DOMINION DIAMOND

New Vision, New Focus, New Name

Wastewater and Processed Kimberlite Management Plan Version 4.1

May 2014

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DOMINION DIAMOND

May 22, 2014

Ms. Violet Camsell-Blondin
Chair
Wek'èezhìi Land and Water Board
#1, 4905-48th Street
Yellowknife, NT, CA X1A 2P6

Dear Ms. Camsell-Blondin:

RE: Ekati Diamond Mine Wastewater and Processed Kimberlite Management Plan

Dominion Diamond Ekati Corporation (DDEC) is pleased to provide the Wastewater and Processed Kimberlite Management Plan Version 4.1. This Plan is an update of Version 4.0 that was submitted to the Wek'èezhìi Land and Water Board (Board) in December 2014. The updated Version 4.1 was requested by the Board in the April 16 decision letter.

This report is submitted under the current Water Licence W2012L2-0001 Part H Item 1 regarding the Wastewater and Processed Kimberlite Management Plan. As specified in the Water Licence an updated version of the Wastewater and Processed Kimberlite Management Plan is to be submitted to the Board 60 days in advance of construction at the Pigeon Pit for Board approval.

DDEC has included a conformity table in Section 1.4 Summary of Changes as request and outlines the updates and inclusions based on the Board letter on April 16, 2014. DDEC has updated the format of Version 4.1 including maps and figures.

Major updates to Version 4.1 include the improved clarity and information for the Pigeon Pit Development location and the management of surface water, in-pit water, run-off and seepage in Sections 2.1.6, 2.1.7 and 2.2.5.

DDEC trusts that you will find the revisions acceptable and informative. Please contact the undersigned at claudine.lee@ekati.ddcorp.ca or 867-880-2232 should you have any questions.

Sincerely,

Claudine Lee, M.Sc. P.Geol.
Superintendent – Environment Operations

Distribution List:
- Bill Ross – Independent Monitoring Agency
- Marty Sanderson – Inspector, GNWT Lands Department
- Lisa Lowman – Environment Canada
- Joel Holder – Government of Northwest Territories
- Veronique D'Amours-Gauthie – Department of Fisheries and Oceans

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1 Introduction

1.1 Corporate Statement

On April 10, 2013, Dominion Diamond Corporation (the “Company”) acquired from BHP Billiton Canada Inc. (and its various affiliates), all of BHP Billiton’s diamond assets, including BHP Billiton’s controlling interest in the Ekati Diamond Mine as well as the associated diamond sorting and sales facilities in Yellowknife, Northwest Territories and Antwerp, Belgium. The Ekati Diamond Mine consists of the Core Zone, which includes the current operating mine and other permitted kimberlite pipes, as well as the Buffer Zone, an adjacent area hosting kimberlite pipes having both development and exploration potential. As of the closing of the transaction, the Company acquired BHP Billiton’s 80% interest in the Core Zone and 58.8% interest in the Buffer Zone, with the remaining interests held by other joint venture parties. The Company’s indirect wholly-owned subsidiary, Dominion Diamond Ekati Corporation, is the current operator of the Ekati Diamond Mine.

Dominion Diamond Corporation has assumed all of the Environmental Obligations and Agreements including the Water Licences for which this Management Plan would apply

1.2 Preface

A Wastewater and Processed Kimberlite Management Plan (Plan) is a requirement of the Type ‘A’ Water Licence (WL) currently held by Dominion Diamond Ekati Corporation (DDEC), the operator of the Ekati Diamond Mine. The Wastewater and Processed Kimberlite Management Plan is intended to ensure that wastewater and processed kimberlite are properly managed, stored and disposed of at the Ekati Diamond Mine. Water Licence W2012L2-0001 was issued by the Wek’èezhìi Land and Water Board (Board) and is in effect between July 30, 2013 and August 18, 2021. This Water Licence is a renewal of MV2009L2-0001.

The scope of WL #W2012L2-0001 is described in Part A, Item 1(a) as (quote):

This Licence entitles the Licencee to divert water from Upper Panda Lake to Kodiak Lake, and to use water and dispose of Waste for the purpose of mining the Panda, Koala, Koala North, Misery and Fox kimberlite pipes and for operating the processing facilities and infrastructure associate, and carrying out Reclamation associated with diamond mining within the Koala, Misery, King-Cujo and Desperation-Carrie Watersheds of the Lac de Gras basin, Northwest Territories.

This Licence also entitles the Licencee to use water, Dewater Sable, Pigeon, and Beartooth Lakes for the purpose of mining, to Drawdown Two Rock Lake, divert Pigeon Stream around the Pigeon Pit, pipe water from Bearclaw Lake outflow around Beartooth pit, deposit Processed Kimberlite into the Beartooth pit for the purpose of creating a pit lake, and dispose of Waste for industrial undertakings in diamond mining and processing, production, Reclamation and associated uses in the Koala, Pigeon and Sable watersheds, Northwest Territories as shown on Figure 6, 8 & 10 of the Class A Water Licence and Land Use Permits supporting documents, submitted August 21, 2001.

The activities listed above are to be conducted as described in the Environmental Impact Assessment.

Water Licence W2012L2-0001 enables the Wastewater and Processed Kimberlite Management Plan to cover the entire Ekati Diamond Mine. Version 4.0 of the Plan was submitted the WLWB on December 16, 2013. On April 16, 2014 the WLWB requested that DDEC submit Version 4.1.

The Wastewater and Processed Kimberlite Management Plan describes the placement of Fine Processed Kimberlite (FPK) within designated Containment Facilities, and describes site-wide waste water management. The intent is to provide a performance-based management plan that provides a level of detail appropriate to this purpose. Water quality and adaptive management strategies are described in other documents (i.e. *Aquatic Effects Monitoring Program, Environmental Impact Report, Annual Water Licence Report*).

The requirements for the Wastewater and Processed Kimberlite Management Plan (Plan) are defined in Part H, Item 3 and Schedule 6, Item 1 of Water Licence W2012L2-0001 and listed below (quote). The specific requirements of the Water Licence are also summarized in Appendix A along with their corresponding reference to this Plan. The term "Waste" is defined in the Water Licence and the definition is presented in Appendix C.

Part H, Item 3

1) Wastewater and Processed Kimberlite Management Plan

a. The Plan shall be in accordance with the detailed guidance referred to in Schedule 6, Item 1.

b. Sixty days prior to Construction of each of the Sable and Pigeon pits, the Licensee shall submit an updated Wastewater and Processed Kimberlite Management Plan to the Board for approval

Schedule 6, Item 1

1) Wastewater and Processed Kimberlite Management Plan

ARD Characterization

a. Representative sampling and testing of Processed Kimberlite;

b. A description of the process to be used to regularly assess and review the plans based on ongoing data collection through this program or through the attached Surveillance Network Program, the Aquatic Effects Monitoring Program, Seepage Surveys, or other environmental monitoring programs;

Wastewater and Processed Kimberlite Management

c. A comprehensive description of all sources and types of Waste related to the Project where not provided in the Waste Rock and Ore Storage Management Plan as approved by the Board;

d. A description of any proposed physical of chemical treatment of Waste prior to Discharge to the Long Lake Containment Facility, the King Pond Settling Facility, *the Phase 1 Tailings Containment Area, Two Rock Sedimentation Pond, or the Receiving Environment;*

e. *A description, including maps to scale, of the location of monitoring station for ground temperature, water quality, water Discharge and Processed Kimberlite elevation, including the sampling protocols and frequency to be undertaking at each station;*
f. *A schedule of Processed Kimberlite Discharge within the Long Lake Containment Facility over the term of the Licence, including detailed maps showing deposition locations;*
g. *Capacity status and projected life expectancy of the Processed Kimberlite deposition locations and Two Rock Sedimentation Pond;*
h. *An anticipated schedule of volumes of Discharge to and from the Two Rock Sedimentation Pond and King Pond Settling Facility;*
i. *A series of contingency options should Two Rock Sedimentation Pond approach or exceed capacity; and*
j. *Any operations changes and Modifications with may impact the Wastewater and Processed Kimberlite Management Plan.*

The current Life of Mine Plan is presented in Figure 1. It outlines the possible operating timeframes of the various open pit and underground mining activities based on current operating projections, costs and economic factors. The Life of Mine Plan is reviewed on an on-going basis and changes in response to various factors. Mining is currently taking place in the Koala and Koala North underground mines, and the Fox and Misery open pits. Stripping of overburden material at Pigeon pit is expected to start in 2014.

The Ekati Diamond Mine site location and Main Camp overview maps are presented in Figures 2, 3, 4, and 5. The Misery site map is presented in Figure 6, the Fox Pit in Figure 7 and the Pigeon Pit Development Area in Figure 8.

A schematic diagram showing the annual overall processed kimberlite (PK) and wastewater balance is presented in Figure 9 for the 2013 calendar year. Figure 9 presents a conceptual schematic model of the Long Lake Containment Facility (LLCF) inputs and outputs and the controlled release of discharge water into the environment. It indicates the water recycling pathway from Cell D and the Underground Mine. The mined-out Beartooth Pit is shown as a minewater retention pond and fine processed kimberlite deposition location.

Figure 10 is a 2013 satellite map of the LLCF and the fine processed kimberlite discharge points.

Figure 11 is a conceptual model of water management.

Figure 12 presents the projected LLCF Closure Plan.

Figure 13 is a plot of the Operational Water Levels in the LLCF

Figure 14 is a water balance diagram of the Misery Site.

Figure 15 and 16 show the Beartooth Pit operating plan comparative effect of divesrion of underground minewater and FPK to Beartthooth Pit.

Figure 17 is shows the proposed development of the Pigeon Pit including water deflection berms and the Waste Rock Storage Area, as submitted in the *Waste Rock and Ore Storage Management Plan.*

1.3 Limitations

Kimberlite is a heterogeneous conglomeration of minerals that causes variability in the wastewater created during mining and processing. This management plan makes assumptions concerning the nature and behaviour of the processed kimberlite and the quality and volumes of wastewater that will result from processing kimberlite based on Ekati's processing experience at since 1998. Ongoing monitoring is required during mine and process operation to verify that the assumptions are correct and the mine's performance is satisfactory under the terms of its licence.

The Wastewater and Processed Kimberlite Management Plan is a guidance document that allows Ekati to adapt to changes in the Life-of Mine Plan, processing performance of kimberlite in the plant, and the ongoing characterization of kimberlite being mined. The Plan is one of the tools that DDEC uses to meet its legal obligations. It is the commitment of the Ekati Diamond Mine that we will not exceed Water Licence discharge criteria and there will be no significant adverse environmental effects in the receiving environment downstream.

1.4 Summary of Changes

This submission is an update to the document titled *Wastewater and Processed Kimberlite Management Plan Version 4.0, December 2013*, to address the requests identified by the WLWB in its April 16, 2014 decision letter. This document is Version 4.1 of the Plan and supersedes all previous versions.

Table 1 below captures the requested changes from Version 4.0 that was submitted in December 2013 to be included in the Version 4.1 submission.

Table 1: Required Updates from the Board for WWPKMP Version 4.1

Page	Concern	Recommendation	Response
Management of surface water at the Pigeon Development (PD):			
13	The description of the location is inaccurate. The first sentence in the PD section references Figures 3 and Figure 7. Figure 7 is a Figure of the Fox Site.	The Board requires DDEC to provide an accurate description of the location of PD. The Board requires DDEC to provide an up-to-date satellite image of the PD in the Figures section at the end of the report (as has been included for all other sites).	Updated in Version 4.1. Figure 8 is satellite map of the Pigeon area.
13-14	The second sentence in the PD paragraph "Drainage and run-off that flows towards the Pigeon Stream and to Fay Bay and Exeter Lake." Is incomplete. The sentence below the Figure included on pg. 14, identifies the use of stormwater berms to manage surface runoff into Pigeon Pit. There is no information provided related to monitoring and management of run-off and seepage away from the planned Pigeon WRSA.	The Board requires DDEC to provide additional information in regards to how run-off, drainage, and seepage at the PD (incl. run-off and seepage from the WRSA) is to be managed.	Updated in Version 4.1 in Section 2.1.6.
14	The conceptual map provided on pg. 14 is helpful in understanding the use of stormwater berms and the route of the dewatering pipeline.	The Board requires DDEC to include the location of the WRSA on this conceptual map. The Board requires DDEC to label all water courses on map.	Updated in Version 4.1 in Figure 8.

Management of open pit water at the Pigeon Development (PD):			
13-15	The PD paragraph on pg. 13 (in the surface minewater section) explains that the Pigeon Test Pit will be dewatered by the construction of a pipeline that will discharge Test Pit minewater into Cell B. The final sentence in this paragraph reads "This same line will be used as the Pigeon Pit minewater line." The sentence on pg. 14 explains that stormwater berms will "…reduce surface runoff into the pit so that it does not need to be managed with sumps in the Pigeon Pit." GNWT-4 highlights that Pigeon Pit has the potential to produce acid rock drainage and metal leachate due to the increased occurrence of metasediment geological conditions and that the handling of this wastewater should be highlighted in the WPKMP. DDEC responded to GNWT-4 that during operations, minewater from the Pigeon Pit sump will be pumped to the LLCF. The 'Management of Open Pit Minewater	The Board requires DDEC to include a section regarding the Pigeon Development under the 'Management of Open Pit Minewater' heading (pg. 15), in WPKMP Version 4.1, which a) clarifies the information related to dewatering and in-pit sumps, presented in the 'Management of Surface Minewater,' section and the company's response in the review comment table (as outlined in Table 2); b) clearly indicates how open pit minewater will be managed at the Pigeon Development; and c) provides the minimum level of information suggested by the Board, in the bullets above.	Updated in Version 4.1 in Section 2.2.5

	section,' on pg. 15, does not include a section describing management of Pigeon Development open-pit minewater.		
Management of Sewage			
17	Paragraph 3, sentence 2 discusses sewage management for remote washroom facilities. The Board believes it would be helpful to provide a list of all remote sewage management locations (Fox, Pigeon, etc.), as this may help clarify how sewage is being managed at all Ekati sites (including Pigeon Development).	The Board directs DDEC to clarify how sewage is to be managed at the Pigeon Development site and provide a list of the remote sewage management locations at Ekati, in this section.	Sewage from Pigeon will be managed as specified in Section 3.
Water Licence Requirements			
Appendix A	Schedule 6, item 1. e) requires the inclusion of map(s) that identify the "locations of monitoring stations for ground temperature, water quality, water discharge and processed kimberlite."	The Board requires DDEC to include these maps in the Figures Section of the WPKMP, and provide appropriate in-text references.	Locations and maps for monitoring stations for ground temperature, water quality and QA/QC programs are included the SNP, Seepage, AEMP annual reports as required in various sections of the Water Licence. The monitoring program for FPK Deposition is outlined in Section 4.10.2 and Figure 10. A monitoring and sampling program for Beartooth is currently being developed based on the collection of information, data, safety, access and will follow best practices. This

			monitoring program will be reported on under the Special Studies section of the Annual Report or in the next update of the WWPKMP.
Appendix A	Schedule 6, item 1. f) requires the inclusion of map(s) of all kimberlite deposition locations.	The Board recognizes that spigots are depicted and labelled with their corresponding spigot numbers in WPKMP Figure 10: Long Lake Containment Facility. However, there is no legend or description on the map indicating that these labelled dots are spigots. The Board requests that DDEC includes a legend or description in Figure 10, to clearly indicate the depicted kimberlite deposition locations, in order to assist the layperson in understanding the figure provided.	Figure 10 has been updated in Version 4.1.
	Schedule 6, Items 1.h), i), and j) as outlined in the Water Licence (and stated in the WPKMP), are not included in the conformity table.	The Board requires that items 1. h) i), and j) be addressed in the conformity table.	Updated in Version 4.1 included in Appendix A.
Editorial Comments			
Whole Document	The Board appreciates efforts made by DDEC to increase the clarity of the language and the information being presented in the report, but believes that removal of reference numbers for each section and in-text figures	The Board requires all sections, as well as in-text figures and tables, to be referenced throughout the text. DDEC's Old Camp Closure and Reclamation Plan, dated December30, 2013,	Version 4.1 has been updated from the previous template to the new DDEC template using Section numbering.

	and tables, decreases clarity when referencing and discussing particular sections of the report.	provides a good template for section and figure references.	
Figures Section	The Board appreciates the high quality maps and diagrams DDEC has included with the WPKMP which add clarity to details in the report by providing visual and conceptual understanding. However, Figure 4: Ekati Mine Camp Development (dated 2005), while it appears to be a very informative map, is extremely difficult to read.	The Board requires DDEC to provide an updated version of Figure 4: Ekati Mine Camp Development, in Version 4.1 of the WPKMP.	Figure 4 is updated in Version 4.1

Other comments specific to previous WLWB's requests are as follows:

- The WLWB requested comment on the feasibility of removing processed kimberlite from Beartooth Pit.
  - It is not feasible to remove the processed kimberlite from Beartooth Pit (Section 4.8.2). The processed kimberlite will not be removed from Beartooth Pit.

- The WLWB requested a description of the location of Pigeon Development at Ekati, with an accompanying map.
  - A description of the location of Pigeon Development is found in Section 2.1.6.

- The WLWB requested a description of how drainage and run-off flowing towards the Pigeon Development will be managed during construction and operations.
  - This information is included in Section 2.1.6 and 2.2.5

- The WLWB requested identification of how run-off and seepage away from the Pigeon Development is to be managed and monitoring during construction and operations.
  - This information is included in Section 2.1.6 and 2.2.5.

- The WLWB requested information on how the Pigeon Test Pit will be dewatered an where the Test Pit water will be discharged, and
- The WLWB requested information on how open pit water will be managed during construction of Pigeon Pit.
  - This information is included in Section 2.1.6 and 2.2.5.

- The WLWB requested information on how the Pigeon Pit will be dewatered in the future, and where the Pigeon Pit water will be discharged.
    - Pigeon Pit will be dewatered by pipeline to Cell B of the LLCF as specified in Sections 2.1.6, 2.1.7 and 2.2.5.

- The WLWB requested a description of any in-pit minewater treatment that might be required (e.g. flocculants of TSS treatment), before minewater is discharged.
    - No in-pit minewater treatment systems will be used in Pigeon Pit as specified in Section 2.2.5.

DDEC has also made editorial changes to various sections of the Plan to increase clarity of the language and the information being presented. Table 2 below includes a summary of these changes and their locations in Version 4.1

Table 2: Summary of Changes for Version 4.1

Location	Change	Rationale
Section 4.5	Update	Clarification of Flocccluant Plants and use
Section 4.8.2	Update	Statement that 2011 Deposition Plan is still in place
Section 4.8.3	Update	Updated Timeline of Deposition Plan based on 2013
Section 4.9	Update	Added reference to Aquatic Response Framework
Section 4.10.4	Update	Added to Special Studies reference to Nitrogen Response Plan

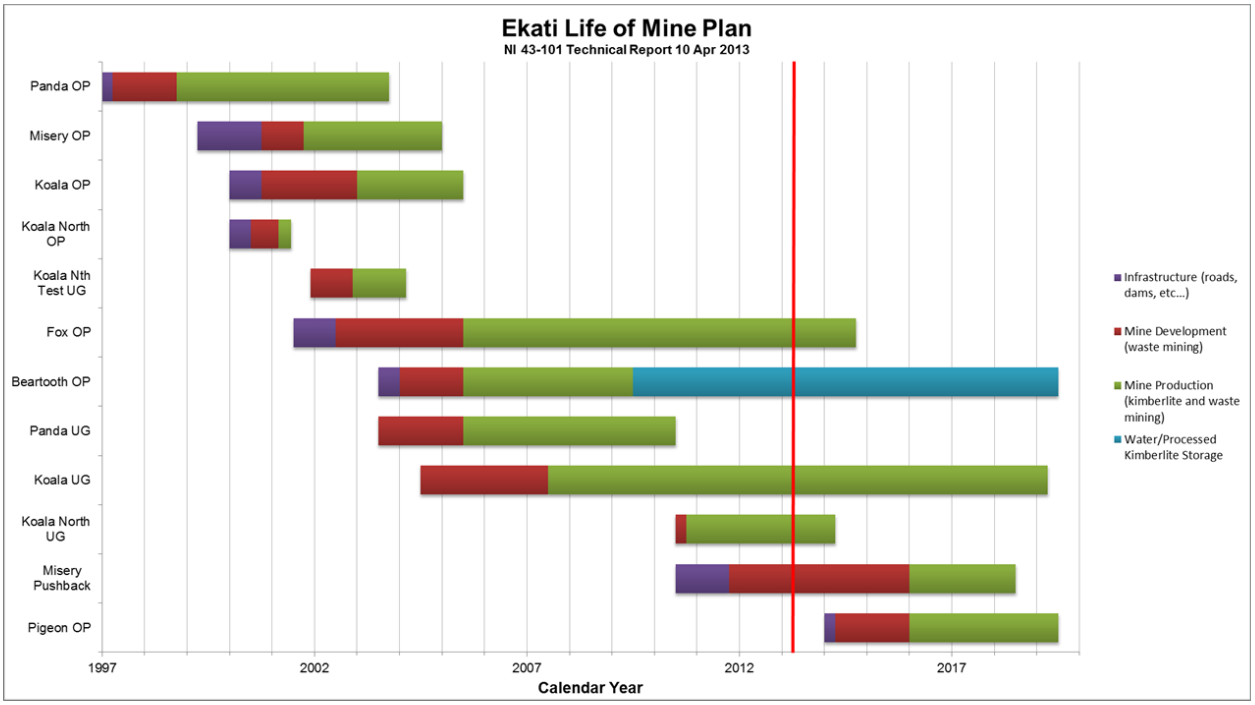

Figure 1 – Life of Mine Plan 2013

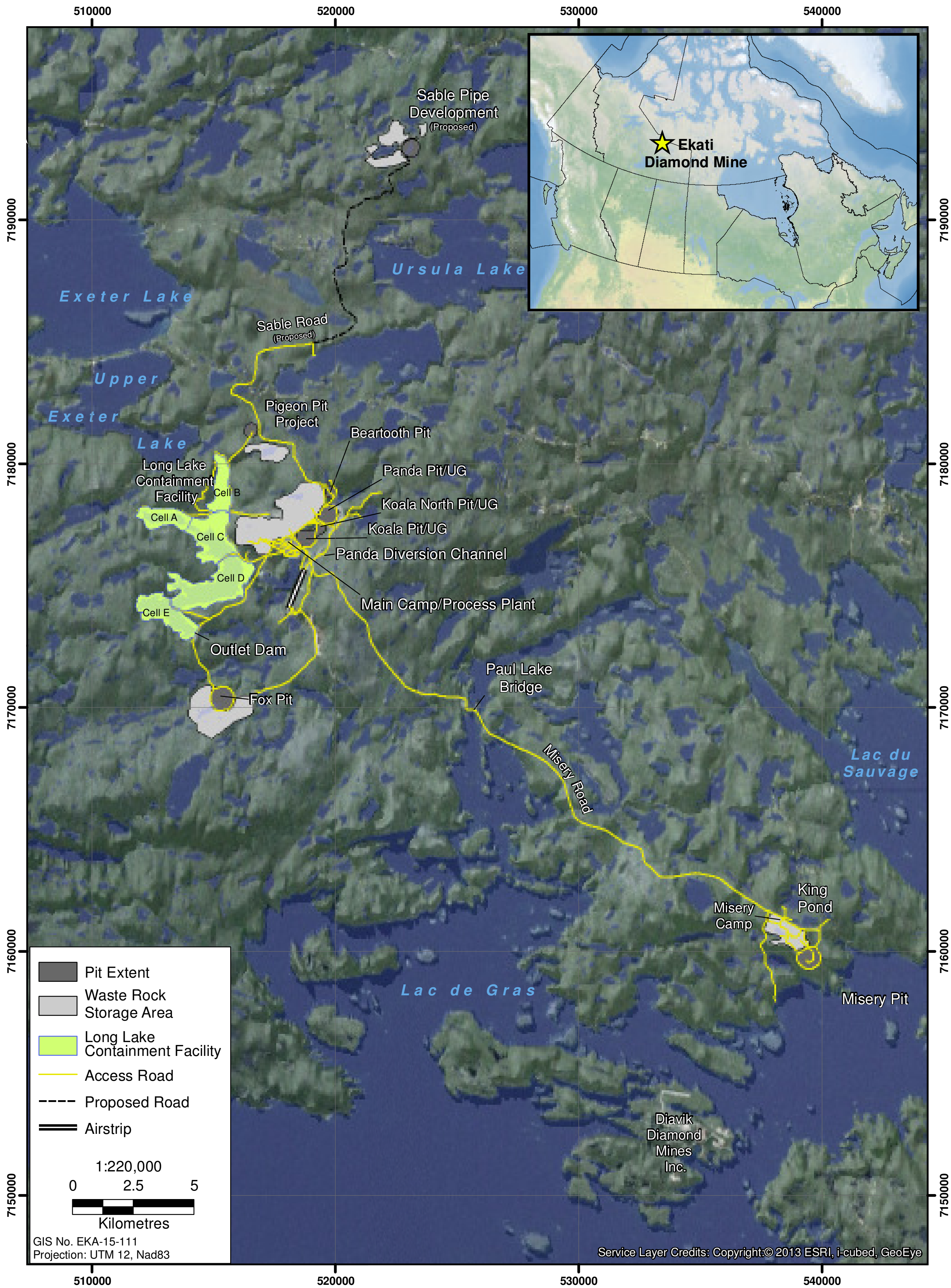

Figure 2

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Location map of the EKATI Diamond MIne

Rescan
an ERM company

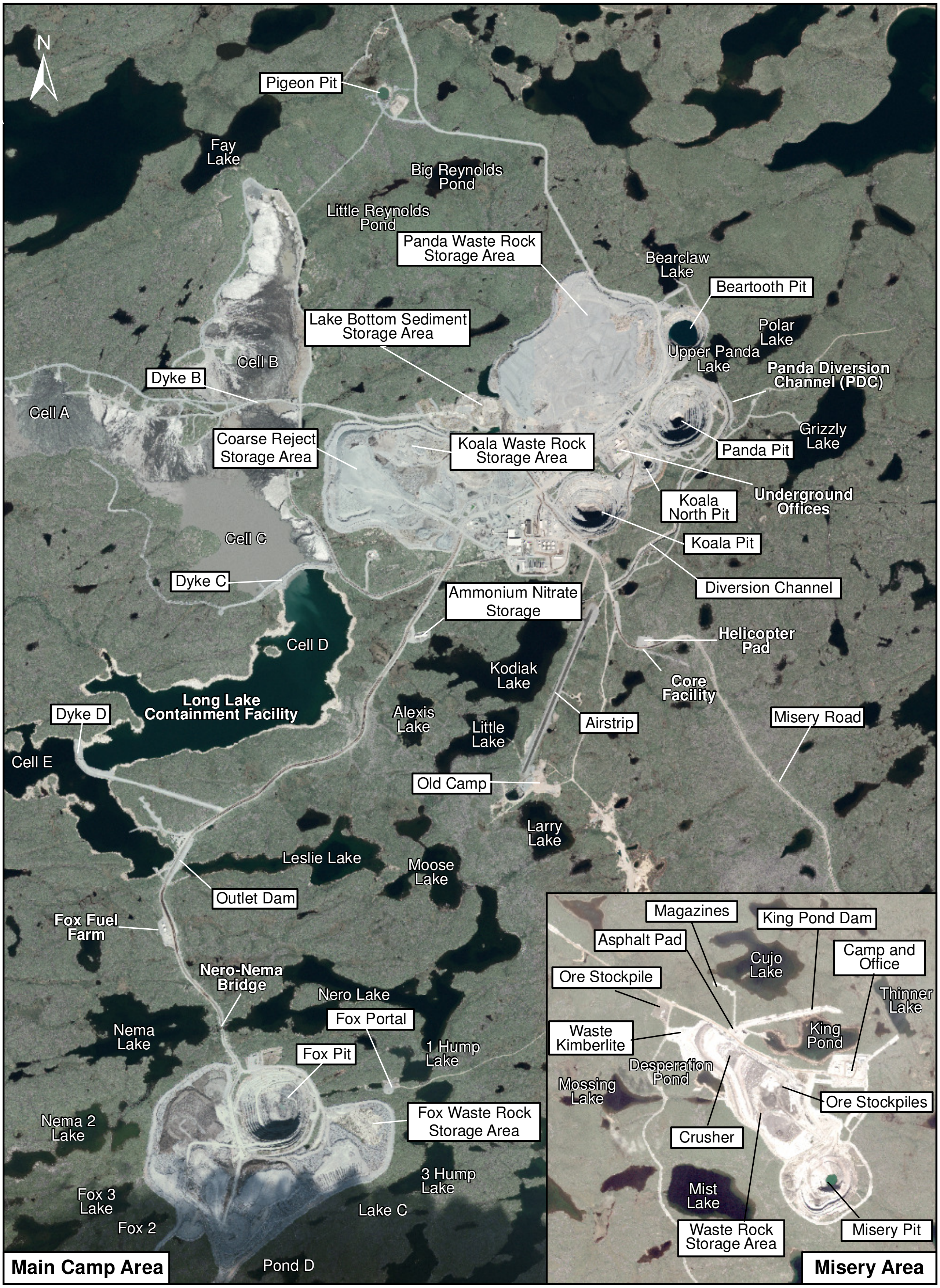
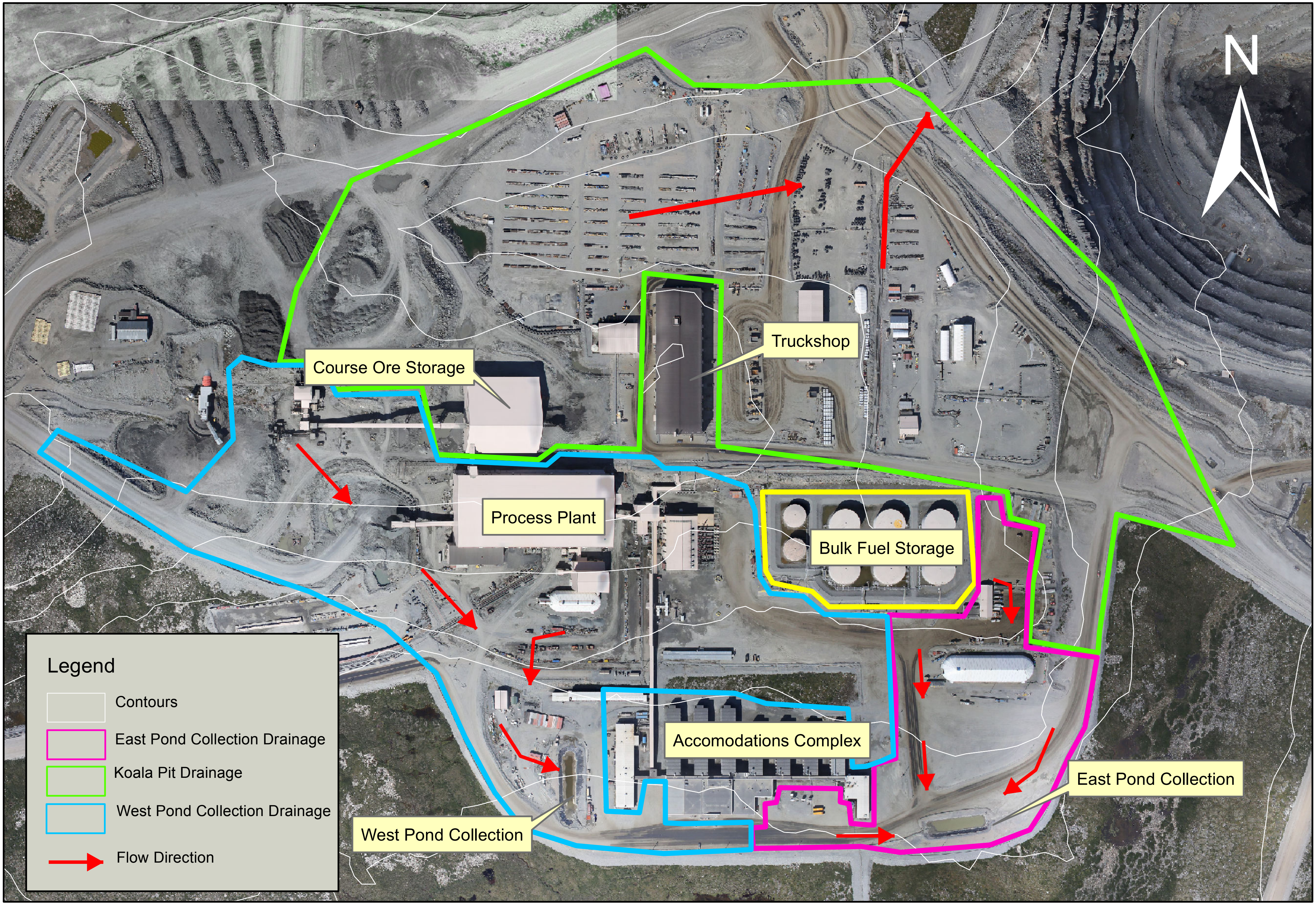


