the environmental assessment (EA) for the De Beers Canada Mining Inc. (De Beers) Snap Lake Diamond Project has been prepared to meet the Terms of Reference established by the Mackenzie Valley Environmental Impact Review Board (MVEIRB). The section specifically addresses the Terms of Reference shown in Table 3.1-1.

Table 3.1-1 Terms of Reference for Project Description

TOR Section	Environmental Assessment or Topic
2.3	***SCOPE OF THE DEVELOPMENT***
	The Review Board is required to provide a scope of development determination according to ss.117(1) of the MVRMA. This section describes what the Review Board considers the scope of the development.
2.3.1	**Principle Development**
	The Principle development is the underground mining of kimberlite ore.
2.3.2	**Accessory Development**
	The accessory undertakings and developments associated with the principle development include:
2.3.2.1	*Mined Rock*
	I. storage and handling of waste rock;
	II. storage and handling of processed kimberlite;
	III. processing of the kimberlite ore for the removal of diamonds;
	IV. removal of the diamonds from the minesite; and
	V. removal of waste rock, kimberlite and mine water from the underground workings.
2.3.2.2	*Water Management*
	I. storage, handling of mine water;
	II. surface water management;
	III. removal of water from Snap Lake for use at the mine site; and
	IV. reintroduction of managed water into Snap Lake.
2.3.2.3	*Transport and Surface Structures*
	I. use of the current Lupin winter road;
	II. the winter road spur off the Lupin winter road to the mine site;
	III. proposed all-weather road to the esker to the south of the development;
	IV. airstrip and support infrastructure for air travel;
	V. Solid waste management and containment areas;
	I. Surface structures (process plant, power plant, magazines, camp(s), roads, airstrip, etc.); and
	VI. Petroleum and chemical storage areas.

TOR Section	Environmental Assessment or Topic
2.3.2.4	*Existing Snap Lake Diamonds Project Advanced Exploration* Changes to existing advanced exploration facilities, infrastructure and undertakings needed to accommodate the proposed development. Only include changes not permitted in previous licences or permits[1] . Where De Beers demonstrates that existing Land User Permit(s), Water Licence(s), or other authorizations adequately address environmental impacts of the proposed changes in existing infrastructure or undertakings, De Beers is not be required to specifically address those impacts in the scope of development but in the cumulative effects section (4.9 Cumulative Impacts) of the environmental assessment. For emphasis, developments included in the environmental assessment include, but are not necessarily limited to the following: <u>Decommissioning and, or, modification of the Snap Lake advanced exploration camp including but not limited to the following.</u> 1. Temporary explosive storage building(s) and access roads 2. Portable crusher and a rock/esker material stockpile 3. Airstrip 4. Temporary underground contractor facilities 5. Bulk sample process plant 6. Underground bulk sample 7. Mine portal 8. Processed kimberlite containment area 9. Dams to contain the kimberlite containment area 10. Potable water intake and pump house 11. Fuel tanks 12. Pilot plant facilities 13. Cold storage 14. Camp and office complex <u>Development of the Snap Lake Diamond Project.</u> 1. Explosive storage with associated roads 2. Landfill for non-hazardous solid waste 3. Portable crusher and a rock/esker material stockpile 4. Mine water clarification pond 5. Mine water clarification pond discharge point into Snap Lake 6. Dams to contain mine water clarification pond 7. Sewage treatment plant 8. Power plant 9. Permanent camp complex 10. Service complex 11. Unheated storage building 12. Process and paste plant 13. Crushed kimberlite ore storage 14. Cement storage 15. Aggregate crushing and batch plant 16. Underground crusher 17. Conveyor used to transport diluted kimberlite ore to surface 18. Kimberlite ore stockpile area

[1] Please submit information verifying that existing authorizations permit the proposed changes to the authorized advanced exploration camp.

TOR Section	Environmental Assessment or Topic
	19. Ventilation points 20. Underground mining 21. Mine portal 22. Fuel tanks 23. Potable water intake and pump house 24. Mine waste rock haul road 25. Propane storage area 26. Pilot plan facilities 27. Container storage 28. Cement storage 29. Lupin and mine access winter road 30. Seepage and collection ponds 31. Sumps 32. Berms 33. Quarry and esker excavation areas 34. Acid generating rock disposal area 35. Non-acid generating rock disposal area 36. Processed kimberlite disposal area 37. Hazardous waste disposal 38. Site transportation routing 39. Contractors lay down area
2.4	***Related Considerations***
2.4.1	**Hazardous Materials**
	The risk and potential impacts associated with handling, storing, using, and disposing of hazardous materials forming part of the proposed development, including: IX. location for hazardous or contaminated materials and details on how hazardous materials will be managed; and, X. the identification and description of all contaminant sources resulting from the project and their related pathways to the receiving environment.
2.4.3	**Closure and Reclamation**
	De Beers shall explain its closure and reclamation approach and to what standards it will reclaim (*i.e.* stable land forms, revegetation, return to previous ecological productivity?). Based on proposed closure and reclamation intentions De Beers shall report the present day Canadian dollar value of reclamation costs associated with the closure and reclamation, including alternative approaches considered, of the proposed development as reported in section 2.3 Scope of Development.
2.10	***Abandonment and Restoration***
	De Beers should provide a description of regulations (regulatory framework), industry standards and government agreements that are needed with respect to the closure phase of the proposed development including plans for mitigating the social and economic impacts of mine closure. Where regulatory requirements, industry standards or government agreements exist, their minimum standards, criteria, etc. should be reported. De Beers shall provide a clear (visual and textual) description of the proposed development site at closure, and after restoration. Abandonment & Restoration (A&R), components and activities should be listed. Rationale and alternatives that have been discarded should be listed, *e.g.*, the removal of all material from site versus partial or total burial, including costs. Details of methods and location of materials disposal, both on and off-site, including the structural foundations in the bottom of the mine water clarification pond.

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.

3.1.2 Component Description and Organization

Section 3 provides the details on the project that will be constructed

This section describes the Snap Lake Diamond Project. Background information on the project and exploration history is provided in Section 1, and the alternatives and opportunities considered and either rejected or accepted are described in Section 2. Thus, Sections 1 and 2 provide the background to Section 3. The purpose of this section is to present the details on the project that De Beers intends to construct, operate, and decommission, subject to approvals. Information in this section provides the necessary information to understand impacts from project activities on all components of the environment, which will be assessed in Sections 5 through 13.

Each aspect of the project is included in Section 3

This section includes the schedule; a description of the kimberlite mining and processing; management of processed kimberlite (PK), waste rock from the mine, and other solid waste; water management; site support facilities and storage; airstrips, roads, and transportation; mine operations; and, decommissioning and closure.

3.1.3 Snap Lake Diamond Project Overview

The diamond deposit is a tilted slab of kimberlite that extends under Snap Lake

In 1997, a diamond-bearing kimberlite dyke was discovered at Snap Lake, Northwest Territories (NWT) (Figure 3.1-1). The kimberlite dyke averages 2.5-metres (m) thick, dips between 11 and 15 degrees to the northeast under Snap Lake, and has been delineated approximately 2,500-m east/west and 2,000-m north/south (Figure 3.1-2). During 1998 and 1999, exploration continued with diamond drilling. In early 1999, bulk samples of kimberlite were mined from two pits on the northwest peninsula. These samples were trucked to a processing plant at Lupin Mine. The results provided sufficient confidence in the grade and diamond values to proceed to a pre-feasibility study.

The indicated ore resource of 22.8 million tonnes was derived from the August 2000 resource study update

A pre-feasibility study was completed in April 2000, which included a pre-feasibility level plan for the establishment and operation of an underground mine and associated support facilities for an ore resource of approximately 12.6 million tonnes (t). Continued exploration and a resource study update in August 2000 resulted in an increase in the indicated resource to approximately 22.8 million t, including waste rock dilution to approximately 20%. During 2001, an optimization study was carried out to provide more detail on the underground mine and surface facility designs, mine operation plans, construction schedules, and costs. As well, additional site bulk sampling and data collection programs were carried out. This submission is based on information contained in the August 2000 resource update, and the information generated through the optimization study as of October 2001.

Figure 3.1-1 Location of Snap Lake Diamond Project Northwest Territories

Figure 3.1-2 Location of Simplified Cross-section of the Kimberlite Dyke

Approximately 3000 tonnes per day will be produced by the underground mine

The kimberlite dyke will be mined by underground mining methods at an average rate of approximately 3,000 tonnes per day (tpd). Underground development will be started while the process plant and surface facilities are being constructed. A small portion of the underground mining will be done beneath the northwest peninsula. The ore body extends under Snap Lake and north of Snap Lake.

The active mine area will be 250 ha; the land lease area (i.e., project footprint) will be 550 ha

The active mine area containing the planned facilities, including the site roads, yards, storage, and lay-down (storage) areas, site structures, the airstrip, the water management pond (WMP), the north pile, the explosives manufacture and storage area, and the winter access road spur to the site is expected to be in the order of 250 hectares (Figure 3.1-3). The land lease area identified for the site (called the project footprint) is approximately 550 hectares.

The overall site plan is provided; site structures are shown more clearly in the facilities site plan

The eastern tip of the northwest peninsula shown in the overall site plan (Figure 3.1-3) has been enlarged in the facilities site plan (Figure 3.1-4). Site structures such as the service complex, process and paste backfill plant, water treatment plant, and crushed ore reclaim building can be seen in more detail (Figure 3.1-4).

Construction and initial mining will be done by contractors

Site surface facilities construction, pre-production underground mine development, and initial production mining will be completed by contractors. The process plant operations, general camp and site operations and maintenance, and subsequent underground production mining will be performed by De Beers' personnel. Specific portions of this ongoing work (*e.g.*, camp catering) will be contracted out to northern businesses as appropriate.

The construction workforce will average 450 and the operations workforce will be 525

The anticipated staff and contractor personnel requirements during the construction phase will average 450 people. The anticipated staff requirements during the operations phase (including De Beers and contractor personnel) will be approximately 525 people.

Access to the site will be by aircraft and winter road

Year-round access to the site is available by aircraft from Yellowknife. As well, a 35 kilometre (km) winter access road can be constructed to the site from kilometre 222 of the Tibbitt-Contwoyto winter road.

De Beers will consider future expansion

De Beers will continue exploration efforts to determine the additional potential of the Snap Lake Diamond Project. The full extent of the Snap Lake dyke is un-delineated. Indications are that the dyke continues to the northeast, and possibly to the east and southeast as well. The ends of the

Figure 3.1-3 Snap Lake Diamond Project Overall Site Plan

Figure 3.1-4 Snap Lake Diamond Project Facilities Site Plan

dyke have not yet been located. When the economic viability of additional resources has been confirmed, De Beers may consider an increased production rate for the Snap Lake Diamond Project. At that time, any substantial changes in this project description will be addressed through the appropriate land use permit and water licence applications to the Mackenzie Valley Land and Water Board.

