510-013

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BHP

BHP Diamonds Inc.
BHP World Minerals

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25 November 1998

TO DISTRIBUTION:

Enclosed for your information are applications for land lease amendments and a type 'B' water licence made to the Lands Division of DIAND and the NWT Water Board, respectively. I trust you will find it of interest.

Should you have questions, please do not hesitate in calling me or John Witteman at 867 880 2232.

Yours sincerely,

Scott Williams
Manager, Environment and Resource Development

Distribution:

Red Pederson, Chair, Independent Environmental Monitoring Agency
Jim McCaul, Executive Director, Mackenzie Valley Land & Water Working Group
Heidi Klein, Executive Director, Mackenzie Valley Environmental Impact review Board

PROJECT DESCRIPTION

PROPOSED DEVELOPMENT OF SABLE AND BEARTOOTH KIMBERLITE PIPES

Prepared as a Supporting Document
To Type "B" Water License Application
And
Koala Mining Land Lease Amendment
November, 1998

BHP
Ekati Diamond Mine

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1. INTRODUCTION

As stated in the NWT Diamonds Project 1995 Environmental Impact Statement, BHP Diamonds Inc. (BHP) is planning to develop additional kimberlite pipes peripheral to their current Ekati Diamond Mine operations. Through bulk sampling, pipes at Beartooth Lake and Sable Lake have been identified as potentially exploitable resources and BHP plans to develop these pipes in the near future. Prior to expenditures required for detailed design and pre-development work being authorized, a water license and land lease amendment must be in place. Other permits required prior to site development include a fisheries authorization and authorization under the Navigable Waters Protection Act.

The following sections provide a description of proposed mining methods, waste rock management, water management, and logistical aspects associated with the development of the Beartooth and Sable Pipes. Information is also included on construction of the Sable Access Road. Information in this condensed project description report has been taken from previously published feasibility studies, the 1995 Environmental Impact Statement, and numerous environmental and engineering reports produced by BHP and its consultants.

In many cases, the information presented in this project description is not sufficiently detailed to allow for the regulating authorities to provide unconditional authorizations or licenses. In these cases it is expected that any authorizations or licenses granted will contain provisions that BHP provide additional information in the form of updating existing management plans to include new developments and undertake additional study in areas where more information is required.

2. PROJECT DESCRIPTION

In general, the development of the Beartooth and Sable Pipes will utilise methods already in use at the Ekati Diamond Mine. These methods of mining, waste rock and water management and logistical support have been previously described and reviewed within the framework of the 1995 Environmental Review Process conducted for the Ekati Diamond Mine (formerly the NWT Diamonds Project). No new processes or methods are proposed for these new developments.

In addition, no new waste stream types will be generated as a result of these new developments and wherever practical, the existing facilities at the main Ekati site will be utilized. In short, these new developments represent a simple expansion of existing operations.

It should be noted that most of the instruments of environmental management contained within the existing Type "A" Water License and Environmental Agreement (Aquatic Effects Monitoring Program, Wildlife Effects Monitoring Program, Waste Rock and Ore Storage Plan, Wastewater & Tailings Management Plan, etc.) will be updated to include aspects of this new proposed development.

2.1 BEARTOOTH PIPE

2.1.1 Location and Environmental Setting

The Beartooth Kimberlite Pipe is located beneath Beartooth Lake (64°43.9'N, 110°30.4W) immediately upstream of Upper Panda Lake. Baseline studies[1] show Beartooth Lake to be a small, typically oligotrophic lake with a small fisheries resource. Water flows into Beartooth Lake via Bearclaw Lake. Beartooth flows out into Upper Panda Lake which flows into the Panda Diversion Channel. Baseline studies[2] indicated that due to the steepness of the topography there is no fish passage possible from Beartooth Lake upstream to Bearclaw Lake.

Figure A-1 shows the pre-development conditions at Beartooth Lake.

The host rock for the Beartooth pipe is white to grey medium to coarse grained, weakly foliated to massive biotite granite. The granite has an average composition of 40% quartz, 45% feldspar and 15% biotite. In weakly altered zones, 1% to 3% epidote may be present. Biotite granite exposed near Beartooth is remarkably unaltered in comparison with granitic host rocks of other pipes in the area. Hornblende biotite granite outcrops northwest of Beartooth. This light grey, medium grained, massive to weakly foliated rock is composed of 10-15% hornblende, 5-10% biotite, 30% quartz and 50% alkali

[1] Beartooth Lake 1997 Fisheries Resource and Habitat Survey. Rescan Environmental Services Ltd., April 1998.

[2] BHP Diamonds Inc. Environmental Baseline Assessment: Beartooth and Bearclaw Lakes, North-west Territories, Canada. Bryant Environmental Consultants Ltd., December 1996.

feldspar. Fine-grained enclaves, up to 30 x 50 cm in size, of more mafic rock are present in places. Epidote alteration was not observed in this rock. The adjacent biotite granite has been altered to a red colour.

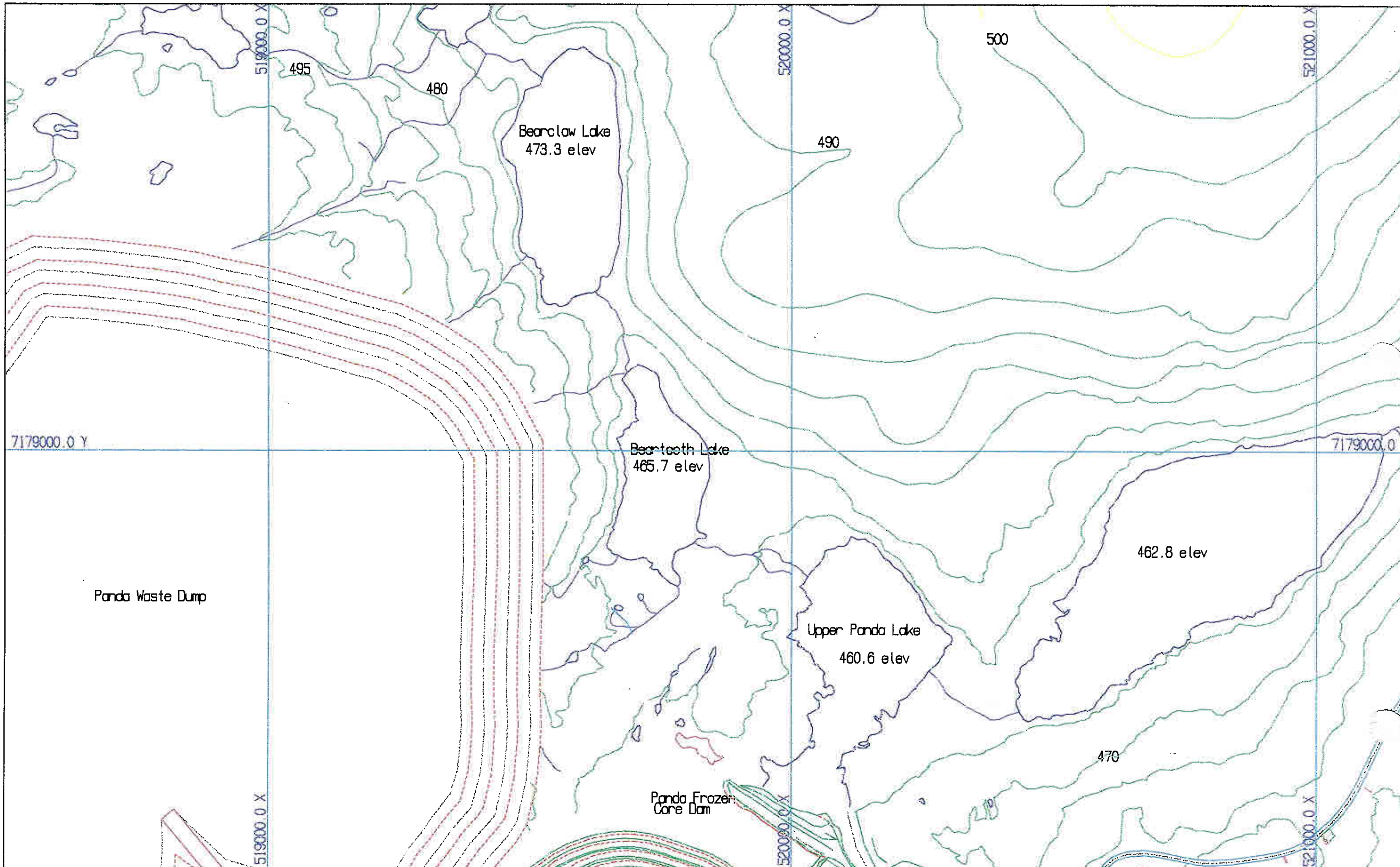
Waste rock from the Beartooth Pipe is not expected to be acid generating nor is it expected to produce any significant concerns with respect to runoff or seepage quality.