Figure 3

Satellite Map of EKATI - 2013

DOMINION DIAMOND

Rescan an ERM company



0 150 300
Meters

Figure 4
Ekati Diamond Mine
2013 Satellite Imagery

Projection UTM 12N Datum NAD83

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Main Camp Satellite Map - 2013

Figure 5

Rescan
an ERM company

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Figure 6

Misery Pit Satellite Map - 2013

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an ERM company

Figure 7

Fox Pit Satellite Map - 2013

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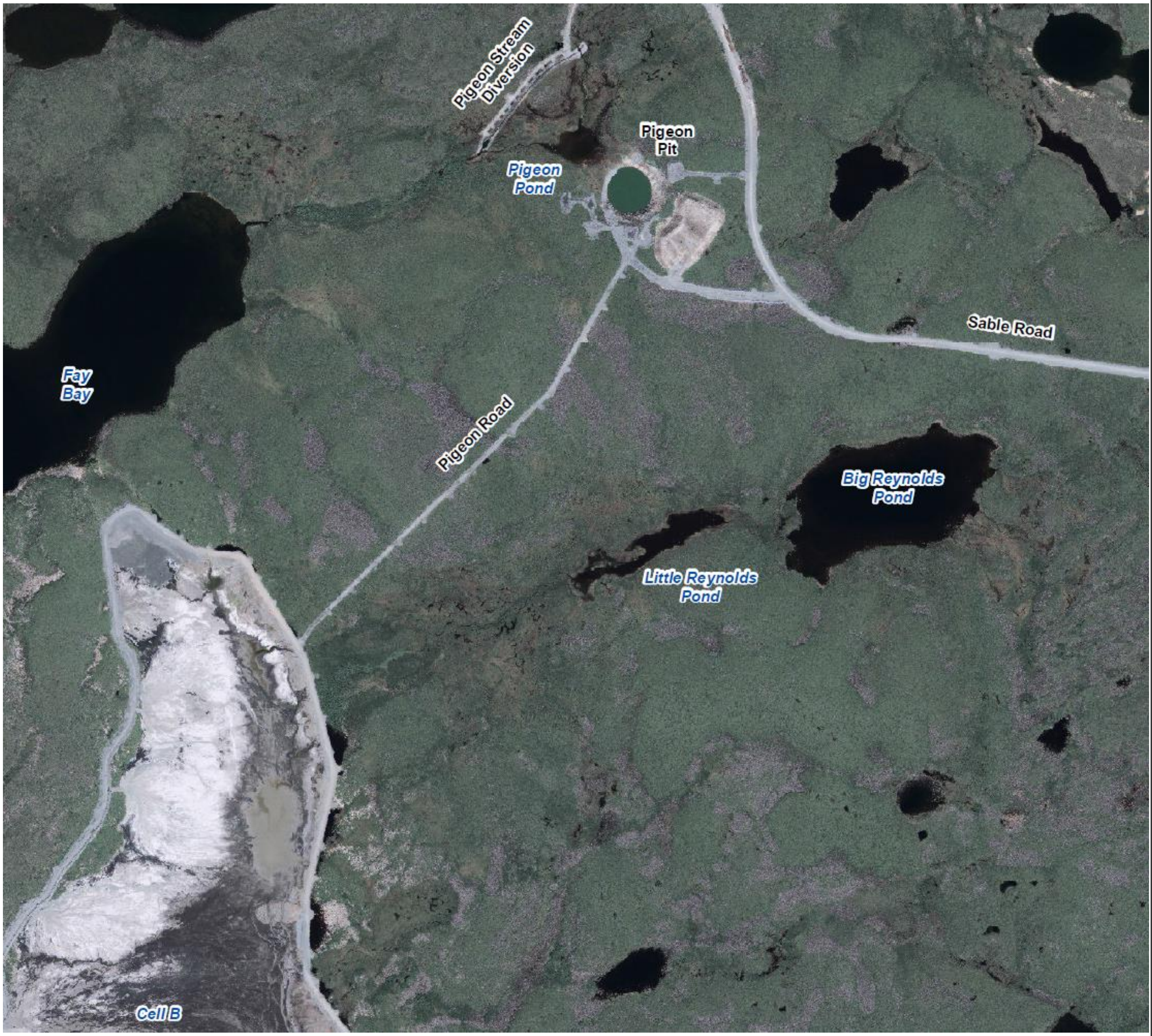

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Pigeon Pit Satellite Map and Development - 2013

Figure 8

Figure 9
2013 Ekati Water and Waste Summary

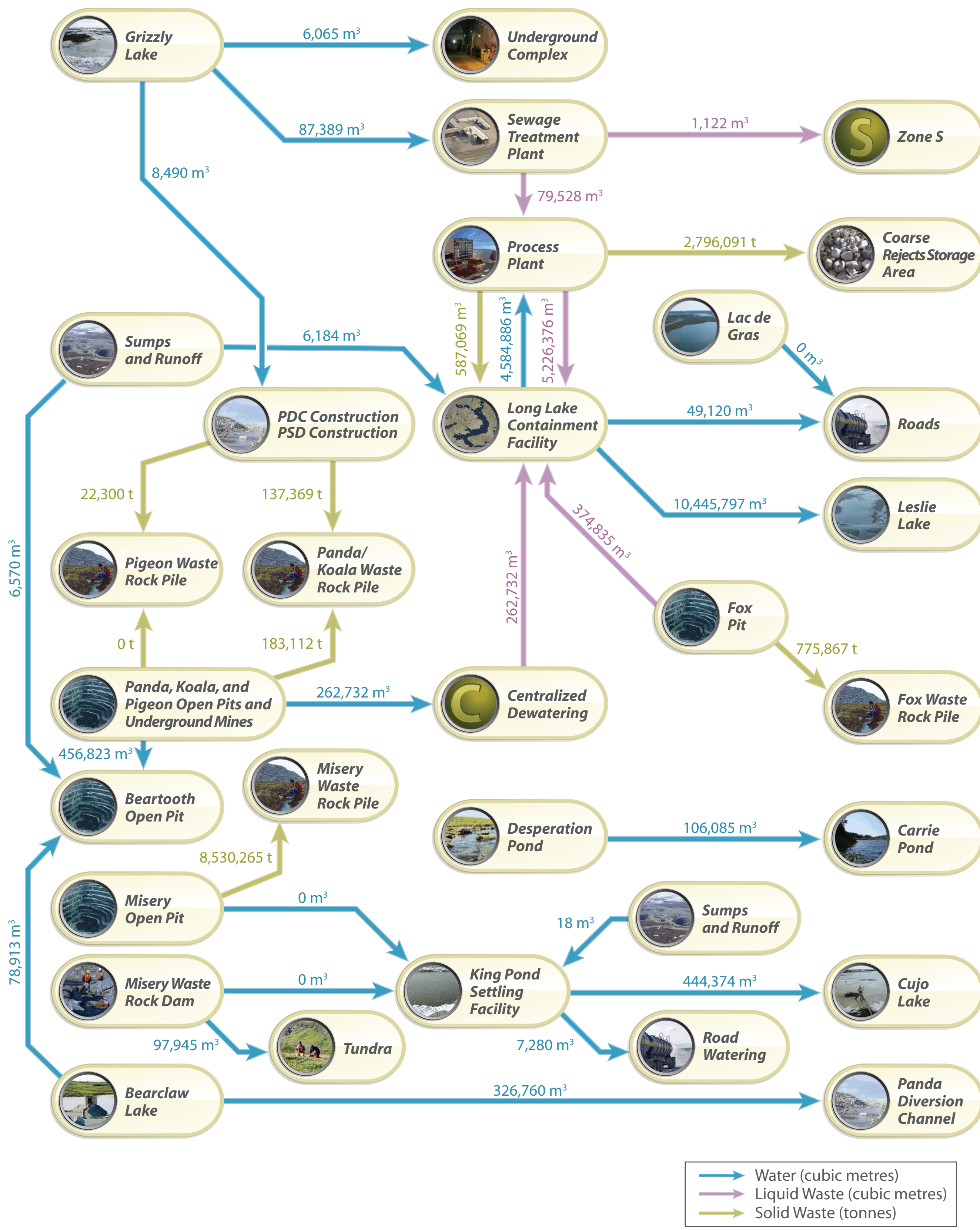
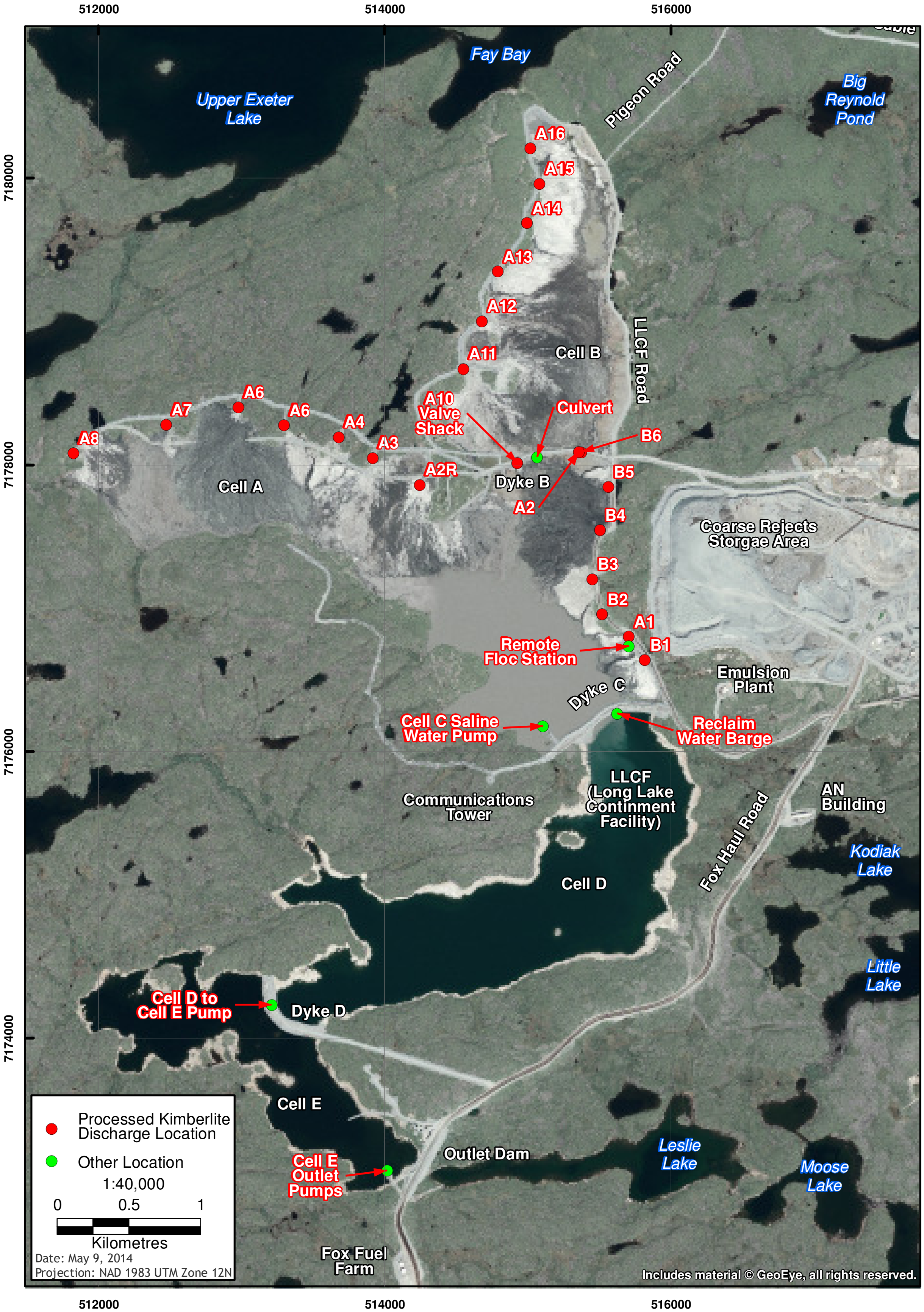


Figure 10
Long Lake Containment Facility - 2013



PROJECT # 0211136-0005 GRAPHICS # EKA-0005-002 November 8, 2013

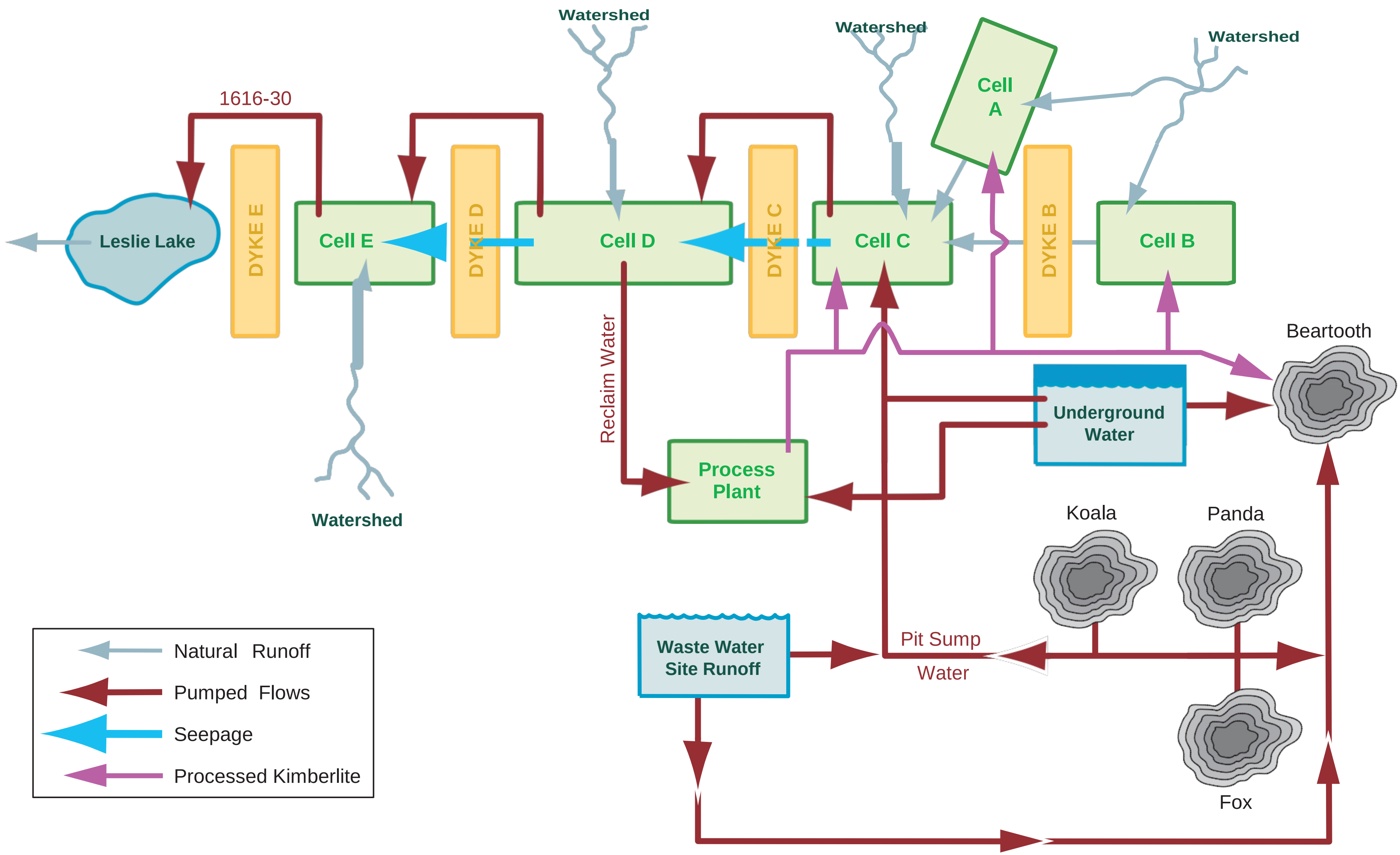


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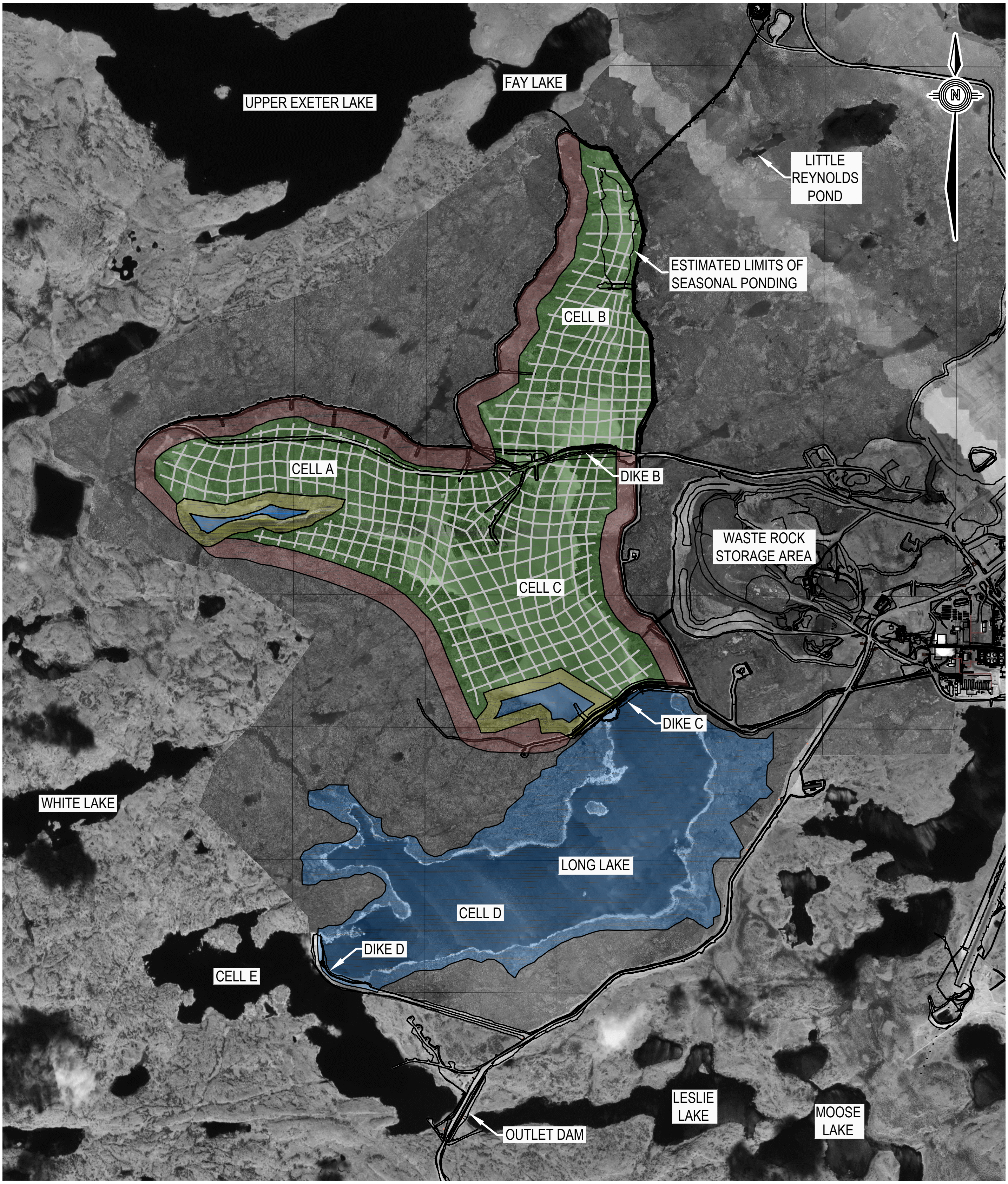
Figure 11

Conceptual Model of Water Management

Rescan an ERM company



LEGEND:

- BERM
- UPPER ZONE
- CENTRAL ZONE
- WATER INTERFACE
- POND AT END OF MINE LIFE

0 2 000

Scale: 1: 40 000 (metres)

STATUS
ISSUED FOR REVIEW

CLIENT
DOMINION DIAMOND

eba A TETRA TECH COMPANY

INTERIM CLOSURE AND RECLAMATION PLAN
EKATI DIAMOND MINE, NT

Long Lake Containment Facility
Closure Plan

PROJECT NO.	DWN	CKD	REV
E14103005-01	GDK	GDK	1
OFFICE	DATE		
EDM	October 2013		

Figure 12

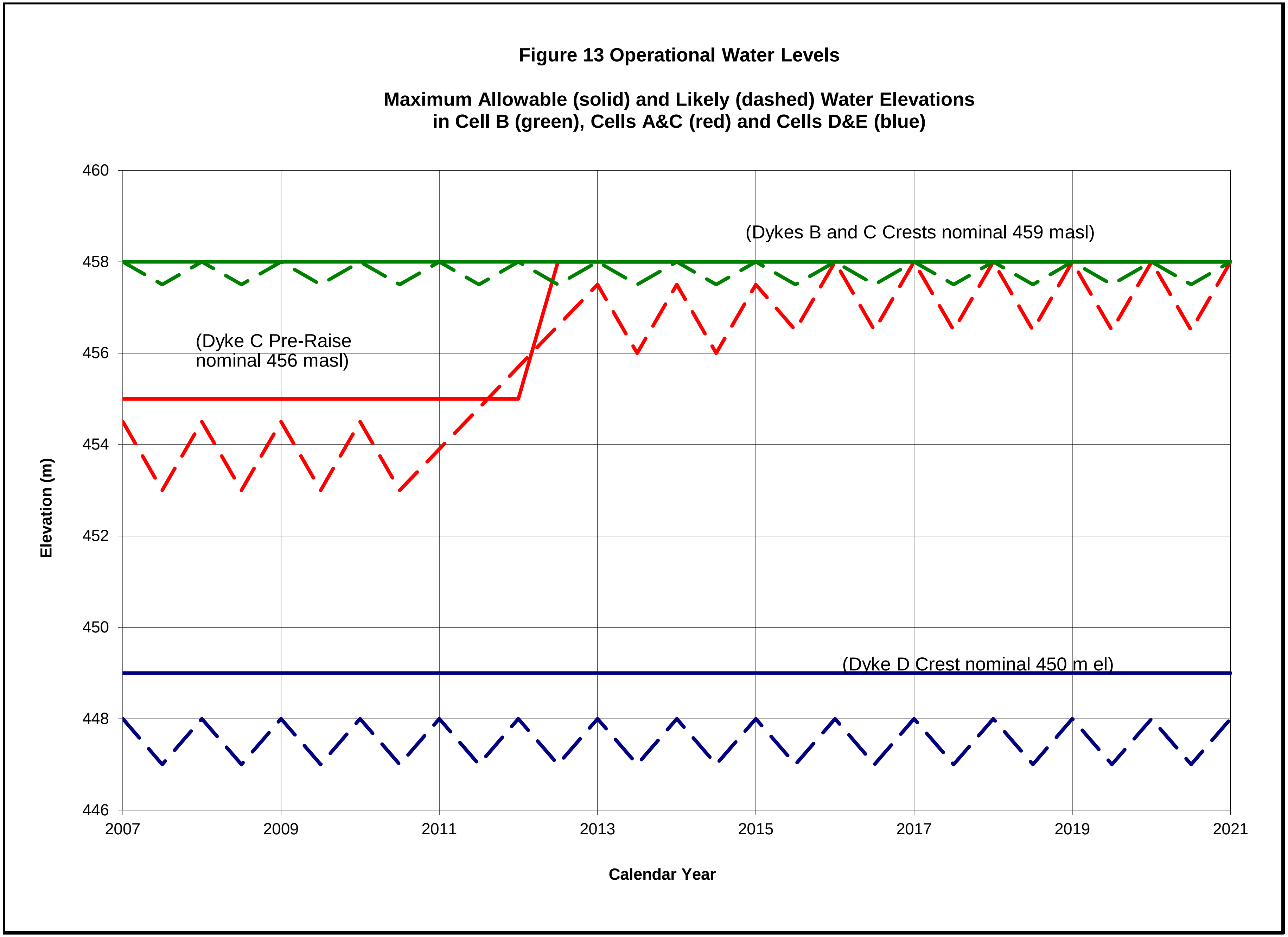


Figure 13 Operational Water Levels
Maximum Allowable (solid) and Likely (dashed) Water Elevations
in Cell B (green), Cells A&C (red) and Cells D&E (blue)
Elevation (m)
Calendar Year
460
458
456
454
452
450
448
446
2007
2009
2011
2013
2015
2017
2019
2021
(Dykes B and C Crests nominal 459 masl)
(Dyke C Pre-Raise
nominal 456 masl)
(Dyke D Crest nominal 450 m el)