There is potential for additional economic kimberlite discoveries on the property

Elsewhere on the property, extensive prospecting has not revealed any other economic kimberlite deposits. However, De Beers is re-evaluating the work previously done on the property, and the potential for additional economic kimberlite discoveries has not been ruled out.

3.2 SCHEDULES

Schedule is based on receipt of permits in early 2003

Based on the assumption that permits for construction and operation will be received during the first quarter of 2003, the proposed schedule for construction, operations, and closure of the mine is presented in Table 3.2-1.

Table 3.2-1 Highlights of Construction, Operations, and Closure

Activity	Time Frame
Permits received	Q1 2003
Begin pre-construction	Q1 2003
Set-up and commission water treatment facility	Q1 2003
Set-up north pile containment	Q2 2003
Begin underground pre-production development	Q2 2003
Mobilize construction equipment, materials, and crews to site	Q1 2004
Processing plant commissioning	Q4 2005
Construction completed	Q4 2005
Underground mining operation	2005 – 2026
Processed kimberlite placement - north pile	2003 – 2026
Processing plant full operation	2006 – 2026
North pile and facilities closure	2026 – 2027
Seepage and runoff collection pond closure	2027
Water management pond closure	2028

Note: Q = quarter (*e.g.*, Q3 = third quarter).

Limited construction will occur in 2003; full construction will occur in 2004 and 2005

A limited pre-construction work program will begin in 2003. This program will concentrate on construction and operation of a water treatment facility, underground pre-production development, construction of additional fuel storage facilities on-site, and site general earthworks/construction to prepare for the main site mobilization over the winter road in 2004. Site earthwork during 2003 will include the construction of an interim containment pond and runoff collection for host rock from the underground development that will be placed in the north pile containment area, as well as quarrying and crushing of construction aggregate and construction of site pads. Full construction will begin in early 2004 and will be completed by the end of 2005.

The bulk sample processing plant may be operated during construction

In addition to the construction program above, pre-production from underground development in 2003 to 2005 will be stockpiled on surface for further test-work (using the existing bulk sample plant) and/or for process plant commissioning. The present bulk sample plant may be operated over part of 2003 and 2004 to carry out further metallurgical test work to refine the process plant design.

The mine will operate for 22 years; closure activities will occur in 2027 and 2028

The production phase (operations) will be approximately 22 years from 2005 to 2026. The site closure activities will be carried out primarily in 2027, with limited final cleanup and initiation of post-closure monitoring in 2028.

3.3 MINING

The mine will be accessed via a ramp from the existing portal

The main access to the underground mine will be by a ramp from the existing single portal located on the northwest peninsula about 200-m east of the processing plant. This portal is 5.0-m wide by 4.5-m high. It can accommodate haulage trucks and satisfy ventilation requirements (Figure 3.3-1). At about 780 m from the portal, the ramp will split into two ramps: north and south. The south ramp will continue below the central part of the planned mining area and will establish the primary access to most of the mine. The north ramp will provide access to the northern part of the mining area, as well as provide a second haulage route, half of the ventilation intake system, and a second route for accessing the mine. A raise to surface on the northwest peninsula will serve as a second means of exit from the mine.

Figure 3.3-1 Snap Lake Diamond Project Underground Development

Two surface intake and two underground exhaust fans will ventilate the mine

Fresh air will be supplied to the mine by two intake fans (vent raises); each located on the northwest peninsula (Figure 3.1-4). Air heating systems will be included at each of the air intake locations. These systems will consist of diesel-fired mine air heaters as well as heat transfer radiators to make use of heat generated elsewhere on-site. Two exhaust raises (allowing air to exit to the surface) will be located north of Snap Lake, where the ore body is located beneath land. The exhaust fans will be installed underground near the bottom of the raises.

Ore will be crushed underground

With the exception of construction and early production, primary crushing of mine rock will occur underground (Figure 3.3-1). Haulage trucks will transport ore to the underground crusher. Crushed ore will be transported by conveyor system directly to the process plant or to an enclosed ore storage building. Conveyors located on surface will be covered. Underground conveyors will be located within a dedicated tunnel.

Approximately 200,000 tonnes of ore will be crushed on surface

During the mine pre-production development period, approximately 200,000 t of ore will be stockpiled on surface. This ore will be crushed on surface using the aggregate crushing facility as required for ongoing test-work, and to supplement underground mine production during process plant commissioning and initial operation.

Underground mining will be by a modified room and pillar method

The kimberlite dyke will be mined by a modified room and pillar method. A series of parallel drifts will be developed in a panel with a long rib pillar between each pair of adjacent drifts. Once the ore is removed from the drifts in the primary phase, then the second phase of mining begins by slicing the farthest ends of all the rib pillars in the panel at a right angle to the drifts. This leaves an open space at the back of the panel that is backfilled with paste backfill or high strength concrete backfill. Mining continues to retreat until the entire panel is backfilled.

Paste backfill will replace the mined-out rock underground

The tails from the processing plant (processed kimberlite) will be partially dewatered to form a paste backfill of a toothpaste-like consistency. The paste will be pumped from a plant on surface through a pipeline distribution system to the pour sites underground to fill the voids remaining after the ore is mined out. Where high strength concrete pillars are used, the concrete will be prepared in a batch plant on surface (Figure 3.1-4) and trucked underground for placement.

The 3,000-tpd production rate will be maintained for most of the mine life

The underground mine will attain its average planned production rate of approximately 3,000 tpd between nine and 12 months after start-up of the process plant. This rate of production will continue for most of the approximately 22 years of operation, decreasing as the number of mining areas becomes more limited near the end of operations.

3.4 KIMBERLITE PROCESSING

Kimberlite processing is primarily crushing, screening, and gravity separation

Kimberlite extracted from the mine will be processed in a plant located on-site. A simplified flow sheet for the processing plant is shown in Figure 3.4-1. Kimberlite processing will be accomplished by means of crushing, washing, screening, conveying, pumping, and cycloning (using centrifugal force). A dense media separation (DMS) circuit will be used to concentrate the diamonds and other heavy minerals by differences in specific gravity. The DMS concentrate will be passed through x-ray sorters to recover the diamonds.

Three sizes of processed kimberlite will be produced: coarse, grits, and fines

The process plant will produce three sizes of PK:

- coarse PK (1.5 millimetres [mm] to 6 mm);
- PK grits, a sand-sized (0.125 mm to 1.5 mm) product; and,
- PK fines, a silt-sized (<0.125 mm) thickened product.

Approximately 50% of the processed kimberlite will be directed underground as paste fill

The coarse PK and PK grits comprise approximately 70% of the total weight of all PK produced, with the remaining 30% consisting of PK fines. PK will be mixed with cement to produce a paste. The maximum possible PK will be directed underground as paste backfill. Due to expansion on breakage, this will be approximately 50% of the PK. The remainder will be placed on surface as an un-cemented paste. Some of the coarse fractions of the PK may be stockpiled separately for use in the construction of the north pile containment berm. Details on the management of PK are presented in Appendix III.1.

Ferrosilicon and flocculent will be used in processing

Two agents are used in diamond processing, ferrosilicon and flocculent (coagulant). Ferrosilicon is used to make a dense separation medium for use in the DMS circuit and is recovered within the plant for re-use. Typical ferrosilicon losses from the plant would amount to approximately 200 grams per tonne (g/t). The lost ferrosilicon will be deposited with the PK. This material consists of iron (79%), silicon (15%), titanium (5%) and aluminum (1%). Flocculent will also be used to aid in the clarification of process water for re-use in the plant. The total estimated usage of these products will be approximately 220 t per year for ferrosilicon powder and 20 t per year for the flocculent.

Figure 3.4-1 Snap Lake Diamond Project Kimberlite 3000 tpd Process Flow Diagram

Diamonds will be cleaned and sorted on site

Rough diamonds will be acid cleaned and sorted on site, then transported off-site by aircraft. An automated neutralization plant will be installed to neutralize the concentrated acids used in the cleaning process. Details on the transport, handling, and storage of acids on site are presented in the Spill Contingency Plan (Appendix III.9).

Paste produced from coarse processed kimberlite, processed kimberlite grits, processed kimberlite fines and cement will be pumped underground

The paste-fill plant will be part of the processing plant. The paste will be manufactured by combining coarse PK and PK grits with thickened PK fines. This mixture will be de-watered prior to discharge from the process plant using screens and deep cone paste thickeners. Cement (estimated at 2.5% by weight) and water will then be added to the de-watered solids to form a paste mixture that will be pumped underground.

The process plant will maximize the use of reclaim water

The use of reclaimed water will be maximized within the process plant. This will require in-plant deep cone paste thickeners, as well as reclamation of water from the paste-fill plant and from the WMP for plant processing purposes.

3.5 MINE WASTE ROCK, PROCESSED KIMBERLITE, AND SOLID WASTE MANAGEMENT

3.5.1 Waste Rock Management

All metavolcanic rock and a portion of the granitic rock will be managed as though it were acid generating

The mined waste rock that will be produced during the pre-production and production periods consists of metavolcanic rock (330,000 t) and granitic rock (1,400,000 t). Details of waste rock management are contained in Appendix III.1. Under specific conditions and over an extended period of time, some of the waste rock has the potential to acidify run-off water due to the chemical reaction between sulphide minerals in the rock, air, and water. The presence of sulphides in the metavolcanic rock as well as a small portion of the granitic rock that is immediately adjacent to metavolcanic rock, results in the potential to acidify. The majority of the metavolcanic rock will be encountered during the initial (pre-production) phase of underground development (Figure 3.1-2). All metavolcanic rock and all granitic rock with visible sulphides will be treated as potentially acid generating (PAG). Pure granite that does not have structures containing visible sulphides can be classified as non-acid generating (non-PAG) and is suitable for construction and capping purposes.

Approximately 400,000 t of potentially acid generating rock will be produced during mine development

Pre-production development of the underground workings will generate approximately 250,000 t of PAG rock. This includes 100,000 t of mined waste rock extracted during the advanced exploration program. Space has been allocated within the north pile for disposal of PAG rock. All PAG rock produced will be deposited in the base of the north pile or used in underground concrete/paste backfill.

