BHP DIAMONDS INC.

CONCEPTUAL STRATEGIES FOR NO NET LOSS OF FISH HABITAT AT THE EKATI MINE

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Reef structures can be created in large lakes using blast rock. Lake areas with steep gradients or deep basins will be selected for enhancement. Steep gradient shores provide limited amounts of the essential habitat components. Deep basin habitat, which provides overwintering for juvenile and adult fishes, is abundant and not generally considered a limiting habitat. Blast-rock will be end-dumped in the lake from the shore or directly into the basin from the ice surface. Crushed rock will then be applied over the blast-rock to provide a substrate for benthos and fish spawning. Enhanced shorelines will have a low gradient and an increased area of lake bottom within the preferred depth ranges of the benthic community, immature fish, and spawning fishes. The application of this option will provide newly created rearing and spawning habitat, thereby reducing the limiting effect of these components and increasing the productivity of the fish community.

2.2 Re-Establishing Pit Lakes

The majority of the kimberlite pipes targeted for development at the EKATI™ Mine are situated below lakes. Therefore, in order to mine the kimberlite in these pipes, the lakes must first be dewatered (BHP 1995). Open pit mining is used to then extract the kimberlite ore. This method involves the removal of overburden and sediments to expose the kimberlite ore body. As the ore is removed from the centre of the pit, an access ramp is constructed, allowing haul trucks access to the ore body. The end result is a deep pit with the shape of an inverted cone. Within the pit is a bench spiraling up the inside periphery.

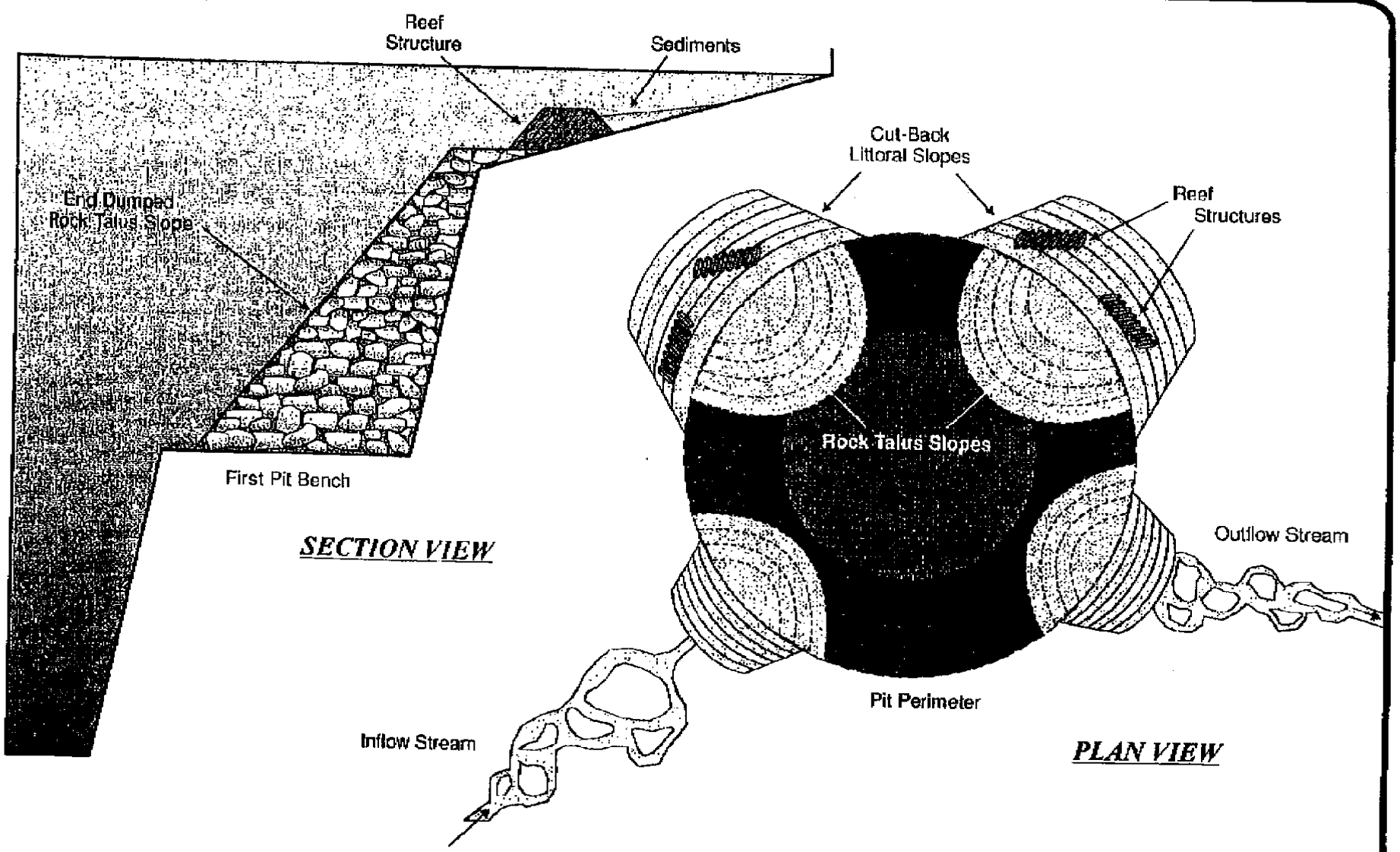
When a pit is mined out, the reclamation phase is initiated. Under the current plan, all structures, and equipment will be removed from the pit. The pit will then be allowed to fill with water through natural inflows. Eventually, a large, circular, deep lake will be established. If viable stream connections exist with other waterbodies, fish communities will re-establish in the lakes. Re-establishing lakes in mined-out pits as a No Net Loss strategy is envisioned not as compensation for the original lake but as replacement habitat for dewatering of future lakes. Therefore there will be little if any time lag between habitat loss and replacement.