2.1.2 Mining Method

Mining of the Beartooth Pipe will proceed as an open pit development similar to other pipes at Ekati such as Panda and Koala. Following fishing out and dewatering of Beartooth Lake, a sump will be established and till and lake bottom sediments will be excavated. Following the removal of the till and sediments, pit development will commence by standard drill and blast methods.

Pit development is anticipated to proceed to a depth of approximately 155m below grade (el. 310m). The final pit volume at closure will be approximately 9.7 million m^3. The anticipated pit dimensions are shown on Figure A2.

Mined ore will be trucked approximately 3 km via all weather haul road to the existing ore storage area at the Ekati Diamond Mine Process Plant.



BHP Diamonds Inc.
Yellowknife Office
4920 - 52nd Street
Suite 1102
Yellowknife, NT X1A 3T1

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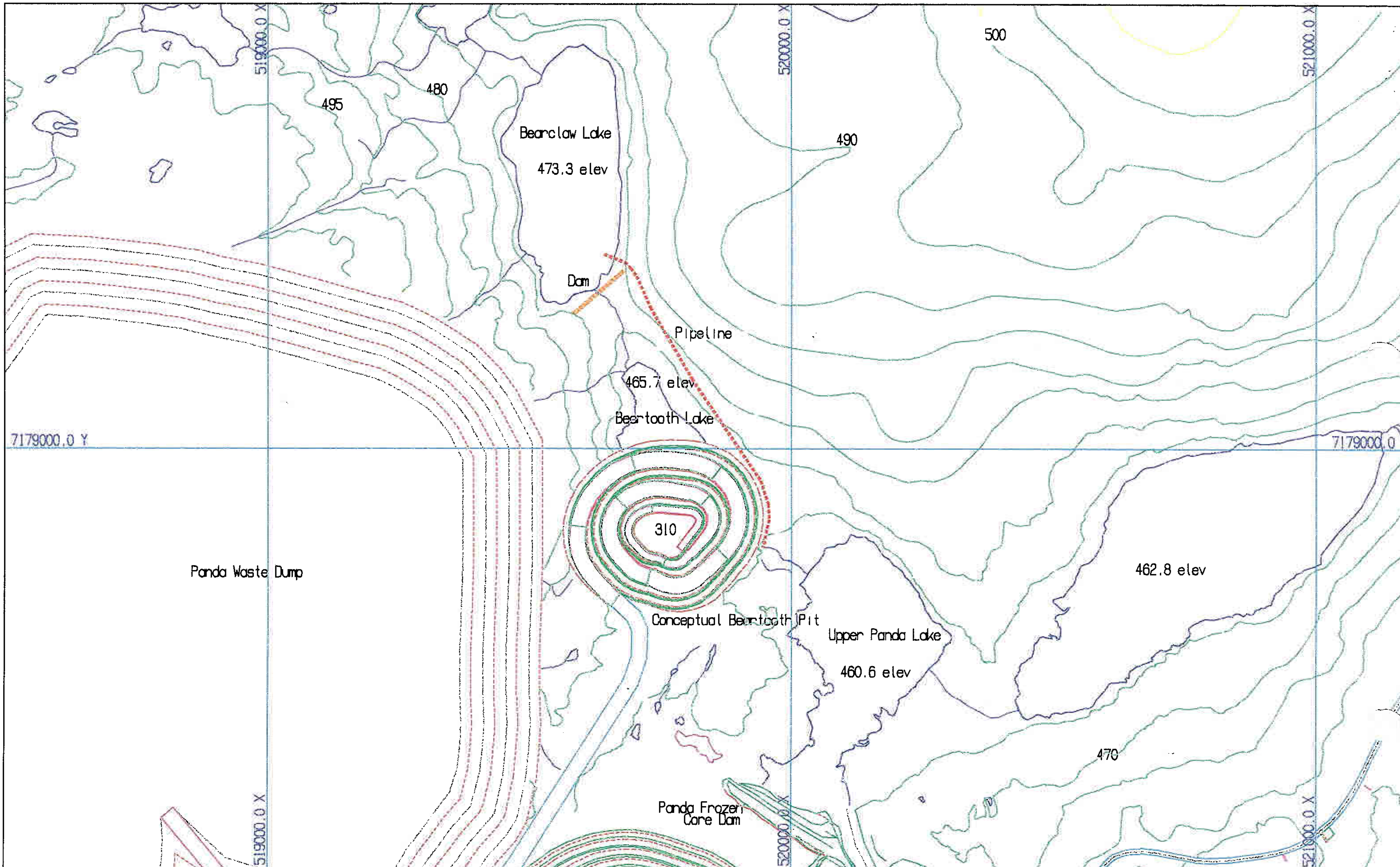
Plan View
Predevelopment Drawing - Beartooth
Figure A-1
Drawn By: mdp

Software by Gemcom Software International



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Yellowknife Office
4920 - 52nd Street
Suite 1102
Yellowknife, NT X1A 3T1

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Plan View
Preliminary Beartooth Design
Figure A-2
Drawn By: mdp

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2.1.3 Waste Rock and Sediment Management

Waste rock from the Beartooth Pit will be primarily biotite granite identical to that found at the Panda Pit. This granite has been shown to be essentially benign with respect to acid rock drainage and runoff quality[3] and will therefore be stored in the existing Panda Waste Rock Dump. Till and Lake bottom sediments from Beartooth will also be stored within the existing Panda Till Dump area.

Approximately 17 million tonnes of waste rock and 1.4 million tonnes of kimberlite will be mined from the Beartooth Pit. A minor increase in the footprint sizes of the Panda waste rock, till, and lake bottom sediments dumps will be required to accommodate material from Beartooth.