The majority of mine rock produced during operations will be used underground

During pre-production and operations, approximately 1,400,000 t of non-PAG granitic waste rock will be produced. The majority of this rock (approximately 1,150,000 t) will be used in high-strength concrete pillars underground, with the remainder being used for site general construction or deposited in the north pile. After about the eighteenth year of operation, the requirement for high-strength concrete pillars will exceed the volume of waste rock produced from continuing underground development. After that time, the waste rock will be supplemented with aggregate obtained from a quarry (see Section 3.7.3) developed within the north pile footprint (Figure 3.1-3).

3.5.2 Processed Kimberlite Management

Processed kimberlite will be produced at a rate of approximately 1.08 million t annually

The annual PK production rate will be approximately 1.08 million t. The processing operations will produce a total of approximately 22.8 million t of PK over the mine life. This value includes dilution, estimated at approximately 20% of the total ore tonnage. About half of this total will be used for underground paste backfill (Appendix III.1).

North pile containment will be provided through construction of a berm of compacted processed kimberlite and rock that is not potentially acid generating

PK not required for underground paste backfill will be disposed of in the north pile. The site selected for the north pile has a thin discontinuous cover of organic and mineral soil over granite bedrock. The organic layer will be stripped prior to construction. Containment for the north pile will be provided by a starter berm, which will be constructed of rock that is non-PAG or from a quarry within the north pile footprint and from non-PAG waste development rock. The berm will be raised as required over the life of the mine. The berm raises will be constructed of compacted PK with a facing of non-PAG granite on the downstream face to enhance physical stability and minimize erosion of the compacted PK. PK will be deposited behind the containment berm as a paste.

12 million t of processed kimberlite paste consisting of coarse, grits and fines will be placed in the north pile

A portion of the coarse fraction of the PK will be used in construction of the north pile berm. The remainder of the coarse fraction will be combined with the grits and fines fractions to form a paste for placement within the north pile. The portions of coarse-grits-fines paste (total approximately 12 million t) for surface disposal are as follows:

- coarse and grits PK: 8.5 million t; and,
- PK fines: 3.5 million t.

The total volume of processed kimberlite will be 9 million m^3

The paste that will be placed on surface is conservatively assumed to have a dry bulk density (mass per unit volume) of 1.35 tonne per cubic metre (t/m^3) and therefore a total volume of approximately 9.0 million m^3. Preliminary estimates indicate that the total volume of PK used in berm construction will be between 1 and 2 million m^3 with the remainder being placed within the north pile as a full mix paste.

Processed kimberlite has a strong acid neutralizing potential

Acid base accounting (evaluates acid production potential) and kinetic acid rock drainage (determines acid generation characteristics) testing indicate that all PK materials are non-PAG and have substantial capacity to neutralize acid. All testing indicates that the PK can be used as part of the closure cover for PAG rock. Details on the geochemistry of all rock types mined are presented in Appendix III.2.

Rock used for capping the north pile will not be acid generating

The north pile will be capped with approximately 0.5 m of non-PAG granite for erosion protection. Capping will be ongoing during operations. At the end of operation, the north pile will have a maximum height of approximately 34 m (crest elevation 484 m). At this elevation, the pile will be approximately the same height as the highest point of natural ground in the immediate area of the project site.

3.5.3 Solid Waste Management

3.5.3.1 Waste Management Plan

Waste management plan is based on six principles

The overall waste management plan is based on the following key principles:

- health and safety of all site employees, visitors and the environment;
- reduction, reuse, and recycling of waste materials;
- proactive management of wastes that may attract wildlife or result in the interaction between humans and wildlife;
- environmental awareness and waste management training;
- a site-based waste management auditing program; and,
- contractor’s compliance with site waste management procedures.

A waste management system will be implemented

The waste management system (Appendix III.3) on-site will incorporate a fenced waste transfer storage area located at the plant site, an oil-fired incinerator and waste storage building, a landfill site within the north pile area, and a land farm site, also located within the north pile area.

3.5.3.2 Incinerator and Waste Transfer Storage Area

Non-hazardous combustible waste will be burned in oil-fired incinerators

An oil-fired incinerator will be located in the plant site area (Figure 3.1-4) and will be operated daily for the incineration of non-hazardous combustible waste materials. Incinerator ash will be collected regularly in containers and transported to the landfill site for disposal.

All wastes will be sorted and processed within a fenced facility

A fenced sorting and storage area will be established adjacent to the incinerator building. All wastes will be brought to this area for processing. Waste products that are not incinerated or land-filled immediately will be sorted and placed within designated areas within the fenced area. Depending on the nature of the waste (hazardous, recyclable, *etc.*) it will be placed in suitable containers and stored for incineration, transport to the land fill site, or long-term storage for backhaul to off-site disposal or recycle facilities.

3.5.3.3 Landfill Site

A landfill will be operated within the north pile

Inert solid waste will be deposited into a small area of the north pile (Figure 3.1-3). As part of waste materials management services, this material will be regularly buried with a cover of PK to minimize exposure to wind and wildlife (Appendix III.3). The landfill site is shown on Figure 3.1-3 and will confirm to applicable NWT regulations for the operation of landfills.

3.5.3.4 Land Farm

A land farm will be operated to treat hydrocarbon-contaminated soils

Hydrocarbon-contaminated soils from spills will be deposited in a land farm cell for bioremediation (treating pollutants with micro-organisms). This bermed cell, which will be located within the north pile footprint near the landfill site, will include an Arctic geomembrane liner under select fill material. By locating the land farm within the north pile area, a secondary means of collecting any possible runoff is provided. The land farm site to be used during production (nominal location shown on Figure 3.1-3) will be relocated periodically to fit with active PK deposition areas in the north pile. The land farm would be available for use after year one of PK deposition.

The land farm and landfill will be located within the north pile

During the site construction period and the first year of mine operation, both the landfill site and the land farm will be located immediately adjacent to the underground rock disposal area which will be located within the north pile footprint (northeast portion). This area will be available for use within six months of the recommencement of underground development activities.

Remediated soil from the land farm will be transferred to the landfill

Hydrocarbon-contaminated soil will be placed on top of the select fill material within the cell. During the summer months, this material will be spread and worked to allow exposure to air. This will allow remediation to acceptable levels using microbiological processes. Fertilizers such as ammonium nitrate (AN) could be added to aid the process and improve efficiency. Soil that has reached an acceptable level of hydrocarbon degradation will be removed and transferred to the landfill site. The land farm cell will consist of at least two separate areas, one for placement of freshly contaminated materials, and one where material is undergoing bioremediation.

3.5.3.5 Specific Materials Waste Handling

Sludge from the sewage treatment plant will be de-watered and incinerated

Treated sewage effluent will be piped into the water-treatment plant discharge pipe. Biodegradable organic components removed from the sewage treatment plant will be de-watered, temporarily stored in bags in a building with a water collection tray built into it, and subsequently incinerated. The frequency of incineration will depend on the time required for adequate de-watering to occur, which will vary on a seasonal basis.

Chemicals that cannot be incinerated will be shipped off-site to a suitable disposal facility or to recycling facility

Chemicals such as glycol, acids, solvents, battery acids, laboratory agents, *etc*., will be collected in lined trays, drums, or other suitable containers and will be stored in the waste transfer area in sealed containers. Chemicals that cannot be incinerated will be shipped off-site to a suitable disposal facility or to recycling facilities, if appropriate. Waste oil will be collected in drums, stored in the waste transfer area, and subsequently incinerated or transported off-site for re-cycling.

Hazardous non-combustible waste will be handled according to the waste management plan

All other hazardous non-combustible waste and contaminated materials will be temporarily stored in suitable containers in the waste transfer area until they can be shipped off-site to an approved disposal or recycling facility. Use, storage, shipping, and disposal of all hazardous materials will be controlled according to a site-specific waste management plan (Appendix III.3).

Food wastes will be incinerated

Food waste will be collected in plastic bags and placed in sealed containers in the waste transfer area for subsequent incineration in an oil-fired incinerator. Incineration of food wastes and plastic waste from food containers will be performed as soon as practically possible (typically on a daily basis) to prevent wildlife attraction.

Non-toxic solid wastes will be sorted and either incinerated, landfilled, or shipped off-site

Non-toxic solid wastes will be sorted into burnables, non-burnables, recyclables, and reusables in the waste transfer area. Burnable items will be burned in open pits or an oil-fired incinerator, while non-burnable items will be landfilled or recycled if practical. Aerosol cans will be punctured and drained prior to incinerating. Inert bulk wastes that cannot be readily recycled or reused, such as debris, incinerator ash, scrap metal, *etc.* will be stored in bins and dumpsters in the waste transfer area and transferred to the landfill or shipped off-site. Where practical, items such as conveyor belts and tires will be shipped off-site for recycling, or disposed of in the landfill.

3.6 WATER MANAGEMENT

3.6.1 Introduction

Water management is designed to minimize impacts on Snap Lake

Water management is defined as the collection, storage, recycling, and treatment of water in a safe, efficient, and compliant manner. Water management is based on two objectives:

- minimize impacts on the quantity of surface water; and,
- minimize impacts on the quality of ground and surface water.

A preliminary water management plan is in Appendix III.4

De Beers has developed a preliminary water management plan to address these objectives. The plan (Appendix III.4) outlines the water management system (infrastructure and management practices), and is summarized below.

3.6.2 Water Management System Summary

The water management system consists of five main components

The water management system (Figure 3.6-1) is as follows:

- Freshwater will be drawn from Snap Lake and piped to a storage location in the process plant and to a potable water treatment plant (Figure 3.1-4) where it will be treated with chlorine and then distributed to camp facilities.
- Seepage water from underground, runoff from the north pile, and surface water in contact with core site facilities will be collected in sumps (drain or receptacle for liquids), ponds and ditches, and transported via pipeline to a water treatment plant.

Figure 3.6-1 Snap Lake Diamond Project Overall Water Flow Patterns

- A water treatment plant will be installed to ensure water released to Snap Lake meets discharge quality.
- Treated water will be recycled and reused to the greatest extent possible for process water, and dust suppression on roads, airstrip and the north pile.
- Sewage will be treated and the discharge will be released to Snap Lake in the same discharge pipe as the water treatment plant discharge.

3.6.3 Water Balance

Water seeping into the mine will be the largest inflow to the site

The water balance is the summary of inflow (gains) and outflow (losses) of water from the project site over time. Water inflows include seepage water into the mine, the freshwater intake from Snap Lake, and surface runoff from the north pile, the core site facilities (*e.g.*, the accommodations, plants, and service complex) and the catchment of the WMP. The seepage water entering the mine will be, proportionally, the largest inflow. The volume of inflow seeping into the mine will be low, 6,300 cubic metres per day (m^3/d) initially, and will increase to 23,930 m^3/d in the later years of the project. Water outflows include treated sewage and treated water discharged to Snap Lake, surface runoff, seepage, and evaporation. Table 3.6-1 summarizes each component of the water balance in year 1, year 6, and the years prior to closure (years 17 to 22).