The re-establishment of lakes depends largely upon natural processes to refill the lake with water, establish algal and invertebrate communities, and to provide immigration of fish species. Left to these natural processes, the establishment of viable lakes within the mined-out pits could require decades to complete. By

pumping or siphoning water from nearby lakes and implementing a more pro-active and artificially controlled reclamation plan, fully viable lakes can be developed within mined-out pits in a considerably shorter time span.

To re-create lakes and therefore habitat to replace habitat lost during the mining of other kimberlite pipes, the pits will be modified to provide the essential habitat components required to support fish communities. This will be achieved by first modifying the pits to provide essential habitat components, then an assisted refill of the lakes, and finally, re-stocking of the lake with fishes.

When mining has been completed in a pit, structures and equipment are removed. Next, the near-surface pit access ramp will be modified to provide a littoral zone by placing broken rocks and crushed rock as rearing habitat (Figure 2-1). Additional littoral areas will be created by constructing bays around the periphery of the pit. Graded shorelines will be created by drill and blast of the high wall onto the upper benches. This will provide both increased littoral areas as well as quiet water areas for the deposition of fines. Once the spawning, rearing, and adult feeding habitat components have been constructed, the pit will be filled with water drawn from a large, nearby lake. Using lake water to fill the pits will ensure that the lake is seeded with the necessary primary and secondary producers of a lake ecosystem. The pit will be filled in a controlled manner over a number of years to minimize effects on the source lake. Lake water will be drawn throughout the open water season to ensure that all seasonally abundant primary and secondary producers will be represented during the seeding of the lake. This will ensure that a natural succession of seasonal primary and secondary producers is established in the lake. Fish stocks will be introduced into the lake once acceptable water quality conditions have been achieved. Large fishes, such as Arctic grayling (*Thymallus arcticus*), lake trout, and round whitefish (*Prosopium cylindraceum*), will be stocked either by using fry hatched from egg and milt harvests from nearby lakes, or by transferring juvenile fish. Smaller fish species such as slimy sculpin (*Cottus cognatus*) will be stocked using immature and adult fishes captured in nearby lakes. A monitoring program will be initiated during the refill stage and will be continued until there is evidence that a fish community has been established.



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Conceptual Fish Habitat in Rehabilitated Pit Lake

FIGURE 2-1

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Each pit will provide a different opportunity to create habitat. Most pits will require the complete destruction of a lake, some partial, others will be developed without affecting any fish habitat. However, in all cases, because of the size of the pits that will remain, habitat can be created within these pit lakes that would exceed the original habitat removed. Depending upon the economics and opportunities, some pits may be filled with processed kimberlite. The potential exists to create lakes with more habitat available to support robust fish communities. Three options are available for re-establishing lakes in the mine-out pits.