Figure 14

Schematic Water Balance for Misery Pit Area

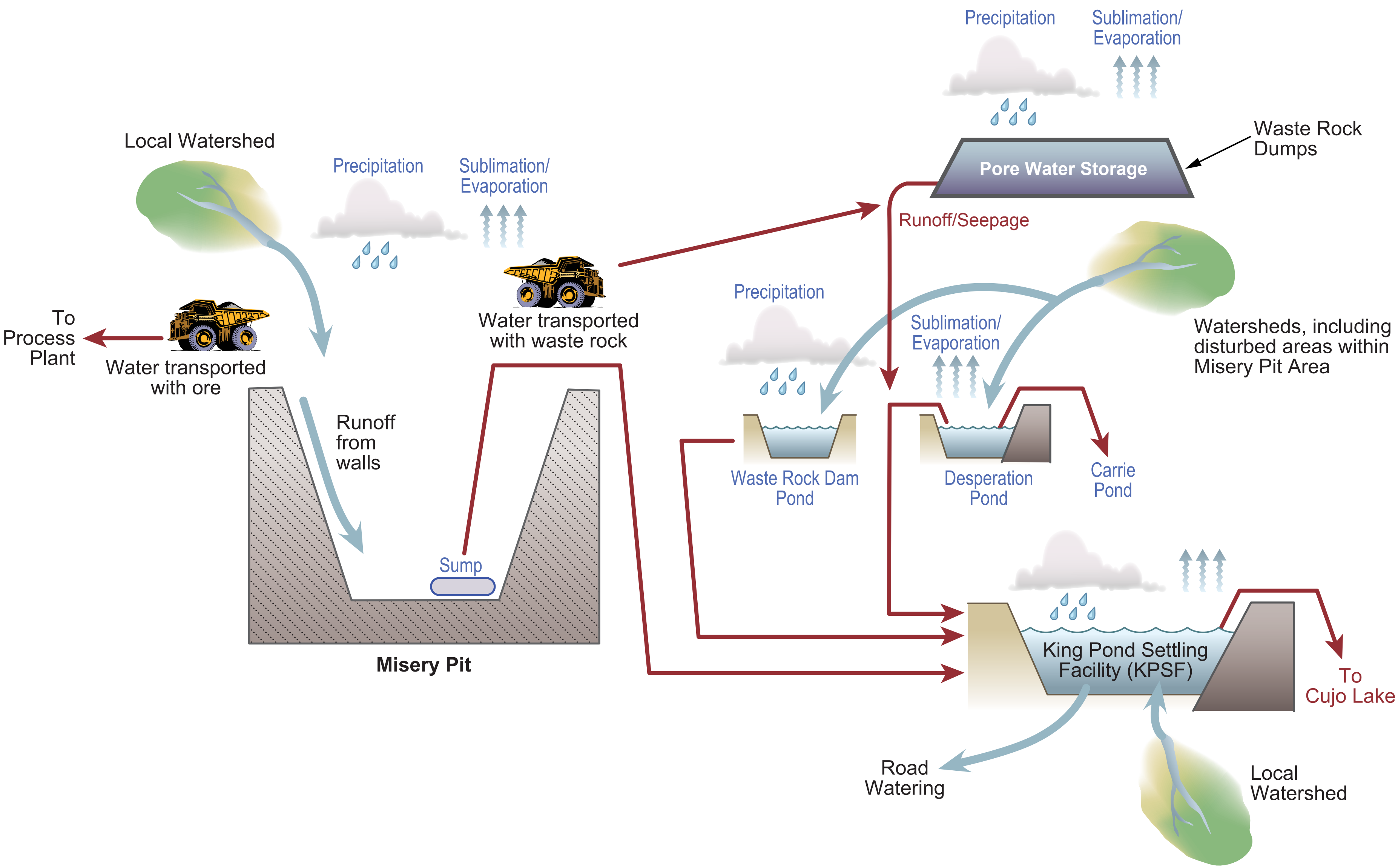


Figure 15. Conceptual Beartooth Pit Operating Plan

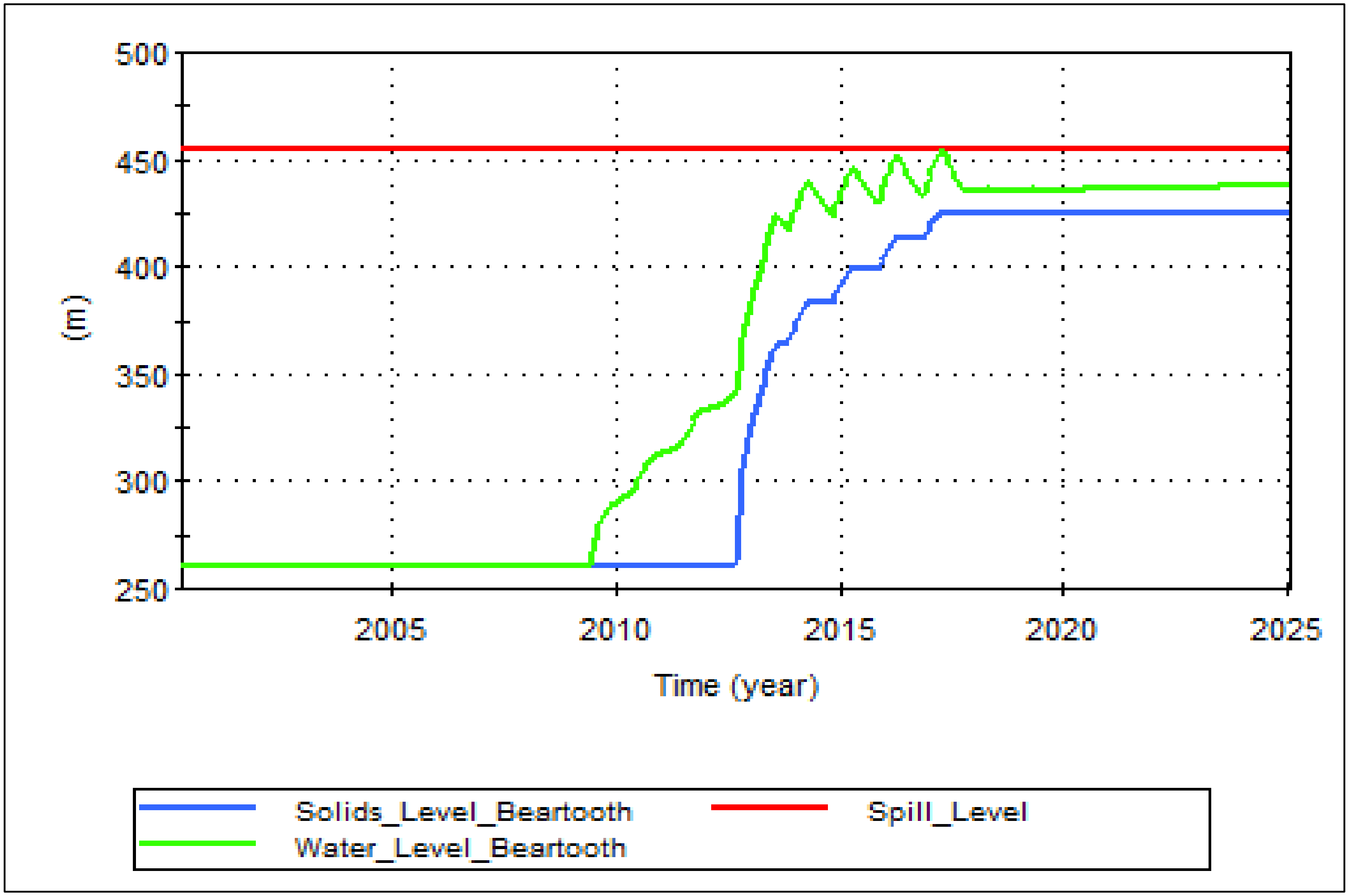
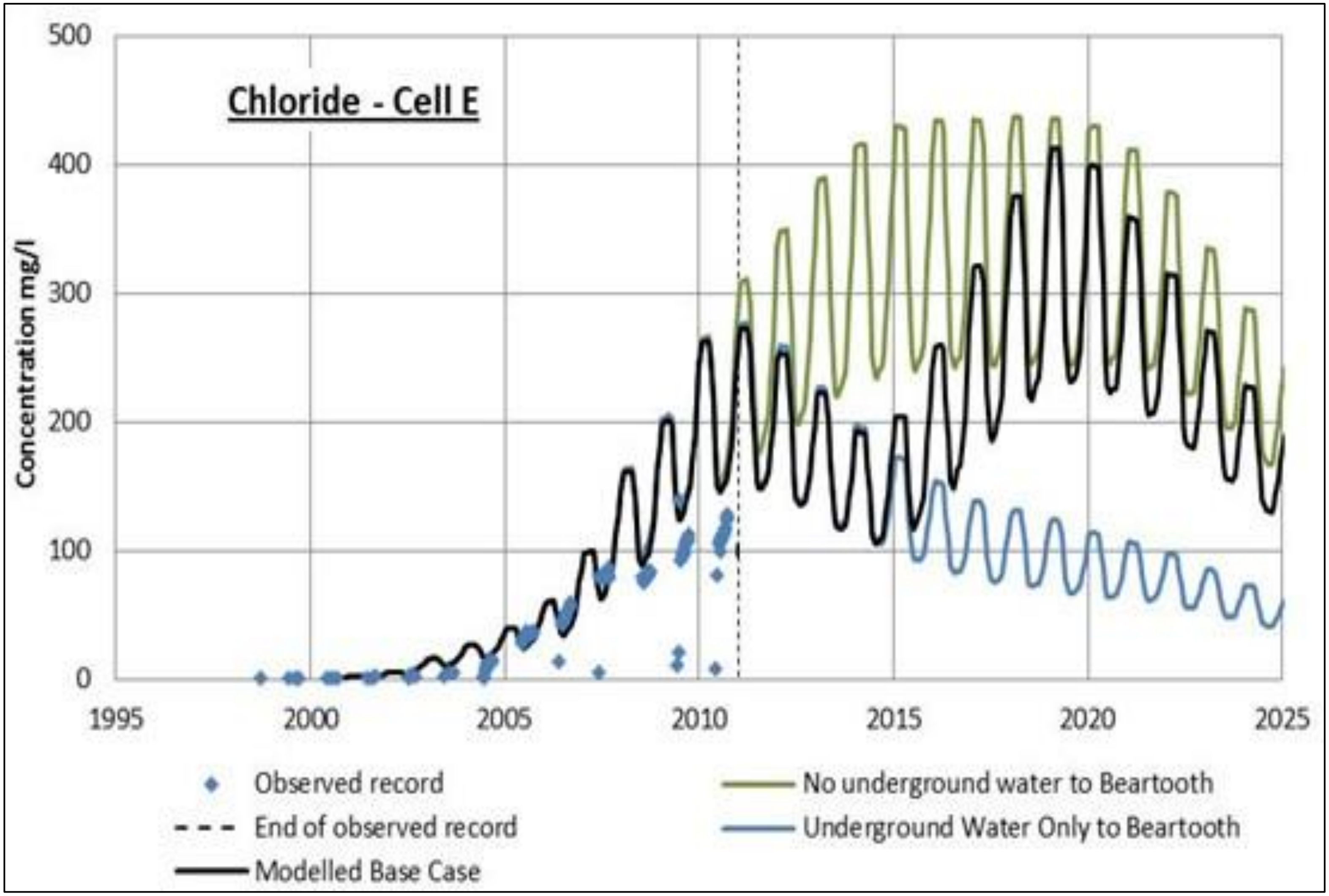


Figure16. Comparative Effect of Diversion of Underground Minewater and FPK to Beartooth Pit



1.5 Overview of Wastewater and Processed Kimberlite Management Plan

This section describes the sources of water or wastewater that are managed at the Ekati Diamond Mine, including Misery Pit, Fox Pit, Pigeon Pit Development and other remote locations that may be serviced by the Ekati main camp. A summary of current wastewater sources at Ekati is presented in Figure 9. Figure 9 was submitted in the report titled *Environment Agreement and Water Licence Annual Report 2013*.

As required by the Water Licence, this Management Plan contains information regarding the wastewater management of the proposed Pigeon Pit. Pigeon Pit Development is scheduled to being in 2014.

Information regarding wastewater management of the proposed Sable kimberlite operations is not included in this Plan. If the proposed Sable kimberlite operations were to be commenced, DDEC would prepare an updated version of the Plan 60 days prior to the construction of either of these pits as is required by the Water Licence. Version 4.1 does not include information on discharge to and from the Two Rock Sedimentation Pond as this facility is not constructed and therefore not in use. If in the future the Two Rock Sedimentation Pond is constructed, the Wastewater Processed Kimberlite Management Plan will be updated and submitted to the Board.

The objective for the wastewater and processed kimberlite management systems is to discharge water to the receiving environment that meets the Water Licence discharge criteria, to ensure no significant adverse environmental effect occurs to the downstream receiving environment (Figures 9 and 10), and to ensure the disposal of FPK is managed in a consistent manner with no significant adverse environmental effects.

The methods described in the following sections are based on normal operating conditions. Emergency conditions may require short-term changes while repairs and/or mitigation measures are implemented. During unusually large flow events, the Ekati Diamond Mine may have to implement short-term measures to protect the safety of the downstream environment and the mining operations. In a case such as this, normal operating practices may be temporarily amended.

During emergency situations, the Ekati Diamond Mine will continue to meet its legal obligations. The Inspector will be informed of any emergency measures being implemented and reasoning for these actions. DDEC will follow up, as soon as possible, with the WLWB by notification of emergency measures undertaken to protect people, property and the environment.

1.5.1 Minewater

Minewater is defined in the Water Licence as:

*"**Minewater**" includes runoff from facilities associated with the Project and all water or Waste pumped or flowing out of any open pit or underground mine.*

The minewater discussed in this Plan is categorized as:

- Surface minewater – water that flows on the surface of mine infrastructure including site drainage, truck wash bays, collection sumps, etc.;
- Open Pit minewater - water that flows or is pumped from open pits; and
- Underground Minewater – water that flows or is pumped from underground workings.

1.5.2 Sewage

Sewage is defined in the Water Licence as:

*"**Sewage**" means all toilet Waste and greywater.*

Sewage sources are:

- Sanitary sewage system at the main site; and
- Sewage from remote work sites (e.g. Fox Pit, Pigeon Pit Development, Misery Camp).

1.5.3 Processed Kimberlite

Processed Kimberlite (PK) is defined in the Water Licence as:

*"**Processed Kimberlite**" means material rejected from the process plant after the recoverable diamonds have been extracted.*

Processed kimberlite generated from processing encompasses two fractions. Coarse Processed Kimberlite (CPK) is the fraction of kimberlite greater than 0.5 mm in diameter and is trucked to the one of the folling Waste Rock Storage Areas (WRSA):

- Panda/Koala WRSA;
- Misery WRSA;
- Fox WRSA; and
- Pigeon WSRA when Pigeon Pit is in development and production.

Fine processed kimberlite (FPK) is composed of the fraction of kimberlite smaller then around 0.5 mm in diameter and is transported by pipeline as a slurry to the Long Lake Containment Facility.

In this Plan, management of water that is used within and released from the diamond separation process in the process plant is described as part of the management of processed kimberlite.

2 Management of Minewater

2.1 Management of Surface Minewater

The Ekati Diamond Mine main camp site, Misery Pit, Fox Pit, and Pigeon Pit location are identified in Figures 3 through 8. Water management is described for the following locations below:

- Main Camp and Fuel Storage Berms;
- Ammonia-Nitrate Storage Facility and Polar Explosives Building
- Panda/Koala Waste Rock Storage Area;
- Misery Site;
- Fox Site; and
- Pigeon Pit location.

2.1.1 Main Camp and Fuel Storage Berms

Surface minewater is collected from the following locations:

- Ekati Main Camp and Pits - snowmelt and rainwater run-off from areas with high vehicular traffic is collected into containment sumps lined with geo-membranes to minimize seepage losses;
- Landfarm - water from precipitation (rain/snowmelt) is approximately 200 m^3 per year (from June to September);
- Contaminated Snow and Ice Containment Facility - water from this location is approximately 100 m^3 per year (from June to September). Hydrocarbon impacted snow and ice from winter spill remediation activities is collected in this Facility as per the Spill Contingency Plan. The spring melt water is collected in the sump and free-phase hydrocarbons are recovered by skimming activities before water is trucked to the LLCF;
- Various Buildings - wastewater collected from various buildings produces approximately 6,000 m^3 of water per year. This includes wastewater from truck washing operations, maintenance shops wastewater (e.g.; floor washing and general maintenance) that is collected in sumps and trucked to the LLCF;
- Scrubbers – scrubbers located in the new incinerator (pending commissioning) may produce approximately 800 m^3 of water per year. The new incinerator may be equipped with 2 wet scrubbers to reduce emissions;
- Containment Berms at Fuel Bays - located at the main Ekati site, along the Fox Haul Road; and the Misery site, collect rainwater and snowmelt;
- Fresh Air Raises (FARs) Containment Berms – located at the Panda/Koala underground mines produce approximately 100 m^3 of waste water per year.

The collected surface minewater is pumped or trucked to the LLCF (Figure 3 and 4). An in-line flocculant treatment plant may be utilized, depending on water quality, before the water is discharged to the LLCF. Water that meets the Water Licence discharge criteria may be discharged directly to the receiving environment.

2.1.2 Ammonia Nitrate Storage Facility and Polar Explosives Building

The concrete sumps around the Ammonia Nitrate (AN) Storage Facility and the Polar Explosives Building (Figure 3) collect surface water and is collected by truck and deposited into Beartooth Pit. During 2013, a totally of 1,909 m^3 of water was collected by truck from these two locations and deposited into the Beartooth Pit.

2.1.3 Panda/Koala Waste Rock Storage Area (WRSA)

Surface run-off and seepage from the western, northwestern and southern portions of the waste rock storage area (WRSA) flows naturally into the LLCF. Surface run-off from the eastern portion of the WRSA predominantly drains to the Panda/Koala Pit diversion ditches and sumps (Figures 5). A portion of runoff in the northeastern area of the WRSA flows into Bearclaw Lake. The management procedures for the WRSA are described in the *Waste Rock and Ore Storage Management Plan*. Runoff from the WRSA is monitored, assessed and reported to the Board under the Water Licence Annual Report and the 3 year *WRSA Seepage Monitoring Report*, which are requirements of the Class A Water Licence.

2.1.4 Misery Site

The Misery Site (Figure 6) is located approximately 27 km by road southeast of the Ekati Diamond Mine main camp. Site drainage is collected by a series of containment sumps and drainage into the Misery Pit. After a suspension of mining activities in 2005, activities resumed in 2011 as part of the Misery Pushback. Re-establishment of the Misery Camp and enlargement and deepening of the open pit will allow mining activities to extend to a depth of 300 m below the surface, all within permafrost. Use of the existing water management facilities (King Pond, Desperation Pond, and the Waste Rock Dam) continues. The final waste rock storage area will cover approximately half of the catchment of Desperation Pond and will extend northwest beyond the catchment of the existing operations. A water balance schematic is included as Figure 14.

The WRSA for the Misery operation is situated within 4 drainage catchments that are captured by Waste Rock Dam, Desperation Pond, the Misery Pit and King Pond, respectively, as shown in Figure 3. A small area of the site facilities pad drains northeast away from Kind Pond. The management procedures for the WRSA are described in the *Waste Rock and Ore Storage Management Plan*. Runoff from the WRSA is monitored, assessed and reported to the Board under the Water Licence Annual Report and the 3 year *WRSA Seepage Monitoring Report,* which are requirements of the Water Licence.

Run-off and discharge from the Waste Rock Dam and Desperation Pond catchments may contain elevated total suspended solids, total metals and/or ammonia concentrations. Water that does not meet Water Licence discharge criteria is pumped to King Pond for mixing and eventual release in a controlled manner to the downstream receiving environment (Cujo Lake) once Water Licence discharge criteria has been met. Water that meets Licence discharge criteria may be discharged directly to the receiving environment.

2.1.5 Fox Site

The Fox Pit area is shown in Figures 3 and Figure 7. Drainage and run-off that flows toward the Fox Pit is captured before it reaches the pit by surface diversion ditches and sumps. Once captured, the water is then pumped by a pipeline to Cell C of the LLCF. An in-line flocculant treatment plant may be utilized, depending on water quality, before the water is discharged to the LLCF, but is currently not in use.

Surface run-off and seepage from the Fox Waste Rock Storage Area is managed, in part, by frozen core perimeter berms. The berms and management procedures for the Fox WRSA are described in the *Waste Rock and Ore Storage Management Plan*. Runoff from the WRSA is monitored, assessed and reported to the Board under the Water Licence Annual Report and the 3 year *WRSA Seepage Monitoring Report*, which are requirements of the Class A Water Licence.

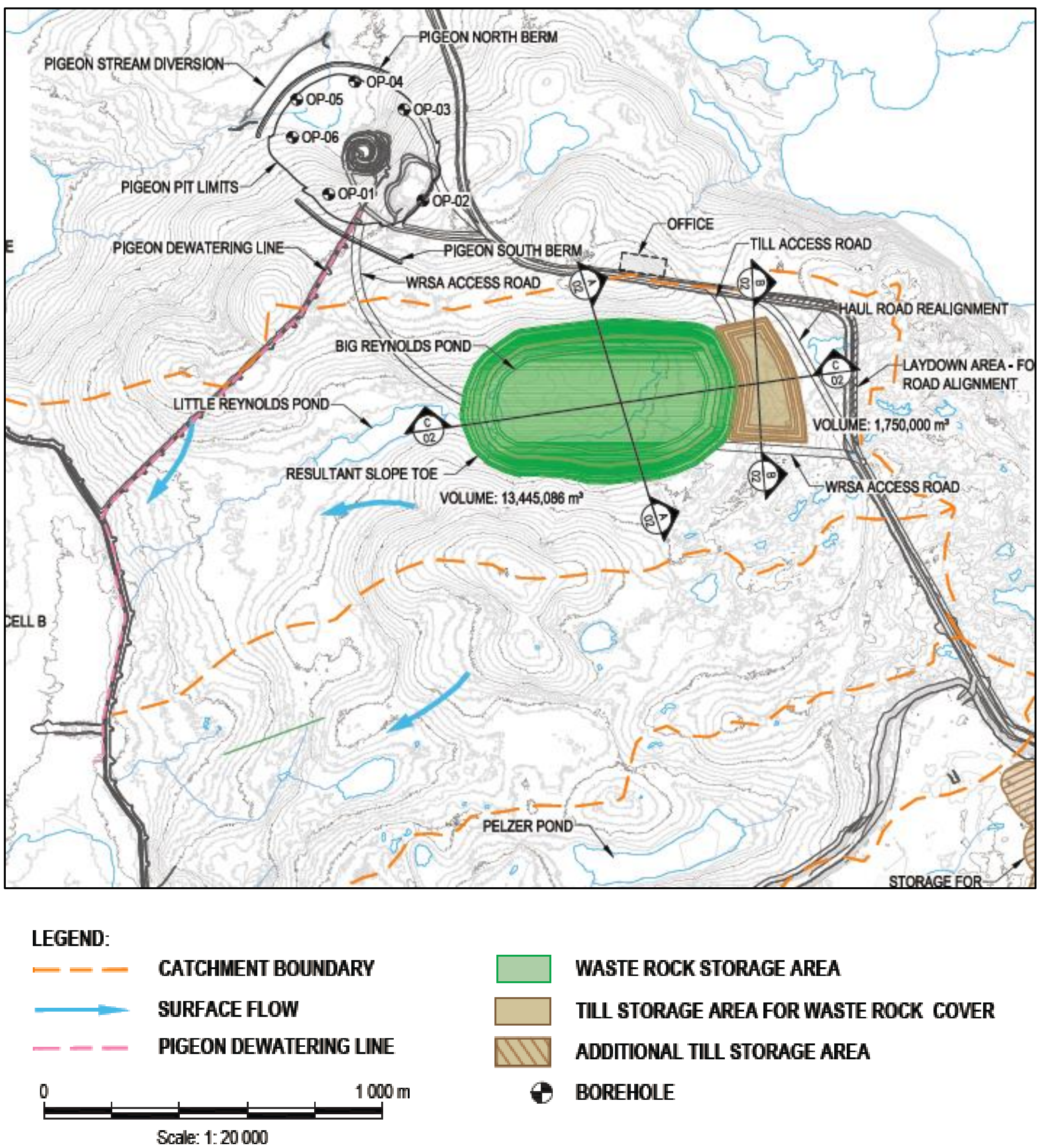
2.1.6 Pigeon Pit Development

The Pigeon Pit area is shown in Figures 3 and Figure 8. Pigeon Pit is located north of the main camp along the Sable Haul Road and south of the Pigeon Stream and Pigeon Pond. Drainage and run-off flows north from the Pigeon Pit area towards Pigeon Pond and into Pigeon Stream and west through Upper Pigeon Stream through the Pigeon Stream and to Fay Bay and Exeter Lake.

Stripping for the development of Pigeon Pit will commence in 2014. In advance of stripping for Pigeon Pit Development, the Pigeon Test Pit will be dewatered. This will be accomplished by the construction of a pipeline from Pigeon Test Pit, along the Pigeon Road to the LLCF where the water will be discharged into Cell B (Figure 17). The dewatering pipeline was completed in October 2013 and water was pumped from Pigeon Test Pit to Cell B of the LLCF in advance of the Pigeon Pit development and reported in the Water Licence Annual Report. This same line will be used as the Pigeon Pit minewater line.

Surface run-off and seepage that ends up in the Pigeon Pit from the development area will be pumped through the dewatering pipeline to Cell B of the LLCF. The construction of the deflection berms will be part of the first phase as to separate the construction area from the Pigeon Stream Diversion and the water flow towards Fay Bay. Water inside the berm in the construction area will be directed into the Pigeon Test Pit and will be dewatered through the pipeline to Cell B of the LLCF.

Figure 17: Pigeon Pit Development



2.1.7 Pigeon Pit

When the Pigeon Pit is in production, surface water within the proposed Pigeon Pit area will be contained within the water deflection berms located between the northern edge of the Pigeon Pit area and the Pigeon Stream and directed into the surface sumps or managed as Open Pit Water. Once captured, the water will then be pumped by pipeline to Cell B of the LLCF or moved by truck to Cell B of the LLCF.

Seepage from the Pigeon WRSA located over Big Reynolds Pond will flow naturally to the LLCF and is described in the *Waste Rock and Ore Storage Management Plan*. Runoff from the WRSA will be monitored, assessed and reported to the Board under the Water Licence Annual Report and the 3 year *WRSA Seepage Monitoring Report*, which is a requirements of the Class A Water Lice

2.2 Management of Open Pit Minewater

The in-pit dewatering systems are designed to maintain safe and reliable operations in active mining areas by removing water that enters the pit.

2.2.1 Panda and Koala Pits

The lower levels of the Panda and Koala open pits are hydraulically open to the deeper underground workings. Therefore, the lower levels of these pits are not dewatered because of safety risks to people working within the pit. This water enters the underground workings and is managed as underground minewater. As much surface flow as practical is intercepted prior to entry into the Panda or Koala pits through interception ditches and sumps and this water is managed as "surface minewater" discussed above.

2.2.2 Fox Pit

Fox Pit water, combined with the intercepted surface water is pumped into the LLCF. The water could be directed to the Beartooth pit as an alternative. An in-line flocculant treatment plant may be utilized, depending on water quality, before the water is discharged to the LLCF, but is currently not in use.

2.2.3 Misery Pit

During the suspension of operations from approximately 2005 to 2011, surface water run-off collected in the Misery Pit. Prior to resumption of mining operations at the Misery Pit in 2011, some of the collected water was pumped to King Pond. Here, the water from the Misery Pit had the opportunity to mix with the volume of water contained in King Pond. The water was then pumped to Cujo Lake when the water met discharge effluent criteria, as laid out in the Water Licence. The pit water may be treated for TSS by an in-line flocculation plant prior to King Pond, if required, but currently, no system is in place at Misery.

During the current mining activities, sumps located in the Misery Pit will collect water and it will be pumped from the pit to King Pond for mixing with natural runoff water and other minewater. The water in King Pond must meet effluent criteria as outlined by the Water Licence before it is pumped into the receiving environment in Cujo Lake.

2.2.4 Beartooth Pit

Prior to 2009, water was pumped or trucked out of the Beartooth Pit to the LLCF. In 2009, the Beartooth Pit ceased mining operations and water was no longer removed from the pit. Beginning in 2009, the mined-out pit was used a minewater retention pond at times when it is beneficial to divert certain wastewater sources away from the LLCF.

Since 2009 the Beartooth pit has been used for retention of minewater that was enriched in nitrate and/or chloride. This was an adaptive management response to enhancing the protection of the environment downstream of the LLCF. Underground minewater, surface minewater from the AN storage facility sumps, and other minewater has been directed to the Beartooth Pit since 2009. This practice will continue on an adaptive management basis as needed and in accordance with the Board's approval.

Version 3.0 of the Wastewater and Processed Kimberlite Management Plan proposed the use of Beartooth Pit for deposition of processed kimberlite. The Processed Kimberlite line from the Process Plant to Beartooth Pit was completed in February 2013. Processed kimberlite has been deposited into Beartooth Pit as required since February 2013.

2.2.5 Pigeon Pit

Open pit minewater from Pigeon Pit water will be collected in the Pit and moved by pipeline to Cell B of the LLCF. The water will flow through the LLCF and be discharged from Cell E to the natural environment when it meets Water Licence Effluent Quality Criteria.

No in pit minewater treatment systems will be used at Pigeon Pit as the water will be pumped to Cell B and move through the LLCF before being discharged from Cell E to the natural environment when the water quality meeting the Water Licence Effluent Quality Criteria.

2.3 Management of Underground Minewater

Water enters the Panda and Koala underground mines from surface via the hydraulic connection to the overlying open pits and through fault zones in the sub-permafrost groundwater regime. The water is managed through a series of sumps that ultimately direct the underground minewater to a single dewatering sump from where it is pumped to surface. Underground minewater is collected in sumps at various levels where it is clarified and then is available for reuse underground as drill water. The underground minewater contains elevated chloride concentrations as a result of the naturally high chloride content of the deep groundwater.

Prior to December 2009, underground minewater was pumped to the LLCF. Beginning in December 2009, an auxiliary piping system was completed that allows the underground minewater to be pumped to the Beartooth pit. This option was identified as a part of the adaptive management alternatives for reducing environmental risks related to elevated chloride concentrations in the minewater. This practice will continue as needed an in accordance with the Board's approval.

A portion of the underground minewater can be pumped to the process plant at times when the elevated chloride content is of benefit to the diamond separation process. This procedure can be used to optimize the use of calcium chloride as an additive in the process plant (Figure 9).

3 Management of Sewage

An enclosed sanitary sewage treatment plant to treat all domestic wastewater was installed at the Ekati Diamond Mine main camp as part of the original site infrastructure construction in 1997. The sewage treatment system has both primary and secondary levels of treatment. The final treated effluent is pumped through an insulated and heat-traced pipeline to the Process Plant where it is mixed with the fine processed kimberlite before being discharged to various cells of the LLCF (Figure 9).

During upset conditions with the sewage treatment plant, raw sewage may be discharged directly to the LLCF for short periods of time after notification to the Inspector.

Sewage collected from the underground operations surface buildings and from the underground workings is trucked to the main camp sewage treatment facility. Sewage generated at remote washroom facilities (e.g.; Fox Pit, Misery Camp and from Pigeon Pit when in operation) is trucked to the main camp sewage treatment facility.

4 Management of Processed Kimberlite

4.1 Diamond Separation Process

A detailed description of the Process Plant operations is contained in Appendix B and provides information on the diamond recovery process.

The diamond recovery process involves three basic steps:

1. Size reduction, washing (scrubbing), and screening;
2. Primary concentration; and
3. Secondary concentration.

Size reduction, washing (scrubbing), and screening

Size reduction involves crushing the kimberlite ore into smaller sized particles to mechanically liberate the diamonds. In this stage of the process, water is used to wash and screen the crushed ore, and also to transport the processed ore (i.e.; processed kimberlite). Waste occurs as:

- Wastewater;
- Coarse Processed Kimberlite (0.5 to 1.2 mm fraction); and
- Fine Processed Kimberlite (FPK) (<0.5 mm fraction).

Water is either recycled within the process plant or is pumped as a FPK slurry to the LLCF. Water is recovered from the LLCF for use in the process plant.

The coarse rejects are trucked to the designated area of the Panda/Koala Waste Rock Storage Area (Figure 3), per the Board-approved *Waste Rock and Ore Storage Management Plan*.

Primary Concentration

This is the first stage of the process that separates the diamonds from the kimberlite ore. Primary concentration involves using Heavy Medium Separation to concentrate the diamonds by physically separating material based on density. Water and Ferrosilicon is used in this process as the separation medium (Ferrosilicon is recycled based on its magnetic properties). The low density material is screened and the solids are generally routed to the coarse rejects waste stream and trucked to the Waste Rock Storage Area. The high density material contains the diamonds and it is rinsed to remove the ferrosilicon and then progresses to the Secondary Concentration.

Wastewater is treated to recover ferrosilicon and water for recycling within the process plant.

Secondary Concentration

The secondary concentration process consists of sorting the material containing the diamonds by magnetism and X-rays. The final stage of separation involves hand-sorting by personnel. The waste streams from this process are water and coarse rejects that are trucked to the designated area of the Panda/Koala Waste Rock Storage Area, per the Board-approved *Waste Rock and Ore Storage Management Plan*.

4.2 Process Water

Water used in the Process Plant is either recycled from within the process plant or discharged to the LLCF, which is than available to be reused.

Figure 9 presents information on wastewater used or recycled by the Process Plant for the calendar year 2013. In summary:

- 5.2 M m^3 of FPK slurry was discharged into the LLCF;
- 4.5 M m^3 of water was reclaimed from the LLCF (Cell D); and
- 79,528 m^3 of treated effluent from the Sewage Treatment Plant was used by the Process Plant to supplement its water requirements.

4.3 Processed Kimberlite

Processed kimberlite occurs in two waste streams, fine processed kimberlite and coarse rejects. The coarse rejects are discussed in the Section on Geochemical Characterization.

The fine processed kimberlite is generated from the washing and screening of the ore and from the Heavy Medium Separation of the ore. The FPK is de-watered or "thickened" in the process plant to recover process water for recycling within the plant. The FPK slurry contains coagulants and flocculants, which are used to recycle the process water (Section 4.5). In some cases, saline water or calcium chloride is added to assist with the settling of fines (extraction of water to 40% solids); after which the remaining slurry is pumped to the LLCF.

Figure 9 presents information on these solid waste streams for 2013 from the Process Plant:

- 0.5 M m^3 of solids (i.e.; FPK <0.5 mm fraction) was deposited into the LLCF.
- 2.8 M tonnes of coarse rejects (i.e.; PK >0.5 mm fraction) was deposited into the designated area of the Panda/Koala Waste Rock Storage Area, per the Board-approved *Waste Rock and Ore Storage Management Plan*.

Within the FPK there is a fraction of material referred to as Extra Fine Processed Kimberlite (EFPK). The material has a high silt and clay content (< 0.1 mm) and remains in suspension longer than FPK. EFPK has different physical properties from FPK (described below).

The coarser FPK (mainly sand sized particles) settles out first to form well-defined sub-aerial and sub-aqueous beaches. This phase accounts for approximately 88 percent by mass of the FPK discharge. The typical characteristics of the FPK include:

- A void ratio of approximately 1.7, which can include up to 15 percent excess ice that is trapped and frozen in the deposit before the water can drain away. This results in an average dry density of 1.05 t/m^3. Efforts are made to rotate FPK deposition between spigots through the winter season to avoid excessive ice entrainment, since the ice otherwise utilizes FPK storage capacity.
- Measured sub-aerial beach gradients ranging from 1.1 percent to 2.7 percent and averaging approximately 1.8 percent.
- Sub-aqueous beach gradient ranging from 4.2 percent to 22 percent and averaging approximately 9 percent.