The existing Waste Rock & Ore Storage Management Plan (July, 1998) will be updated to include all aspects of management of Beartooth Lake waste rock, sediments and till.

2.1.4 Water Management

<u>Water Use & Wastewater Management</u>

Water use at the Beartooth pit will consist of road watering and drilling operations. All water used will be hauled from the main Ekati Mine site or recovered from the pit sump. Approximately 2000 litres per day will be used for drilling and other pit operations. Due to the close proximity to the main Ekati camp, no sewage or lunch room facilities will be constructed at Beartooth.

<u>Dewatering</u>

Access to the top of the kimberlite will be gained by dewatering Beartooth Lake. Since water quality within Beartooth Lake is excellent, dewatering effluent will be discharged into Upper Panda Lake immediately downstream of Beartooth Lake. The dewatering discharge point will be from a floating pipe within Upper Panda Lake itself to minimize erosion and to maintain good water quality. Dewatering discharge into Upper Panda Lake will be sampled and analyzed regularly to ensure good water quality meeting the existing requirements of Water License N7L2-1616. Should unacceptable TSS levels develop, discharge water will be directed to the Long Lake Containment Area via the Process Plant.

The total volume of Beartooth Lake is approximately 145 000 m^3. Drawdown of the lake will be conducted slowly over a maximum two-month period to minimize water quality effects due to slumping of exposed lake bottom sediments. A maximum pumping rate of 0.5 m^3/sec will be in effect although a lesser rate of discharge should be sufficient to drain Beartooth Lake in this two-month period. To minimize the effects of runoff back into Beartooth, and to maximize the effects of bank stabilization through freezing, dewatering will be conducted during the months of October and November. This will

[3] Acid/Alkaline Rock Drainage & Geochemical Characterization Program. Norecol, Dames & Moore, 1997.

allow some freezing of newly exposed sediments without the presence of large thicknesses of overlying ice.

Water Diversion & Drainage Management
The flow into Beartooth Lake from Bearclaw Lake will be diverted by means of pumping from Bearclaw to the upper reach of the Beartooth-Panda Stream. By diverting to the stream rather than directly to Upper Panda Lake, any seasonal fish habitat within the stream can be preserved. A small dam structure will be constructed at the outfall of Bearclaw Lake in order to provide emergency storage capacity within Bearclaw Lake and to facilitate placement of water diversion pumps. Pumping from Bearclaw to Upper Panda will be conducted at varying rates in response to natural hydrological conditions in order to maintain a stable water elevation within Bearclaw Lake and natural flow volumes within the Beartooth-Panda Stream and other downstream watercourses. A multi-pump system with a header leading into a single discharge line will be utilized to accommodate the need for increased pumping capacities during the spring freshet.

Based upon a total catchment area for Beartooth and Bearclaw Lakes of 2.18 km^2 (218 ha) and historically high runoff depths of 250mm/year, approximately 560,000 m^3 will require diversion from Bearclaw Lake per year. A peak monthly (freshet) runoff of approximately 200 000m^3 was estimated using these assumptions. Assuming that the maximum daily flowrate is five times as great as the maximum monthly flowrate, a pumping capacity of 1500 Litres/sec will be required to ensure no significant storage occurs within Bearclaw Lake. The optimum pumping configuration will therefore include two 1000 L/s pumps with a third in reserve along with a small submersible pump for use during low flow periods. Pumps would be level controlled to allow for non-continuous operation.

Water draining into the Beartooth Pit will be collected in a sump. The Beartooth sump will be pumped to the Panda/Koala Settlement pond (to be constructed) where it will be pumped on to Cell C of the Long Lake Containment Area via the process plant.

The existing Tailings and Wastewater Management Plan will be updated to include all aspects of water, wastewater, and tailings management associated with development of the Beartooth Pit.

2.1.5 Logistics and Site Infrastructure

A short haul road will connect the Beartooth Pit with the rest of the main Ekati site. No other infrastructure will be constructed at the Beartooth Pit.

Environmental Impacts & Mitigation Strategies

Additional environmental impacts or potential impacts that will be incurred as a result of the development and operation of the Beartooth Pit include:

Table 2-1: Beartooth Pit Environmental Impacts & Mitigations

Potential Impact	***Mitigation Strategy***
- Loss of fish habitat within Beartooth Lake	- Replacement of littoral zone habitat within the exhausted pit. Re-establishment of a viable pit lake upon closure (see Section 2.1.7).
- Poor quality discharge from Beartooth dewatering operation	- Redirection of dewatering discharge to Long Lake Containment Area via process plant with flocculent/coagulant addition as required.
- Entrainment of fish during Bearclaw diversion pumping	- Installation of fish screens on pump intakes
- Erosion at pump discharge points in Beartooth-Panda Stream	- Discharge into concrete baffle boxes to distribute flow energy
- Injury to wildlife due to blasting	- Continue to use and investigate methods for removing and deterring wildlife in blast perimeter.

2.1.7 Reclamation and Fisheries Replacement

Reclamation of the Beartooth Pit and associated infrastructure will be performed in accordance with the existing Abandonment & Restoration Plan. The existing Abandonment & Restoration Plan will be updated to include all aspects of the Beartooth development.

In order to satisfy DFO policy of no net loss to fisheries habitat a productive post-closure pit lake will be developed within Beartooth Pit. Once open pit mining has ceased, the upper walls of the pit will be made stable and the pit will be allowed to flood. Prior to flooding, select areas of the pit lip will be excavated back at a shallow angle thus forming a beach area with the drop off down to the first bench occurring at approximately 5 metres depth in the future pit lake. Granitic waste rock will be end dumped back into the pit to form steep rocky slopes extending from the littoral zone down to the first bench. Within the constructed littoral zone, screened and washed esker material will be used as substrate along with boulders placed strategically to provide wave breaks and refuge areas for smaller fish.

The pit will be allowed to flood by discharging a portion of the Bearclaw discharge into the pit while maintaining a minimum required flow downstream in Beartooth-Panda stream. Groundwater seepage will also serve to re-flood the pit. Based on a reversion of 80% of the annual flow from Bearclaw Lake into Beartooth Pit Lake, and allowing nothing for seepage inputs or evaporation, flooding time will range from 21.5 to 15.5 years depending on relative magnitudes of annual precipitation. Inclusion of 50 000 m^3 of seepage per year would decrease average flooding times by approximately one year.

During the final stages of flooding, the pit lake will be monitored to determine any need for nutrient addition or fish re-stocking. Roads and other infrastructure associated with the pit will be either removed and reclaimed or left in place and reclaimed.

2.2 SABLE PIPE

2.2.1 Location and Environmental Setting

The Sable Kimberlite Pipe is located beneath Sable Lake. Baseline studies conducted by BHP[4],[5] show Sable Lake to be a small, typically oligotrophic lake with a small, isolated fisheries resource. Sable Lake is a headwater lake with a catchment area of approximately 830,000 m^2 and no significant inflow. The outflow from Sable Lake drains eventually to Exeter Lake via several intermediate lakes and ponds as shown on Figure C-1. While Sable Lake lies within the Exeter Lake catchment, it is also very close to the Ursula Lake catchment, making placement of waste rock dumps critical.