2.2.1 No-Fill

Mined-out pits which are too distant from the processing plant to allow processed kimberlite placement can be enhanced to provide fish habitat. Because a significant area of the lake bottom will be in the aphotic profundal zone (deep areas with little to no light penetration), the resulting lakes will provide the lowest habitat per volume of the post-reclamation pit lakes. However, because these pit lakes will be many times the size of the original lakes, there is still a potential to create more habitat than had previously existed in the original lake.

No-fill pit lakes will be very deep, containing large volumes of water (Figure 2-2). Habitat components required for the maintenance of a healthy fish community will be limited to those which can be constructed on the upper benches and around the pit edge. The benches will be modified through grading and features will be constructed before the pit is filled with water.

There are a number of advantages to creating fish habitat in mined-out pits. The first advantage is that because these lakes will be much larger and deeper than the original lakes, the hydraulic residence time will be many times greater. The effect of this is that these lakes can act as sinks for sediment and/or metals that may cascade down the watershed. This characteristic will also allow the lake water quality to stabilize more quickly during the re-establishment of a lake. Another advantage to this method is that there are low construction costs. All areas of construction in the lake will already be accessible to machinery. Also, few materials will need to be trucked in. With the exception of crushed rock for

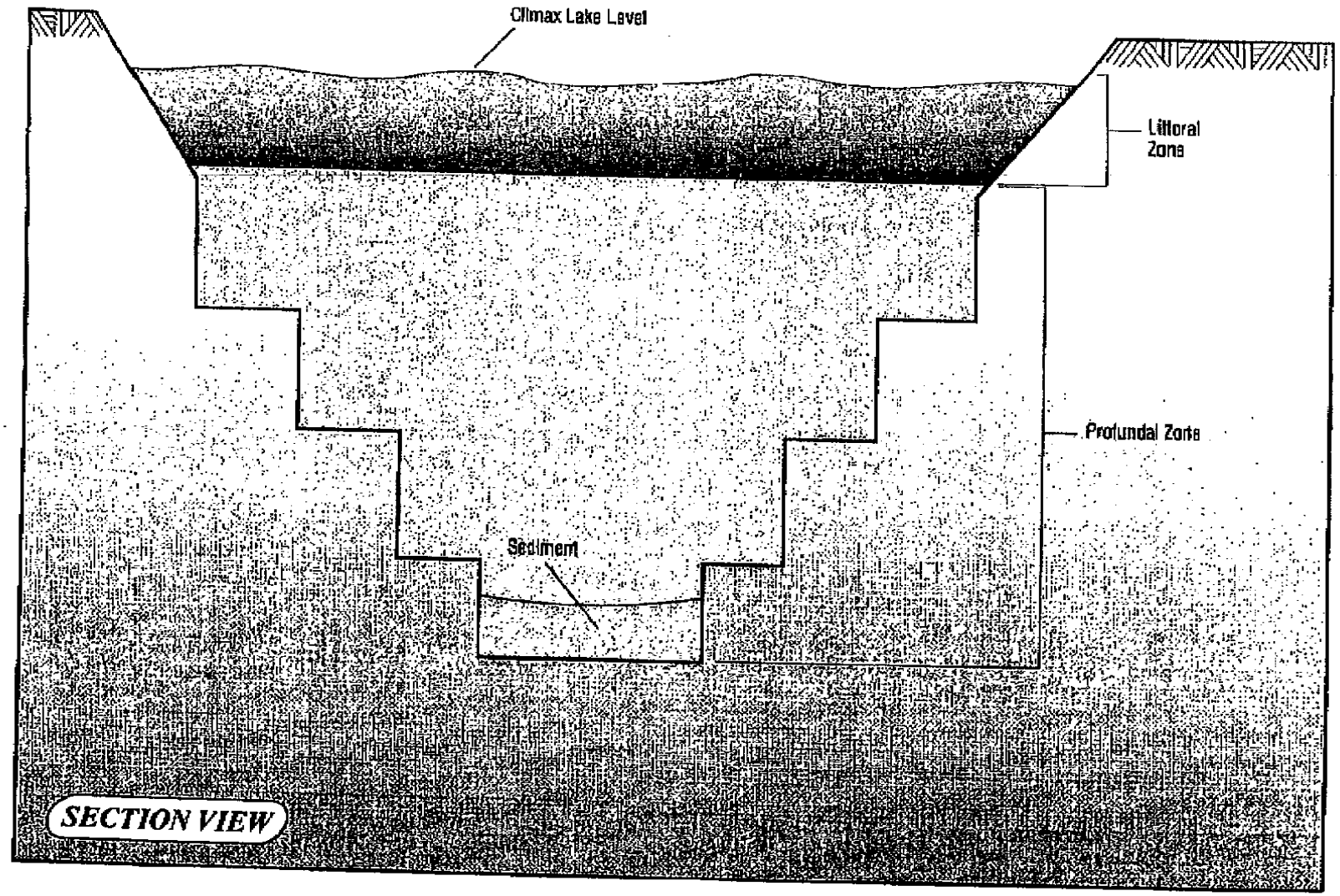

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FIGURE 2-2

Conceptual Pit Lake: No Fill

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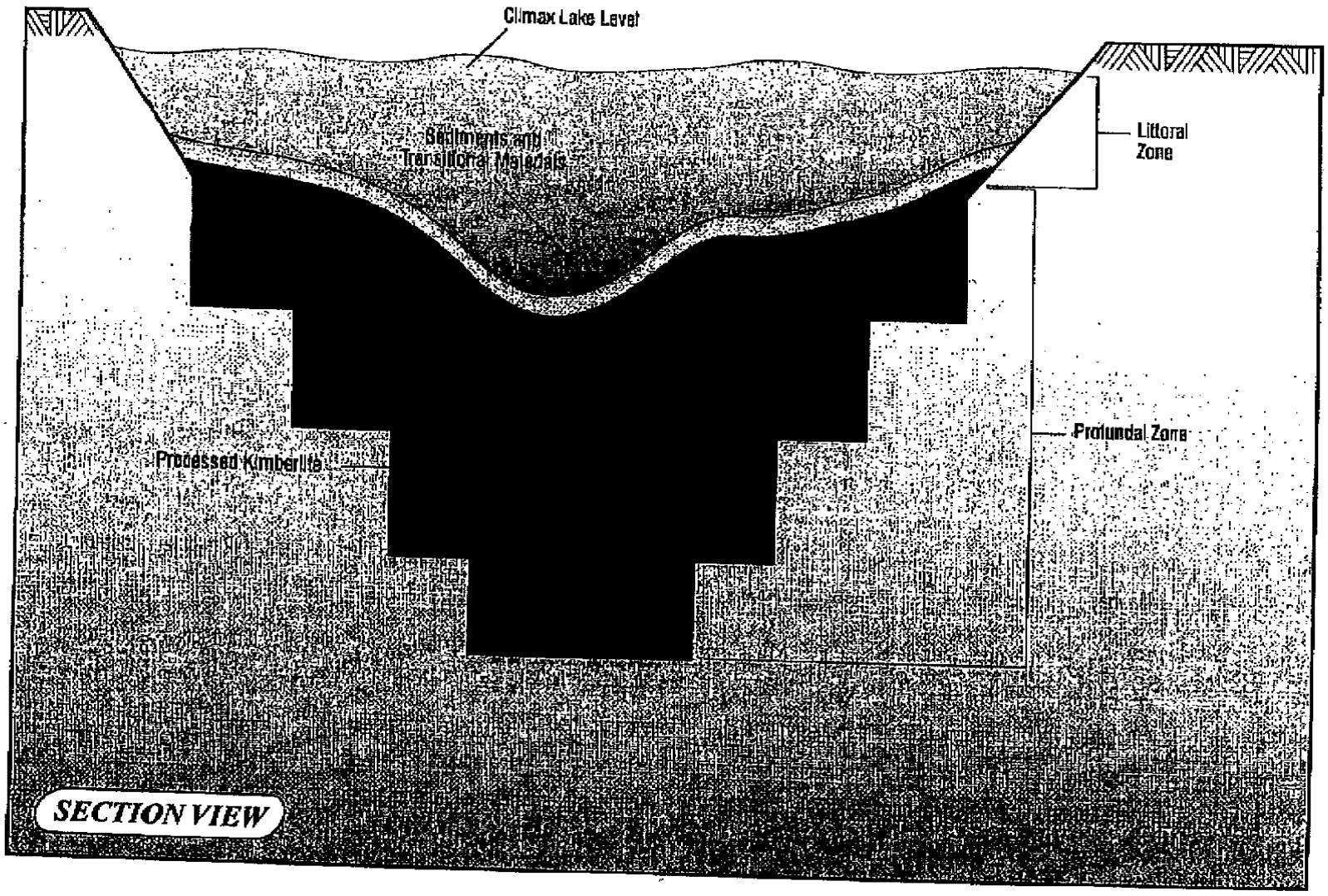
spawning habitat, all rock used in the construction of habitat components will be moved down slope from the pit walls. The third advantage is that there are only temporary or minimal effects on existing fish habitat. By creating habitat in an already disturbed area, no undisturbed habitat need be affected by material acquisition or habitat construction. The re-establishment of stream connections would typically be expected to provide only minor and temporary disturbances.