The EFPK (mainly silt and clay sized particles) that has not settled on the beaches is largely carried into the nearest pond where it settles at the base of the pond as undulating, low density mass that takes substantially longer to settle. Recent test information indicates that the EFPK will settle over time and in the presence of certain physical and chemical conditions. This phase has the following characteristics:

- It constitutes up to approximately 12 percent by mass (30 percent by volume) of the FPK.
- The average void ratio is approximately 9.53.
- The average dry density is approximately 0.25 t/m^3
- Flocculent and coagulants are added in the process plant to facilitate the settling of these very fine particles and to increase overall FPK settling rates. This approach ensures that water can be recycled internally in the process plant and lowers the amount of reclaim water required in the diamond process. Control room operators vary the amount of flocculent and coagulant added depending on the actual settling characteristics of the kimberlite ore being fed to the plant. The process of coagulation involves the aggregation of typically very fine charged clay particles that on their own have very low settling rates. Through the addition of flocculent, these aggregates can combine with other FPK to form “flocs”, larger structures that have higher settling rates and facilitate the recycling of water in the process plant.
- Cone Penetration Testing (CPT) was conducted in October 2010, to investigate the materials in Cell C, including the extra-fine processed kimberlite. The testing consisted of 13 Cone Penetration Test Soundings, 6 Ball Penetration Tests, 1 Vane soundings and 4 soil sample locations. The results found clear water to a depth of about 5 m overlying a soft to firm (7.5 kPa) silt/clay layer, which is interpreted to be EFPK. This layer may have formed during winter as a result of elevated salinity (chloride) in the pool water and relatively low winter water levels. The data and interpretation can be found in Appendix D.
- In comparison with bathymetric surveys from previous years, the CPT data indicates little, if any, EFPK in the upper 5 m of the water column in Cell C. This may be the result of chemistry changes (increased salinity) in the pool combined with the physical effects of ice formation under relatively low winter water levels. Specifically, the temperatures measured in the upper 5 m fluid during the CPT are generally less than zero °C, averaging between -2 and

-3 °C. The elevated salt content may have depressed the freezing point which, combined with lower winter water levels in Cell C in recent years, has enabled improved settlement of the EFPK.

4.4 Processed Kimberlite Geochemical Characterization

The Geochemical Characterization has been included in Appendix E and is summarized below.

Processed kimberlite (coarse kimberlite rejects and FPK) has the same geochemical and mineralogical characteristics as unprocessed kimberlite. This is because the diamonds are a very minor component of kimberlite.

Although processed kimberlite is not potentially acid generating due to its high carbonate content, waters resembling acid rock drainage (ARD) containing elevated TDS have been found adjacent to the Coarse Kimberlite Reject (CKR) Storage Area. The waters appear to be generated by the release of iron under reducing conditions at the contact between CKR and naturally acidic tundra soils. Sulphate is released by oxidation of fine-grained pyrite and remains in solution at high concentrations due to the concurrent leaching of magnesium from silicates and possibly carbonates. CKR is no longer placed directly on tundra and is instead placed on a pre-laid granitic pad (i.e. an example of adaptive management).

The CKR were sampled at least once per month from the surge pile formed at the outlet of a conveyor located at the southwest corner of the Process Plant. Samples are analyzed using the standard Sobek et al. (1978) procedure for acid-base accounting (ABA), including total sulphur, neutralization potential and paste pH, and a metal scan by ICP-ES following an aqua regia digestion.

A detailed summary of geochemical characterization analyses (pre-mining, monitoring program, and additional studies) are presented in Appendix E.

The FPK slurry was sampled from the Process Plant Discharge (PPD), which is the last point within the process plant before the FPK slurry enters the pipe that transports it to the Long Lake Containment Facility. The PPD contains the thickened FPK slurry as well as sewage effluent and mine water. After sufficient time to allow settling, the liquid portion (PPD water) is sampled and analyzed for major ions, pH, con ductivity, sulphate, alkalinity/acidity, total ammonia, hardness, total suspended solids, and a suite of total and dissolved metals. FPK solids are analyzed using the standard Sobek et al. (1978) procedure for acid-base accounting (ABA), including total sulphur, neutralization potential and paste pH, and a metal scan by ICP-ES following an aqua regia digestion. Analytical data for FPK solids and PPD water have not been previously reported. A technical summary of the geochemical characterization of the FPK solids is provided in Appendix E. Analytical data for FPK solids and PPD water are provided in Appendix E.5 and E.6, respectively.

The dominant anions in PPD water are sulphate and alkalinity, and the major cations are magnesium, calcium, sodium, and potassium. Water pH values ranged from 6.5 to 8.8 with an average of 7.6. These samples indicate the combined effects of entrained process water and FPK weathering but could also be influenced by evaporative processes which produce white salt crusts on older areas of the FPK deposits. The *in-situ* pore-water chemistry was found to be dominated by sulphate, magnesium, calcium, and alkalinity. Sodium and potassium were also present in high to moderate concentrations, and pH ranged from 6.7 to 9.0.

Kimberlite is generally not a source of ARD due to its high carbonate content. Minor potentially acid generating zones have been found at the Fox Pipe due to sulphide enrichment, but the quantities are insignificant (<1% by volume). Kimberlite and its waste products are known to leach nickel at neutral pH and seepage may contain higher levels of total dissolved solids due to the effect of oxidation of sulphides producing sulphate and weathering of magnesium rich minerals releasing magnesium. The presence of dissolved magnesium supports higher total dissolved solids (TDS).

It is concluded that processed kimberlite (CPK and FPK) is not potentially acid generating.

4.5 Flocculants

The use of flocculants in the Process Plant has been previously approved by the Mackenzie Valley Land and Water Board. The purpose and benefit of flocculant added is to enhance the settlement of fine processed kimberlite in the process plant thickeners and to some extent the LLCF. This use of flocculant is part of the routine process plant procedures. Calcium chloride addition is also approved and is sometimes necessary to facilitate the settlement of fines when ore is processed containing higher clay contents. Its use is minimized by the provision of chloride-rich underground minewater into the plant. The quantity of chloride introduced into the LLCF through the process plant is minor relative to the underground minewater; hence the adaptive management focus on diverting underground minewater away from the LLCF. Flocculant addition in the process plant is further described in Appendix B.

Flocculant can also be added to other minewater sources on an as-needed or contingency basis. The locations where in-line flocculant plants are installed are the minewater pipeline to the LLCF and the minewater pipeline to King Pond. These in-line plants have been used in past years although neither is currently in use. At this time there is no longer an in-line flocculant plant on the pipeline to King Pond. There are no plans to re-activate these in-line plants in the near future. There is no plan to put a flocculant plant on the Pigeon Dewatering line.

However, the in-line plants are an option for contingency responses. As such, there are no pre-defined numerical criteria for their use in this manner. The determination is, by necessity, based on a case-by-case assessment of risks and trends in water quality. For example, if unusually heavy runoff were to generate unusually high concentrations of sediment in the minewater pumped from Waste Rock Dam to King Pond of a magnitude that posed a risk to the effluent quality discharged from King Pond, then the flocculant plant could be activated to reduce that risk. This would be reported to the Board in the Water Licence Annual Report.

4.6 Long Lake Containment Facility

4.6.1 Facility Description

The Long Lake Containment Facility (LLCF) encompasses Long Lake and the former headwater lakes of Long Lake (Figures 2, 3, and 10). The LLCF is at the headwater of the western Koala Watershed which feeds into the Lac de Gras watershed. The LLCF currently includes the following components (Figure 10):

• ***Cells*** – A, B, C, D, and E. Cells A and C currently receive and store FPK and wastewater. Cell B is no longer receiving FPK but still receives wastewater. Cell D is used as a polishing pond that may receive FPK in the future and Cell E provides surge water storage capacity for surplus water and acts as a finishing pond prior to pumping and discharging into the receiving environment. Cell E will not receive FPK.

• ***Dikes*** – B, C, and D (designation corresponds to upstream subtended cell). These filter dikes are designed to retain FPK solids within the upstream cell but allow water to filter through to the downstream cell. These dikes will provide secure storage of processed kimberlite in the future. The filtering action of the dikes is anticipated to progressively slow as FPK accumulates on the upstream face. Dike B is considered to be effectively sealed and water transfer from Cell B to C flows through a culvert. Dike C is considered to be partially sealed and water transfer from Cell C to D is augmented by pumping, if and when required. Dike D is not affected by FPK but water transfer from Cell D to E is augmented by pumping as required to safely manage pond water levels.

• ***Dams*** – The Outlet Dam serves as the downstream water control structure at the outlet of Cell E which retains water until sampled, authorized and pumped to the receiving environment. The Spillway Dam and East Dam (east side of Cell D, Figure 12) have been assessed and are permitted as water management contingencies but have not been constructed. The East Dam and/or the Spillway Dam would be constructed only if alternative water storage options in the LLCF are not available and a long lead time of several years were available.

• ***Water Pumps*** – Pumps on the upstream side of Dike C are used to pump water from Cell C to the reclaim barge in Cell D when required. The Reclaim Water Barge in Cell D pumps water to the process plant. Pumps at Dike D seasonally assist transfer of the water to Cell E. Pumps in Cell E transfer water that meets Water Licence discharge criteria into Leslie Lake.

• ***Access Roads*** – Roads are located along the north side of Cell A, around the perimeter of Cell B and the east and south sides of Cells C and D. The Fox pit road extends from the plant to the Outlet Dam. The Cell C West road was completed in September 2012 and the Cell A South road is under construction.

• ***Powerlines, Pipelines, and Discharge Spigots*** – These are used for the delivery of the FPK slurry along the access roads from the process plant site. These run along the east and north side of Cell C, the north side of Cell A, and the west side of Cell B (Figure 10). Powerlines, pipelines and discharge spigots have not yet been installed on the Cell C West road and the Cell A South road. These will be installed starting in 2014. Powerlines have been installed as far as the Outlet Dam. Electric pumps are used to pump the water from Cell E to Leslie last to reduce environmental risks associated with diesel pumps.

• ***Drainage Channels, Diversion Channels, and Diversion Berms*** – These have been assessed and permitted, but not constructed. The permitted structures include the East Diversion Channel external to the east side of Cells B and C has not been constructed and is part of the *Interim Closure and Reclamation Plan*.

4.6.2 Water Management

Figure 13 (Operational Water Levels) is provided to identify the projected water levels of the cells within the LLCF to the life-of-mine. These predicted elevations are dictated by the maximum containment facility elevations, less 1 metre of freeboard as required by the Water Licence. Operationally the Ekati Diamond Mine typically manages the water elevations 0.5-1.0 m below the maximum allowable freeboard limit for contingency purposes; such as spring freshet or rain events.

4.6.3 Cells A, B and C

The levels of water in these cells is monitored and water is pumped as required to maintain the 1 m of freeboard required by the Water Licence; especially during spring freshet conditions or rain events.

Water is sometimes pumped from Cell C to the intake of the Reclaim Water Barge in Cell D (Figure 10). This water is recycled to minimize the use of fresh water in the Process Plant.

Dike B has become sealed by the FPK and EFPK in that cell, and little water filters through the dike from Cell B into Cell C. There is a heat-traced culvert in Dike B to allow a normal transfer of water from Cell B into Cell C to assist in maintaining the 1 m freeboard. During the period of the freshet, pumps may be located on Dike B to pump water over the dike into Cell C if necessary.

The design of Dike C provides for raising the filter zone (upstream side) by 2 m to a nominal crest elevation of 461 m asl. This raise is planned to be completed in future and may be undertaken in 2 stages of 1 m each. The appropriate timing to complete the raise(s) will be determined based on operational needs, with consideration of the desired long-term water levels and water management strategy for closure.

4.6.4 Cell D

A Reclaim Water Barge is located at the north end of the cell (Figure 10), which pumps water from Cell D to the Process Plant. The reclaim barge is located in Cell D to provide adequate quality (i.e.; clarity) and quantity of water (about 4.5 M m^3) for diamond processing. Water may be pumped from Cell C to the intake of the reclaim barge. Pumps located on Dike D pump water over the dike into Cell E. This maintains 1 m of freeboard against Dike D. The pumping is usually necessary to supplement the exfiltration of water through the dike from Cell D to Cell E. In Figure 13, no changes to Cell D are foreseen regarding raising containment levels.

4.6.5 Cell E

The crest elevation of the Outlet Dam is 458.75 m for the frozen core element of the structure and the top of rock is 462.75 m. It ensures water does not exit from the LLCF into the receiving environment until it is sampled and proven to meet discharge criteria. When the water meets discharge requirements, it is pumped into Leslie Lake. Pumping rates are up to 2.55 m^3 per second from 1 May to 31 July, and 0.52 m^3 per second at other times (approximately 6-8 M m3 annually). The water level is maintained less than 449 m to maintain 1 m freeboard against Dike D. In Figure 13, no changes to Cell E are foreseen regarding raising containment levels.

4.7 Beartooth Pit

Beartooth pit is a relatively smaller sized open pit located approximately 3 km from the process plant to the north of and adjacent Panda pit. Mining operations in Beartooth pit ceased permanently in 2009. Since 2009, the mined-out pit has been used as a minewater retention pond at times when it is beneficial to divert certain waste water sources away from the LLCF. This was approved by the WLWB in April 2009.

Beginning in 2009, surface minewater from the AN Storage Facility, Polar Explosives and underground minewater from Panda and Koala has been directed to Beartooth pit. The diversion of this water away from the LLCF is a key part of DDEC's current adaptive management response to elevated nitrate concentrations in the LLCF water and to the risk of future elevated chloride concentrations in the LLCF water. These measures assisted in reducing potential effects in the receiving environment downstream of the LLCF.

It is not certain how long into the future the diversion of underground minewater to Beartooth pit will be implemented. This determination will be based on an ongoing assessment of current and projected water quality trends in the LLCF water in regards nitrate and chloride. Other parts of the nitrate/chloride adaptive management response are working towards reversing the recent trend of increasing concentrations in the LLCF with the intent that some or all of the underground minewater might, in future, be returned to the LLCF and ultimately discharged safely to the environment.

The use of Beartooth Pit as a storage location for processed kimberlite was proposed in Version 3.0 of the Wastewater and Processed Kimberlite Management Plan. This was approved by the WLWB in October 2012. Deposition of processed kimberlite commenced in February 2013 and is ongoing.

DDEC reports on the use of Beartooth Pit in each Annual Report under the Water Licence.

4.8 Processed Kimberlite Deposition Plan

4.8.1 Background

All of the FPK produced to date has been deposited into the Long Lake Containment Facility, apart from a relatively small amount of test and start-up FPK deposited into the Phase 1 Containment Area (closed in 1998) and the processed kimberlite deposited in Beartooth since February 2013. . The LLCF comprises the basin and structures that are designed to contain Fine Processed Kimberlite (FPK) and other Waste as defined by the Water Licence and this Plan (Figures 2, 3, and 10). The LLCF was designed to safely contain all of the anticipated FPK for the mine and to provide for acceptable water quality according to operating and environmental protection requirements.

The operating approach for the LLCF was reviewed and refined through a consultative process that was undertaken in 2004 and 2005. The objectives of the review were to:

- Categorize the FPK deposit that had developed in the LLCF as a consequence of the depositional plan and review management practices implemented to date.
- Identify opportunities for the optimization of the LLCF management system which would improve operational costs, reliability, and mitigate potential operational and closure environmental effects.

The review included the following activities:

- Review operational practices, deposit geometry, and volumes to identify lessons-learned from five years of LLCF operation.
- Survey FPK dry beach and bathymetry to measure beach angles above and below water.
- Undertake a geotechnical investigation of the FPK deposits on the beaches and in the ponds; characterize ice entrainment, permafrost development, and the distribution of extra fine processed kimberlite (EFPK) in the LLCF.

Alternative operation and development options were presented to Ekati Diamond Mine stakeholders during a series of three meetings in 2004 and early 2005[1]. The meetings, facilitated by Robertson Geoconsultants, were attended by DDEC staff, consultant, regulators, Aboriginal Affairs and Northern Development Canada (AANDC), Environment Canada, Government of Northwest Territories (GNWT), Aboriginal community representatives and Independent Environmental Monitoring Agency (IEMA) participants.

At that time a number of operating strategies were assessed and one approach (Option 3aM) was selected as the collectively preferred approach. Option 3a was identified as the preferred alternative. Option 3aM is a modified alternative of Option 3a that accounts for information obtained subsequent to the MAA and in particular the requirement to provide adequate space for storage of the EFPK. The achieved objectives of Option 3aM include:

- Maximize use of the volume in Cells A, B, and C to minimize the footprint of the stored FPK deposit, taking into account the geometry of beaching and the need to store EFPK.
- Delay discharge of FPK to Cell D for as long as possible.
- Develop a FPK delivery and discharge system that is simple and robust for winter operating conditions and which minimizes ice entrainment.
- Create topography landforms with stable topography suitable for reclamation.
- Minimized internal catchment areas to lessen concentrated flow across the beach.
- Diversion facilities will be optimized, where feasible, to preclude concentrated flow from external catchment areas flowing onto the beaches.
- Internal ponds will be established to limit erosion of the EFPK and provide settling.
- Minimize the potential need to construct additional perimeter dams, such as East Dam and Spillway Dam by raising Cell C and constructing diversion ditches, and thereby minimize the need for long-term monitoring and maintenance of such structures.
- Provide for water management of flow through the LLCF over the long term, recognizing that EFPK will accumulate and will continue to restrict flow through the dikes.
- Provide flexibility for managing future water quality within the operational, closure, and post-closure phases.

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[1] **5-Year Performance Review of: Ekati Mine Processed Kimberlite Containment Facility And Assessment of Options for Optimized Future Development; Summary Report on the Evaluation of Ekati Long Lake Containment Facility Five-Year Review Multiple Accounts Analysis, July 4, 2005.**

Option 3aM required the construction of access roads that incorporate the support pads for the FPK distribution pipelines and discharge spigots for the west side of Cell B and north side of Cell A.

- In 2007 the Cell B west access road was constructed along the west slope above Cell B. This west access road and pipeline allowed renewed deposition into Cell B from west to east using the high ridge that bounds Cell B to elevate the spigot points. This approach increased the volume of FPK that would be stored in Cell B.
- In 2008/09 the access road on the north slope of Cell A was relocated upslope from its previous elevation to a higher elevation. This provided a higher platform for the discharge spigots. This location incorporates most of the area of the catchment on the north side of the impoundment and increases the volume of FPK that can be placed in Cell A. The previous access road at the lower elevation will be covered by the new beach that forms on the slope below the new road. During 2010 the dike at Cell C was raised to 459 m.
- Spigots are installed with valves allowing discharge to be directed from any spigot simply by opening or closing the appropriate valves. The valve system is installed and protected from the weather to allow year-around independent operation of the spigots with the capability to alternate flows in accordance with the deposition plans.

The water management conceptual model is presented in Figure 9, which identifies water sources and flows into and out of the LLCF. The current operating considerations for the LLCF are:

- Make the most effective and efficient use of the available storage volumes in Cells A, B and C to defer, as long as is practical, the deposition of FPK into Cell D.
- Contain turbid water and recycle clarified water for the process plant.
- Discharge to the environment surplus water that complies with the discharge criteria established in the Water Licence and ensure no significant adverse environmental effect occurs to the downstream environment.
- Manage the EFPK such that it does not hamper operational or environmental plans.
- Provide every practical opportunity to maximize progressive reclamation by adopting FPK deposition and runoff water management strategies that generate a stable landscape during and after the operating phase of the project. This includes the geotechnical stability of the processed kimberlite (FPK and EFPK) and its ability to support various covers which may include waste rock, vegetation, or water.
- Manage the facility in a safe and professional manner in accordance with relevant water licence requirements, safety guidelines and best practices.

4.8.2 Deposition Plan

In 2011, the deposition plan was optimized through an evaluation of options undertaken with Robertson Geoconsultants and presented in the report titled Ekati Mine 2011 FPK Deposition Alternative Study found in Appendix D. This deposition plan is currently being used and no changes have been made since 2011.

Regardless of remaining capacity in Cells A and C, new deposition locations were required in the short term. Diligent planning for a large deposition plan such as Ekati Diamond Mine's relies on the effective sequencing of deposition locations in a manner that avoids bottlenecks and provides contingency options. In particular, it is necessary to deposit the FPK in thin lifts in the winter time to minimize entrained ice and maximize storage capacity. This requirement involves both a primary and secondary discharge location. A summary of the storage requirement as of 2011 is listed in the table below.

Table 3: Storage Requirements 2011

Requirement for Recommended Deposition Plan	Already Available	Additional Capacity Required		
Implementable 35M m^3	15M m^3	20M m^3	-----	-----
Feasible 20M m^3	-----	-----	20M m^3	-----
Conceptual: Quantity Unknown	-----	-----	-----	Potentially Large

Notes:

[1]The volume that is available for FPK deposition in Cells A, B and C under the current configuration of roads and pipelines from summer 2011 onwards.

[2]The volume required, additional to that shown at left, to meet the study objectives.

To facilitate a comparative evaluation, the options described in the Ekati Mine 2011 FPK Deposition Alternatives Study found in Appendix D were evaluated based on the following:

- FPK storage volume – considers relative FPK storage volumes created.
- Implementation – considers relative construction and operating complexities and timeframes.

- Environment – considers relative environmental uncertainties and risks, primarily concerned with water quality during operations.
- Closure – considers relative closure uncertainties and risks.
- Costs – considers relative scope of capital, operating and closure costs.

The options evaluation indicated that the only option that can singly accommodate FPK deposition to the end of the current life of mine is the use of Cell D without internal dike. Several other options scored higher, however, in the rating and are preferred on that basis.

Several options have been assembled in an approach and sequence that provides for FPK deposition through the remainder of the current life of mine. This approach provides a number of benefits, most notably continuing to defer, and possibly eliminate, the use of Cell D for FPK deposition. The ultimate need to use Cell D will depend on the effectiveness of the other options.

The selected sequence of options also increases the operational flexibility for FPK deposition over different areas. Upside potential, expandability and contingency options will ensure that the Ekati Diamond Mine does not fall unexpectedly short of FPK storage capacity. The selected sequence of options is summarized below and is described in detail in Appendix D.

Table 4: Deposition Sequence

Option Description	Volume
1. Continue in Cell A North, Cell B West and Cell C North	15 Mm^3
2. Beartooth Pit (secondary FPK stream)	7 Mm^3
3. Dike C Raise / Cell C West	6 Mm^3
4. Cell A South	4 Mm^3
5. Cell C East	2 Mm^3
TOTAL	**34 Mm^3**
6. Cell D (without intermediate dike) as Contingency during Life of Mine and as feasible beyond Life of Mine	
7. Fox/Panda/Koala Pits feasible beyond Life of Mine	

Cell A, B and C

The plan includes continuing FPK deposition according to the existing procedures and locations, focussing primarily on Cell A (north side) and Cell C (north side). Deposition into Cell B (west side) was completed in 2013 and no more processed kimberlite is being deposited in to Cell B.

Beartooth Pit

The Beartooth Pit is no longer mined. The portion of the kimberlite pipe that extends below the depth of the open pit was evaluated and assessed as not economically feasible to mine. Therefore, Beartooth Pit is now used for deposition of processed kimberlite as approved by the WLWB since February 2013.

Beginning in late 2009, underground minewater and some surface sump water have been pumped into the Beartooth pit as a means of diverting nitrate and chloride-rich minewater away from the LLCF. It is assumed that this water will continue to be directed to the Beartooth but water from Beartooth Pit may be directed to the LLCF to maximize the storage potential for processed kimberlite. This is a benefit to a FPK deposition option because the elevated salinity is considered a settling aid for EFPK. An operation freeboard of 455 masl (2 m below the overflow elevation of 457 m) has been established for the Beartooth pit.

The initial Environmental Assessment of the Ekati Diamond Mine planned for depositing FPK into open pits and conceptualized a 30 m deep cover of clean water over the FPK for closure. Therefore at closure the maximum height of FPK would be 427 masl. This depth of water (30 m) is considered to be potentially over-conservative to protect against long-term risks. The most appropriate depth of water for closure could be technically optimized in future through environmental and engineering studies. Processed kimberlite will not be removed from Beartooth Pit and the water and quality in the Pit will be managed as per the plan discussed in this Section.

DDEC considered if it was possible to remove the processed kimberlite from Beartooth Pit in the future, and as part of the evaluation to use Beartooth Pit, determined it would not be feasible to remove the processed kimberlite. Beartooth Pit was selected for the environmental, closure and operations benefits and therefore there is no reason to consider removing the processed kimberlite. Removing the Processed kimberlite would require access to the Pit and additional pumping of a slurry material. Hauling would require access to the Pit with heavy equipment and special trucks. Beartooth Pit was originally abandoned due to the safety of equipment working in the bottom of the Pit.

The concept of completely filling Beartooth Pit to surface with FPK is not considered here as this would necessitate major changes to the closure plan for Beartooth pit, which is not in the scope of this Plan.

The total volume of Beartooth Pit to the freeboard water elevation (455 masl) is approximately 12M m^3. Approximately 5M m^3 of minewater may be pumped into the pit through the life of the mine (including what has already been pumped to date). This indicates a conservatively available storage capacity for FPK of 7M m^3. The nominal elevation of the FPK surface in this case would be approximately 413 m, more than 30 m below the full level and well within the desired constraint for closure. The estimated storage volume of 7M m3 is a conservative estimate that might be bettered if the anticipated settlement of FPK and the anticipated future out-pumping of minewater to the LLCF are achieved. It is anticipated that FPK settlement will be good with negligible sediment in the supernatant waters. This is also an important consideration for operating recycle water pumps.

During the operation phase of Beartooth Pit as a wastewater and processed kimberlite deposition area, water can rise up to a maximum elevation of 455 masl (2 m freeboard from spill-over elevation). A higher in-pit water level (below the 2 m freeboard requirement) will assist with maximizing the deposition and settlement of FPK. As the in-pit water level approaches maximum, water will need to be removed from the pit to provide storage space for FPK. This will be accomplished by pumping water from Beartooth Pit to the process plant for recycle and/or release to the LLCF in a controlled manner. Once in the LLCF, the Beartooth pit water will mix with other waters and the inflow can be managed such that the effluent quality criteria applicable at the outlet of Cell E are achieved. The pumping may begin around 2016, depending on the rate of filling observed in the pit.

The pertinent aspects of the Beartooth pit operating plan are illustrated on Figure 11 as follows:

- Process water is recycled within the process plant and between the LLCF and the process plant according to current practices;
- Underground minewater is pumped to the Beartooth pit throughout the mine life;
- A portion (estimated 33%) of the FPK from the process plant is planned is pumped to the Beartooth pit; and
- Water is withdrawn from the Beartooth pit for recycle and release to the LLC F beginning around 2016 to maintain the necessary freeboard in Beartooth pit and to enable full utilization of potential storage capacity for FPK.

Following completion of FPK deposition (i.e., FPK to 30 m below pit overflow), minewater could be pumped out of Beartooth Pit and replaced with freshwater if necessary to achieve closure water quality criteria. Water could be pumped to the LLCF for controlled discharge or to the Panda open pit.

The implementation of this option involved the construction of pipes and installation of pumps to convey the FPK from the process plan to Beartooth Pit, and later, recycle water to the process plant. The length of the line is approximately 4.5 km and was built between August 2012 and February 2013. A recycle water barge/pump would be required when the in-pit water level has risen to an elevation that can be safely accessed.

Cell C West/Dike C Raise

Accessing storage capacity in the western area of Cell C will be achieved by constructing an access road starting from the west end of Dike C and running north on the western side of Cell C. The general elevation of the road would be 471 m. The construction of the Cell C West road was completed in September 2012. Spigots will be installed at selected locations, particularly where the topography juts out into the cell area. Jetties will be constructed as required, similarly as has been done in other areas. The filter zone (upstream side) of Dike C will be raised by 1 to 2 m in future as the operational needs become defined. The combination of the Dike C raise and the Cell C west road will create an estimate 6 M m3 of storage capacity.

Cell A South

A new access road and pipeline will be constructed on the south side of Cell A, continuing from the end of the proposed Cell C West access road. The construction for the Cell A South road was started in September 2012 and is continuing as material becomes available. As the existing Cell A north access road and pipeline is at a similar elevation, deposition would be controlled in the same way on both sides of the cell. It will be important to avoid building up a beach that might result in the backup of material in the west end of cell A. Deposition from both the north and a new south road will result in the formation of a low area near the center of the cell and this will ultimately become the post-closure drainage routing for runoff within the local catchment.

Cell C East

The available capacity of Cell C can be increased by the construction of a new road and deposition pipeline on the east side of the cell (adjacent to the Waste Rock Pile). This option is already a part of Option 3a as selected during the 5-year review. The new road would be constrained to the east by the Koala/Panda waste rock storage area. Cell C will be extended to the east up to the toe of the existing waste rock storage area. This option may require the raise of Dike C as discussed above. This re-alignment would provide approximately 2M m3 of additional capacity.

4.8.3 Timeline of Deposition Plan

The following is the recommended timeline for the deposition plan discussed above:

Stage 1 (current deposition and continuing)

- Utilize the remaining capacity in Cells A and C under the current operating configuration.
- Utilize Beartooth pit for deposition of secondary FPK.

Stage 2 (current construction continuing)

- Install pipeline and infrastructure on the completed Cell C West road.
- Construct the Cell A south road/pipeline and, possibly, the Dike C raise for primary FPK deposition.

Stage 3 (1 to 2 years and continuing)

- Construct and bring online the Cell C east road /pipeline on an appropriate schedule based on the continual assessment of deposition needs.
- Assess deposition status in all areas and adapt the deposition plan accordingly to prioritize the full utilization of Beartooth pit. A reclaim water line will be required to re-use effluent water and provide storage capacity for FPK.
- Maintain the Cell D (without dike) option as contingency again unforeseen events.

Stage 4 (3+ years)

- Assess the final FPK deposition needs and whether the options developed above are adequate for the Life of Mine Plan.
- If the options developed above are not adequate, conduct an assessment of the Panda/Koala Pit option for final FPK deposition, and implement the selected option.

The 2011 Deposition Plan is still the current plan in place and is on-track with focusing on using and optimizing Cells A and Cell C and using Beartooth Pit.

4.9 Operating Risks and Uncertainties

Sound management of the FPK deposition plan requires consideration of performance uncertainties that may arise from mine operations and natural events. For example, although all of the mined kimberlite pipes at the Ekati Diamond Mine have been thoroughly tested, the kimberlite ore mined from one particular pipe may contain an unexpectedly high concentration of a potential contaminant that is released to the LLCF. There have been specific examples of unexpected issues of this nature such as nitrate in the LLCF water.

The very nature of these uncertainties precludes a pre-determined response plan because one does not know what the risk is until it is identified. Instead, the ongoing cycle of monitoring and review of information will be used to identify trends and to then develop the most appropriate response plan based on the circumstances at hand.

The current adaptive management response to nitrate in the LLCF water is an example of this approach. Monitoring and review work identified nitrate as a potential risk to water quality downstream of the LLCF. An adaptive management response was then developed and implemented, which included the diversion of underground minewater to Beartooth pit and the development of Site Specific Water Quality Objectives for nitrate.

At time of submission, DDEC has submitted an Aquatic Response Framework as per the Water Licence to link the results of the Aquatic Effects Monitoring Program (AEMP) with actions necessary to ensure that project-related effects in the receiving environment remain within an acceptable range.