3.6.4 Water Supply and Distribution

515 m^3/day of water will be withdrawn from the north arm of Snap

Freshwater will be drawn from the north arm of Snap Lake. The estimated volume of water to be drawn is 515 m^3/day (Table 3.6-1). This is a conservative estimate because recycling of water should reduce the volume of freshwater required. Freshwater will have the following uses:

- potable water;
- process plant “make-up” water;
- fire suppression;
- dust suppression (initial construction only); and,
- drill water for underground drilling (only if necessary).

Table 3.6-1 Summary of Water Balance for Full-scale Mining (2005 - 2026)

Description	Year 1		Year 6		Year 17 to 22	
	Inflow [1] (m^3/day)	Outflow [1] (m^3/day)	Inflow [1] (m^3/day)	Outflow [1] (m^3/day)	Inflow [1] (m^3/day)	Outflow [1] (m^3/day)
Fresh Water from Snap Lake						
To camp (potable water)	200		200		200	
To mine (potable/industrial)	165		165		165	
To mill (potable/make-up water)	150		150		150	
Sewage treatment plant effluent		200		200		200
Used mine water to surface		165		165		165
Used process to paste		150		150		150
Totals	**515**	**515**	**515**	**515**	**515**	**515**
North Pile Internal Drainage						
PK water with paste	460		580		580	
Direct precipitation	260		500		890	
North pile dust suppression	30		30		30	
Decant to water treatment plant		190		280		610
PK pore water storage (permanent)		410		500		500
Seepage		20		50		90
Evaporation		130		280		300
Totals	**750**	**750**	**1,110**	**1,110**	**1,500**	**1,500**
North Pile External Drainage Collection						
Direct precipitation	5		40		60	
Runoff from adjacent catchments	30		140		140	
Evaporation		5		30		40
Decant to water treatment plant		30		140		140
Seepage		0		10		10
Totals	**35**	**35**	**180**	**180**	**200**	**200**
WMP						
Runoff from plant site	160		160		160	
Runoff from WMP catchment	170		170		170	
Direct precipitation	70		70		70	
Decant from north pile	0		0		330	
Evaporation		60		60		60
Seepage		30		30		30
Discharge to treatment plant		310		310		640
Totals	**400**	**400**	**400**	**400**	**730**	**730**
Water Treatment Plant						
Mine water pumped to surface	6,200		21,000		18,800	
North pile internal drainage	190		280		610	
North pile external drainage	30		140		140	
WMP decant	310		310		640	
Reclaim to process		800		800		800
Use as dust suppression		30		30		30
Treated water discharge		5,900		22,900		19,360
Sewage treatment plant discharge	200	200	200	200	200	200
Totals	6,930	6,930	21,930	23,930	20,390	20,390

Note: The inflows and outflows are estimated daily flows at the end of the given year of operation. Mine water flows are based on average annual flows. PK = processed kimberlite; WMP = water management pond.

The design of the freshwater intake will comply with federal criteria

The water intake and pump house will be located on the north shore of the northwest peninsula (Figure 3.1-4). The intake will consist of vertical filtration wells fitted with vertical turbine pumps that supply water on demand. The intake will be connected to the pump house with piping buried under a rock-filled embankment. The embankment will be constructed out from the shore to a depth of 7 m and will impact 810 square meters of lake-bottom. The embankment fill material will be composed of non-PAG, washed granite and will be less than 600 mm in size. The water intake will not need to be screened to prevent fish entrainment because the rock filled embankment will act as a screen. Intake velocities will be below the federal regulatory criteria for the operation of water intakes.

Water will be distributed to the process plant for use as makeup water and for fire suppression

Freshwater will be pumped from the intake through a main overland pipeline to the freshwater storage tank in the process plant. The pipeline will consist of insulated and heat-traced, high-density polyethylene pipe, located on a fill bench adjacent to the service road. Water in the process plant will be used for fire suppression and as "make-up" water for the processing of kimberlite. Water for fire suppression will be pumped from the storage tank through a pressurized system to adjacent areas of the process plant and to the accommodations, service complexes, power and water treatment plants, and the utilidors. The volume of water and duration of flow in the pressurized system will be standardized to national fire codes.

Freshwater will be treated with chlorine for use as potable water

Fresh water will be pumped from the process plant by overland pipeline to the potable water treatment plant. Water will be stored in a storage tank in the potable water treatment plant, chlorinated, and sampled monthly to ensure it meets NWT health regulations. Treated water will be piped to areas in the process plant requiring potable water and to the accommodations and service complexes.

Water for dust suppression will be obtained from the water treatment plant

During the initial construction period, water for dust suppression on surfaces such as roads will be obtained from Snap Lake. Once a water treatment plant is operational, treated water will be drawn from the water treatment plant to be used for dust suppression.

3.6.5 Water Management System

3.6.5.1 Underground Water Quantity

Groundwater flowing from the rock into the mine will be reduced by grouting

Groundwater will seep into the mine from the surrounding rock. The volume of water entering the mine will increase over time as more underground areas are exposed and mined. To reduce the volume of water entering the mine, grout (cement compounds) will be injected into fractures and drill holes in the underground walls.

Water will be collected in sumps and pumped from the mine to the water treatment plant

Seepage water will be directed by ditches maintained along the ore and footwall drifts (underground tunnel below the ore) to a series of sumps. These sumps will allow initial settlement of coarse solids suspended from the water. Pipelines from the sumps will be routed along footwall drifts and up the conveyor incline to surface and to the water treatment plant. Under upset conditions in the water treatment plant, water will be temporarily directed to the WMP.

Limited storage capacity will be available underground

In the event of electrical or mechanical failures, pumps may be non-functional and flooding to sumps could result. Storage capacity will be provided underground to prevent flooding of working areas.

3.6.5.2 Underground Water Quality

Material suspended in the water as it travels through the mine will be removed

As water travels through the mine, it will pick up residual explosives, grout, fine sediment, and cement materials. Coarse material suspended in the water will settle in the sumps, and will be removed and disposed of in inactive areas of the mine. A small amount of fine sediment will remain in the water decanted from the sumps. Fine sediment will be removed from the water by the water treatment plant.

Oil and grease will be separated from the water and burned

Oil and grease from used explosives, accidental spills, or vehicle leaks will also collect in the sumps. Oil and grease will be skimmed from the sumps, brought to surface and put in an oil-water separator located in the service complex. Once separated, the oil and grease will be burned in a waste-oil furnace and the water will be placed in the WMP for treatment.

3.6.6 Surface Water

3.6.6.1 Site Runoff

Runoff from core site facilities will be collected and treated

Rockfill ditches and grading will direct the runoff from the peninsula areas towards the WMP. Traps will collect sediment generated from runoff in outlying areas such as the access roads, the airstrip, AN storage, and the explosives manufacturing plant. Any spills will be contained, collected, and remediated as described in the Spill Contingency Plan (Appendix III.9).

3.6.6.2 North Pile

3.6.6.2.1 Internal Water Collection System

There are three sources of water collected by the north pile internal system

Three temporary collection ponds will be constructed within the north pile to collect water from the following sources:

- direct precipitation and runoff on the north pile;
- dust suppression water; and,
- seepage water from the PK in the north pile.

Ponds will be re-located within the north pile as development proceeds

The ponds will store water during seasonal surges, and they will allow suspends solids in the water to settle-out and thus reduce the sediment load to the WMP. The ponds will be active at various periods during development and will be re-located within the north pile as development proceeds. Ponds will be de-watered and filled with PK when an area of the north pile is reclaimed and the pond is no longer needed. Water from the ponds will be pumped via overland pipelines to external ponds.

3.6.6.2.2 External Water Collection System

An external system will collect water in contact with the outside slopes of the north pile

The external water collection system will receive water from the internal system and external sources of water including the following:

- direct precipitation to the outside slopes of the north pile;
- runoff from the north pile and related catchment areas; and,
- seepage water from the PK in the north pile.

The north pile external system is composed of ditches, ponds and sumps

Ditches around the perimeter of the north pile will direct and collect runoff from the outside slopes of the north pile and will intercept seepage from the northern toe and near-surface of the north pile. The ditches will direct water to three external sedimentation ponds to be developed from two natural ponds and one wetland around the exterior of the north pile. These ponds do not contain fish and have no defined connection to Snap Lake. Ditches along the northern perimeter of the north pile will be partially lined to prevent seepage downstream of the north pile. All external sumps will be lined to prevent seepage to Snap Lake.

Water collected in the external system will be directed to the water treatment plant

Water collected in the external system will be pumped to the water treatment plant. In the event of seasonal surges in runoff, during maintenance periods, or during upset conditions in the water treatment plant, water from the north pile external system will be pumped to the WMP.

Potential runoff from the landfarm and landfill will be collected in the north pile system

Runoff collected in the internal and external systems will contain runoff from the landfill and land-farm that will be within the footprint of the north pile. The landfill will contain only inert solid waste and any runoff will be routed to the external system via pumping and pipelines and then to the water treatment plant. The land-farm will be fully lined and runoff from the land-farm is not anticipated.

Dust in the north pile will be suppressed with water from the water treatment plant

Water for dust suppression on the uncapped areas of the pile will be drawn from the water treatment plant at a rate of 55 m^3/d for six months per year. In winter, water may be sprayed on the pile to form thin sheets of ice that will reduce dust generation. Water may also be drawn directly from exterior sedimentation ponds.

Runoff that does not contact the north pile will be directed around the north pile

Uncontaminated runoff in areas adjacent to the north pile will be directed around the north pile to drain naturally into an adjacent watercourse and Snap Lake.

3.6.7 Water Treatment and Discharge to Snap Lake

3.6.7.1 Water Management Pond

The water management pond will receive water from six sources

The WMP will receive and temporarily store water from the following sources:

- direct precipitation to the pond;
- runoff from the watershed surrounding the pond;
- runoff from core site facilities;
- the underground mine (in the event that it cannot report directly to the water treatment plant);
- the process plant (under upset conditions only); and,
- decant from the north pile (years 17-22).

The water management pond will store water from the north pile after closure of the east cell

After the collection ponds in the east cell of the north pile are closed (Year 17 to 22), a portion of the runoff from the north pile will be directed to the WMP and the remainder will flow to a sump to be pumped directly to the water treatment plant. The WMP will receive the spring freshet in excess of treatment plant capacity.