Possible impacts of re-establishing lakes in mined-out pits will be mitigated through planning and by obtaining and applying baseline data in adjacent watersheds. For lakes which will be used as a source of refill water, hydrology information will be collected. PVC pipes used to siphon or pump water from source lakes are light and easily moved. These pipes will be laid down either in the winter or during the summer using a helicopter. This will have minimal to no impact on the land. Baseline hydrology data collected for source lakes will be used to determine safe volumes for water removal. In order to further mitigate effects, the source lakes will be monitored during the water removal. This will ensure that the rate of removal can be adjusted to any natural fluctuations in the source lake levels. The pits would be refilled over several years, annually removing only an appropriate proportion of the source lake volume to further minimize lake level fluctuations. Curtailing water removal prior to the fall spawning season would prevent effects on fish spawning and the overwintering of eggs.

Mined-out pit lakes will likely be ultra-oligotrophic. These lakes will likely have similar productivity to the original lakes. Typical kimberlite lakes are deeper with less littoral zone than other lakes (Rescan 1997). However, the pit lakes will be much larger in area and volume than the original lakes. Because these lakes will have a longer hydraulic retention time, they will act as more effective sinks for sediments, metals, and/or nutrients.

2.2.2 Processed Kimberlite Fill

Mined-out pits located near to the processing facility can be used for processed kimberlite placement. This has the added advantage of extending the life of the Long Lake processed kimberlite containment area. Once a pit is mined-out, processed kimberlite can be placed into the pit (Figure 2-3). Because the



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Conceptual Pit Lake: Processed Kimberlite Fill

FIGURE 2-3

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kimberlite is deposited in a slurry, settling kimberlite will create a pond above the rapidly settling kimberlite. Clean water will then be removed from above the settled kimberlite fill. This process will continue until the pit has reached its planned capacity for kimberlite. Before the capacity is reached, habitat components will be constructed on the benches and bays will be constructed around the perimeter of the pit. As the processed kimberlite in the pit consolidates, a natural profundal lake basin will be formed. When water quality parameters meet NWT Water Board requirements for discharge, additional water, if necessary, will be added either by pumping or natural inflows, and the fish community will be restocked.

There are a number of advantages to this approach. First, this will provide a safe and secure method for the placement of processed kimberlite. The processed kimberlite will lie below the wave zone. With time, incoming "natural" sediments and organic detritus will cover the kimberlite, thereby further ensuring that the kimberlite remains in the basin of the lake, unaffected by seasonal mixing of the lake. Another advantage is that by partially filling the pit with processed kimberlite, the volume of the resulting lake will be much less than a No-Fill pit lake. Therefore, the hydraulic retention time will be greatly reduced and more characteristic of other lakes in the region. This will serve to reduce the nutrient sink effects of such a lake.

Very little water will be required to complete the top-up of the pit lake. As before, possible impacts will be mitigated through planning and by collecting and applying baseline data from adjacent watersheds. Siphon or pump lines will be laid down either in the winter or during the summer using a helicopter. Baseline and monitoring hydrology data will be collected from source lakes to determine safe volumes for removal and to adjust removal volumes to account for any natural fluctuations in the source lake levels. The pit refill may be conducted over several years to minimize source lake level fluctuations.

2.3 Habitat Enhancement in Existing Lakes

The lakes of the Ekati Mine claim block have a wide range of morphometry. That is, these lakes vary greatly in area, volume, depth, shape, and substrate. This results in a great variability in the habitat present among lakes of similar size. Therefore lake productivity and fish communities also vary greatly among lakes.