Initial environmental testing of the Fox kimberlite provides a different example of this approach. Prior to and during the initial stages of mining of the Fox kimberlite, testing indicated that there could be a risk of elevated concentrations of certain metals released to the LLCF water through the processing of this ore. This information was circulated to the (Mackenzie Valley) Land and Water Board at the time. The subsequent years of monitoring work, as reported to the WLWB in the annual AEMP and Water Licence Reports, have shown that the initial testing was overly conservative and that the potential risk did not materialize into an observed trend in the monitoring information. In this example, the monitoring and review work continues and contingency measures have not been required.

4.9.1 Water Quality

There are currently no anticipated water quality upsets in the mine plan beyond those that have been previously identified and that are being addressed.

Minewater within the Beartooth Pit is not required to be compliant with the Water Licence. However, the in-pit water quality is of interest because of:

1. Risk of elevated suspended sediment in the water column overlying settled FPK to the extent that the ability to recycle the water for use in the process plant is compromised;
2. Risk of poor quality water during operations to the extent that water pumped from Beartooth pit to the LLCF during operations causes non-compliance at the outlet of Cell E or adverse environmental effects in downstream lakes; and
3. Risk of poor quality water after mine operations to the extent that pit lake water quality does not meet the water quality criteria for closure.

Item number 1 above is an operational risk. This will be addressed through day-to-day operational monitoring and management. The risk and a determination of water suitability for recycle use in the process plant are managed by process plant operating personnel.

Item number 2 above has been assessed using the previously developed LLCF Water Quality Prediction Model. The model was expanded to include input from the Beartooth

Pit and also to provide a prediction for receiving lakes downstream of the LLCF (i.e., Leslie to Slipper Lakes). A report on the modelling results, *Ekati Diamond Mine Water Quality Modelling of the Koala Watershed April 2012*, is provided as Appendix F. The report was prepared by ERM-Rescan. Water quality in the Beartooth Pit during operations was estimated based on the anticipated inflows and qualities of underground minewater, FPK slurry water, and natural runoff/precipitation. Chloride is used as an illustrative example of the influence of Beartooth pit water on water quality in the LLCF (Figure 16). Figure 16 shows modelled Cell E effluent water quality for three cases: 1) base case (the Beartooth pit operating plan described herein); 2) underground minewater and FPK slurry flow completely to the LLCF (i.e., no diversion or pumping of either to Beartooth pit); and 3) only underground water is diverted to Beartooth pit. The comparison indicates that the use of Beartooth pit as described herein improves water quality through reduced effluent concentrations during operations. The risk is managed through the established monitoring of water quality both in Beartooth pit and in the LLCF. The report in Appendix F provides complete descriptions and results of the predictive model.

Item number 3 above is addressed through the Interim Closure and Reclamation Plan, in part through the Reclamation Research Plan for Pit Lakes Water Quality Modelling. The water quality criteria for Beartooth Pit Lake after closure are being determined and the risk will be assessed and managed on that basis.

In the event that any of these risks materialize to the extent that additional actions are required, those actions would be determined at the time based on the circumstances at hand. Those actions could include:

- flocculation in the pit to enhance settlement of suspended solids;
- suspension of out-pumping activities to provide additional time for settlement;
- flocculation and/or clarification of recycle water within the process plant;
- pumping of pit water directly to the LLCF for discharge (provided that effluent water quality in Cell E was not compromised);
- pumping of water into Panda pit (provided that it was safe to do so with regards to activities in the underground mine); or suspension of FPK deposition into the pit, either temporary or permanent.

4.9.2 FPK Storage Capacity

There is uncertainty regarding the volume of FPK that can be deposited into a given area. In the cells of the LLCF this is governed to a large degree by the beach angles, which are, in turn, governed by various physical and operating parameters. This uncertainty is managed through monitoring, refinement of operating procedures where needed, and adjustment of expectations where appropriate. This monitoring is on-going at the LLCF annually. The open pit options, particularly Beartooth because of its smaller size and absence of underground workings, provide better constraint on this uncertainty because the deposition area is confined and much less affected by beach angles.

If Cells A, B, C, and Beartooth Pit are filled sooner than currently anticipated because of increased FPK production tonnages, increased percentages of EFPK, or because of lower in-place EFPK and FPK densities, deposition of FPK into Cell D will begin. Notification, accompanied by an assessment of deposition options that will include assessment of the Panda/Koala open pits, will be provided to the WLWB at least one-year prior to the anticipated start of FPK deposition into Cell D.

4.9.3 Settlement of EFPK

The rate of settlement and consolidation of EFPK is an uncertainty at this time. The monitoring information (CPT field tests) described in this report and in Appendix D indicates good settlement of EFPK in Cell C of the LLCF, likely linked to pond water salinity and effects of ice formation under constrained, shallow-water conditions. This indicates that continued FPK deposition into Cells A, B and C can be undertaken with good EFPK settlement anticipated. The uncertainty increases dramatically when considering FPK deposition into Cell D because the same conditions will not be present. The salinity in Cell D water will be less than Cell C and ice formation will not be a factor because of the large size and depth of Cell D. This creates the risk of excess sediment in the water of Cell D.

In Beartooth Pit, settlement of EFPK is expected to be good due to the elevated salinity, the constrained physical setting and the ability to manage water levels once accessible for pumping. A monitoring program as per the Water Licence will be conducted when there is safe access to Beartooth Pit. Additionally, the limit to final FPK height of 30 m below pit overflow preserves a surface water body considered to be of at least sufficient depth to protect the surface environment over the long term. EFPK settlement was a factor considered in the evaluation of deposition alternatives (Appendix D) and is one of the reasons why all options were evaluated as better than the previous deposition plan (Cell D without intermediate dike).

During operations, monitoring FPK settlement and water clarity in FPK deposition areas will direct day-to-day operational management of the facilities. Planning for the long-term management of EFPK through closure and reclamation is being undertaken by DDEC through the ICRP.

4.10 Wastewater and Processed Kimberlite Performance Monitoring

4.10.1 Water Quality and Aquatic Monitoring Programs

Monitoring of the quality of many of the wastewater streams is required by the Water Licence to determine constituent concentrations and composition trends of the water. The results from such monitoring are used to plan management strategies.

Water monitoring is conducted under the Surveillance Network Program (SNP). The SNP is focused on point source discharges (such as the effluent from the LLCF and King Pond Settlement Facility) and key internal locations (such as the cells of the LLCF). Sampling protocols are described in a Quality Assurance/Quality Control Plan. Water quality, water acute toxicity testing, and flow measurement locations, frequency, and analytical schedules are described in the SNP section of the Water Licence. Results of the SNP monitoring are reported to the WLWB monthly and in the Water Licence Annual Report.

Water monitoring, and other aquatic and fisheries monitoring, is also conducted under the Aquatic Effects Monitoring Program (AEMP). The AEMP monitors the aquatic receiving environment for any changes that may result from mining activities. Under the AEMP, a series of potentially affected lakes and streams, along with reference stations are monitored for a suite of aquatic parameters. The sampled lakes and streams include the environment downstream of the LLCF to Lac de Gras and the environment downstream of the King Pond Settlement Facility to Lac du Sauvage. Results of the AEMP monitoring are reported to the WLWB annually.

As required in the Water Licence, DDEC has prepared and submitted to the Board an Aquatic Response Framework to link the results of the Aquatic Effects Monitoring Program (AEMP) with actions necessary to ensure that project-related effects in the receiving environment remain within an acceptable range. In the proposed framework, the results of the AEMP will be incorporated into an “early warning” system with defined action levels that will allow DDEC to monitor and respond to any change in the receiving environment prior to significant environmental impact occurring.

Monitoring of seepage from the Waste Rock Storage Areas is conducted under the Seepage Monitoring Program, which is a requirement of the Water Licence. Seepage flows are monitored twice per year (freshet and fall) and results are reported in the Water Licence Annual Report and the 3 year Seepage Monitoring Report.

4.10.2 FPK Deposition Monitoring

The Ekati Mine is leading the development of an understanding for FPK properties and the complex operation of a large FPK storage facility in an arctic environment. FPK management adapts to changing conditions. FPK properties have been found to differ among ores from different kimberlite pipes and kimberlite phases within a given pipe.

Also, the geometry of the beached deposits and properties of the EFPK deposits in ponds resulting from different ores can vary.

The depositional monitoring information collected to date (Appendix D) has confirmed the fundamental operating parameters and the fundamental depositional plan that was determined through the collaborative 5-year review that was conducted in 2005 (Section .4.8.1). The refinement of this approach that is represented in the options analysis in Appendix D is also based on the monitoring information. The depositional monitoring information is also useful in DDEC's day-to-day management of the facility as regards, for example, scheduling various spigot locations and maintenance activities.

Operational monitoring of FPK deposition includes:

- Twice per 12-hour shift visual inspection of the current discharge locations and the road-accessible perimeter of Cells A (north road), C (east road) and Beartooth Pit pipeline.
- Recording of daily processing rates and tonnages pumped to the LLCF. Records of pumping times and flow rates to individual spigots.
- Periodic surveys of the beaches and bathymetry to determine deposit geometry and enable refinements to the day-to-day deposition sequencing.

Periodic geotechnical investigations of the deposits to determine the deposit characteristics required to evaluate the effect of deposition strategy on ice inclusion and the geotechnical properties of the deposits.

4.10.3 Beartooth Pit

Environmental Monitoring

The quality of water in Beartooth pit during mine operations is of interest to operational management of the facility and long-term planning.

The quality and quantity of underground minewater pumped into the Beartooth pit is monitored monthly and reported to the Board in the Annual Water Licence Report. The quality and quantity of other sources of minewater entering Beartooth pit are also tracked and reported individually.

Monitoring of water quality within the pit will be conducted twice per year, once under-ice and once during open water season as per the Water Licence, when there is safe access to Beartooth Pit. Two water samples will be collected, near surface and at depth, and analyzed for a broad suite of parameters. Additionally, a continuous water column profile will be obtained using a Sonde or similar submersible probe that provides parameters such as pH, temperature, dissolved oxygen and conductivity. The sampling and monitoring program will be refined and updated as information is collected in Beartooth Pit. This information will be reported to the Board in the Annual Water Licence Report.

The water elevation in Beartooth pit will be surveyed twice per year, once in spring after ice-off and once in fall prior to ice formation. The surveyed elevations can be used to verify water balance projections. This information will be reported to the Board in the Annual Water Licence Report.

Portions of the Beartooth pit wall are known to be physically unstable and subject to rock falls. To date, safe access to the pit bottom has not been possible due to safety concerns in the absence of the active ground control measures that were utilized during mining. As well, deposition of processed kimberlite is on the ramp, making access unsafe. The specific approval of the Ekati Diamond Mine technical services (geotechnical) group is required prior to any access into the pit. Therefore, in-pit monitoring of water quality or other items will commence once the safety of Ekati Diamond Mine personnel is assured.

Permafrost

Prior to the approval and use of Beartooth Pit for minewater retention, DDEC assessed the potential for an operational safety risk to workers in the (then) active Panda underground mine as a result of ground thaw related seepage between the Beartooth Pit and the underground mine (with full recognition that there are many additional factors that would also affect the level of risk such as the presence/absence of transmissive fault zones). An analysis was conducted by EBA Engineering Consultants (and circulated to the WLWB) that determined that the rock mass will not become thawed during mine operations. Additionally, there are no known connecting features such as fault zones and, therefore, even under thawed conditions seepage would need to travel through granite rock. Water flows in the Panda/Koala underground mines are monitored such that increasing trends would be identified and responded to. Water volumes pumped from the underground mines is reported to the Board in the Annual Water Licence Report.

The plan for closure and reclamation of the Beartooth Pit is for the pit to be filled with water, which will affect the permafrost surrounding the pit to some degree. In this sense, the partial filling of the pit with minewater during operations does not introduce any new risks or implications for permafrost around the pit beyond the operational safety risk described above. That is, the pit was always intended to be filled with water and this is now taking place during operations rather than closure. The long-term (i.e., closure and reclamation) considerations related to permafrost around the pit once it is filled with water are addressed through the *Interim Closure and Reclamation Pla*n (ICRP) itself.

A string of thermistors were installed in a deep borehole located between the Beartooth and Panda pits in 2009 as part of the initial investigations for using Beartooth pit as a minewater retention pond. The thermistor readings provided good validation of the depth of permafrost adjacent Beartooth pit. The installation was difficult and the thermistor string is no longer operational. There is currently no determined need for replacement of this thermistor string.

4.10.4 Special Studies

Special studies are conducted periodically to investigate specific issues. These are reported to the Board as appropriate.

A special study was conducted by Roberston Geoconsultants to determine the processed kimberlite deposition options discussed in this report. The Robertson Geoconsultants' report is attached in Appendix D.

The LLCF Water Quality Prediction Model (Appendix F) is an example of a recent special study to assess the implications of the Beartooth pit operating plan. This study is updated approximately every two years or as required.

4.10.5 Dams and Dikes

LLCF dams and dikes undergo an annual professional geotechnical inspection in accordance with the Water Licence. This is reported annually to the Board. The dikes have been found to be performing as anticipated. Similar inspections occur with the dams and structures associated with the Misery operation, as per the requirements of the Water Licence.

Ground temperature of all frozen core dams constructed at site has been monitored since their construction and will continue to be monitored to confirm satisfactory performance of the frozen core dams.

4.10.6 Nitrate Management

LLCF Nitrate Reduction Experiment

DDEC implemented an adaptive management response plan for nitrate in minewater. The response plan was initiated based on increasing concentrations of nitrate in the LLCF, which was identified through the Surveillance Network Program and the Aquatic Effects Monitoring Program. The response plan incorporated the following actions:

- Assessment of nitrate sources from blasting;
- Adjustment of seasonal effluent discharge schedule from the LLCF;
- Review of environmental guidelines for nitrate;
- Diversion of nitrate-rich minewater away from the LLCF; and
- Testing of an experimental method for nitrate reduction within the LLCF.

The method for nitrate reduction that was tested through this experiment was based on the knowledge that algal growth in northern waters (including within the LLCF) is "phosphorus-limited". This means that the addition of phosphorus, especially in the presence of elevated nitrogen as is the case within the LLCF, should result in increased growth of algae. The algae, in turn, take up nitrogen compounds and therefore should remove nitrate from the water column. For this experiment, phosphorus is added in the form of *monopotassium phosphate fertilizer*. The use of this commercially available product facilitated shipping logistics and mitigated environmental and safety risks as compared to more concentrated industrial products.

This concept presented a risk of over-addition of phosphorus. Although it is an essential nutrient, too much phosphorus entering into the receiving environment downstream of the LLCF could result in negative environmental effects through toxicity, algal blooms (eutrophication) and associated biological oxygen demand. DDEC assessed this risk and, with Rescan, designed the experiment to include the following mitigating elements:

- The experiment was carried out in Cell D of the LLCF, allowing Cell E to continue to function as a polishing pond for effluent discharge;
- The amount of phosphorus added was less than the theoretical amount required for complete uptake of all of the nitrate in Cell D (25% was initially targeted), so that the amount of residual phosphorus at the end of each summer season was minimized;
- Fertilizer was added incrementally each week, which was operationally practical (maintains algal growth through the summer) and provided the opportunity to stop the additions at any time through the summer based on monitoring results;
- Intensive and frequent monitoring was carried out in Cell D, which would identify an over-addition of fertilizer and the need to stop or reduce fertilizer addition; and
- Intensive and frequent monitoring was carried out in Cell E, which would identify any seepage effects entering into Cell E and the need to stop or reduce fertilizer addition.

The initial two years of the test project (2008/2009) were successful in validating the method, providing preliminary bounds on basic operating parameters, and documenting secondary water quality metrics. The data was used to relate, on a preliminary basis, the amount of fertilizer/phosphorus added with the anticipated removal of nitrate from the water column. Results from the following two years of the test project (2010/2011) indicated the concentrations of nitrate in Cell D and Cell E did not decrease as they had in the initial two years of the test project. DDEC has completed the program and will assess the opportunities for continuation for the future.

Nitrogen Response Plan

As per the Water Licence, DDEC prepared and submitted to the Board a Nitrogen Response Plan. The overall objective of the Nitrogen Response Plan is to minimize the amount of nitrogen entering the receiving environment at the Ekati Diamond Mine and is achieved by:

- Identifying current nitrogen sources and management activities;
- Reviewing current blasting and explosives management practices on site; and
- Creating an Implementation Plan to address recommendations made through the review of blasting and explosives management.

Key findings indicate that DDEC has many positive practices in place to contain, handle, use and dispose of explosives. Moreover, many of the recommendations made in a 2008 blast audit conducted by Golder Associates have been incorporated into standard operating procedures on site. Golder concludes for the 2013 report that the most significant area of potential for minimizing the availability of nitrogen for dissolution into minewater, and subsequent release to the receiving environment, is through improved usage practices in the open pits.

5 Closure and Reclamation

5.1 LLCF

The Interim Closure and Reclamation Plan for the LLCF can be found on Figure 12.

5.1.1 Surface Topography

Three distinct topographic units have been designed into the LLCF that will facilitate reclamation planning of surface cover and drainage. Each unit will have predictable geomorphic attributes, geographic distribution and soil properties which allow for evaluation of reclamation alternatives. The revised system configuration recognizes the following three distinct topographic units within the various cells:

- Gently sloping, well drained beaches;
- Residual ponds in Cells A, B and C; and
- Interface shorelines where beach deposits meet the ponds.

Reclamation designs are being developed through the *Interim Closure and Reclamation Plan*.

5.1.2 Permafrost Development

The majority of FPK surface area will be well drained sloping beach sediments. The high proportion of well drained beaches will encourage formation of permafrost from the surface downward. The ponds may remain with an unfrozen zone or “talik” below those areas where water depth exceeds the natural winter ice thickness. Interface zones where the pond will freeze to the bottom sediments each winter will sustain permafrost but would be expected to have a thickened active layer.

5.1.3 Surface Drainage

Small permanent ponds will likely form in each of Cells A, B and C. The Cell C pond will decant into Cell D and ultimately into Cell E before flowing to the receiving environment. The water elevations in Cells B, C and D after closure will be controlled by overflow structures incorporated into Dikes B, C and D.

5.1.4 Water Control Structures

The dikes that now function as filter dikes will become water level control structures. They will be permanent features in the new landscape that control water elevation in the residual ponds and allow surface water to decant from one pond to the next within the basin. Water level control weirs will be used to pass flow over the dikes. Long-term seepage through the dike is expected to diminish with time as the filters blind off and most water passes over rather than through the dikes. The final water level at the outlet of

Long Lake (i.e., Outlet Dam) will be lowered to approximately the natural outflow elevation in accordance with the approved Closure and Reclamation Plan.

5.1.5 Water Quality

Water quality at the outlet will be enhanced by a permanent system of ponds that dissipate energy and provide intermediate settling basins for suspended soils. Erosion of the FPK will also be reduced by a stable surface cover (vegetation and/or rock). This approach is substantively enhanced under this Management Plan because the deposition plan minimizes, and possibly eliminates, the use of Cell D for FPK deposition and thereby preserves its use as a long-term water management area.

5.2 Beartooth Pit

The closure plan for the Beartooth pit is to fill the pit with natural water from a nearby source lake. Once the pit is full and the water quality meets discharge criteria, inlet and outlet channels would be connected to the natural streams from Bearclaw Lake and to Upper Panda Lake. The pit perimeter may be modified to provide safety for people and wildlife and to facilitate the establishment of a self-sustaining aquatic ecosystem in the pit lakes.

FPK deposition into the pit means that less natural fill-water would be required. The minimum water depth over FPK of 30 m is deep enough to not affect the work to be done around the pit perimeter. Water quality would have to meet discharge criteria before the pit lake could be allowed to overflow, as determined in the ICRP.

Appendices

Appendix A

Water Licence W2012L2-001 – Summary of Specific Requirements for the Wastewater and Processed Kimberlite Management Plan

Appendix A

WATER LICENCE W2012L2-0001 – Summary of Specific Requirements for the Waste Water and Processed Kimberlite Management Plan Version 4.0

Under **Part H.2** of Water Licence W2012L2-0001, which also covers the Sable, Pigeon, and Beartooth developments, the following information is quoted and is specified for inclusion within the Plan:

Part H: Conditions Applying to Waste Disposal

2. Wastewater and Processed Kimberlite Management Plan

a) The Plan shall be in accordance with the detailed guidance referred to in Schedule 6, Item 1.

b) Sixty days prior to the Construction of each of the Sable and Pigeon pits, the Licensee shall submit an updated Wastewater and Processed Kimberlite Management Plan to the Board for approval.

Schedule 6:

1. The Wastewater and Processed Kimberlite Management Plan referred to in Part H, Item 2 shall be in accordance with the NWT Water Board's *Guidelines for Tailings Impoundment in the Northwest Territories, February 1987*, and shall include, but not be limited to, the following information:

<u>ARD Characterization</u>

a) Representative sampling and testing of Processed Kimberlite;

b) A description of the process to be used to regularly assess and revise the plans based on ongoing data collection through this program or through the attached Surveillance Network Program, the Aquatic Effects Monitoring Program, Seepage Surveys, or other environmental monitoring programs;

<u>Wastewater and Processed Kimberlite Management</u>

c) A comprehensive description of all sources and types of Waste related to the Project where not provided in the Waste Rock and Ore Storage Management Plan as approved by the Board;

d) A description of any proposed physical or chemical treatment of Waste prior to Discharge to the Long Lake Containment Facility, the King Pond Settling Facility, the Phase 1 Tailings Containment Area, Two Rock Sedimentation Pond, or to the Receiving Environment;

e) A description, including maps to scale, of the locations of monitoring stations for ground temperature, water quality, water Discharge and Processed Kimberlite elevation, including the sampling protocols and frequency to be undertaken at each station;

f) A schedule of Processed Kimberlite Discharge within the Long Lake Containment Facility over the term of this Licence, including detailed maps showing deposition locations;

g) Capacity status and projected life expectancy of the Processed Kimberlite deposition
locations and Two Rock Sedimentation Pond;

h) An anticipated schedule of volumes of Discharge to and from the Two Rock Sedimentation Pond and King Pond Settling Facility;

i) A series of contingency options should Two Rock Sedimentation Pond approach or exceed capacity; and

j) Any operational changes and Modifications which may impact the Wastewater and Processed Kimberlite Management Plan.

Appendix A

WATER LICENCE - W2012L2-0001 - Summary of Specific Requirements for the Wastewater and Processed Kimberlite Management Plan Version 4.0

Reference	Section	Section
Schedule 6: 1.a, b	Processed Kimberlite Geochemical Characterization Geochemical Characterization and ML/ARD in Processed Kimberlite Operating Risks and Uncertainties	4.4 Appendix E
Schedule 6: 1.c	Overview of Wastewater and Processed Kimberlite Management of Surface Minewater Management of Open Pit Minewater Management of Underground Minewater Management of Sewage Process Water Processed Kimberlite Flocculants	1.5 2.1 2.2 2.3 3 4.2 4.3 4.5
Schedule 6: 1.d	Main Camp and Fuel Storage Berms Panda and Koala Pits Fox Site Misery Pit Processed Kimberlite Flocculants	2.2.1 2.1.3 2.1.5 2.1.4 4.3 4.5
Schedule 6: 1.e	Process Kimberlite Deposition Plan Wastewater and Processed Kimberlite Performance Monitoring	4.8 4.10
Schedule 6: 1.f	Timeline of Deposition Plan	4.8.3
Schedule 6: 1.g	The nature of FPK deposition strategy does not lend itself to simple elevation filling curves for the Cells of the LLCF. This is because the deposition strategy requires FPK beaches of various slopes that extend above water. That is, there is no single elevation that will represent FPK deposition into each cell. The dykes establish the maximum operating water elevation at 1 m of freeboard. The FPK surface will extend to various upper elevations above the water level depending on the elevation of the local spigot point and the general topography of the land. The FPK surface will continue below the water level at a different slope angle. This is the strategy that lends itself to maximizing the use of available storage capacity in Cells A, B and C as agreed through the previous collaborative review process described in below.	
Schedule 6. 1.h,i,j	Overview of Wastewater and Processed Kimberlite Management Plan	1.5

Appendix B

Process Plant Description – Revised January 2010

Appendix B
PROCESS PLANT DESCRIPTION – Revised January 2010
Wastewater and Processed Kimberlite Management Plan
January 2010

The Wastewater and Processed Kimberlite Management Plan is concerned with the kimberlite ore processing and diamond recovery methodology currently utilized at the Ekati™ Diamond Mine. These processes are generally described by the following areas (refer to Figure B-1 Process Plant Flowsheet):

- Size reduction, washing (scrubbing) and screening
- Primary Concentration
- Secondary Concentration.

1. SIZE REDUCTION, WASHING (SCRUBBING) and SCREENING

1.1 Primary Crushing

"Run-of-mine" ore is transported to temporary stockpiles close to the process plant either by haul truck from the open pit mines or by conveyer/haul truck from the underground mines. Depending on production requirements, it can be sorted to remove granite and nuisance metal that can disrupt downstream processes. "Run-of-mine" ore is dumped into either the Primary Sizer (mainly drill & blast and/or rocky ore) or the stand-by MMD sizer (mainly pre-crushed U/G ore), where the main function is size reduction. The Primary Sizer discharges material nominally minus 150 mm in size.

There is no water usage requirement at Primary Sizer or MMD sizer. The ore from this size reduction step is transported by conveyer to either the reclaim building where it can be fed by a loader into another MMD sizer or directly into the process plant for secondary crushing.

1.2 Secondary Crushing

Ore is conveyed to the secondary crusher either directly from the Primary Sizer/MMD Sizer or from the reclaim building where another MMD sizer can be used for further size reduction. The Secondary Crusher is a water flushed cone crusher that continually uses process water to wash fines and small material down through the crusher while the larger sized ore is broken down.

Process water is added to kimberlite ore in the feed chute directly above the cone crusher. The secondary crusher discharges material nominally minus 75 mm in size. All sized material and process water discharged from the cone crusher passes directly into the Primary Scrubber located beneath the crusher (i.e.; re-circulated).

1.3 Primary Scrubbing

The Primary Scrubber is designed to disperse friable ore particles, allow autogenous grinding and assist in thawing frozen ore particles with process water. A scrubber is also designed to break up agglomerations of fine grained particles and clays, and disperse/suspend them in water for removal from the plant process by screening.

The primary scrubber discharge screen is set at 4 mm. The 4 mm plus fraction is routed directly to the High Pressure Grinding Rolls (HPGR), detailed later in this plan. The 4 mm minus fraction is pumped to the Primary Degritting section.

1.4 Primary Degritting

The 4 mm minus material, that was separated from the primary scrubber discharge screen, is a slurry that is pumped to the primary degritting dewatering cyclones. A large amount of the process water is removed and is recycled as "make-up" water elsewhere in the process plant. The partially de-watered slurry is further classified on the Primary Degritting Screen. The classification scheme consists of the following three particle fraction sizes:

- 1.2 mm to 4 mm.
- 0.5 to 1.2 mm (sand size).
- 0.5 mm minus.

1.4.1 Fraction Size 1.2 mm to 4 mm:

The 1.2 mm to 4 mm material can be either diverted to the High Pressure Grinding Rolls to assist in autogenous grinding or to the Heavy Media Separation (HMS) circuit (Section 2).

1.4.2 Fraction 0.5 to 1.2 mm (sand size):

Process water is added to the 0.5 to 1.2 mm fraction (i.e.; sand size) and pumped as a slurry to the "desand" dewatering cyclones, where a large amount of the process water is removed. The partially dewatered slurry is then fed onto the desand screen where it is further dewatered to achieve a lower moisture content.

There are 0.5 mm slotted aperture panels used in the desand screen that remove any very fine material < 0.5 mm remaining from the primary and secondary degritting circuits or generated during slurry pumping.

The 0.5 to 1.2 mm fraction is normally deposited onto the coarse PK conveyer and piled outside the process plant as **"**Coarse Rejects**".** This material is continually loaded and transported by truck to the Waste Rock Storage Area ("Rejects Pile"). Alternatively, this size fraction can be sent to the Small Diamond Recovery circuit, however there are no current plant to utilize this circuit in the future.

1.4.3 Fraction 0.5 mm minus:

The minus 0.5 mm size fraction (i.e.; FPK) of the feed that is removed by the degritting and desand sections is routed to the Thickening circuit, where Deep-Cone Thickeners (DCT) are used to recycle process water for further use in the process plant. In this circuit the slurry containing FPK is treated with coagulant and flocculent to increase the settling rates of the partially suspended solids. Thickened slurry is obtained at the bottom of the DCT's and clean, recycled water from the DCT overflow. The thickened FPK is discharged from the plant as a slurry and transported through a pipeline to the Long Lake Containment Facility (Cells A, B, or C).

1.5 High Pressure Grinding Rolls (HPGR)

The HPGR provided tertiary crushing and is designed to liberate diamonds from the kimberlite ore without breaking or causing damage to the diamonds. Feed to the HPGR is nominally 1.2 to 75 mm fresh ore from the primary scrubbing and primary degritting circuit, re-circulating 25 mm plus material discharged from the HPGR, coarse rejects from the recovery plant, and intermittently (depending on carat grade) 8 to 25 mm float material rejected from the HMS circuit. An option that allows for part of the feed (approximately 10%) to bypass the HPGR and rejoin the HPGR product prior to entering the secondary scrubber is available. This provides a charge of more competent particles that assists in breaking down the "caked" material produced by HPGR in the secondary scrubber.

1.6 Secondary Scrubber

The function of the secondary scrubber is to ensure de-agglomeration of the HPGR "cake" product. The secondary scrubber is similar to the primary scrubber in operation and function. The secondary scrubber discharges onto the Secondary Scrubber Screen for sizing at 25 mm. Any oversize material is returned to the HPGR for further size reduction. The 25 mm minus portion is sized at 4 mm and the 4 to 25 mm fraction is routed directly to the HMS. The minus 4 mm fraction is pumped to the secondary degritting circuit.

1.7 Secondary Degritting

The secondary degritting section is similar to the primary degritting section in operation and function. The main difference is the 1.2 to 4.0 mm size fraction must report to the HMS circuit and does not have the option of being routed back to the HPGR. The 0.5 to 1.2 mm size fraction reports to the desand circuit and the 0.5 mm minus size fraction reports to the Thickening circuit (see additional detail provided in the Primary Degritting Section 1.4).

2. PRIMARY CONCENTRATION

Primary separation of the diamonds from the ore is accomplished through heavy medium separation (HMS). This process is highly effective at producing a diamond bearing concentrate that can be treated with further downstream processing.

2.1 Heavy Medium Separation

Heavy medium separation is a gravity separation process that separates high density particles (including diamonds) from low density particles in a conventional separating cyclone. The process requires the generation of an *in situ* slurry comprised of water and suspended ferrosilicon that must be maintained at a certain specific gravity. This slurry is mixed with the 1.2 to 25 mm sized washed and screened ore that was generated from the crushing and scrubbing circuit. There are two identical HMS modules and each unit treats the full size range of 1 to 25 mm ore.

The combined 1 to 25 mm crushed ore feed stream is stored initially in a surge bin and fed to a feed preparation screen where it is washed with process water and magnetic separator effluent water. The wash water will remove the undersize (nominally 1 mm minus) from the screen, which can then be pumped to either the secondary scrubbing circuit or thickening circuit.