The prominent host rock lithologies around the Sable Pipe are two-mica granite and biotite granite. The two-mica granite is comprised of fine- to coarse-grained quartz, K-feldspar and plagioclase. Biotite and muscovite comprise 3% to 15% of the rock. Tourmaline laths up to 0.5 cm x 3.5 cm have been observed in this unit on the property and pegmatitic phases are common. The biotite granite is medium-grained and equigranular. It is comprised of plagioclase feldspar, quartz, biotite ± hornblende and contains occasional trace sulphides. A diabase unit is also present.

2.2.2 Mining Method

Mining of the Sable Pipe will proceed as an open pit development similar to other pipes at Ekati such as Panda and Koala. Following fish-out and dewatering, a sump will be established and till and lake bottom sediments will be excavated. Following the removal of the till and sediments, pit development will commence by standard drill and blast methods.

Pit development is anticipated to proceed to a depth of approximately 360m below grade (el. 135m). The final pit volume at closure will be approximately 66.5 million m^3. The anticipated pit dimensions are shown on Figure C-2.

Mined ore will be trucked via all weather haul road to the existing ore storage area at the Ekati Diamond Mine Process Plant. Waste rock, till and lake sediments will be stored as described below.

2.2.3 Waste Rock and Sediment Management

Waste rock from the Sable Pit will be primarily a two mica granite similar to that found at the Panda Pit. This granite has been shown to be essentially inert with respect to runoff quality and will therefore be stored in waste rock storage areas as shown on Figure C-2. Preliminary static testing has shown the waste rock to have no potential for non-

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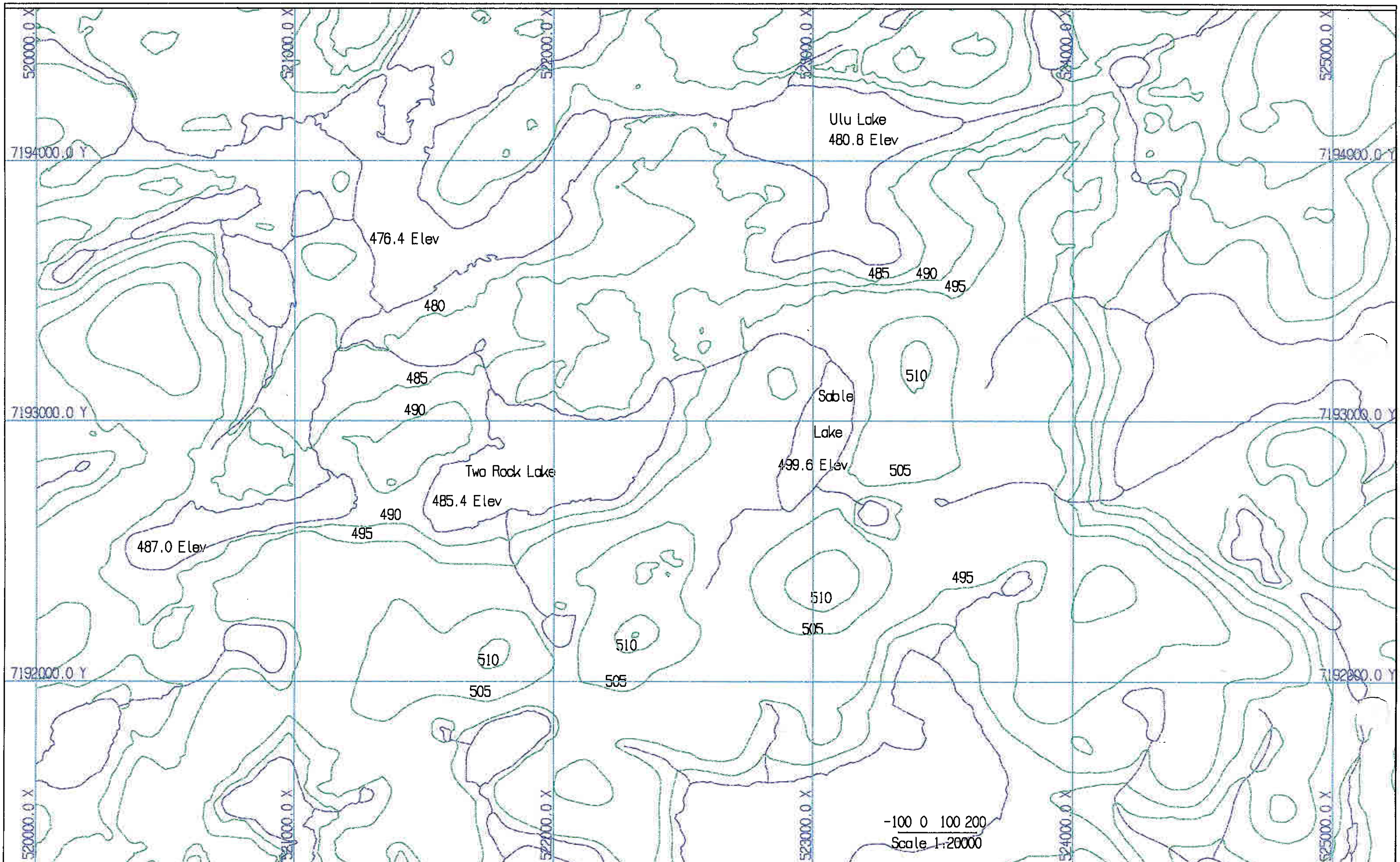
[4] Sable Lake 1996 Environmental Data Report – Primary and Secondary Producers. Rescan Environmental Services Ltd., Sept., 1996.
[5] Sable Lake 1997 Fisheries Resource and Habitat Survey. Rescan Environmental Services Ltd. April, 1998.



BHP Diamonds Inc.
Ekati Diamond Mine
BHP World Minerals
Suite 1102-4920 52nd St.
Yellowknife NT X1A 3T1

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Plan View
Predevelopment Drawing - Sable
Figure B-1
Drawn By: hg