Dam 1 and Dam 2 will be raised by 2 m

During the first years of operation, the WMP will be capable of handling seasonal fluctuations in water level from extreme wet year conditions as well as possible upper bound flows from the underground. As underground flows increase, Dam 1 and Dam 2 will need to be raised by 2 m each to increase storage capacity in the WMP. This may occur in Year 2 but exact timing will depend on the observed inflows.

Monitoring seepage will continue

During the advanced exploration program, thermistors and monitoring wells were installed to monitor seepage around the WMP. Monitoring of potential seepage areas will continue throughout construction and operation. Any water collected in the monitoring wells will be pumped to the WMP.

3.6.8 Water Treatment Plant

Removal of suspended solids will result in water of suitable quality for discharge to Snap Lake

The water treatment plant will receive both mine water and surface water for treatment prior to discharge to Snap Lake. Studies and testing indicate that the removal of suspended solids will provide water of suitable quality to discharge to Snap Lake. Pilot plant testing has confirmed this.

A filtration plant will be installed in 2003

The water treatment plant will be constructed in phases. In 2003, a filtration plant will be installed to treat the relatively low flows in the mine pre-production period and the water stored in the WMP (Table 3.6-1). This temporary water treatment plant will be located near the cold storage building (Figure 3.1-4).

The water treatment plant will consist of a screen, a thickener, a filter feed tank, and a bank of four filter units

In 2004, construction of a water treatment facility that consists of a screen for water-feed, a thickener, a filter feed tank, and a bank of four filter units is planned. Water will feed through screens to a cone-shaped thickener in the water treatment plant. The water from the thickener will be sent to the filter feed tank and then filtered. Filtered water will be released to Snap Lake provided it meets discharge criteria. Systems for adding flocculent and coagulant will be installed at the outset in case additional removal of solids is required. Solids in the thickener and from the filter backwash will be removed and sent to the deep-cone thickener in the process plant, then will be disposed of underground or in the north pile.

Levels of water treatment will depend on sediment loads

Runoff from the north pile and core site facilities will be sent directly to the filter feed tank since suspended solids levels will be low. There will, however, be capacity to direct this runoff directly to the thickener in the water treatment plant should elevated solids levels be detected. Solids from the filter (backwash) will be sent to the north pile.

Plant capacity will be 20,000 m^3/day initially

The water treatment plant will be capable of treating 20,000 m^3/day initially. Future capacity expansions would be carried out if and when required.

Treated water will be discharge through a diffuser into Snap Lake

The discharge from the water treatment plant will be discharged via pipeline to Snap Lake. The pipeline will be anchored to the bottom of Snap Lake at a depth of 10 to 12 m. The portion of the pipe in shallow water will be armored to protect it from wave action and ice scour. A submerged, multi-port diffuser will be installed at the end of the pipe. The diffuser will direct discharge into multiple directions and will maximize initial mixing of effluent with Snap Lake water. In addition, the diffuser will direct water away from lake-bottom sediments to prevent scour.

The performance of the treatment plant will be monitored

Monitoring of water quality in the water treatment plant will be conducted before and during discharge to Snap Lake as well as in Snap Lake at the discharge location. The monitoring program will be finalized in conjunction with water license conditions and water treatment plant engineering recommendations.

3.6.9 Sewage Treatment

A sequencing batch reactor will be used to treat sewage

Sewage will be collected in pipelines and directed for treatment to a sewage treatment plant. The sewage treatment plant (Figure 3.1-4) will be based on sequencing batch reactor (SBR) technology (similar to the current SBR plant in use for the advanced exploration program). The treated effluent will be combined with the effluent from the water treatment plant and discharged as a combined effluent, which will meet discharge criteria. The sludge from the sewage treatment plant will be incinerated and placed in the landfill.

Sewage will be treated at the existing plant until the new plant is completed

The existing SBR will treat sewage while the new plant is being constructed. Upon commissioning of the sewage treatment plant, the sewage from the existing construction camp will be pumped to this facility for treatment. Then the existing plant at the construction camp site will be decommissioned. The total sewage effluent discharge is anticipated to be 200 m^3/day.

3.7 SITE SUPPORT FACILITIES AND STORAGE

Exact locations within the footprint are not final

All of the site support and storage facilities shown on Figure 3.1-3 are included within the project footprint, but exact locations will not be finalized until the detailed engineering is complete. The overall site footprint will not be altered by location changes.

3.7.1 Service and Camp Complex

A service complex will be constructed

A two-storey service complex (Figure 3.1-4) will be constructed to house administration, training room, mud room, change rooms, laundry facilities, showers, lunch rooms, first aid, equipment repair bays and services, welding, machine and fabrication shops, and a warehouse and shipping/receiving area.

A 350-person permanent camp will be built

A 350-person permanent camp complex will be located as shown on Figure 3.1-4. The camp will be of modular construction (pre-fabricated or pre-assembled) with dormitory wings and a core complex for the shared facilities.

Existing facilities will be expanded during construction

The existing camp facilities constructed for the advanced exploration program will be expanded to provide accommodation for the construction crews. Existing power, water supply, and sewage disposal systems will be used for the construction camp. As well, an ATCO-type trailer camp may be assembled to house additional personnel during the construction period.

Heated, enclosed corridors will connect buildings

The process plant and paste plants will be integrated into one steel clad structure (Figure 3.1-4). Heated and insulated corridors will be provided between the plant, service complex, and camp complex.

3.7.2 Consumables Storage

Annual quantities of consumables moved to site have been calculated

Table 3.7-1 summarizes the consumables that will be used at the Snap Lake Diamond Project in substantial quantities on an annual basis during operation. Approximate annual quantities and the types of containers in which the consumables are delivered to the site and stored are also provided.

The consumables list does not include items used in small quantities

The above list does not include repair and replacement parts, which are stocked on site but not consumed on an annual basis. Consumables required in relatively small quantities that are not listed include, but are not limited to, the following items:

Table 3.7-1 List of Consumables Stored at Snap Lake

Item	Approximate Annual Quantity	Method/Container for Delivery	Storage on-Site
Diesel fuel	45 million litres (L)	tanker truck	diesel storage tanks
Cement	38,000 tonnes (t)	2-t sealed bags	cement storage buildings
Ammonium nitrate (for bulk emulsion)	1,000 t	1-t totes	AN storage building
Ferrosilicon (process plant reagent)	350 t	1- or 2-t sealed bags	C-can containers in container storage yard and process plant
Flocculent (process plant and water treatment plant reagent)	40 t	1- or 2-t sealed bags	C-can containers in container storage yard and process plant
Lime	450 t [a]	1- or 2-t sealed bags	C-can containers in container storage yard and water treatment plant
Ferric sulphate (water treatment coagulant)	350 t [a]	sealed drums	service complex warehouse and water treatment plant
Glycol	10,000 L	205-L drums	service complex warehouse and equipment service bays, power plant, underground shops
Gasoline	9,000 L	205-L drums	C-can containers in container storage yard and equipment service bays, underground shops
Miscellaneous lube oils and greases	1,000 t	various drums, pails, cans and tubes	C-can containers in container storage yard, service complex warehouse and equipment service bays, power plant, process plant, water treatment plant, underground shops
Food products	1,000 t	various bags, cans, boxes, crates, *etc*.	service complex warehouse and camp warehouse
Nitric acid	1,250 L	Double walled high density polyethylene drum (one drum per year)	process plant
Emulsifiers (N7) for bulk emulsion	53,000 L	205 L drums	storage yard
Emulsifiers (N23) for bulk emulsion	53,000 L	205 L drums	storage yard
Emulsifiers (N16) for bulk emulsion	53,000 L	205 L drums	storage yard
Jet – B fuel	100,000 L	tanker truck	envirotank at airstrip
Sodium nitrate (for bulk emulsion)	182 t	25 kg bags, palletized	C-can in container storage yard
Glass beads for bulk emulsion	100	4 cubic feet boxes, palletized	bulk emulsion plant or C-can in storage yard
Hydrofluoric acid (diamond cleaning)	1,250 L	Double walled high density polyethylene drum (one drum per year)	process plant
Ammonium nitrate fuel oil	220 t	25 kilogram (kg) bags, palletized	explosives magazine
Dynamite/packaged emulsion	75 t	25 kg boxes	explosives magazine
Perimeter explosives	65 t	25 kg boxes	explosives magazine
Boosters for bulk emulsion (110 grams [g])	25 t	25 kg boxes	explosives magazine

[a] Quantity based on a 10,000 m^3/d water treatment plant. Quantity would double for a 20,000 m^3/d water treatment plant.

- camp maintenance products (detergents, cleaning fluids and powders, light bulbs, *etc*.);
- office supplies;
- laboratory chemicals;
- shop supplies (batteries, hardware, fasteners, solvents, machining lubricants, *etc*.);
- surface and underground drilling consumables (drill bits, *etc*.); and,
- equipment maintenance parts.

3.7.2.1 Fuel

Diesel fuel will be stored in three 12.5 million L tanks and a 3.3 million L storage facility

Diesel fuel is required for surface and underground mobile equipment, power generation, and mine air heating. Three 12.5-million L, single-walled, welded steel tanks, combined with the existing 3.3-million L storage facility, will provide storage for the fuel requirement for full-scale production (Figure 3.1-4). The fuel truck unloading facility will include a concrete pad and spill containment sump. Fuel will be distributed by means of doubled-walled pipes on surface. Approximately 9,000 L of gasoline will be stored within the tank farm area.

Envirotanks will store fuel away from the tank farm

Two envirotanks will be installed at the airstrip, one for generator fuel storage and one for jet 'B' (jet grade) fuel storage. One envirotank will be located at the emulsion plant for the storage of diesel heating fuel.

Potential fuel spills will be contained within a bermed, lined containment area

A secondary containment area, protected by berms, will be provided to contain potential fuel spills. The design of the containment area is based on the requirements of the Canadian Council of Ministers for the Environment (1994) *Environmental Code of Practice for Above Ground Storage Tank Systems Containing Petroleum Products*, and the *National Fire Code of Canada*. The containment area will hold 110% of the volume of the largest storage tank. It will include a gravel berm with a continuous 60 millilitre (mL), high-density, polyethylene liner sheet installed under the tanks and the internal sides of the berm. The dyked area will be graded to a sump with a manual drain connection extending outside the dyke.