The amount of 0.5 mm minus fraction (i.e.; FPK) generated in this process is very low, since the ore has already passed through the primary/secondary degritting circuits. The FPK is eventually routed to the thickening circuit (either directly or indirectly, based on processing requirements), and ultimately to the Long Lake Containment Facility.

The 1 to 25 mm material retained on the feed preparation screen is discharged to the primary mixing box where it is mixed with the water-ferrosilicon correct medium. This slurry of 1 to 25 mm crushed ore and ferrosilicon is pumped to three separating cyclones operating in parallel.

Centrifugal forces within the cyclones cause the high density heavy minerals and diamonds to be separated from the low density material. The low density material exits the top of the cyclone as *overflow* (Section 2.1.1) and the high density material exits the cyclone at the bottom as *underflow* (Section 2.1.2). These two different flows are treated separately in the HMS process.

2.1.1 HMS Overflow treatment

The overflow from the HMS cyclones is discharged to a double deck drain and rinse screen, which sizes the overflow at 8 mm. The plus 8 mm fraction retained on the screen under normal operation is routed to the coarse ore rejects conveyer and deposited in the "rejects stockpile". If ore conditions warrant, a small modification allows the plus 8 mm material to be routed to the HPGR circuit where it is re-crushed and additional diamonds potentially liberated. The 0.8 to 8 mm fraction on the bottom deck is discarded on the coarse ore rejects conveyer and deposited in the "rejects stockpile".

On the drain portion of the screen, the water-ferrosilicon slurry is allowed to drain back into the circulating medium pump box where it can be directly used in the cyclone separation process. Spray water is used on the rinse side of the screen to wash residual ferrosilicon from the ore, and allow it to be recycled back into the process.

The dilute underflow from the rinse section (consisting of water, ferrosilicon and non-magnetic grit) of the screen is pumped to the magnetic separators where the ferrosilicon is recovered as a relatively high density slurry for recycling back into the HMS process. The process water and non-magnetic grit is removed as magnetic separator effluent, and can either be used as wash water on the feed preparation screen or routed to the effluent pump box.

A de-magnetizing coil is used to treat the water-ferrosilicon slurry to remove any remnant magnetism so that the ferrosilicon slurry will disperse evenly with the 1 to 25 mm crushed ore being fed into the HMS cyclones. The ferrosilicon slurry will not be totally recovered in the magnetic separation process, thus requiring periodic recharging of the system with fresh ferrosilicon. The "make up" Ferrosilicon is supplied to the dilute medium tank in the HMS process (described above) via a floor sump pump or directly to the circulating medium pump box as a water-Ferrosilicon slurry sourced from the dry Ferrosilicon storage bin.

2.1.2 HMS Underflow Treatment

The underflow from the HMS cyclones is routed to a diverter, which allows the concentrated material to be sent directly to the recovery plant (normal operation) or concentrated further. If the material is to be re-concentrated, it is directed to a re-concentration cyclone where an identical gravity based separation process is used to concentrate the highly dense minerals.

The overflow from the re-concentration cyclone is routed to the primary mixing box at the head of the HMS process, as to protect against diamond losses.

Depending on the configuration, the heavy underflow material from either the primary or re-concentration cyclones is routed to a drain and rinse screen, where the material is washed to remove Ferrosilicon and then transported by pneumatic conveyer to a feed storage bin in the recovery plant.

3. SECONDARY CONCENTRATION

Secondary concentration is accomplished by using wet high intensity magnetic separation (WHIMS), wet X-ray separation, high intensity magnetic separation (HIMS) and dry X-ray separation.

3.1 WHIMS Process

The WHIMS process is designed to reduce the amount of feed to the low capacity wet X-ray units by separating the magnetic material from the primary concentrate. The WHIMS process utilizes high intensity rare-earth magnets to attract magnetic minerals and remove them from the process stream. As described, the WHIMS can reduce the concentrate volume by up to 65%, depending on the characteristics of the ore blend.

The reject, magnetic material is presently audited by a grease table to recover weakly magnetic or misplaced diamonds and then collected and stockpiled, for use in the underground batch plant for the production of shotcrete (used in underground ground support construction). Alternatively, the WHIMS rejects can be combined with the coarse PK waste stream which is hauled to rejects waste pile within the waste rock storage area.

3.2 Wet X-Ray Sorting Process

X-Ray sorting uses a well known property of diamonds, fluorescence, to achieve excellent separation results. The separation process can be achieved by the property that diamonds fluoresce, or emit visible light when irradiated with X-rays. Detection of this emitted light by a Photo-Multiplier Tube (PMT) causes an air jet to eject the diamond material from the non-diamond material.

The X-Ray machines in this section do not require the material to be dry and in fact use spray water to ensure diamonds are not shielded by unwanted material. All product from the wet X-Ray machines is thoroughly dried and sent for further concentration.

The rejects are audited with a grease table to recover diamonds not detected by the wet X-Ray machines and then routed back to the HPGR. This ensures that any diamonds not recovered are circulated back to the main plant for a further chance at recovery and allows the non-magnetic, non-fluorescent material to be ground down and removed at secondary degritting/HMS.

3.3 HIMS Process

Similar to the WHIMS process, further concentration of the product from the wet X-Ray machines can be achieved in the High Intensity Magnetic Separators (HIMS). The Wet X-Ray product is dried in the fast air drying and transport system (FADAT) and deposited in a storage bin. Only the dried product smaller then 6 mm is processed by the HIMS. The magnetic rejects are circulated back to the front-end of the recovery plant to ensure no loss of diamonds. The product is sent for dry X-Ray sorting.

3.4 Dry X-Ray Sorting Process

Similar to the Wet X-ray sorting process, the fluorescence property of diamonds allows X-Rays to be used to obtain high separation results. The product is in a highly concentrated form and this separation process produces a highly clean product that can be sent for hand sorting.

3.5 Small Diamond Processing

The Small Diamond recovery process is an intermittent process that is currently not operated and will not be in the foreseeable future. The process involves the routing of the 0.5 to 1.2 mm material to a feed storage tank (normally removed from the plant as coarse PK (coarse rejects). This material will be further concentrated using standard mineral processing equipment which mechanically separates material on the basis of specific gravity. The concentrated material is pumped into a drum tank along with a conditioning reagent, and the material tumbled to clean the surfaces so that the diamonds are responsive to flotation. The material is dewatered and fed into a flotation unit where it is combined with a frothing (surfactant) and collecting agent. The flotation concentrate is then transferred to recovery plant. The rejected material is washed, dewatered, and added to the coarse PK waste stream, which will be trucked as coarse rejects to the waste rock storage area. Since water is the transport medium, it is recycled within the SDR circuit, and all waste streams are sent to the thickener, where further water is recovered.

3.6 Processed Kimberlite Thickening of Fine PK

The 0.5 mm minus material (i.e.; FPK) from the primary and secondary degritting and HMS effluent is routed to the deep cone thickeners (DCT). This flow of FPK is treated first with powder MF368 cationic coagulant and then with a solution of MF156 anionic polymer flocculent prior to entering the DCT. The anticipated dosages of coagulant and flocculent vary considerably depending on the ore blend being fed to the process plant, the throughput rate, and the thickener configuration. The actual dosages in the plant are continually adjusted to optimize thickener performance and reduce reagent consumption

Testing has demonstrated that the addition of calcium chloride has a positive impact on Fox Pit ore settling rates. To obtain this benefit, a salt water line has been installed connecting the process plant with the high saline content water that is dewatered from the Underground mines. When operational, this supplies a slow, steady stream of calcium chloride to the process plant. In addition, during summer months a submersible pump is used to transfer water directly from Cell C to the reclaim raw water barge. This provides higher saline content water different from what would normally be available, but it does not increase the load of calcium chloride in the LLCF (while also drawing down the water level from Cell C in the LLCF). When settling issues arise in the process plant, calcium chloride can be added to stabilize the thickening circuit and return it to normal operation (only infrequent consumption of calcium chloride is required).

The upper zone of the DCT is the feed mixing well where the coagulated suspended clay particles form “flocs” of clay particles. The DCT process involves a repetitive rising and settling process, which increases floc size and weight while clarifying the overflow water. The flocs will reach a critical mass at which time they are no longer held in suspension by the hydrodynamic regime in the DCT. The floc will then settle to the bottom or the compaction zone of the DCT. Self-weight consolidation combined with dewatering, facilitated by the dewatering cones within the DCT, compact the flocculated PK within the compaction zone. The large flocculated structure is compacted together, resulting in uniform PK slurry.

The overflow from the DCT is clear water.

The underflow from the DCT will be thickened “tails” of between 30 and 45% solids content with the planned underflow PK having a solids content of 40% under normal operating conditions. The DCT is controlled in such a way that the settling rates within the unit are monitored. The underflow density is monitored so that the 40% solids content is achieved by adjusting the residence time of the PK within the DCT.

The thickened FPK underflow from the DCT is pumped to a large holding tank immediately upstream of three centrifugal slurry pumps in series (used to discharge the FPK to the LLCF). The PK within the tank is agitated by a paddle mixer to ensure the kimberlite within the slurry does not settle to the bottom of the tank. Deposition of the FPK into the Long Lake Containment Facility requires three centrifugal pumps in series to generate the necessary pressure and flow-rate. The first pump in the series is a fixed speed pump, which controls the rate of feed to the two variable speed pumps downstream. The variable speed pumps are required to maintain the minimum flow velocity of the FPK slurry needed to prevent settlement in the discharge line.

There are three sets of three pump trains arranged in this manner, in order to facilitate the transfer of the FPK slurry to the Long Lake Containment Facility. There are two discharge lines exiting the process plant, providing flexibility depending on discharge location and volume. The FPK is pumped through approximately 8 km of 0.3 m diameter steel HDPE lined and HDPE pipe to the Long Lake Containment Facility. The distance pumped is dependent on the discharge location and this location is optimized to account for summer, winter, and volume conditions.

DOMINION DIAMOND

Appendix C
Definitions of Waste

APPENDIX C
DEFINITIONS OF WASTE
Wastewater and Processed Kimberlite Management Plan
January 2010

Waste is defined in the Water Licence W-2009-L2-0001 and other legislation associated with the Water Licence definition.

"Waste" means Waste as defined by section 2 of the Act.

Section 2 of the Mackenzie Valley Resource Management Act:

Mackenzie Valley Resource Management — November 4, 2009

	SHORT TITLE	TITRE ABRÉGÉ
Short title	**1.** This Act may be cited as the *Mackenzie Valley Resource Management Act*.	**1.** *Loi sur la gestion des ressou* *vallée du Mackenzie*.
	INTERPRETATION	DÉFINITIONS ET AUTRES DISP(INTERPRÉTATIVES
Definitions	**2.** The definitions in this section apply in this Act.	**2.** Les définitions qui suivent s'a la présente loi.
"deposit of waste" *« dépôt de déchets »*	"deposit of waste" means a deposit of waste described in subsection 9(1) of the *Northwest Territories Waters Act*.	« accord de revendication » L'accor l'accord du Sahtu ou l'accord tlicho.

Section 9(1) of the Northwest Territories Waters Act:

DEPOSIT OF WASTE

Prohibition

9. (1) Except in accordance with the conditions of a licence or as authorized by regulations made under paragraph 33(1)(*n*), no person shall, subject to subsection (2), deposit or permit the deposit of waste

(*a*) in any waters in a water management area; or

(*b*) in any other place under conditions in which the waste, or any other waste that results from the deposit of that waste, may enter any waters in a water management area.

Exception

(2) Subsection (1) does not apply to the deposit of waste in waters that form part of a water quality management area designated pur-

Appendix D

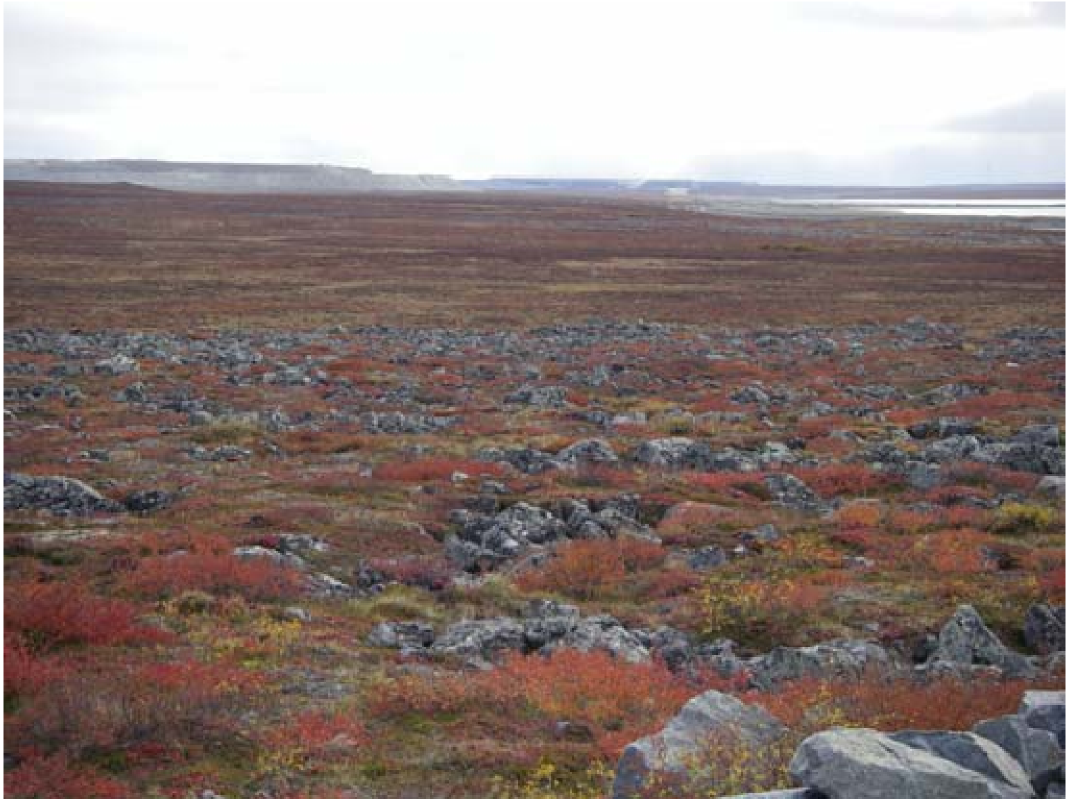
Ekati Mine 2011 FPK Deposition Alternatives Study, Robertson Geoconsultants

REPORT NUMBER 023008/7

EKATI MINE

2011 FPK DEPOSITION ALTERNATIVES STUDY

Revision 0



Submitted to:

BHP Billiton Canada Inc.

Prepared by:

Robertson GeoConsultants Inc.
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September 2011

Summary

This report describes and evaluates alternatives for future Fine Processed Kimberlite (FPK) deposition for the BHP Billiton Canada, Inc. (BBCI) EKATI Mine. Findings and recommendations in this report are the result of work undertaken by a team of engineers, scientists and operations personnel from BBCI, Rescan, EBA, and RGC. The team completed field investigations, undertook studies, compiled reports, and met to deliberate on issues, findings, and recommendations. The team members are in unanimous concurrence with the findings and recommendations of this report.

A recommended deposition plan is provided based on an evaluation of FPK storage volume, implementation, environment, closure and cost considerations. The selected sequence of options also increases the operational flexibility for FPK deposition over different areas. Upside potential, expandability and contingency options ensure that the EKATI mine does not fall unexpectedly short of FPK storage capacity. The selected sequence of options is summarized as follows:

	Volume
1. Continue in Cell A North, Cell B West and Cell C North	15 Mm^3
2. Beartooth Pit (secondary FPK stream)	7 Mm^3
3. Dike C Raise / Cell C West	6 Mm^3
4. Cell A South	4 Mm^3
5. Cell C East	2 Mm^3
	34 Mm^3

6. Cell D (without intermediate dike) as Contingency during Life of Mine and as feasible beyond Life of Mine

7. Fox/Panda/Koala Pits feasible beyond Life of Mine

EKATI MINE

2011 FPK DEPOSITION ALTERNATIVES STUDY

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EKATI MINE

2011 FPK DEPOSITION ALTERNATIVES STUDY

1 INTRODUCTION

1.1 BACKGROUND

BHP Billiton Canada Inc. (BBCI) owns and operates the EKATI Diamond mine in the Northwest Territories, Canada. The EKATI mine facilities are illustrated on Figure 1.

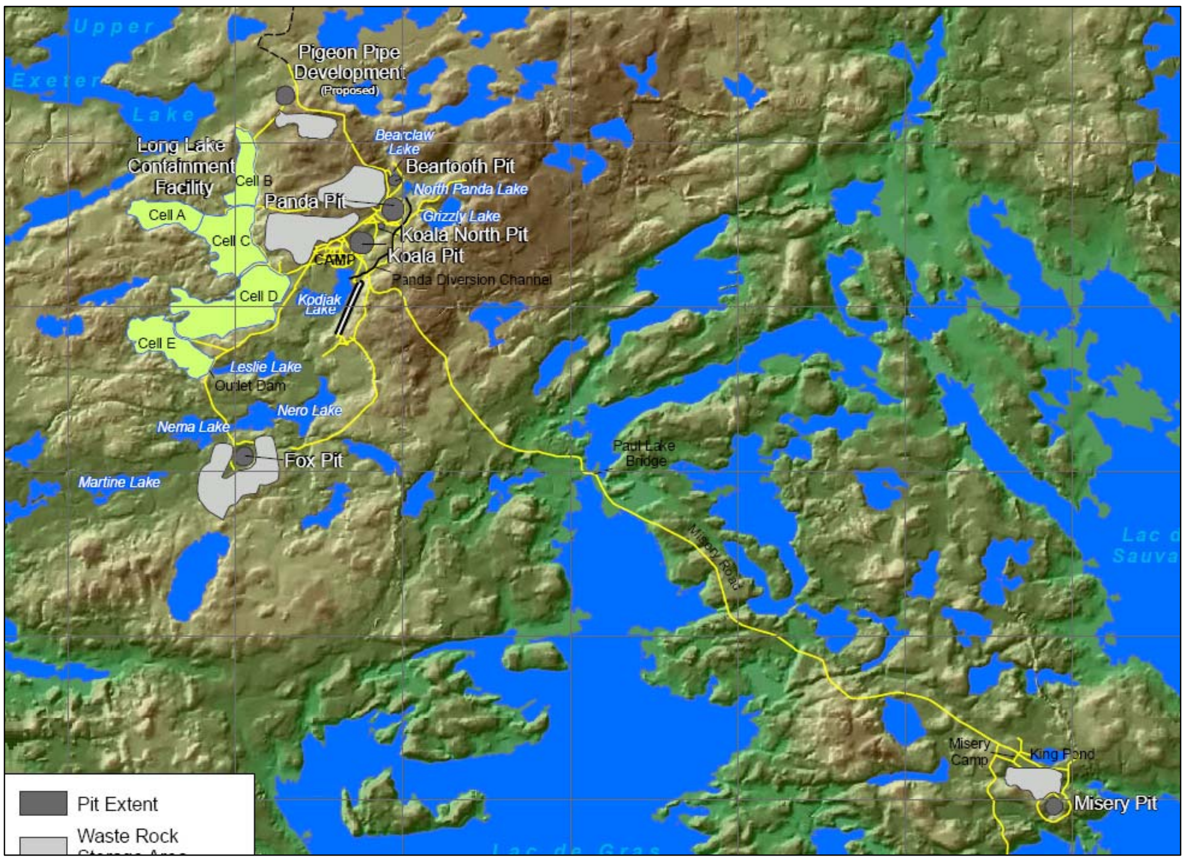

Figure 1. EKATI Site

Diamond-bearing kimberlite ore is mined in a series of open pits and underground workings and passed through a Process Plant to separate the diamonds. During and after separation of the diamonds, kimberlite rock is removed from the Process Plant as coarse kimberlite reject (0.6 to 6mm diameter typ.) and fine processed kimberlite (FPK). The coarse kimberlite reject is trucked to designated areas within the waste rock storage area and is not part of this study.

FPK has a grain size generally less than 0.6 mm and is de-hydrated or “thickened” to 40% solids in the process plant to recover wastewater for recycling within the plant; after which the remaining slurry is pumped to the Long Lake Containment Facility (LLCF). Within the FPK there is a fraction of material referred to as Extra Fine Processed Kimberlite (EFPK). This is material in the clay and silt sized fractions (< 0.1 mm) and it remains in suspension longer than FPK. The proportion of FPK that is the fine-grained EFPK varies between different kimberlite pipes and has been generally estimated to be about 30% by volume and 12% by weight of the total FPK volume.

The LLCF comprises the basin and structures that are designed to contain Fine Processed Kimberlite (FPK) as defined by the Water Licence (W2009L2-0001) and the *Wastewater and Processed Kimberlite Management Plan*, which is a requirement of the Water Licence. The location of the LLCF is illustrated on Figure 1.

The LLCF was designed in 1995 (EBA 1995) and brought into operation in 1998. The original design for the LLCF provided for deposition of FPK into four of the five cells that comprise the LLCF, namely Cells A, B, C and D. The fifth (downstream) cell, Cell E, was designated as an effluent polishing pond not to receive any FPK deposition. The LLCF was designed to safely contain 20 years of FPK production according to the original Life of Mine Plan. After that time, FPK would be deposited in one or more of the mined-out open pits. This information was included in the initial Environmental Assessment for the project. Subsequently in the 2000 Environmental Assessment of the Sable, Pigeon and Beartooth Expansion Project the concept of FPK deposition was again assessed and the specific use of Beartooth Pit for FPK deposition was written into the scope of the resulting Water Licence (now W2009L2-0001).

The operating approach for the LLCF was reviewed and refined in 2005 (the “Five Year Review”) through a process that involved engagement with regulators and communities. At that time, a number of operating strategies were assessed and a plan (Option 3aM) was selected as the preferred approach. The primary objective of Option 3aM was to maximize the use of the available storage capacity in upstream Cells A, B and C and to defer, as long as practical, the deposition of FPK into Cell D. Deferring the use of Cell D for FPK deposition was seen as advantageous because it retained its use, for as long as practical, as an additional effluent polishing pond. This plan (illustrated on Figure 2) represented a refinement within the scope of the initial design.

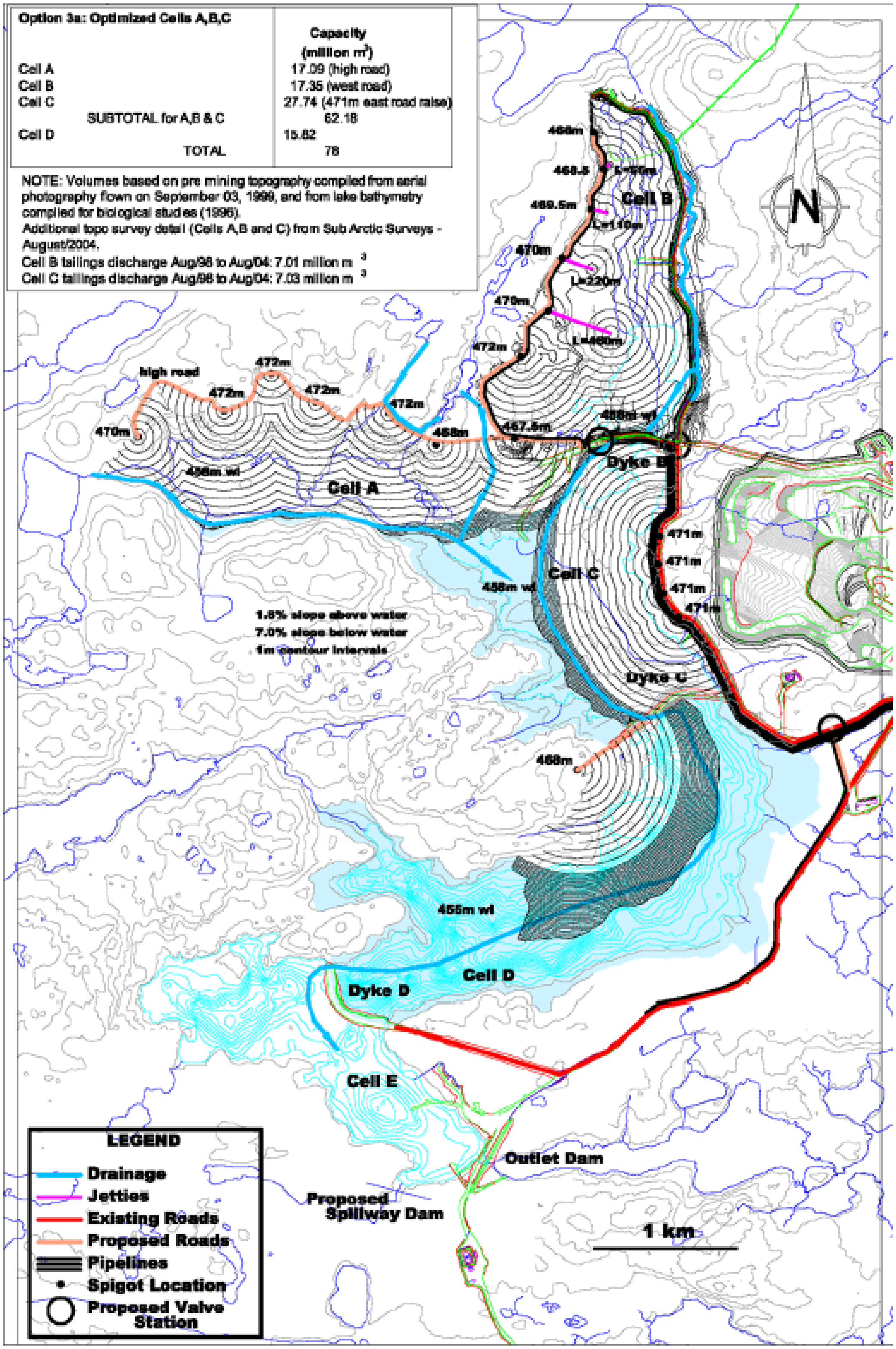

Figure 2. LLCF 5-Year Review Summary, Option 3a

Deposition of FPK into Cells A, B and C of the LLCF has since followed the plan developed in 2005. This has included the construction and operation of roads and deposition pipelines on both sides of Cell B, on the north side of Cell A and on the east and north sides of Cell C. Detailed depositional planning has included measures to limit the build up of ice lenses through the winter season, which can otherwise reduce the storage volume available for FPK. There has not been any FPK deposition into Cell D of the LLCF to date. It is likely that deposition into Cell D would begin in 2014 (in combination with the continued use of Cells A and/or C) under the current plan. The status of the LLCF in summer 2010 is illustrated in Figure 3.

Figure 3. LLCF 2010 Satellite Image

The Closure Plan for the LLCF is described in the *Interim Closure and Reclamation Plan* (ICRP). The closure plan for the LLCF is based on the current approach of using Cell D for FPK deposition. The plan calls for a combination rock and vegetation cover over exposed FPK beaches, depending on the localized needs for surface stabilization and the ability for vegetation to grow. A diversion channel is planned for the east side of Cells B and, possibly, C to route runoff water from the catchment area east of Cell B and C around the FPK deposit to as great an extent as feasible and to reduce surface flow over the FPK surface. Overflow weirs will be provided for the internal dikes (Dikes B, C and D) and the Outlet Dam will be breached. Additionally, a number of internal swales over the FPK surface will be required to direct runoff water to the residual ponds. A sequence of *Reclamation Research Plans* and *Reclamation Engineering Studies* are planned that will identify the most effective means of implementing the Plan. The closure plan for the LLCF is illustrated on Figure 4.

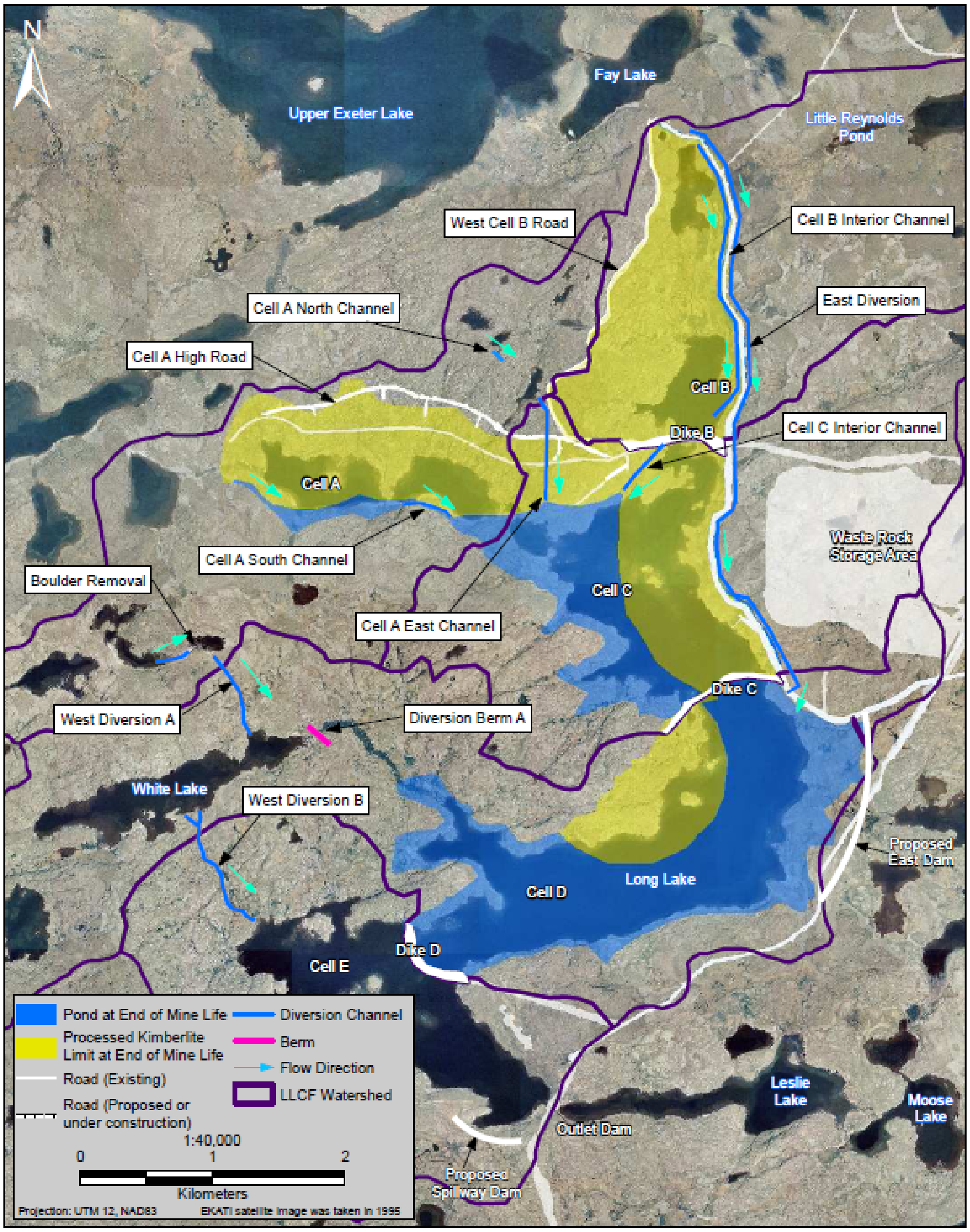

Figure 4. LLCF Closure Plan

1.2 LONG LAKE CONTAINMENT FACILITY

The LLCF comprises lakes and dikes that form five cells. Cells A, B and C have been used, to date, for FPK deposition and Cells D and E for water polishing. Water is pumped from Cell E to the environment provided that the Water Licence water quality criteria are achieved. Around the cells are access roads and FPK delivery pipelines and discharge spigots.