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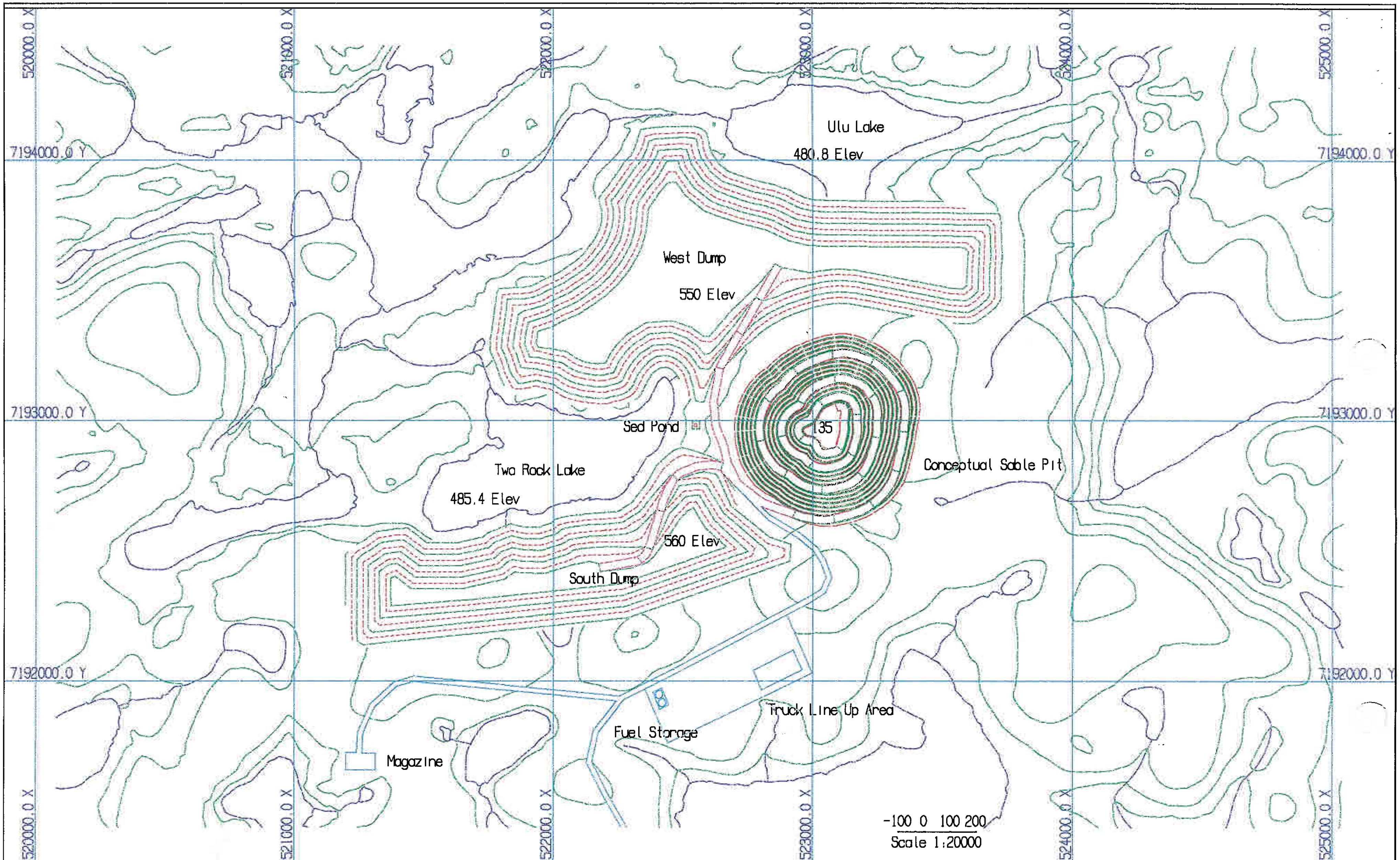

BHP Diamonds Inc.
Ekati Diamond Mine
BHP World Minerals
Suite 1102-4920 52nd St.
Yellowknife NT X1A 3T1

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Plan View
Preliminary Sable Design
Figure B-2
Drawn By: hg

Software by Gemcom Software International

neutral drainage. Some low grade and crater phase kimberlite will also be mixed within the waste rock dumps. Till and lake sediment materials will also be stored within the waste rock dump. Management of the smaller quantities of waste diabase may require special attention if geochemical characterization indicates a potential for acid generation. The current plan for waste rock dump creation calls for the partial filling of the southern half of Ulu Lake. Should the diabase prove to be a potential acid producer it will be disposed of subaqueously within Ulu Lake. During placement of waste rock into Ulu Lake, a system of silt curtains will be erected to minimize transport of suspended solids and sediment to the northern half of Ulu Lake. In addition, following erection of the silt curtain, waste rock placement will proceed from north to south. The placement of an initial dyke of waste rock across the narrows within Ulu Lake will further serve to minimize sediment transport due to placement of waste rock further south.

Approximately 121.8 million tonnes of waste rock and 12.7 million tonnes of kimberlite will be mined from the Sable Pit.

2.2.4 Water Management

Water Use & Wastewater Management

All water used for potable and equipment purposes at the Sable Pit will be hauled from the main Ekati Mine site or collected from the pit sump. Water required for road watering, drilling and other pit operations will be recycled from the pit sump as practical with the remainder being hauled from Ekati. Approximately 2000 litres per day will be used for drilling and other pit operations. All sewage and grey water will be collected at the Sable site and hauled back to the main Ekati site for disposal into the site sewage system.

Dewatering

Access to the top of the kimberlite will be gained by dewatering Sable Lake. Since water quality within Sable Lake is good, dewatering effluent will be discharged into Two-Rock Lake immediately downstream of Sable Lake. The dewatering discharge point will be from a floating pipe within Two-Rock Lake to minimize erosion and to maintain good water quality. Dewatering discharge into Two-Rock Lake will be sampled and analyzed to ensure good water quality.

The total volume of Sable Lake is approximately 393 000 m^3. Drawdown of the lake will be conducted slowly to minimise water quality effects due to slumping of exposed lake bottom sediments. A maximum pumping rate of $0.5m^3/sec$ will be employed, however actual pumping rates should be significantly less. To minimize the effects of runoff back into Sable, and to maximize the effects of bank stabilization through freezing, dewatering will be conducted during the months of October and November and possibly into December. This will allow some freezing of newly exposed sediments without the presence of large thicknesses of overlying ice.

Water Diversions & Drainage Management

Sable Lake is a headwater lake and therefore no significant water diversion will be required.

A sedimentation pond will be constructed downgradient of the Sable Pit to allow collection and settling of pit sump water and any drainage from the constructed waste dump areas that requires collection and settlement prior to discharge. Following sufficient retention within the sedimentation pond, water will be discharged to Two-Rock Lake downstream of the Sable Pit. Water collected within the pit sump will be recycled for road watering and drilling operations as practical. Any remaining pit water will be pumped to the Long Lake Containment Area.

The existing Tailings and Wastewater Management Plan will be updated to include all aspects of water, wastewater, and tailings management associated with development of the Sable Pit.

2.2.5 Logistics & Site Infrastructure

Support facilities at the Sable Pit will consist of a small, independently powered warehouse and field office complex complete with a lunchroom, washrooms, a first aid room and emergency accommodation and supplies. A two bay truck shop, truck ready line and laydown area will be constructed. A fuel storage facility consisting of two 40 000 litre tanks with secondary containment will be located adjacent to the laydown and truck ready line areas. An explosives magazine will be located away from the pit area to house primers, detonators and other blasting supplies. Mine employees will be housed at the permanent Ekati Accommodations site and will be bussed to and from the Sable site each shift. Bulk explosives will be supplied via mobile units from the main Ekati site.

All solid, liquid and sewage wastes will be collected at the Sable site and hauled back to the main Ekati site for proper disposal, treatment or recycling.