3.7.2.2 Explosives

Approximately 1,500 t of explosives will be used on site per year

Explosives use on-site will approximate 1,560 t per year. This will be made up of approximately 1,200 t of emulsion, 220 t of AN fuel oil (ANFO), 75 t of stick powder and 65 t of specialty (perimeter) explosives. The emulsion explosives are made of a mix containing approximately 76% AN, 16% water, 6% fuel oil and 2% emulsifier.

An emulsion plant will be constructed to manufacture explosives

An explosives plant will be erected on-site to manufacture the emulsion and ANFO explosives. Electrical power to the plant will be provided through the site power distribution system. Two small diesel-fired boilers will be used to provide heated water for the process. The 50,000 litre per year (L/yr) of diesel fuel to be used by the boilers and in the manufacturing process will be stored in an envirotank located at the explosives plant site. Other chemicals used in the explosives manufacturing process are included in Table 3.7-1.

The emulsion plant will only run intermittently

The emulsion plant will operate intermittently, with limited quantities of the finished product being stored in explosives magazines for subsequent use underground.

Components used in the manufacture of explosives will be stored near the emulsion plant

The total explosives manufacture and storage facilities will consist of an explosives manufacturing plant as described above, a cold storage building with a cement floor to be used for the storage of AN and other raw materials, and approved explosives magazines to be used for the storage of detonators (stored separately from other explosives), nitro-glycerine explosives, specialty explosives, and manufactured explosives.

The emulsion plant will be located to the northwest of the airstrip at the distance required by federal regulations

The emulsion plant and explosives magazines will be located north and west of the airstrip (Figure 3.1-3). Clearances as shown comply with the quantity-distance tables for the storage of blasting explosives as issued by the Explosives Regulatory Division of Natural Resources Canada (D7 for clearance from the airstrip, and D8 for clearance from accommodation buildings). The magazine layout and size are based on a storage requirement of approximately 400 t of explosives.

3.7.2.3 Cement

38,000 t of cement will be stored on-site

Cement will be stored in unheated storage structures as shown on Figure 3.1-4. It will be delivered to site in storage sacks. Total cement storage capacity will be approximately 38,000 t.

3.7.2.4 Unheated Storage

Unheated storage will be provided

A pre-engineered, unheated building, with an approximate area of 600 square metres (m^2), located near the container storage, will provide storage of dry goods and equipment (Figure 3.1-4).

3.7.2.5 Stockpiles, Laydowns, and Parking Areas

Lay-down areas will be used during construction and operations for the storage of non-hazardous materials

Various lay-down and parking areas are identified on the overall site plan (Figure 3.1-3). These include two kimberlite storage pads, a permanent lay-down area for concrete and a container storage area on the main site area (northwest peninsula). A permanent lay-down area, a temporary construction lay-down area, and a temporary winter truck parking area will be located in the general vicinity of the airstrip.

3.7.3 Sand, Crushed Rock/Ore, and Concrete Facilities

3.7.3.1 Quarry Locations

The quantity of waste rock will be insufficient

Granitic waste rock from mining will be crushed and used during construction, operations, and closure. However the quantity and availability of this rock will be insufficient to meet site operation and progressive closure needs (*e.g.*, capping of the north pile).

Three separate granitic-rock quarries will be developed within the footprint of the north pile

Over the life of the mine, three separate granite quarry locations will be operated on site as shown in the Quarry Management Plan (Appendix III.5). All granite quarries will be established within the ultimate footprint of the north pile. At closure, the north pile will cover these quarries. Two granite quarries will be active primarily during the construction and initial mine operations. A third granite quarry, in the west cell of the north pile, will be used during operations. The total amount of material taken from the granite quarries will be approximately 1.05 million m^3.

Sand will be quarried from an esker 9 km south of the mine site

Sand will be extracted from an esker (deposition from a glacial stream) located 9 km south of the project site. This esker site was used during the advanced exploration program (Figure 3.7-1). The esker will be accessed via the esker access road during winter. The total amount of sand quarried from the esker during construction will be 25,000 m^3. During operations, it is anticipated that 13,000 m^3 of sand may be required on three or four subsequent occasions if sufficient fine material cannot be produced on site from crushing of the granitic rock.

Figure 3.7-1 Snap Lake Diamond Project Winter Road Access

Quarried material will be used for roads, concrete, building foundations, and reclamation

During construction, quarried materials from site and the esker will be used for construction fill (*e.g.*, airstrip, roads, backfill for concrete foundations, *etc*.), production of concrete, bedding sand, and sand for production of concrete for equipment and building foundations. Granite usage during operations will include capping of north pile for closure, crushed rock for production of concrete for underground support pillars, and crushed rock for maintenance of roads. Sand from the esker will be used for concrete for underground support pillars.

3.7.3.2 Rock Stockpile and Storage Area

Quarried rock will be stored next to the quarry site

A storage area for quarried granite and sand from the esker will be located adjacent to the granite quarry site (within the north pile ultimate footprint). All subsequent crushing and screening of this material for construction use will normally be carried out at the aggregate crushing and concrete batch plant location.

3.7.3.3 Crushed Ore Storage and Conveying Equipment

Coarse ore storage and primary crushing will be underground

After an initial period of crushing on surface, the primary crushing facility and run-of-mine ore storage will be located underground. Crushed ore will be fed by means of an inclined covered conveyor from the underground primary crusher to the process plant. When the plant is not operating, crushed ore will be stored on the surface in a 18,000-t capacity storage building. The storage building, conveyors, and transfer structures will be totally enclosed to contain fugitive dust emissions, as well as to minimize potential problems from freezing.

3.7.3.4 Aggregate Crushing and Concrete Batch Plant

A batch plant will produce concrete for underground pillars

Concrete for the underground high-strength concrete pillars will be produced on-site using an automated batch plant (Figure 3.1-4). The complete plant will include aggregate bins, cement silo, conveyors, mixer, batch weigh system, water tanks, controls, ancillary equipment, and necessary heating and insulation. Silos, bins, and tanks will be sized for approximately one day’s storage of concrete constituents.

Rock will be crushed and stored nearby

An aggregate crushing and stockpile facility will be located beside the batch plant. It will include a hopper, crushers, screens, conveyors, and associated controls. Non-PAG granitic waste rock from underground or from the surface rock quarry, as well as esker sand to be used in construction, will be stockpiled on a pad immediately adjacent to the crushing facility. The rock will be stockpiled and reclaimed by wheel loader for feeding into the batch plant or for general site use.

3.7.4 Power Generation and Distribution

The main power plant will consist of five 4,400-kW diesel generators

The main power plant (Figure 3.1-4) will consist of five 4,400-kilowatt (kW) diesel generators. During normal operations, three will be operating, one will be on standby, and one will be down for maintenance.

An emergency power plant containing 3 x 1,250 kW diesel generator units will be in place on-site

An emergency power plant will ensure power supply even in the event of a disruption in the main power plant. This facility will contain three 1,1250-kW packaged diesel generator units and a packaged switchgear unit (distributes power); the facility is a larger version of the current site power plant. The existing two 750-kW diesel generator units will be used primarily for construction power and as stand-by during operations.

Two voltages will be used in power distribution

The site surface power distribution system will be based on 4.16-kilovolts (kV) primary and 600 volt (V) secondary power distribution. A 13.8-kV power distribution system will be considered for the underground mine due to the longer transmission distances involved.

25 million L of diesel fuel will be needed annually

Based on an estimated annual power requirement of 100 million kilowatt hours (kWh), total diesel fuel consumption for power generation is estimated to be 25 million L/yr.

Two stacks will be used for emissions

The power plant generators will exhaust to a common stack. The emergency generators will exhaust to a second common stack. Information on air emissions is provided in Section 7.3.2.

3.7.5 Site Energy Use

Options for the use of waste heat are being investigated

A site-wide energy balance study will be completed as part of the detailed engineering in 2002/2003. The study will identify options to best use waste heat generated by compressors, the waste incinerators, the electrical generators, and other fixed heat sources. A majority of this heat will be captured by a glycol heat distribution system for use in building and mine air heating.

3.8 AIRSTRIP, ROADS, AND TRANSPORTATION

3.8.1 Airstrip

The existing airstrip will be widened and lengthened

The airstrip is located approximately 1.5-km west of the plant site (Figure 3.1-3). The existing airstrip (approximately 914-m long and 30-m wide) will be extended to 1,900 m and widened to 45 m. The total cleared and graded area will be 150-m wide. This will accommodate C-130 Hercules and Boeing 737 or equivalent aircraft. The airstrip will be equipped with a non-directional beacon and air radio. Approach lighting will be installed for night and winter operations. A strip of sulphacide brilliant blue 5J liquid dye will be placed in the middle of the runway along its length during winter to aid visibility.

A building will be included

A small building and a weather observation facility will be located adjacent to the apron. Water will be trucked in and sewage pumped out as required.

An ice-strip will be constructed to accommodate C-130 Hercules aircraft

Prior to the extension of the land airstrip, an ice strip will be constructed on Snap Lake in order to allow flights using a C-130 Hercules aircraft during construction. This ice strip would be 45-m wide and approximately 1,800 m long.

3.8.2 Site Roads

Roads within the site will be either one or two lanes

Primary roads will be two lanes with an 8-m surface and 1-m shoulders, for a total width of 10 m. Where feasible, service roads will be single lane with a 4-m surface and 0.5-m shoulder for a total width of 5 m. Road grades will be 8% maximum with lesser grades used wherever possible. Mining vehicles will be restricted to separate dedicated roads between the portal and the mine rock areas.

3.8.3 Winter Access Road

Materials moved to the mine via the winter road will travel along the Tibbitt-Contwoyto winter road and then take the 35-km winter access road to Snap Lake

Annual re-supply for the mine will be by truck operation over the Tibbitt-Contwoyto winter road, north from the end of the Ingraham Trail, east of Yellowknife. A 35-km long winter access road will be constructed each winter to connect the mine to the Tibbitt-Contwoyto winter road at approximately km 222 (km 0 of the winter road is Tibbitt Lake at the departure from the Ingraham Trail) near MacKay Lake. The route was established in 2000 when approximately 400 loads were hauled to site to support the advanced exploration program. The winter access road will comply with the Tibbitt-Contwoyto Winter Road Joint Venture operating parameters (see Appendix III.6). The traffic requirements of the Snap Lake Diamond Project are compared with the overall road demand in Appendix III.6.

3.8.4 Transportation

Access will be by winter road and air

Materials and personnel will be transported to site annually by winter road and year round by air.

Supplies needed for construction will be transported to site via the winter road

The majority of the supplies required for the construction phase will be brought to site over the winter access road. The number of truckloads expected during the construction phase is dependant upon how suppliers will ship the goods, the level of pre-assembly available, and the contractors detailed construction planning schedule.