There are three dikes designed as flow-through structures constructed of compacted rockfill and upstream filters intended to pass water but retain solids, Dikes B, C and D. These dikes are anticipated to “blind” with fine sediment over time as a result of FPK deposition such that water flow through the dike decreases over time. There is a frozen-core dam, Outlet Dam, at the south (downstream) end of Cell E.

There is essentially no pond or pool of water in Cell A. Supernatant water flows freely from the cell into Cell C. There is a relatively small pool in Cell B. The elevation of water in the pool is kept constant by a culvert through Dike B. Water passes from Cell B to Cell C through this culvert. Water passes from Cell C to Cell D and from Cell D to Cell E both through the filter dikes and via pumping, at times when additional water movement is desired. Water is pumped from the north end of Cell D to the Process Plant to be used as process water. Water is pumped from Cell E to the environment according to the terms of the Water Licence.

Water flow from the north end of Cell B is facilitated by a channel within the north end of Cell B that is graded towards the south and backfilled with coarse kimberlite reject (drainage) material. The southern side of the Cell B road at its northern extent is lined with an impermeable plastic liner. These works were constructed in 2008/09 to prevent flow northwards from the facility to the Exeter drainage.

The access roadways provide past and current pipeline routes and means of operational inspection of the facility. The roads are constructed of uncompacted rockfill varying in height from less than 1 m to about 3 m. The primary roadways are:

- East Roadway: The roadway traverses the entire eastern side of the LLCF extending from the Outlet Dam at the south end of Cell E along the south side of Cell D and continuing along the east sides of Cells D, C and B, and ending at the north end of Cell B at the saddle to the Exeter drainage. The Dike D road provides access from this road to Dike D. Deposition of FPK into Cell B took place from this road from a nominal elevation of 461 m up to mid-2007 at which time deposition into Cell B switched to the Cell B West Road. Deposition of FPK into Cell C can take place from this road from a nominal elevation of 461 m.
- Cell B West Road: This roadway traverses the western side of Cell B, extending from the west side of Dike B and traversing the entire western perimeter of Cell B to the north end where it joins the East Roadway. The road is at a nominal elevation of about 471 m. Deposition of FPK into Cell B switched from the Eastern Road to this road in mid-2007.
- Cell A North Road: This roadway traverses the northern perimeter of Cell A ending at the west end of Cell A. The road is generally at elevations between 466 and 472 m. The roadway replaces a lower road running more or less parallel but at a lower elevation than the current

road. The lower road was breached and abandoned in mid-2009. Deposition of FPK into Cell A switched from the lower road to the current road in mid-2009.

Currently FPK is pumped via two pipelines to the LLCF. It is possible to deposit FPK from both lines to the east side of Cell C. This is generally done only when it is necessary to suspend deposition into Cells A or B. The primary pipeline crosses Dike B and continues along the access road on the north side of Cell A to the westernmost Spigot A8. The secondary pipeline crosses Cell B and continues along the access road on the west side of Cell B to the north end of the cell.

The primary pipeline is designed to transport and discharge up to about 13,000 m^3/day. The secondary pipeline is designed to transport and discharge up to up to about 5,000 m^3/day. The operational performance of these pipelines for FPK deposition has been approximately 67% primary and 33% secondary and these values are used for planning purposes in this study. The current FPK spigot locations are illustrated on Figure 5.

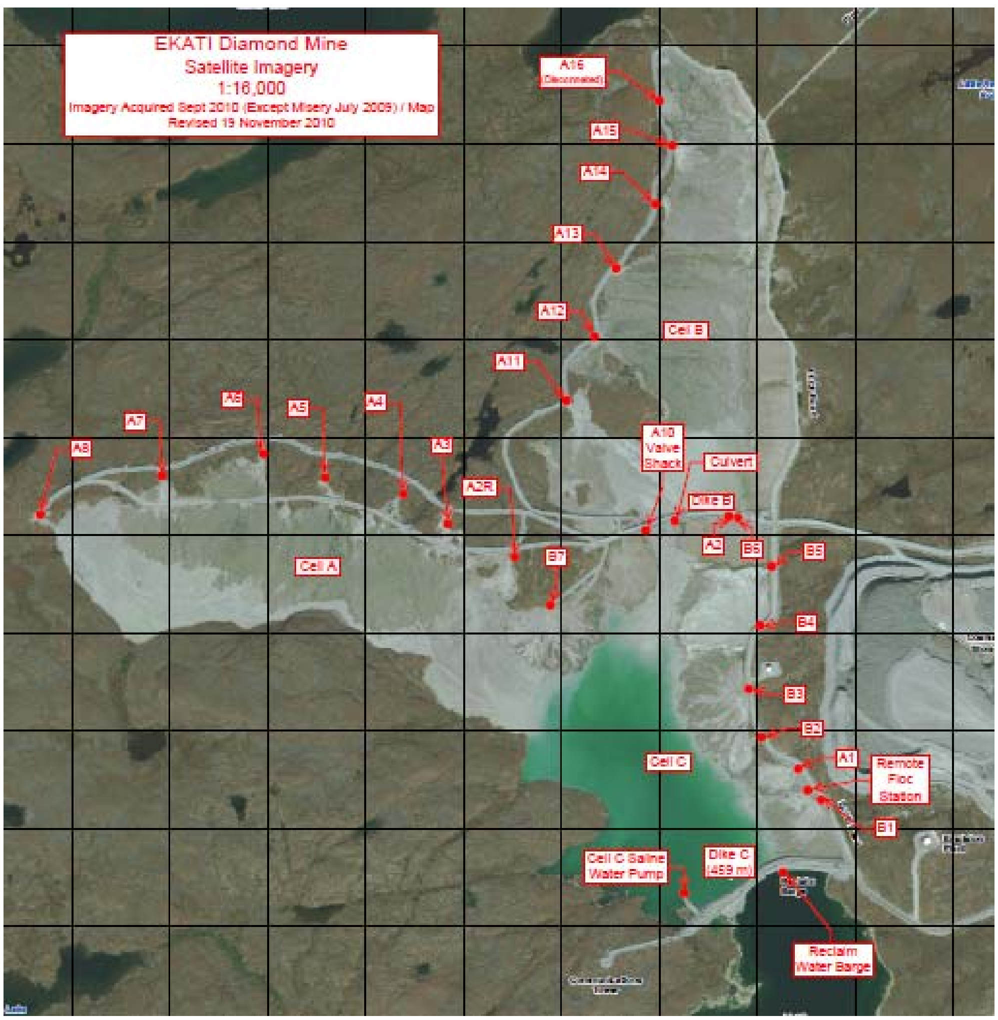

Figure 5. Current FPK Discharge Locations (2009 Satellite Image)

1.3 STUDY OBJECTIVES

This study was requested by BBCI to identify options for future FPK deposition that provide operational efficiency, that are environmentally sound and that respect BBCI's previous commitment to defer FPK deposition into Cell D where practical.

The objectives for this study are as follows:

- Determine FPK storage requirements beyond June 2011, considering:
    - FPK settling characteristics (in situ and laboratory testing)
    - Topographic surveys of the LLCF
    - Planned, potential and conceptual sources of kimberlite ore
- Identify and evaluate FPK deposition options.
- Describe a recommended plan for FPK deposition.
- Provide a report on the above.

This report assumes that the reader is generally familiar with the EKATI mine operation and the general configuration of the LLCF. Additional introductory Information on these topics is available in other documents or from BBCI.

1.4 REPORT PREPARATION TEAM

This document is compiled by Robertson GeoConsultants (RGC) for BBCI. It is written by Jack A. Caldwell, P.E., MSc(Eng.), LLB. This report incorporates, by reference and repetition, significant contributions from BBCI, EBA Engineering Consultants Ltd. and Rescan Environmental Services Ltd. The following are the members of the team assembled by BBCI to undertake the work described in this report:

- BBCI (core team): Iona Mackenzie, Metallurgist Process Plant; Keith McLean, Superintendent Environment Operations; Eric Denholm, Superintendent Traditional Knowledge and Permitting.
- Rescan: Katherine Jones, Geochemist.
- EBA: Gary Koop, Civil Engineer.
- RGC: Jack Caldwell, Civil Engineer.

Peer review of the work was undertaken by three senior engineers who have been associated with the design, construction, and operation of the LLCF since its inception in 1995, namely Andrew MacGregor Robertson, P. Eng., PhD., of RGC, Don Hayley P.Eng., PhD., of EBA, and Clem Pelletier P.Eng., PhD., of Rescan.

2 INVESTIGATIONS AND STORAGE REQUIREMENTS

2.1 IN-SITU CONE PENETRATION TESTING

In October 2010, a Cone Penetration Testing (CPT) investigation of the materials in the pool area of Cell C was undertaken (RGC 2010a). Testing consisted of 13 Cone Penetration Test Soundings (of which 10 included natural gamma data), 6 Ball Penetration Tests, 1 Vane sounding and 4 soil sample locations. The test locations are illustrated on Figure 6.

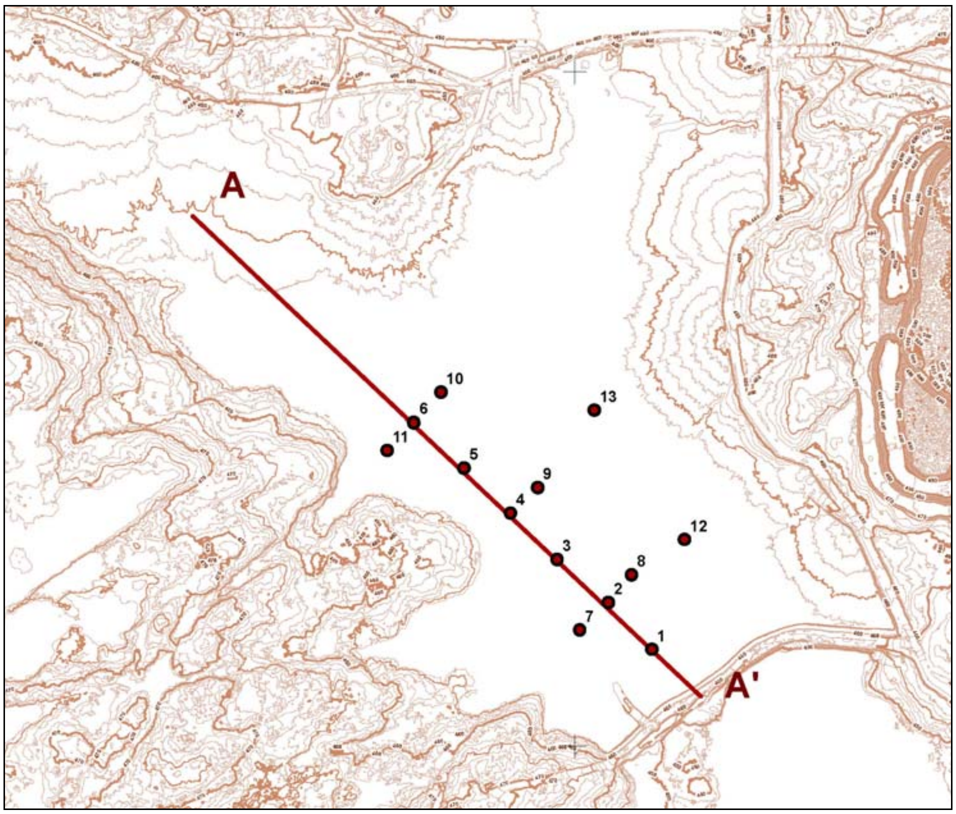

Figure 6. CPT Test Locations, Cell C

The data indicate the following vertical profile of materials in the pool of Cell C, which is also summarized in Figure 7 and Table 1:

- ***Zero to about 5 m Depth:*** This material is interpreted to be water with little if any suspended solids. Cone penetration resistance is negligible and no more than would occur for a fluid containing a small amount of suspended solids. The water pressure probe records pore pressure equal to the pressure from a column of water above the point of measurement, i.e., a fluid with density of about 10 kN/m^3. The temperature of this layer was generally less than zero. As the fluid was not frozen, this low temperature would indicate an elevated salt content. The gamma response of this material is essentially zero, indicating negligible clay content.

- ***Between 5 and 6 m:*** With some variation across the pond, there is a 0.3 to 0.5 m thick layer at a depth varying from about 5 to 6 m of a soft to firm silt/clay. The measured shear vane strength of this material is about 7.5 kPa. Samples were collected and have undergone gradation testing. The material is varved in appearance. The density is about 18 kN/m^3. The temperature of the material was about 4 to 5 ^{0}C. This material may be the result of settling of EFPK. It is also possible that some freezing and thawing of this material has occurred during winter months when the pool depth is less than the freeze depth.
- ***From 6 m to Refusal:*** Varying across the pond there is between 1 to 7 m of soft, liquid-like material of low strength (1 to 2 kPa). The temperature was generally about 3 to 4 ^{0}C. The gamma count is indicative of a substantial clay fraction in the material.
- ***Refusal:*** A layer of sand or similar dense, relatively high permeability material.

By comparison with bathymetric surveys done in previous years, the CPT data indicate little, if any, EFPK in the upper 5 m of the water column. This may be the result of chemistry changes (increased salinity) in the pool combined with the physical effects of ice formation under relatively low winter water levels. Specifically, the temperatures measured in the upper 5 m of fluid are generally less than zero C, averaging between -2 and -3 ^{0}C. The elevated salt content may have depressed the freezing point which, combined with lower winter water levels in Cell C in recent years, enabled improved settlement of EFPK.

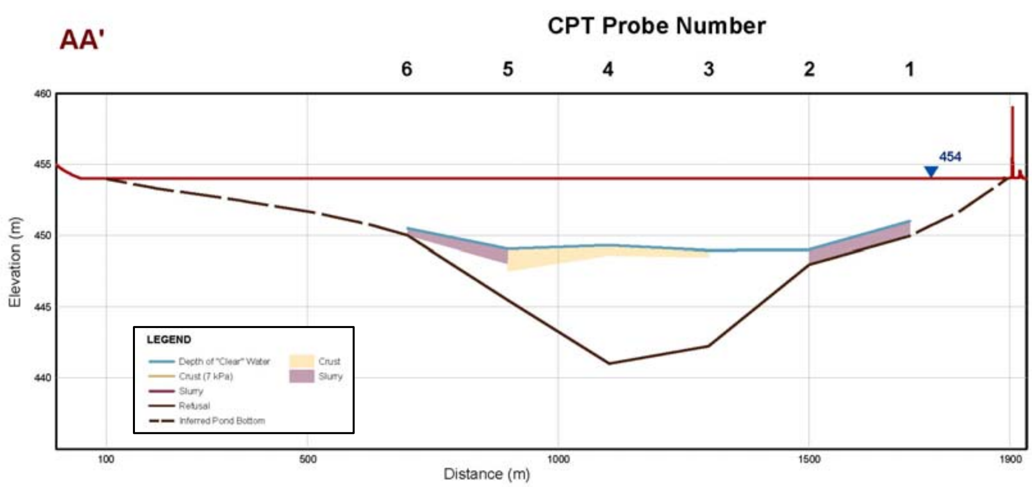

Figure 7. CPT Test Summary Profile, Cell C

Table 1. CPT Test Summary Depths to Refusal, Cell C

Point	Northing	Easting	Depth (m)
1	7176287	515228	3.95
2	7176426	515099	5.85
3	7176554	514948	11.7
4	7176691	514810	12.95
5	7176826	514671	8.2
6	7176960	514523	4.3
7	7176345	515015	8.15
8	7176509	515168	4.15
9	7176768	514890	12.8
10	7177049	514603	2.65
11	7176877	514444	8.05
12	7176613	515325	2.25
13	7176995	515058	2.15

2.2 LABORATORY SETTLING TESTS

Laboratory settling tests were conducted on samples of FPK collected in November and December 2010. The tests evaluated factors that could influence the settling rate of total suspended solids (TSS) including:

- Variation of FPK slurry density; and
- Dilution of FPK slurry.

The samples were placed in 1 L glass vessels and the height of the sediment-water interface was measured over a total period of 168 hours. Water samples were collected at a constant height above the sediment-water interface and analysed for TSS.

The results showed that an interface formed separating a clear overlying supernatant from a turbid underlying layer. A second, less distinct interface formed between the suspended FPK and the settled FPK. The middle, turbid layer is interpreted as representing EFPK.

The results (Table 2, Figure 8) indicate the following for the samples tested:

- The rate of settling is highest during the first 24-hours in all tests.
- Settling performance for specific gravities of 1.36, 1.34 and 1.28 showed no appreciable difference.
- Increased dilution of the samples resulted in improved settling performance.
- TSS in the water column above the ‘EFPK’ interface was less than 15 mg/L after 24 hours in all tests.

Table 2. FPK Settling Test Summary, 24-hour Settling Rates

Specific Gravity	Date	Type	Settling Rate (cm/hr)
1.36	October 31, 2010	Undiluted	0.16
1.34	November 2, 2010	Undiluted	0.16
1.28	November 3, 2010	Undiluted	0.15
1.36	October 31, 2010	4:1 FPK- Cell D Water	0.44
1.34	November 2, 2010	4:1 FPK- Cell D Water	0.49
1.28	November 3, 2010	4:1 FPK- Cell D Water	0.46
1.36	October 31, 2010	1:1 FPK- Cell D Water	0.64
1.34	November 2, 2010	1:1 FPK- Cell D Water	0.69
1.28	November 3, 2010	1:1 FPK- Cell D Water	0.59
1.36	October 31, 2010	Undiluted-Coagulant**	0.05
1.36	October 31, 2010	1:1 FPK- Cell D Water – Coagulant**	0.7

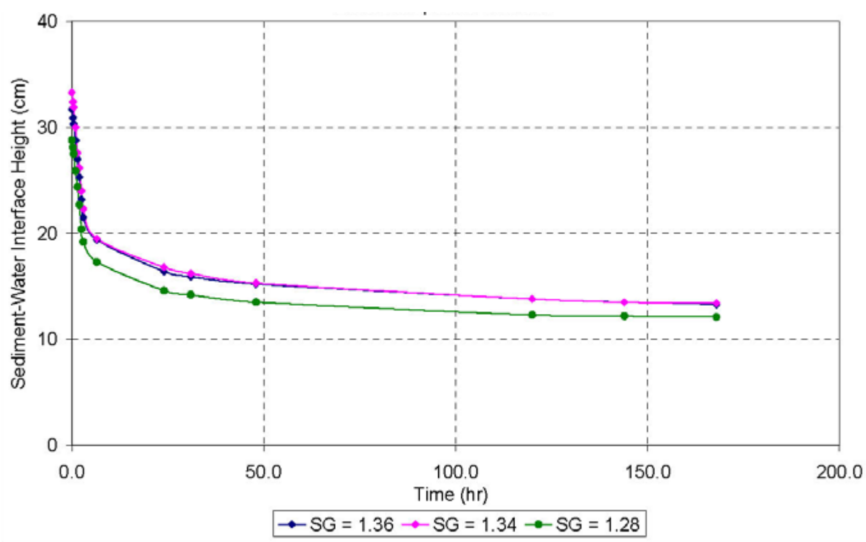

Figure 8. FPK Settling Test, Change in Sediment Height 1:1 FPK-Cell D Water Mixture

2.3 TOPOGRAPHIC SURVEYS OF THE LLCF

In 2008 and 2010 detailed LiDAR topographic surveys were conducted at the LLCF. LiDAR is a sophisticated technology that provides a highly accurate topographic survey conducted with a sensor slung beneath a helicopter at low altitude. These surveys provided detailed topographic surfaces that were used in this study. This approach was effective in providing the level of detail needed for this study but is not considered necessary on a routine basis. The topographic contours derived from the 2010 LiDAR survey with beach inclinations and cross sections are provided in RGC 2010a.

The LiDAR surveys were combined with complementary profiles of underwater FPK beaches to enable the development of a complete FPK surface. The underwater surveys were conducted by BBCI personnel using weighted lines dropped to bottom along transects through the ponds in Cells A and C (Cell B did not contain a pond large enough for useful profiling).

FPK beach slopes were evaluated from the 2010 survey data. The flattest inclination is 0.57%, observed towards the north end of Cell B. In this area the beach inclination is considered to be controlled primarily by the characteristics of the deposited materials. The beach extends across the cell from the west to the east.

Low inclination slopes were also observed in Cell A, These varied from 1.1 to 1.25%. As with Cell B. the flatter slopes of Cell A are considered to be the result primarily of the characteristics of the deposited materials.

The steeper slopes as observed elsewhere are considered to be controlled primarily by pre-existing conditions as follows:

- At spigot A7 the slope of 1.89% is controlled by deposition before 2008.
- At spigot A11, the primary factor controlling the beach inclination of 1.85% is considered to be the topography of the ground downgradient of the spigot.
- Along the east side of Cell C, the beach inclination of 2.25% is considered to be controlled primarily by long-term deposition going back five or more years.

On the basis of comparison of LiDAR surveys done in 2008 and 2010, it is estimated that about five million cubic meters of deposition capacity per year is being filled (RGC, 2010a), which is a greater volume than would be anticipated based on typical FPK quantities and material densities. This suggests that the measured volume (derived from the 2008-2010 surveys) is representative of the short term volume requirements for FPK which include some extra quantity of entrained water and EFPK that has not yet settled out of the water column.

In this sense and in reliance on the principle of generally preferring measured field data over theoretical, the measured annual storage volume of 5M m^3 can be used as a conservative (i.e., slightly high) planning estimate of the future storage volume required for FPK. This is based on BBCI not substantively changing the planned ore processing rate.

Based on the 2008 and 2010 LiDAR surveys, the combined remaining capacity of Cells A, B and C as of summer 2010 and under the current configuration of pipelines and discharge spigots was approximately 20M m^3.

2.4 SOURCES OF KIMBERLITE ORE

2.4.1 EKATI Life of Mine Plan

The EKATI Life of Mine (LOM) Plan is an annual snapshot of the kimberlite pipes that are planned to be mined and the intended sequence of mining. This is based on the legal definitions of *ore reserves* and estimated costs and revenues. The LOM is typically updated annually as part of EKATI's annual planning cycle. The LOM can change based on the addition or removal of kimberlite pipes as a result of changes in the geological classification, revised revenue projections or revised cost projections (diesel fuel, for example). The most recent LOM which is used in this study is the BHP Billiton fiscal FY11 LOM, illustrated on Figure 9 (BHP Billiton fiscal year ends June 30 of the named year).

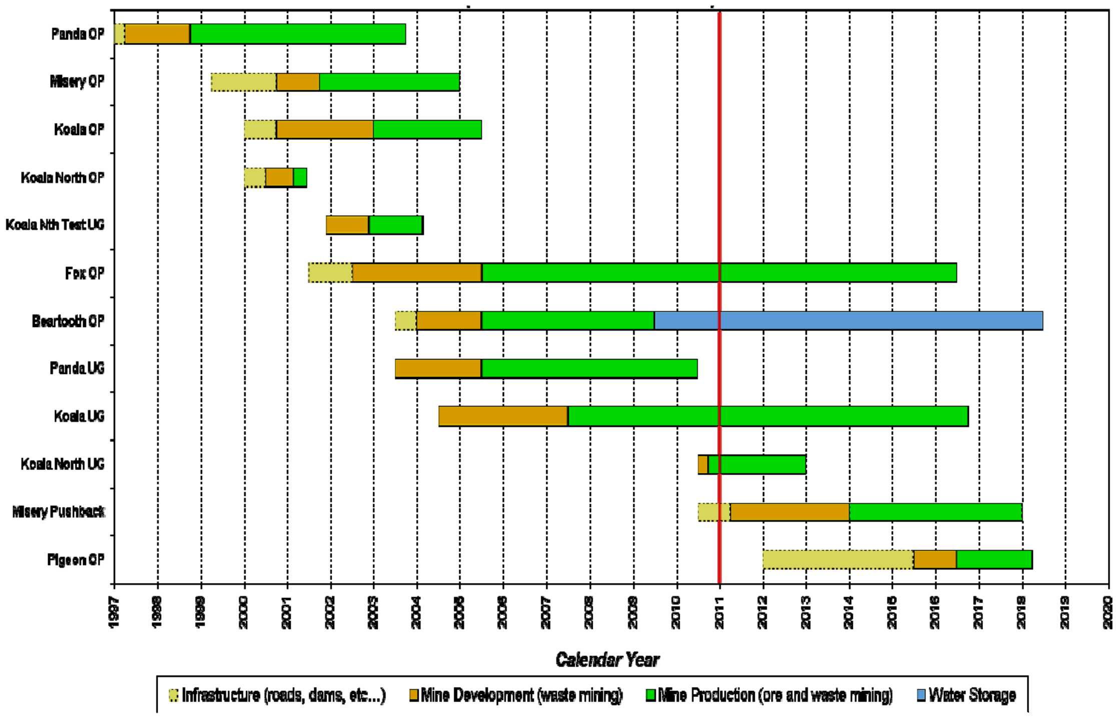

Figure 9. FY11 Life of Mine Plan

The FY11 LOM shows that mining is planned to continue to approximately the first quarter of 2018. The kimberlite pipes scheduled are Fox (open pit), Koala (underground), Koala North (underground), Misery (open pit) and Pigeon (open pit). The Pigeon open pit has not yet been developed and is currently undergoing BHP Billiton's corporate review and approval process.

The 6.75 years from July 2011 to March 2018 represent an FPK storage requirement, for planning purposes, of 33.75M m^3. Given the inherent uncertainties in mineable versus forecast quantities of ore, a 3-month buffer should be added to provide a minimum allowance for operating variances. Therefore, this study is based on an implementable plan of 35M m^3 of FPK.

2.4.2 Other Licenced Sources of Ore

In addition to the ore sources identified in the 2010 LOM, there are several other potential sources of ore that are licenced and that could be processed. These include the Sable kimberlite pipe (open pit) and Fox Low Grade (quarrying). None of these potential sources of ore currently meet financial requirements to be included into the LOM. However, given that they are already allowed in the essential operating permits they could be mined if the economic projections improve. These are, therefore, considered potential sources of ore that could collectively add in the order of four years to the LOM. That represents a potential FPK storage requirement, for planning purposes, of 20M m^3.

<u>Therefore, this study should recommend a feasible plan for an additional 20M m^3 of FPK beyond the 2010 LOM.</u>

2.4.3 Other Conceptual Sources of Ore

Other possible sources of ore beyond those identified above are concepts that are not licenced and that are currently under conceptual review only. These include Fox Deep (open pit or underground), Jay (open pit), Lynx (open pit) and Cardinal (open pit). Some of these concepts represent extremely large reserves that would generate a substantive need for FPK storage. No estimate for FPK storage is developed here but the concept of possible on-going storage needs is identified for conceptual consideration.

<u>Therefore, this study should recommend a conceptual plan for FPK deposition beyond the LOM and other licenced sources of ore.</u>

2.5 SUMMARY OF FPK STORAGE REQUIREMENTS

Under the current plan, Cells A, B and C of the LLCF provided approximately 20M m^3 of storage capacity for FPK as of the summer 2010 LiDAR survey. Approximately one year will have passed since then to the start of the planning period for this study, representing an assumed deposition of approximately 5M m^3 to July 1, 2011. Therefore the available remaining storage capacity in Cells A, B and C for the purpose of this study is 15M m^3. This storage capacity will be utilized under any of the deposition options described in this study. Deposition into Cell B is nearly complete under the current plan and is anticipated to cease in 2012.

However, this can not be taken as suggesting that additional deposition locations would not be needed or used before 3 years time. Diligent planning for a large deposition plan such as EKATI's relies on effective sequencing of deposition locations in a manner that avoids bottlenecks and provides contingency options.

A summary of the FPK storage requirements is listed in Table 3.

Table 3. Summary of FPK Storage Requirements

Requirement for Recommended Deposition Plan	Currently Available in Cells A, B and C[1]	Additional Volume Required[2]		
Implementable: 35M m^3	15M m^3	20M m^3	--------------------	--------------------
Feasible: 20M m^3	--------------------	--------------------	20M m^3	--------------------
Conceptual: quantity unknown	--------------------	--------------------	--------------------	*potentially large*

Notes: 1. The volume that is available for FPK deposition in Cells A, B and C under the current configuration of roads and pipelines from summer 2011 onwards.

2. The volume required, additional to that shown at left, to meet the study objectives.

3 DEPOSITION OPTIONS

3.1 METHODOLOGY

Options for FPK deposition, including the current plan for FPK deposition into Cell D, have been identified and evaluated by the project team. All of the options assume that the remaining capacity in Cells A, B and C (approximately 15M m^3) under the current plan is utilized. The options fall into one of three categories: LLCF Cell D; LLCF Cells A, B and C; and Open Pits (Figure 10).

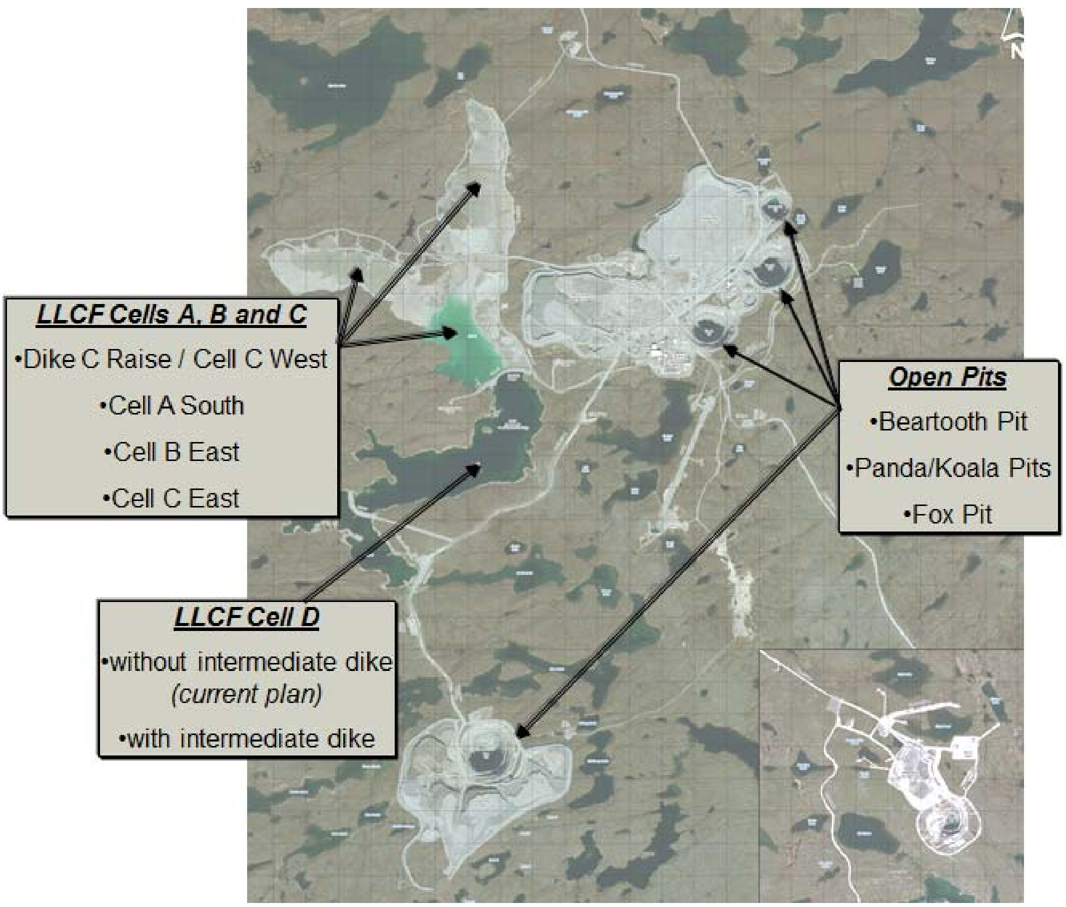

Figure 10. FPK Deposition Options

To facilitate the comparative evaluation, the options are described and evaluated below under a series of consistent topics:

1. FPK Storage Volume

   Considers relative FPK storage volumes created.