2.2.6 Environmental Impacts

Additional environmental impacts or potential impacts that will be incurred as a result of the development and operation of the Sable Pit include:

Table 2-2: Sable Pit Environmental Impacts & Mitigations

Potential Impact	***Mitigation Strategy***
- Loss of fish habitat within Sable and Ulu Lakes.	- Creation of new lake habitat through flooding of Sable Pit, construction of littoral zone, and re-establishment of a viable pit lake upon closure (see Section 2.3.7).
- Acid rock drainage and poor quality runoff from waste diabase.	- Completion of geochemical characterization to define magnitude of problem. - Placement of diabase material below water within Ulu Lake.
- Poor quality pit lake water due to acid generation from diabase and schist left in pit walls.	- Completion of geochemical characterization to define magnitude of problem. - Finalization of pit design and determination of rock types in final walls. - Creation of littoral cut zones within areas of diabase to minimize wall area exposed to atmosphere.
- Injury to wildlife due to blasting	- Continue to use, improve and investigate methods for removing and deterring wildlife

2.2.7 Reclamation & Fisheries Replacement

Reclamation of the Sable Pit and associated infrastructure will be performed in accordance with the existing Abandonment & Restoration Plan. The existing Abandonment & Restoration Plan will be updated to include all aspects of the Sable development.

In order to satisfy DFO policy of no net loss to fisheries habitat a productive post-closure pit lake will be developed within Sable Pit. Once open pit mining has ceased, the upper walls of the pit will be made stable and the pit will be allowed to flood. Prior to flooding, select areas of the pit lip will be excavated back at a shallow angle thus forming a beach area with the drop off down to the first bench occurring at approximately 5 metres depth in the future pit lake. Granitic waste rock will be end dumped back into the pit to form steep rocky slopes extending from the littoral zone down to the first bench. Within the constructed littoral zone, screened and washed esker material will be used as substrate along with boulders placed strategically to provide wave breaks and refuge areas for smaller fish.

The pit will be allowed to flood naturally due to precipitation, runoff, and seepage. Based on a reversion of 100% of the annual runoff and precipitation from the Sable Lake catchment into Sable Pit Lake, and allowing nothing for seepage inputs or evaporation, flooding time will range from 228 to 320 years depending on relative magnitudes of annual precipitation. In order to accelerate the flooding of Sable Pit Lake, consideration should be given to pumping water from other, larger sources, such as Ursula Lake. A modest average annual removal of 0.1 m^3/sec from one or more adjacent water sources would decrease the time required to flood Sable Pit Lake to approximately 20 years.

During the final stages of flooding, the pit lake will be monitored to determine any need for nutrient addition or fish re-stocking. Roads and other infrastructure associated with the pit will be either removed and reclaimed or left in place and reclaimed

2.3 SABLE ROAD

The Sable Road will be constructed to allow all weather access to the Sable Pit. The road will be constructed of till, run of mine and crushed mine rock from development of the Beartooth/Koala/Panda Pipes. The waste rock used will be non-acid generating two mica granite similar to that found at the Panda Pit.

The road will run between the north end of the Long Lake Containment Area and the Sable Pit for a length of approximately 19 km. The proposed route for the Sable Road is shown on Figure C[6]. The road bypasses the Exeter and Ursula eskers before reaching the Sable area.

The road will be kept as low as practical in order to minimize the construction of safety berms and therefore minimize impediments to caribou migration across the road. In areas of significant caribou movement, side slopes of the road will be flattened to allow easier passage across and to increase visibility for equipment operators. Culverts will be used where necessary to ensure that water continues to flow through the roadway in an unimpeded fashion.

[6] Eskers are highlighted on figure C.

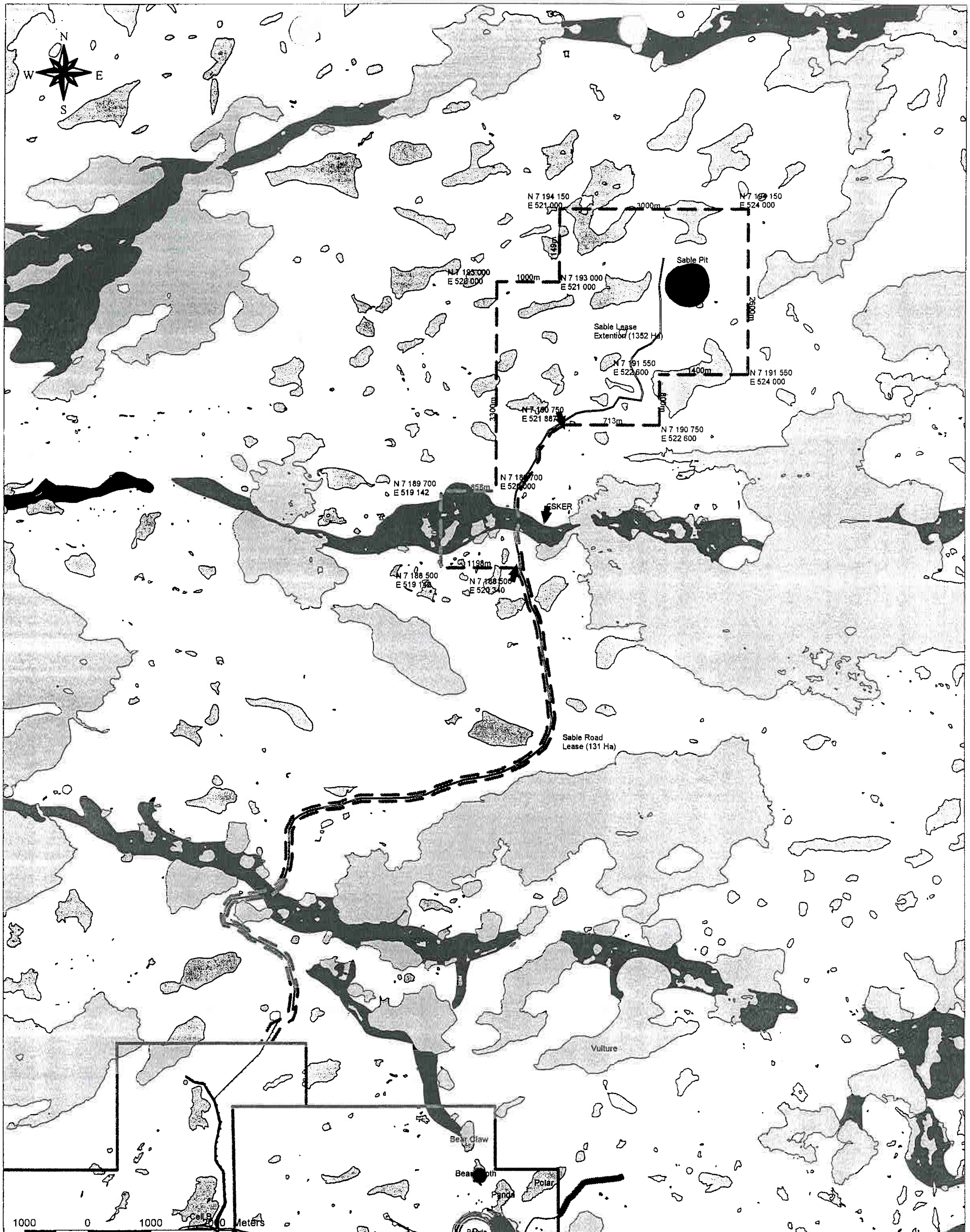

Figure C. Proposed Location of Sable Pit and Sable Road

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2.4 URSULA GRANULAR QUARRY

Granular material will be needed for road construction and for laydown pads and berms at the Sable pit. It is estimated that 200,000 m^3 of granular material will be needed during the development, mining and reclamation phases. While the base of the roads will consist of run-of-mine granite obtained in prestripping the pits, the top dressing will be granular material mixed with crushed granite to form a smooth, stable surface for traffic.