Quantities of goods to be transported are summarized

The freight transported to site annually during the operation phase will be as follows:

- diesel fuel: 45 million L (approximately 35,000 t);
- cement: 38,000 t; and,
- other goods and consumables: 10,000 t.

2,800 return truck trips will supply the mine annually

Materials will be transported by tanker truck, flat deck and lowboy tractor-trailers, cube vans, and specialized vehicles as required. The number of annual return truck trips is estimated to be 2,800. Freight items such as regular mail, emergency goods, and fresh food will be transported to site by regular personnel flights or charter flights.

3.8.5 Mobile Equipment

A fleet of vehicles will provide surface transport

In addition to the mining equipment, a fleet of surface mobile equipment will be required for transportation and site activities. Equipment will include pickup trucks, buses, wheel loaders, freight handling vehicles, rock haul trucks, maintenance vehicles, and emergency equipment.

3.9 MINE OPERATIONS

3.9.1 Management

3.9.1.1 Mine Management Advisory Committee

The mine management advisory committee will include communities

De Beers will set up a mine management advisory committee (MMAC). The MMAC's make-up will be determined through consultation, but ideally will be composed of De Beers personnel and representatives of each of the directly affected communities.

This committee will review performance and meet with management at least quarterly

The MMAC will have "high-level" input into the management of the mine through regular reviews of mine performance and policy, and through community consultation. The MMAC will meet with mine management at least quarterly and have access to production, safety, environmental, employment, and training data.

3.9.1.2 Hiring Commitment

Priorities in hiring will put local people first

De Beers is committed to recruiting and hiring as many Aboriginals and northerners as possible during both the construction and operation phases. Priorities in hiring will be as follows:

- First: Aboriginals born or residing in one of the primary communities;
- Second: residents of the NWT;
- Third: Canadians willing to relocate to the NWT; and,
- Fourth: others from across Canada.

3.9.1.3 Recruitment, Employment, and Training Strategy

De Beers will develop a strategic approach to increase Aboriginal and northern employment

De Beers will develop a long-term strategic approach to maximizing Aboriginal and northern content in the mine workforce. The success of this approach will require cooperation and commitment of other stakeholders, including the Government of Canada, the Government of the Northwest Territories (GNWT), and the primary communities.

A recruitment and employment strategy will be implemented

A recruitment and employment strategy will be implemented to match Aboriginal and northern workforce skills with employment opportunities and to provide progressive employment for mine employees. This strategy will be implemented in five year plans updated annually and continue throughout the life of the mine.

Education and skill levels will be assessed

Assessments will be carried out both in the communities and at the mine site to identify the education and skill levels among the Aboriginal and northern workforce. These assessments will be concurrent with assessments of workforce needs for the project. Identification of existing education and skills will be instrumental in fulfilling two objectives. One, it will allow De Beers to offer appropriate work opportunities to new recruits and to offer opportunities for advancement to existing employees. Two, it will identify skill and educational gaps that educational agencies should address to enable northern communities to participate as fully as possible in project related opportunities in particular and the wage economy in general.

Training programs will be tailored to meet Aboriginal and northern needs

The key component of any strategy to maximize Aboriginal and northern employment is a training program. Job descriptions and a capacity survey of the primary communities are presently being completed and training programs will be tailored to take advantage of employment opportunities.

Programs specific to mining will be offered in the communities and on-site

Training specific to mine employment will be provided both on-site and in the primary communities. A mine employment orientation program, which will be mandatory for all new employees, will be offered primarily in the communities. However, an underground mining training program and other training programs specific to mine jobs will be offered on-site.

De Beers will support the apprenticeship training program

De Beers will actively support the existing GNWT apprenticeship training program by encouraging candidates who have indicated an interest in mine employment. Where interest in shown, De Beers will facilitate their participation in the apprenticeship program.

Training initiatives will include apprenticeship positions, a trades training program, and an underground mine training program

The following specific initiatives address training and northern employment:

- Ten apprentice positions will be provided to Aboriginals or northerners who meet the requirements of the NWT Apprenticeship Trade and Occupations Act.
- Within three years of production, De Beers will set up a trades training program and will provide 10 positions for Aboriginals or northerners. The program will be designed for individuals who do not qualify for the apprentice program but will become eligible for the apprentice program through successful completion of the De Beers program.
- Within the first three years of production, a De Beers underground miner training program will be set up and 20 positions will be made available to Aboriginals or northerners. This program will be modelled after the Common Core Program in Ontario.

De Beers will establish a learning centre for literacy and academic upgrading on site and encourage community based programs

Another component of the strategy is the longer term view that learning opportunities for Aboriginals and northerners must be broader than training skills. Learning opportunities must also be provided in relation to literacy and academic upgrading. A learning centre will be provided at the site for employees to participate in literacy and upgrading programs. The required resources (*e.g.*, materials, programs of study, instruction, computers, and internet access) will be provided.

Pre-employment upgrading in the primary communities requires partnership support

Recognizing that there are people in the communities who are not able to access programs available to employees, De Beers will also work in partnership with the other stakeholders to provide pre-employment educational upgrading in the primary communities. These programs will be open to all community members.

3.9.1.4 Northern Business Opportunities

De Beers is committed to increasing business capacity in the Northwest Territories

A northern businesses opportunities strategy is presently under development. De Beers is committed to working with communities and individuals to increase the likelihood that small, medium, and large enterprises located in the NWT will be able to participate in providing goods and services to the project. A northern business policy will include the following specific initiatives:

- A manager of business development will be hired to assist and build relationships with NWT businesses.
- Construction and operations contracts will be structured such that they can be reasonably accessed by a variety of different sized NWT businesses.
- De Beers will publish a business opportunities profile that will provide NWT businesses with information required to access potential opportunities. In acknowledgement of the greater amount of time it may take for primary communities to organize and assemble resources to participate in the bidding process, this list of project requirements for goods and services will be provided to primary communities in advance of its release to the general public.
- In an attempt to encourage contractors to hire and train Aboriginals and northerners, De Beers will require all contractors to disclose their policies and practices for providing preferential opportunities to Aboriginals and northerners.

3.9.1.5 Work Rotation Schedules

Rotation on site will be two in and two out during operation of the mine

Except for a limited number of management staff, the rotation schedule on-site during the construction period is anticipated to be three weeks in and one week out. During the operations period, it is currently anticipated to be two weeks in and two weeks out. In discussions with the local communities, the two/two rotation was identified as the preferred option, as it provides a reasonable income while still allowing adequate time for family and for traditional pursuits.

3.9.2 Key Policies and Plans

Operating policies and procedures will be developed

As the Snap Lake Diamond Project moves towards production, many operating policies and plans will be developed and implemented. Two key policies, Environmental Policy (Appendix III.8) and Loss Control Policy (Appendix III.7), have already been implemented at the corporate and operations level.

The Snap Lake Diamond Project has a Loss Control Policy

In the Loss Control Policy (Appendix III.7), De Beers commits to a program of risk reduction that will provide protection from accidental losses for all personnel and physical assets under its control. Accidental losses will be controlled through best management practices and systems, combined with the active participation of the workforce.

There is also an Environmental Policy

In the Environmental Policy (Appendix III.8), De Beers commits to balancing good environmental stewardship with economic growth. The elements of this policy include being in compliance with applicable legislation, communicating openly with governments and communities, implementing appropriate management systems and programs, increasing environmental awareness among employees and contractors, integrating environmental management into corporate business and planning, avoiding environmental impacts, and applying good management practices.

Policies are supported by communication

Both of these policies are supported by a communication program to foster awareness of the shared responsibility and accountability for environment, health, and safety among employees. This program includes interaction and cooperation with all stakeholders.

Plans related to environmental concerns have been developed and are appended

A number of plans related to the key areas of environment and loss control have been developed. These include the North Pile Development Plan (Appendix III.1), the Waste Management Plan (Appendix III.3), the Preliminary Water Management Plan (Appendix III.4), the Quarry Management Plan (Appendix III.5), the Spill Contingency Plan

(Appendix III.9), the Emergency Response Plan (Appendix III.10), and the Decommissioning and Reclamation Plan (Appendix III.11). Many of these plans have been mentioned in previous sections of the Project Description.

3.9.3 Environmental Management System

The environmental management system will include management plans and monitoring

De Beers is presently developing an environmental management system (EMS), including ISO 14001 certification. The EMS will set out how the project will be managed to minimize its impact on the biophysical and socio-economic environment, and to continually improve its environmental performance. It will set out the management plans and the emergency plans for all key areas of the environment during construction, operations, and closure. De Beers will develop, in consultation with stakeholders, a program to monitor not only the effectiveness of the management system but also the effects of the project on the environment (see also Section 14).

The monitoring program has four components

This monitoring program will consist of a number of features including:

- monitoring for regulatory compliance;
- monitoring for project-related regional socio-economic and environmental effects;
- identifying circumstances under which additional mitigation should be undertaken if the results of measures in the plans are uncertain or if they fail; and,
- participating in cumulative effects monitoring.

3.9.4 Diamond Sorting, Valuation, and Marketing

Diamond Trading Company manages sorting and valuation

De Beers is a leader in rough diamond sorting, and valuation expertise and technology. Sorting and valuation is managed by the Diamond Trading Company (DTC) at facilities in London, England. The DTC currently sorts and values 60 million carats per annum; approximately 60% of the world's rough diamond production.

Diamonds are sorted to 16,000 different categories

The DTC buys rough diamonds from De Beers mines in Botswana, Namibia, South Africa, and Tanzania, and under contract from Alrosa in Russia and BHP Billiton in Canada. These diamonds are sorted by shape, weight, clarity, and colour into approximately 16,000 different categories. Sorting to this detail enables the DTC to provide consistent and tailored assortment to match the requirements of a broad range of clients. Over 400 staff are engaged in sorting and valuation at the DTC. The unique skills of this staff are supplemented by proprietary sorting technology.

The Snap Lake diamonds will receive a primary sort in the Northwest Territories

To meet the current requirements of government regulations, Snap Lake production will receive a primary sort for valuation purposes in the NWT, prior to shipment to the DTC. At the DTC, the Snap Lake production will be incorporated with the DTC's production from other diamond mines for sale to clients.

3.10 DECOMMISSIONING AND CLOSURE

Best practical, northern mine closure techniques will be used during closure

Mine decommissioning and closure will take place using best practicable, northern mine closure techniques that will comply with accepted protocols and standards (refer to Appendix III.11, Decommissioning and Reclamation Plan). Efforts will be focused on promoting natural re-vegetation.