Eskers in the Ekati and Misery areas have been found to have massive ground ice and a geotechnical program is planned for that portion of the Ursula esker included in the land lease amendment. The area where granular material will be extracted will be kept as small as possible avoiding massive ground ice where possible. Standing water bodies will also be avoided and the drainage of the same will not be impeded.

A quarry management plan for the Ursula Esker will be developed using the Environmental Guidelines for Pits and Quarries (1994) as a guide for the design and operation of the quarry. The ultimate objective of this quarry management plan is to localise and minimise environmental disruption by maximising the resource, drainage and ground ice management and creating stable final landforms especially stream channels. This plan will be completed and submitted to government before any granular material is extracted.

2.5 PROJECT SCHEDULE

The current mine plan is summarized below in Table 2-3.

Table 2-3: Current Mining Plan

	Prestripping	Mining	Completion
Panda	1997	1998	2003
Panda U/G	1999	2003	2008
Koala	2000	2003	2007
Koala U/G	2005	2008	2013
Misery	1999	2000	2013
Fox	2005	2009	2013
Sable	2004	2005	2012
Koala North	2001	2001	2002
Beartooth	2004	2005	2008

Figure D-1 shows an approximate time frame for critical development and pre-development and post-development (closure) activities.

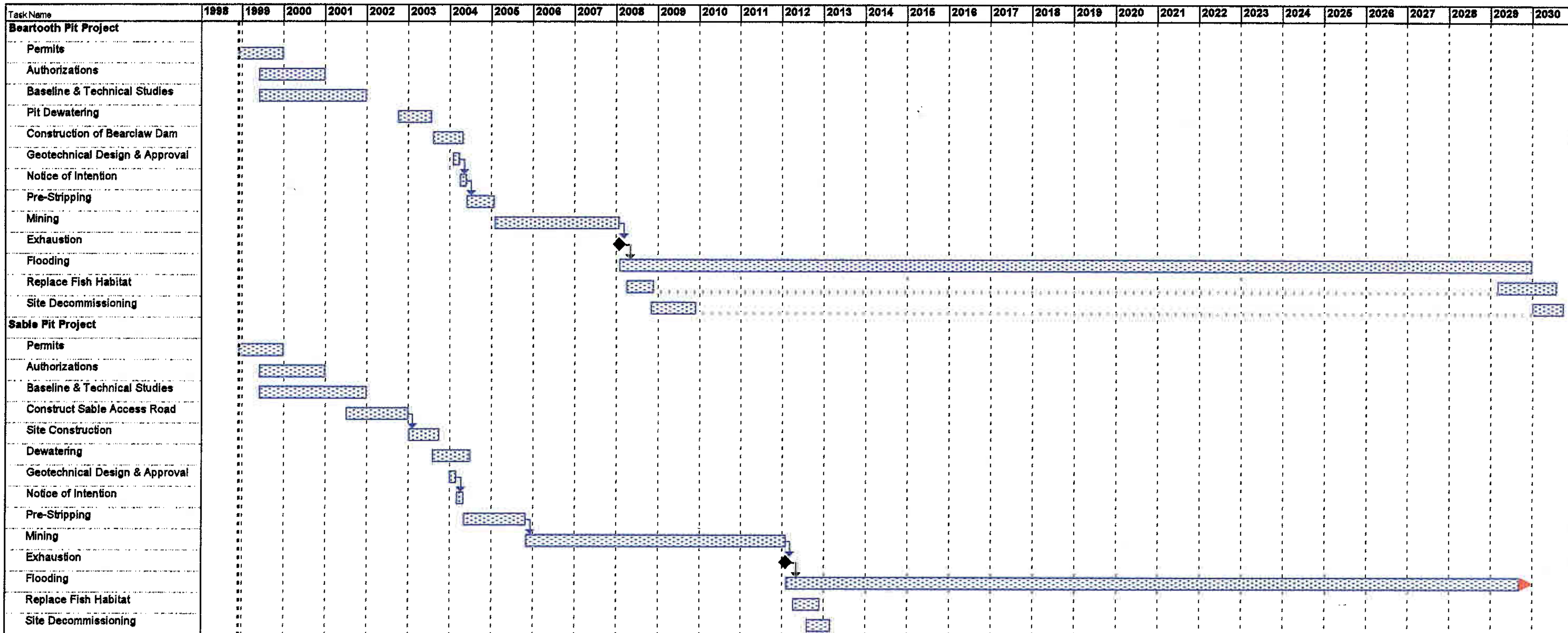

FIGURE D-1: PROJECT TIMELINES

3. ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

Since the development of Beartooth and Sable Pipes will use standard mining and waste rock management methods, no previously undescribed potential environmental impacts are presented by this development. All of the following impact mechanisms have been previously described and discussed at length during the 1995 Environmental Review Process for the NWT Diamonds Project.

Existing Aquatic and Wildlife Effects Monitoring Programs will be updated to include all aspects of the development of Beartooth and Sable Pits. Other monitoring programs such as the Air Quality Monitoring Program will also be updated to include these proposed developments.

All instruments of environmental management currently in use at Ekati will be updated to include all aspects of the proposed developments.

3.1 DEWATERING IMPACTS

As a lake is dewatered, the newly exposed lake bottom sediments may become physically unstable and slump down into the remaining lake water. This typically causes increased turbidity and total suspended solids within the lake that is being dewatered. To avoid this, several actions will be taken. They include:

- *Gradual Dewatering:* By dewatering slowly, the exposed lake bottom sediments have a greater time with which to drain, thereby increasing their physical stability.
- *Dewatering During Optimum Season:* By dewatering during periods of low precipitation, the exposed lake bottom sediments have a greater ability to drain themselves. If dewatering is timed properly, sediments will be exposed during the late fall and will experience some freezing in place.
- *Chemical Stabilization:* The use of a sedimentation pond with addition of flocculent and coagulants could become necessary if suspended solids become too high for discharge downstream. Alternatively, the lake itself could be batch treated during dewatering.
- *Monitoring:* To ensure that poor quality water is not discharged, the water in the lake being dewatered will be regularly sampled and monitored for parameters regulated within existing Water License N7L2-1616.

If the dewatering discharge point is improperly chosen, erosion may occur at the receiving water body. The erosion may cause increases in suspended solids and sedimentation effects within the receiving water body and may ultimately result in the destruction of habitat. To avoid this the dewatering discharge points will, in the case of discharge to a lake, be placed away from any erodeable shoreline or into the lake proper. In the case of discharge to a stream, coarse waste rock or a constructed multi-port discharge box will be used with the idea of absorbing the kinetic energy of the discharge water and allowing introduction of discharge water into the streambed from a number of ports, thus reducing the chances of erosion. Dewatering discharge points will be regularly inspected during operation to ensure that unacceptable erosion is not occurring.

3.2 IMPACTS DUE TO DISCHARGE OF PIT WATER

Water that collects in the sump at the floor of an open pit can be very turbid and may contain higher than desirable concentrations of blasting residues (ammonia). Surrounding water bodies could be impacted if the pit sump water is pumped directly into them.