A small footprint and progressive reclamation are an integral part of the reclamation plan

The project footprint has been kept to a minimum to reduce environmental impact and the need for reclamation. The north pile has been designed for progressive reclamation during operation. The progressive reclamation approach will also be implemented in the reclamation of the esker site and the two bulk sample pits.

3.10.1 Underground Mine

Equipment will be removed and mine openings sealed

Following completion of underground mining, all mobile equipment and salvageable stationary equipment will be removed. Surface equipment will be disconnected and removed. All underground openings, including ventilation raises, and the conveyor and access ramps, will be sealed in accordance with applicable mining regulations.

3.10.2 North Pile

The north pile will be capped

All PK will be deposited in the north pile until the end of mine operation in approximately 2026. As the north pile reaches its ultimate elevation (484 m), an erosion barrier consisting of a 0.5-m thick layer of non-PAG rock will be placed over the PK. Final capping of the north pile will be completed in 2027. Although the north pile is expected to freeze, its design in terms of permanent stability is not dependant on freezing.

The seepage and runoff collection pond will be closed

On closure, the seepage and runoff collection ponds will be drained. A layer of sand or non-PAG granite cover will be placed over any sediment in the pond to prevent erosion of these materials. The liner material will be removed from the upstream face of the berm and disposed of in the underground workings. The berm fill materials will be re-graded to blend into the existing topography.

3.10.3 Water Management Pond

Dam 1 will be breached and natural drainage restored

On closure of the mine in 2026, the WMP will be temporarily drained. A layer of non-PAG granite will be placed over the bottom of the pond to prevent erosion of the fine sediments. When the WMP is shown to meet discharge criteria, Dam 1 will be breached. To the extent possible, the natural drainage pattern will be re-established.

3.10.4 Site Facilities

Buildings and equipment will be removed from site

Salvageable buildings, surface structures, and equipment will be dismantled and de-mobilized from the site. Non-salvageable buildings and structures will be dismantled or demolished and disposed of underground. Concrete foundations will be removed to 1-m below the original ground level and disposed of underground.

Roads and culverts will be removed and natural drainage restored

All site roads not required as part of the post-closure monitoring will be decommissioned and the terrain restored. Culverts will be removed and original drainage restored.

The airstrip will be closed at the end of the project

The airstrip is not expected to be required to support the post-closure monitoring program; therefore, it will be closed near the end of the decommissioning phase. This will involve the removal of culverts, re-contouring, and scarification to facilitate natural re-vegetation (see the Decommissioning and Reclamation Plan in Appendix III.11).

Borrow pits and quarries will be stabilized

The decommissioning and reclamation of borrow pits and quarries will involve the removal of all mobile and stationary equipment. As site conditions dictate, the slopes will be stabilized and contoured. Cover materials may be needed for erosion and/or dust control.

Remaining rock or esker material will be spread and contoured

Any stockpile of rock and esker material on-site will be depleted during the last years of operation. Any remaining material will be spread and contoured to blend with the natural surroundings.

The water intake embankment will provide fish habitat at closure

The wells and pipes within the potable water intake embankment will be removed. The embankment will be left in place and contoured to maximize shoreline habitat. The site water discharge facilities will be removed.

Fuel containers will be removed and the site restored

Tanks, tank foundations, containment berms, and liners will be removed from the fuel storage and re-fuelling areas. The potential for hydrocarbon impact to the soil will be assessed and addressed if necessary.

Incinerator and waste handling equipment will be removed

The incinerator and waste handling equipment will be removed. A sampling program will be carried out to assess potential impacts associated with the incinerator operation. Following infrastructure removal, the area will be re-graded and re-contoured.

3.11 REFERENCES

CCME (Canadian Council of Ministers for the Environment). 1994. Environmental Code of Practice for Above Ground Storage Tank Systems Containing Petroleum Products, and the National Fire Code of Canada. Winnipeg, MB.

MVEIRB (Mackenzie Valley Environmental Impact Review Board). 2001. Terms of Reference and Work Plan for the Environmental Assessment of the De Beers Canada Mining Inc. Snap Lake Diamond Project. Issued by MVEIRB in Yellowknife on September 20, 2001.

3.12 UNITS, ACRONYMS, AND GLOSSARY

UNITS

g	gram
g/t	gram per tonne
kg	kilogram
km	kilometre
kV	kilovolt
kW	kilowatt
kWh	kilowatt hour
L	litre

L/yr	litre per year
m	metre
m^2	square metre
m^3/d	cubic metre per day
mL	millilitre
mm	millimetre
t	tonne
t/m^3	tonne per cubic metre
tpd	tonnes per day
V	volt

ACRONYMS

A&R	abandonment and restoration
AN	ammonium nitrate
ANFO	ammonium nitrate fuel oil
CCME	Canadian Council of Ministers for the Environment
De Beers	De Beers Canada Mining Inc.
DMS	dense media separation
DTC	Diamond Trading Company
EA	environmental assessment
EMS	environmental management system
GNWT	Government of the Northwest Territories
MMAC	mine management advisory committee
MVEIRB	Mackenzie Valley Environmental Impact Review Board
non-PAG	not potentially acid generating

NWT	Northwest Territories
PAG	potentially acid generating
PK	processed kimberlite
Q	quarter
SBR	sequencing batch reactor
WMP	water management pond

GLOSSARY

acid base accounting	refers to a procedure used to estimate the propensity of a sample to produce acidity upon interaction with the atmosphere; the potentially acid producing minerals are balanced with the potentially alkaline or buffering minerals of a given sample; this is a short term, or static test that is completed over a fixed period of time
aggregate	composed of mineral crystals of one or more kinds of mineral rock fragments
aggregate crushing facility	plant for crushing ore, waste rock, and quarry rock; located on the surface
automated neutralization plant	facility for neutralizing the concentrated acids used in the cleaning process
backwash	type of filter that is self-cleaning due to a backward flow or movement of water produced by a propelling force
batch plant	plant for producing concrete on site for the underground high-strength concrete pillars; complete plant includes aggregate bins, cement silo, conveyors, mixer, batch weigh system, water tanks, controls, ancillary equipment, and necessary heating and insulation
bioremediation	the treatment of pollutants or waste (as in an oil spill, contaminated groundwater, or industrial process) by the use of microorganisms (such as bacteria) that break down the undesirable substances
bulk sample plant	small scale processing plant used to extract diamonds from bulk kimberlite ore samples and to generate process specific data for future design
bulk-sample pit	the area where the kimberlite dyke was mined at the surface to provide bulk samples for diamond recovery

capacity survey	survey used to determine the capacity of the community to provide potential employees from the local area to the mine; evaluates skills, quantity and desires of local peoples related to mine needs
C-can container	industry standard steel shipping container
coarse processed kimberlite (PK)	processed kimberlite that is 1.5 mm to 6 mm in size
contingency	an event (as an emergency) that may, but is not certain to, occur
cube van	specialized type of vehicle used in mining for transport
cycloning	a method of separating mineral particles based on their size or density using centrifugal force; in the diamond industry the main separation is based on particle density
deep cone paste thickeners	devices for separating fine solid particles (slimes) from water to allow the clean water to be reused in the process and the high density slime to be disposed of with a minimum of wasted water
dense media separation (DMS) circuit	a process used to concentrate the diamonds and other heavy minerals by differences in specific gravity
diffuser	located in Snap Lake and receives discharge from the water treatment plant; designed to optimize mixing in conformance with dispersion modelling results
drift	an underground tunnel
dry bulk density	the measure of the mass per unit volume of dry crushed ore
dyke	a tabular igneous intrusion that cuts across the planar structures of the surrounding rock
emulsifier	something that disperses a substance (as an oil) into a suspension
envirotank	a steel, double-walled tank used for storage of fuel or liquid chemicals
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
exhaust raise	vertical hole from the mines to the surface allowing used air to exit
explosives magazine	a place where explosives are stored

ferrosilicon	agent used to make a dense separation medium for use in the dense media separation circuit; recovered within the plant for re-use
filtration plant	facility to treat the relatively low flows in the mine pre-production period and the water stored in the water management pond
flocculent	agent that increases solids removal; used to aid in the clarification of process water for re-use in the plant
footwall drift	an underground tunnel developed below the ore deposit
full mix paste	processed kimberlite (PK) that is placed in the north pile; composed of coarse PK, PK grits, and thickened PK fines
geomembrane liner	an impermeable containment lining material installed under ponds, ditches, berms, catchments, etc.
grout	thin mortar used for filling spaces; any of various other materials (as a mixture of cement and water or chemicals that solidify) used for a similar purpose
hopper	a usually funnel-shaped receptacle for delivering material or for the temporary storage of material
jet ‘B’ fuel	jet grade aviation fuel
kimberlite	an agglomerate biotite-peridotite that occurs in pipes especially in southern Africa and that often contains diamonds
kinetic acid rock drainage testing	refers to a group of testing procedures used to determine the acid generation characteristics of a sample over time
lay-down area	area used for storage of construction materials and supplies
metavolcanic	a rock type; at Snap Lake these consist mainly of well-foliated high-grade amphibolites
modular construction	the off-site pre-fabrication and/or pre-assembly of building structures or equipment that reduces installation time on site
non-acid generating (non-PAG)	pure granitic rock that does not have structures containing visible sulphides
paste-fill plant	a plant where the processed kimberlite is mixed to form a paste suitable for backfilling the underground mine or for surface disposal
perimeter sump	a pit or reservoir serving as a drain or receptacle for liquids; located around the perimeter of the north pile
potentially acid generating (PAG)	metavolcanic rock and granitic rock with visible sulphides

processed kimberlite (PK) fines	processed kimberlite that is approximately the size of silt, <0.125 mm in size
processed kimberlite (PK) grits	processed kimberlite that is approximately the size of sand, 0.125 mm to 1.5 mm in size
project footprint	the area covered by the project site
rib pillar	a pillar for support of underground mine workings which can be *in situ* rock or artificially created
room and pillar	mining method in which up to 75% of the kimberlite is mined, leaving regularly spaced kimberlite pillars for support of the rock above the kimberlite dyke
scarify	to break up and loosen the surface of (as a field or road)
sequencing batch reactor (SBR)	a technology used for treatment of sewage (currently used for treatment of the existing advanced exploration program camp sewage)
silo	a deep bin for storing material
starter berm	initial containment structure for the north pile; constructed of rock that is non-PAG from a quarry within the north pile footprint or from non-PAG waste development rock; processed kimberlite will be deposited behind the containment berm as a paste
sump	a pit or reservoir serving as a drain or receptacle for liquids
switchgear unit	a unit of electrical equipment that controls and distributes power generated by the diesel generators