To avoid this, pit sump water will be pumped either to the Long Lake Containment Area or into a sedimentation pond prior to release to the environment. The Sable sedimentation pond will be constructed so that sufficient retention time is available to allow settling of suspended solids and oxidation of nitrogen compounds such as ammonia. The outflow of the sedimentation pond will be monitored for regulated parameters to ensure that poor quality water is not released to the environment.

3.3 IMPACTS DUE TO RUNOFF FROM WASTE ROCK STORAGE AREAS

Waste rock, till, and lake bottom sediments stored in constructed waste dumps may leach metals into runoff water which may impact adjacent water bodies. Sulphide minerals in the waste rock may oxidize and cause acid rock drainage.

The majority of waste rock produced at Beartooth and Sable Pits will be a two mica granite that is typical of the Koala area. The granite contains very little sulphide content. Static and dynamic acid-base accounting (ABA) tests have shown the granite does not produce acid runoff and does not leach excessive concentrations of metals. These predictions have been confirmed, at a preliminary level, by sampling of seepages from granitic waste rock excavated from the Panda Pit.

Diabase dikes and metasediments may contain sufficient sulphides to have the potential to produce acidic runoff with higher metal concentrations. Diabase is found at Sable Pipe. These waste rocks have not been tested using acid-base accounting procedures. Testing will be done in advance of any development and any potentially acid generating waste rock will receive special handling to minimize acid production. Potential mitigation measures include the subaqueous disposal of PAG waste rock within the southern portion of Ulu Lake.

3.4 IMPACT TO WILDLIFE TRAVEL DUE TO SABLE ROAD

The presence of the Sable Road may act as a barrier to caribou migration and may increase the risk of collisions between animals and vehicles.

Roads that are constructed over low ground are often high and therefore require safety berms to prevent trucks running off the edge. These berms will act as an impediment to animals (especially caribou) trying to cross the road. To minimize this effect roads will be built as low as possible so that a minimal amount of berms are required. Also in areas of high caribou traffic (i.e.: natural topographical choke points, crossings, etc.) the side slopes of the road will be flattened to allow easier crossing and greater visibility for drivers. Drivers will follow the procedures for approaching wildlife outlined in the Operating Environmental Management Plan.

3.5 IMPACTS DUE TO ROAD AND OTHER CONSTRUCTION

During the construction of roads and yard areas, the placement of large quantities of crushed rock close to water bodies may cause an increase in suspended sediments in the runoff. The sediment load in the runoff may cause unwanted sedimentation in adjacent lakes and streams.

Road development and the preparation of sites for construction work invariably causes disturbance to vegetation and an increase in runoff sediment load, most of which is contained immediately adjacent to the roadway. These impacts are expected to be short term and will cease once construction of roads and yards has been completed and rock fill has stabilized. In-stream construction activities (primarily culvert placement) will cause the temporary release of sediment only while construction is underway.

Sedimentation associated with culvert placements in the Panda Diversion Channel and construction of existing site roads and yards has not appeared to have had any significant impacts on adjacent or downstream water bodies.

3.6 IMPACTS TO FISH HABITAT DUE TO DEWATERING AND PIT DEVELOPMENT

The dewatering of Sable and Beartooth Lakes and the development of open pits will destroy existing fish habitat.

Existing fish habitat within Sable and Beartooth Lakes will be removed during development and operation of the Sable and Beartooth Pits. Once no longer in operation the pits will be allowed to flood with natural surface runoff, precipitation and groundwater seepage. Selected areas of the uppermost portions of the pit will be graded and cut back to form a gently sloping lip that, once flooded, will provide a shallow littoral habitat zone. Coarse waste rock will also be introduced into the constructed littoral zone and onto upper benches to increase the availability of hiding and spawning areas, and to promote the retention of sediments. Once flooded, the pit lake would be repopulated either by natural migration of fish from upstream or downstream lakes or by restocking using fish captured from adjacent lakes and replaced in proportion to what was present during original baseline studies. During flooding the pit lakes would be monitored to determine any need to supply nutrients.

3.7 CUMULATIVE ENVIRONMENTAL EFFECTS

The cumulative effects of the Ekati Diamond Mine and the Diavik Project have been evaluated by Diavik in their Environmental Impact Statement that is currently under review. Diavik's work has focussed on the cumulative effects on Lac de Gras.

The effect of adding the small Beartooth Pit to Ekati will have little effect on the Koala Lake drainage basin and an unmeasureable effect on Lac de Gras. Beartooth is a small pit that is close to the existing Panda Pit. The Beartooth Pit will not introduce any measurable loadings to existing watercourses and the diversion of water around Beartooth will preserve surface water flows. Waste rock from Beartooth will be stored in existing facilities and processing of ore from Beartooth will be undertaken at the existing process plant. No additional infrastructure (i.e.: sewage treatment or potable water supplies) will be required for Beartooth. Regardless of whether Beartooth Pit is developed, BHP Diamonds remains committed to maintaining water quality within Slipper Lake outflow to Lac de Gras that betters our compliance limits and will have no impact on Lac de Gras. However, mitigation measures described above will allow the Long Lake Containment Area to operate at its design performance level, and will not result in any additional loadings in the eventual effluent.

Sable Pit will be located within the catchment basin for Exeter Lake. Therefore Sable will not have any cumulative effects on the Lac de Gras basin.

The cumulative effects from the Sable pipe on Exeter Lake will be minimal if not unmeasureable. Drainage from Sable must first drain through a chain of 7 small lakes prior to reaching Exeter some 13 km to the west. The only other source of environmental burden on Exeter Lake is BHP's Norm's Camp. Norm's camp is a small (20 person) exploration camp that operates seasonally (June – September). Norm's camp does not have any waste or sewage disposal facilities as all wastes are transported back to Ekati.

4. STUDIES UNDERTAKEN TO DATE

The following technical studies have been completed for the areas containing Beartooth Lake Sable Lake, the Sable Road and Ursula Granular Quarry:

NWT Diamonds Project Environmental Impact Statement. BHP Minerals Ltd. 1995.

Bird Inventory and Habitat Assessment – 1995 Baseline Update. Rescan Environmental Services Ltd. December 1995.

Eskers Carnivores and Dens – 1995 Baseline Study Update. Rescan Environmental Services Ltd. December 1995.

Small Mammals Inventory and Habitat Assessment – 1995 Baseline Study Update. Rescan Environmental Services Ltd. December 1995.

BHP Diamonds Inc. Environmental Baseline Assessment: Beartooth and Bearclaw Lakes, Northwest Territories, Canada. Bryant Environmental Consultants Ltd. December 1996.

Beartooth Lake 1997 Fisheries Resource and Habitat Survey. Rescan Environmental Services Ltd. November 1997.

1996 - Archaeological Investigations for BHP Diamonds Inc. Points West Heritage. 1996.

Archaeological Investigations for BHP Diamonds Inc. Ekati Diamond Mine, North-west Territories, 1997. Points West Heritage. 1997.

Sable Lake 1996 Environmental Data Report – Primary and Secondary Producers. Rescan Environmental Services Ltd. September 1996.

Sable Lake 1997 Fisheries Resource and Habitat Survey. Rescan Environmental Services Ltd. April 1998.