2. Implementation

Considers relative construction and operating complexities and timeframes.

3. Environment

   Considers relative environmental uncertainties and risks, primarily concerned with water quality during operations. Modeling of water quality in the LLCF was undertaken using the existing LLCF Water Quality Prediction Model (V.3.0, Rescan 2010). The model was validated against observed chloride concentrations, representative of a conservative water quality parameter (Figure 11), and water levels, representative of the water balance modeling (Figure 12). Sediment (TSS) was not modeled.

4. Closure

   Considers relative closure uncertainties and risks.

5. Costs

   Considers relative scope of capital, operating and closure costs.

Each deposition option is evaluated relative to the current plan, deposition into Cell D. Each option was scored for each topic on a progressive scale from -3 to +3 with zero representing the current case, as follows:

Much less favourable than the current plan | *current plan, Cell D without Internal Dyke* | *Much more favourable than the current plan*

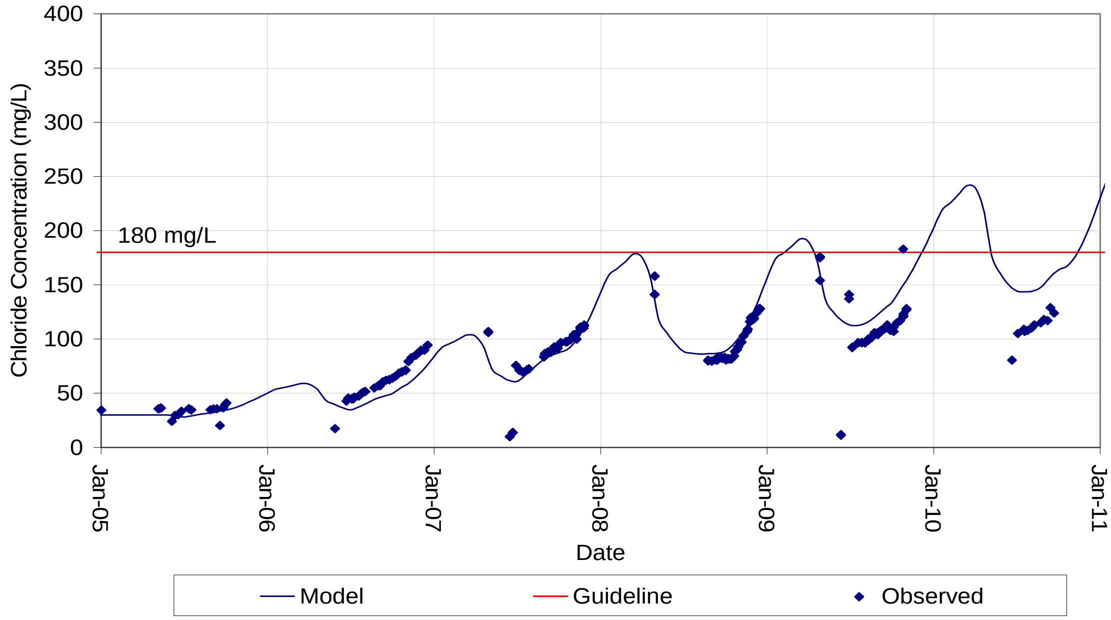

Figure 11. Water Quality Model, Cell E Chloride Calibration

Note to Figure 11: The guideline value shown (180 mg/L) is a first-level screening level based on the hardness modified, site-specific water quality objective derived for the EKATI site (Rescan 2009) and is not a regulatory limit on effluent quality.

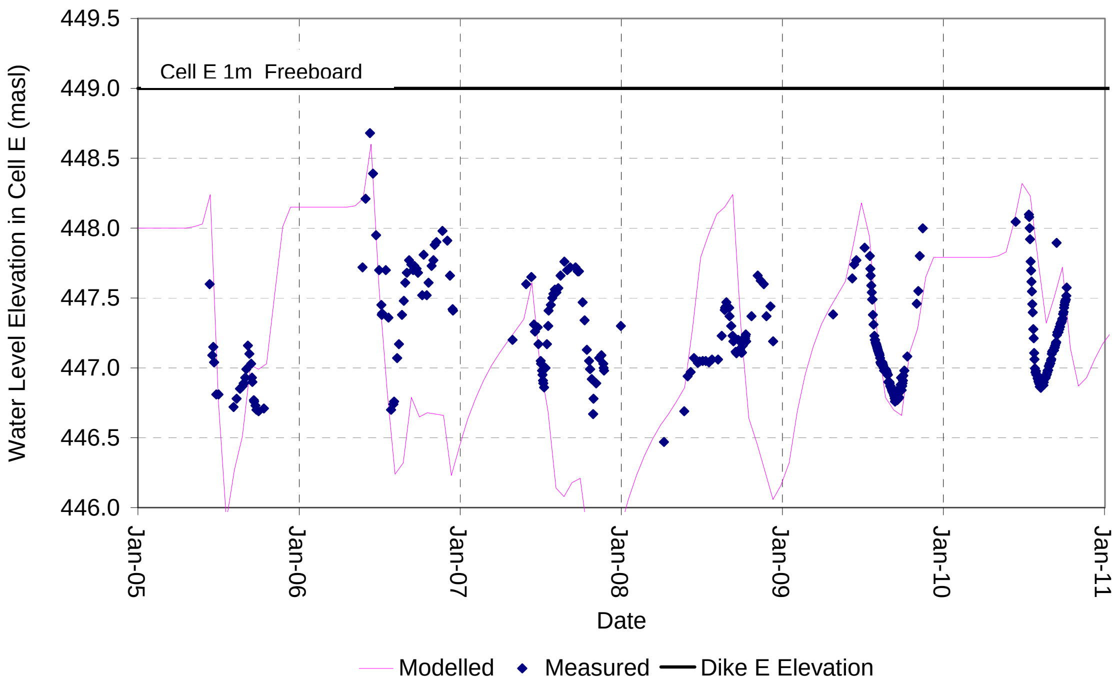

Figure 12. Water Quality Model, Cell E Water Level Calibration

3.2 DEPOSITION OPTIONS: LLCF CELL D

3.2.1 Cell D Without Internal Dyke (Current Plan)

3.2.1.1 FPK Storage Volume

The current plan for FPK deposition is to use Cell D (Figure 2). As capacity is used up in Cells A, B and C, deposition would gradually phase completely to Cell D beginning around 2014. In total, Cell D provides a conceptual maximum available volume of approximately 32M m^3 within the current working elevation of Dyke D. Note that this maximum conceptual volume would increase under the concept that is also incorporated into the currently assessed plan for construction of additional peripheral dykes and raising of Dyke D. For this study and without consideration of peripheral dykes or raise of Dyke D, Cell D is considered to easily provide 20M m^3 of FPK storage volume with a substantial residual pool of water in Cell D for closure, consistent with the current closure plan.

3.2.1.2 Implementation

In order to use Cell D for FPK deposition, the recycle water barge would have to be relocated from the north to the south end of the cell. New recycle water pipes and pumps would have to be installed from the new barge location at Dyke D to the process plant. Relocating the barge from the north end of Cell D would involve disruption of current LLCF operations. Temporary recycle water facilities or an alternative source of plant makeup water would have to be provided if it were not possible to relocate the barge during a period of suspended plant operations.

A new deposition pipeline could be extended across Dike C to the north-west corner of Cell D and deposition undertaken from that location. This would result in beaches that are consistent with current closure plans (Figure 4). Construction of new access roads and installation of new delivery pipes and pumps would not significantly impact ongoing deposition into Cells A, B, or C.

Alternatively, new pipelines with multiple spigots could be installed on both the west and east sides of Cell D and beaches advanced out into the cell from both the east and west sides. This would be similar in concept to what has been undertaken at Cell B. This approach involves more piping and new access roads along the west perimeter of the cell, but results in a greater volume of FPK being able to be deposited into the cell. The potential extent to which the west and east side perimeter discharge systems could be extended south would depend on the settlement of the fines fraction of deposited material. If settlement occurs as has been observed in Cell C (RGC 2010a), the potential would exist to extend the discharge lines and spigots almost to the south of the cell and close to Dike D.

It is estimated that it will take six months to prepare the materials that may be needed for new access roads. New access roads and delivery pipes could be constructed any time thereafter over a period of approximately six months. Deposition into Cell D is not feasible, however, until the current water levels in Cell D are reduced, which is dependent on continued reductions in nitrate concentrations in the Cell D water. This is considered to take another two years (summers of 2011 and 2012) and, therefore, FPK deposition should not be scheduled prior to late 2012.

Therefore, this option could be available beginning in late 2012, the limiting factor being reduction of water levels in Cell D. The construction and operational complexities are low as the work is a continuation of established practices.

3.2.1.3 Environment

Because this option represents the current operating plan for the LLCF, the water quality predictions (excepting sediment which is not modeled) from the LLCF Water Quality Prediction Model (V.3.0, Rescan 2010) are representative of the option. These predictions are representative of all options that provide 100% of the FPK stream to the LLCF because all parameters are considered to behave conservatively. None of the water quality parameters are modeled with a decay function that that would be affected by the location within the LLCF where the FPK would be deposited. Note that modeled results for nitrate are affected by the on-going nitrate reduction experiment in Cell D and are not, therefore, included here as part of this comparative study. For all of the water quality predictions the seasonal effect of ice formation is modeled and results in increased concentrations in the under-ice water column during the winter season due to ion-exclusion from the ice.

Figure 12 shows the predicted future chloride concentrations in Cell E. Figure 12 illustrates the benefit that pumping underground minewater to Beartooth pit is predicted to have on chloride concentrations in the LLCF. This benefit is most exaggerated for chloride because the underground minewater is the predominant source of chloride entering the LLCF.

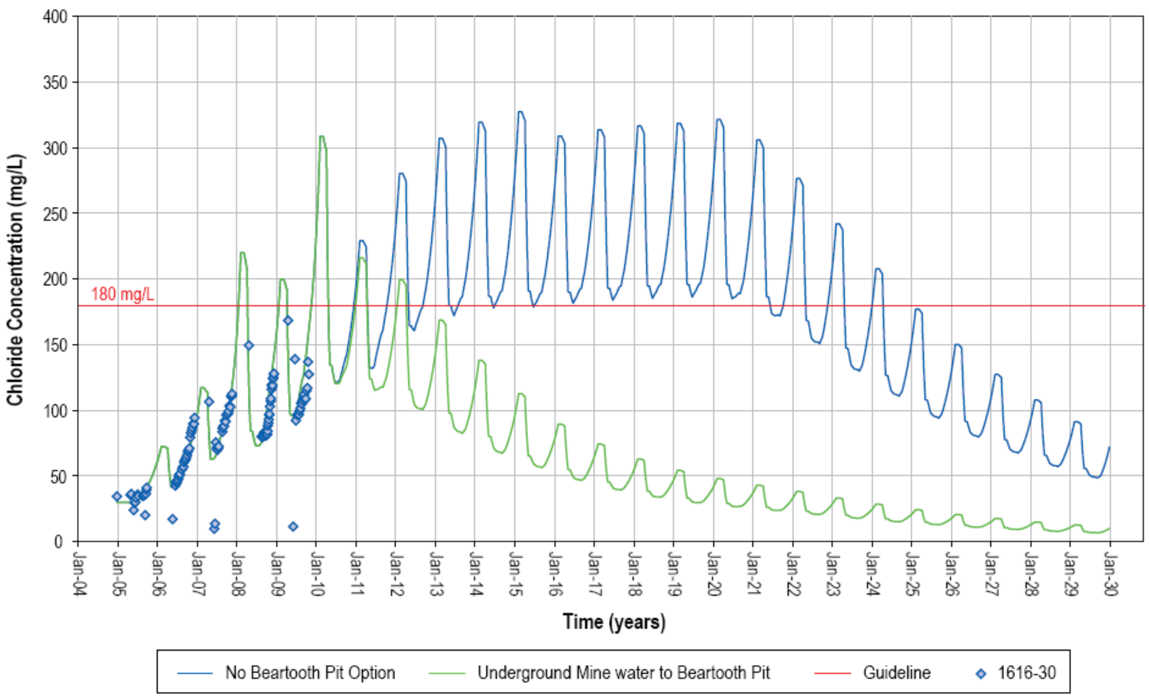

Figure 13. Predicted Chloride Concentrations in Cell E, 100% FPK to LLCF

Note to Figure 12: The guideline value shown (180 mg/L) is a first-level screening level based on the hardness modified, site-specific water quality objective derived for the EKATI site (Rescan 2009) and is not a regulatory limit on effluent quality.

Figure 13 shows the predicted future zinc concentrations in Cell E. Figure 13 illustrates the sensitivity analysis on 10% variations in the quality of process plant discharge water and indicates that zinc (as representative of trends for metals generally) is not sensitive in this regard.

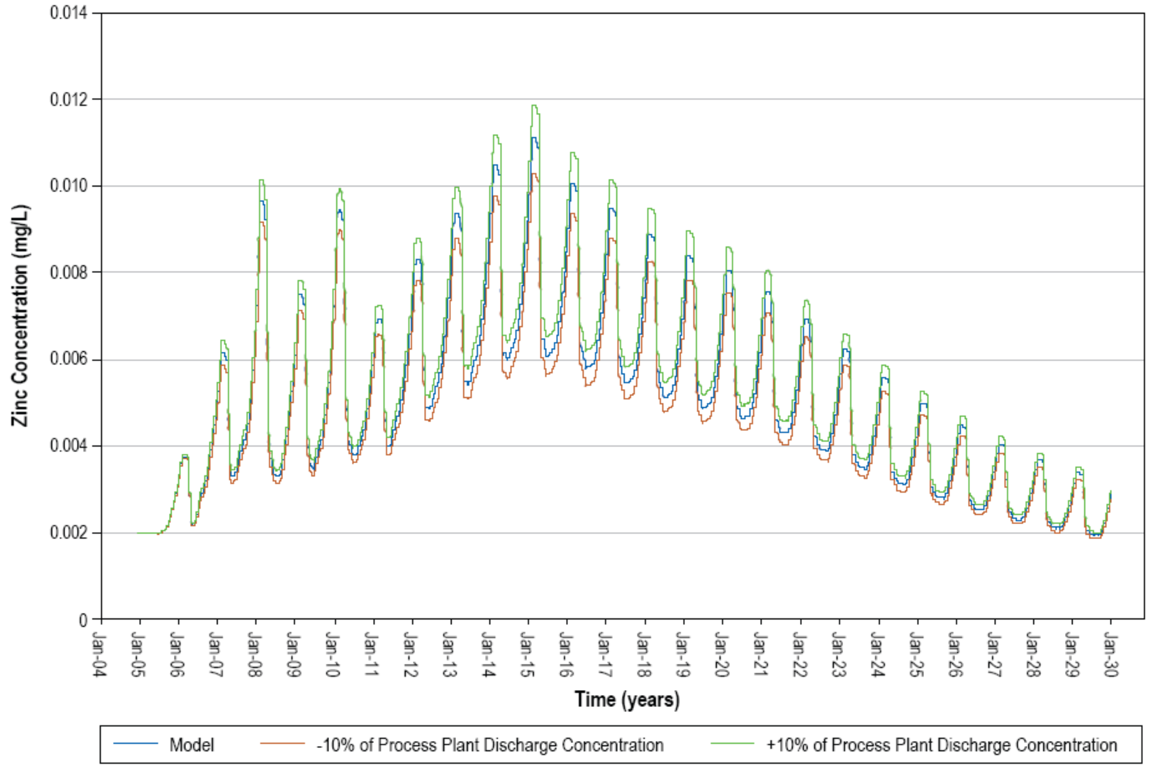

Figure 14. Predicted Zinc Concentrations in Cell E, 100% FPK to LLCF

This assessment shows that water quality in Cell E is not predicted to worsen substantively through the life of mine and the ability to discharge compliant water would not be affected. Average annual discharge volumes through mine operations are predicted to be in the order of 8M m^3/yr, well within EKATI's established operating capabilities.

There is uncertainty with this option regarding the settlement of EFPK out of the water column. If EFPK settlement were much worse than observed in Cell C, there is a risk that EFPK could accumulate in Cell D water to the point where the ability to recycle water to the process plant or to discharge water to the environment may be negatively affected. This is considered to be a considerable uncertainty of this option. It is not feasible to model sediment concentrations in the manner of other water quality parameters such as chloride and therefore the assessment of sediment risk is based primarily on past performance in the LLCF and settlement tests. This risk can be mitigated by contingency planning for a sediment-filtering system.

No additional environmental risks would be anticipated that are not addressed through EKATI's operating plans and procedures or through minor revisions to those.

3.2.1.4 Closure

The current closure concept for Cell D is shown in Figure 4. The beach(es) in Cell D would be reclaimed as is planned for other beaches in Cells A, B, and C and there would be a residual pool of water in Cell D for energy dissipation and additional settlement. An overflow weir would be constructed for Dyke D, as is also planned for Dykes B and C. Additionally, drainage swales would be constructed on the FPK surface as required to safely direct surface runoff to the residual pool.

This option does not take advantage of the opportunity presented by some of the other options, singly or in combination, to preserve the use of Cell D as an additional settlement/polishing pond free of FPK. This is not considered an essential requirement of the closure plan but represents a possible optimization that was recognized in the earlier 5-Year Performance Review and that is one of the drivers for BHP Billiton's interest in conducting this study.

3.2.1.5 Costs

Based on similar work to construct the Cell A high access road and install deposition pipelines, it is estimated that construction costs in the order of $10M should be planned to relocate the barge, build new access roads, and purchase and install new pipes and pumps.

Contingency costing of a sediment filtering system should be included into this option. The potential for this need has been recognized in previous planning exercises based on the risk of poorer than anticipated settlement of EFPK that results in unacceptably high sediment in recycle water and effluent discharge water. A contingency cost in the order of $5M should be provided plus increased annual operating costs in the order of $0.5M annually.

3.2.2 Cell D With Internal Dyke

3.2.2.1 FPK Storage Volume

This option provides for deposition of FPK into Cell D with a new filter dyke constructed within Cell D as mitigation against the risk of unacceptably high sediment in the Cell D water. This would split Cell D in two providing an upstream cell for FPK deposition (Cell D_N) and a downstream cell for water clarification and recycle pumping (Cell D_S). As with the current plan, deposition would be progressively directed to Cell D. An estimated 12 to 15M m^3 of FPK storage volume would be expected based on the preferred location of the internal dyke, as described below. Therefore this option alone would not be expected to provide FPK storage capacity for the remainder of the life of mine.

3.2.2.2 Implementation

The construction of new roads and pipelines and the relocation of the recycle water system would be equivalent to the base case. Construction of the internal dyke would be a large and complex project.

Figure 13 shows three possible locations in Cell D for an intermediate dike. The more northern location results in a Cell D_N that is too small to provide adequate FPK storage volume to justify its construction. The more southern location provides for a shorter and less expensive dyke but provides a small Cell D_S that is considered too small to serve its intended purpose. Therefore the central location has been considered for the intermediate dyke.

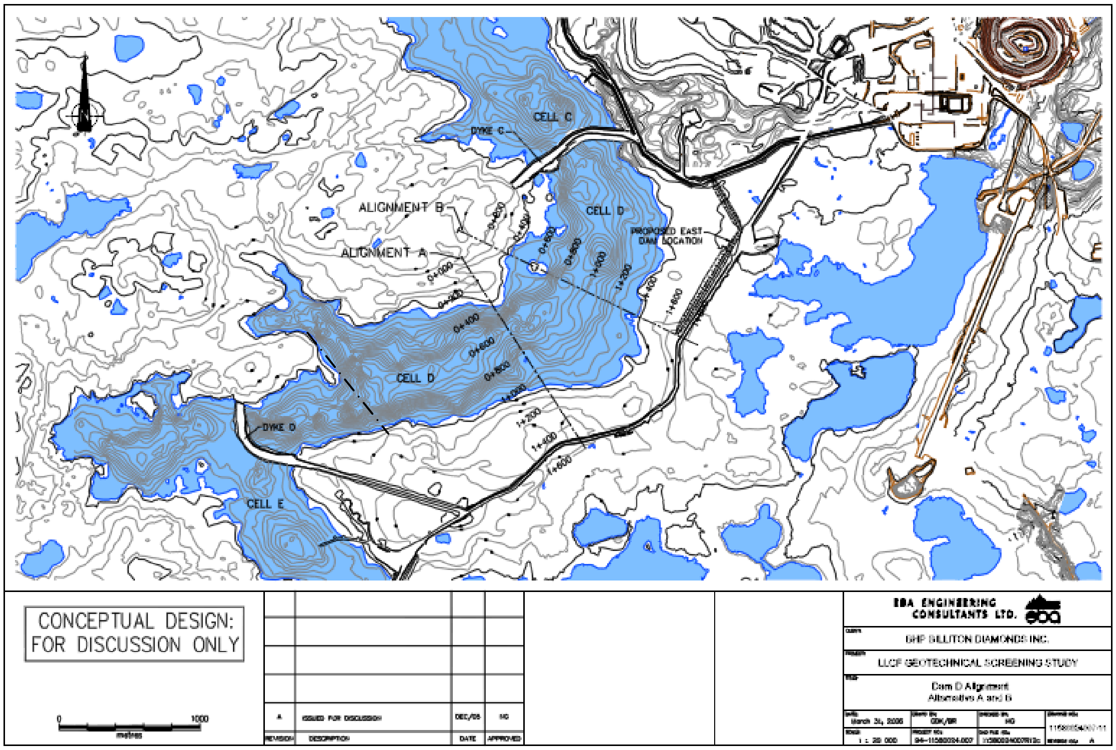

Figure 15. Locations of Possible Cell D Intermediate Dikes

The intermediate dike could be constructed to function as a throughflow structure as are Dikes B and C. Alternatively a new intermediate dike could be constructed as an impermeable dam as is Outlet Dam at Cell E. A throughflow dike is preferred for these reasons:

- It is considerably less expensive to construct than an impermeable dam.

  There is no need for frozen core construction, liners, thermosyphons or thermal monitoring.

- It is not considered necessary to provide an impermeable dam.

  There is no driving need for water retention in the upper cell.

- It provides the benefit of filtering sediment from water that passes through.

  The effectiveness of sediment retention has been observed at other dikes.

- It reduces pumping requirements and costs.

  Runoff and other water in excess of recycle needs would have to be pumped over an impermeable dam.

Construction of the intermediate dyke would be complicated by the necessity to work in depths of water in the order of 20 m. Placing fill materials at depth in this manner would slow the work, increase construction costs and could increase performance risks of the filter zone.

The placement of construction materials will displace water from Cell D that will need to be pumped out of the cell. Therefore, construction of the intermediate dyke is not feasible until the current water levels in Cell D are reduced, which is dependent on continued reductions in nitrate concentrations in the Cell D water. This is considered to take another two years and, therefore, construction should not be scheduled prior to late 2012.

Preparation of fill materials, geotechnical field investigations and final engineering designs would require approximately 12 months and could be undertaken concurrently with reducing the current water level in Cell D. Construction of the dyke itself would require approximately 8 to 12 months encompassing a summer season. Therefore, this option could be available by the end of 2013. The construction complexities are high but operational complexities are low as the operation of the facility would be a continuation of established practices.

3.2.2.3 Environment

The modeled water quality in the LLCF for this option would be the same as for the current plan (Figures 12 and 13). This assessment shows that water quality in Cell E is not predicted to worsen substantively through the life of mine and the ability to discharge compliant water would not be affected. Average annual discharge volumes through mine operations are predicted to be in the order of 8M m^3/yr, well within EKATI's established operating capabilities.

The environmental benefit of this option as compared to the current plan is to essentially eliminate the risk of elevated sediment in Cell D_S and Cell E.

No additional environmental risks would be anticipated that are not addressed through EKATI's operating plans and procedures or that would not be readily addressed through minor revisions to those.

3.2.2.4 Closure

If an intermediate dike were constructed, it is anticipated that Cell D_N would be reclaimed as is proposed for Cells A, B, and C. The intermediate dike would be reclaimed with an overflow weir in a manner essentially the same as is proposed for Dikes B, C and D. Cell D_S would be retained as an open pool of water and provide the continued benefit of an additional water polishing area within the reclaimed LLCF.

This work is essentially within the scope of the current closure plan. The beached areas of FPK to be reclaimed would be similar to the current plan. The increase in closure costs for notching the internal dike would be small.

3.2.2.5 Costs

As per the current plan, it is estimated that in the order of $10M should be provided to relocate the barge, build new access roads, and purchase and install new pipes and pumps. A water filtration plant is not required.

EBA (2006) provides a preliminary estimate of the cost of an intermediate dike. Updates of these costs in 2010 indicate the minimum cost of an intermediate (throughflow) dike would be in the order of $32M.

Operating costs would be less than the current plan because contingency planning for operation of a water filtration plant is not required.

3.3 DEPOSITION OPTIONS: LLCF CELLS A, B AND C

3.3.1 Dyke C Raise / Cell C West

3.3.1.1 FPK Storage Volume

The crest elevation of Dyke C is currently 459 m. The crest elevation could be raised to 461 m as is allowed in the dyke design. This would create additional upstream storage capacity in the order of 4M m^3 in Cell C. This additional capacity could not easily be accessed from the existing pipeline configurations because much of the storage capacity is in the western area of Cell C (Figure 2). Therefore, raising of Dike C would best be undertaken in conjunction with the construction of new roads and deposition pipelines on the west side of Cell C.

Accessing additional storage capacity in the western area of Cell C could be achieved by constructing a new access road from the crest of Dike C west and north towards Cell A (Figure 15). The general elevation of the road would be about 471 m. Spigots could be installed at selected locations, particularly where the topography juts out into the cell area and jetties could be constructed as has been done in other areas to promote efficient deposition. Thus beaches could be formed much as is being done from the current jetties on the north side of Cell A. Deposition from the west side of Cell C would access approximately 2M m^3 of storage capacity additional to the capacity created by a raise of Dike C.

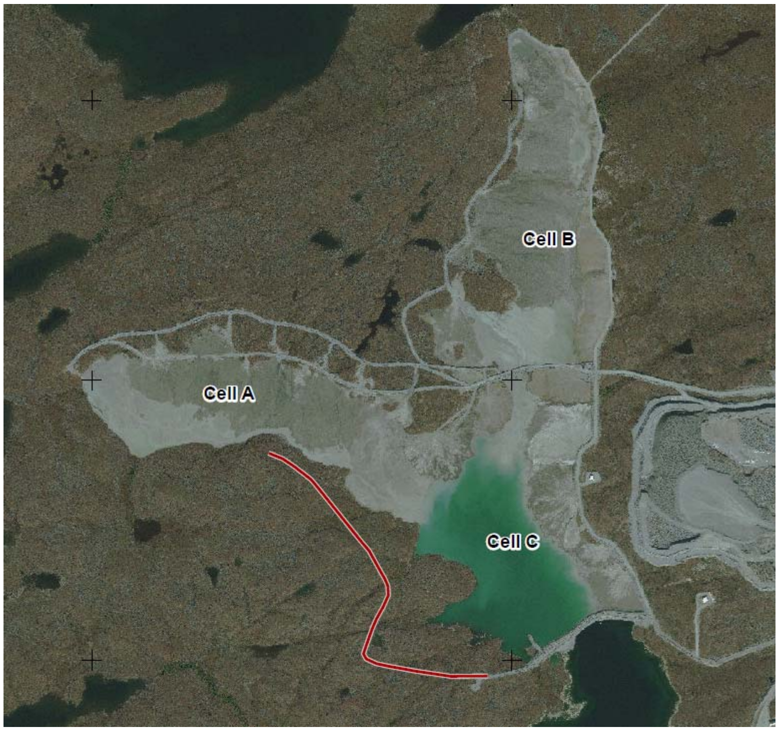

Figure 16. Cell C West Road

Therefore this option creates an estimated 6M m^3 of additional storage capacity (Figure 16) and would not, on its own, be expected to provide FPK storage capacity for the remainder of the life of mine.

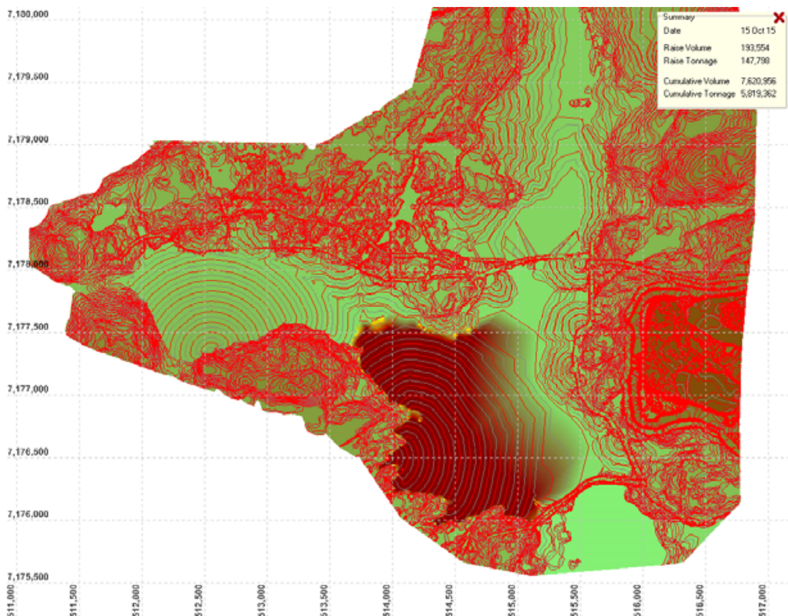

Figure 17. FPK Deposition Concept, Cell C West/Dike C Raise

3.3.1.2 Implementation

A raise of Dike C would follow established designs and construction practices. The most recent raise was completed in 2010 (to nominal crest elevation 459 m) and so those procedures are current. The raise design (to nominal crest elevation 461 m) would continue the basic design approach of a downstream shell of granite rock and an upstream filter of crushed and sized granular material (Figure 15). The raise could be accomplished with minimal disruption to pipelines, electrical and other ground installations on the dike. Construction materials (granite) would be quarried from the Panda/Koala waste rock storage area according to current, established practices. By comparison, the construction complexity for a raise of Dike C is not nearly as great as construction of an intermediate dike within Cell D because, primarily, the raise is completely out of water.

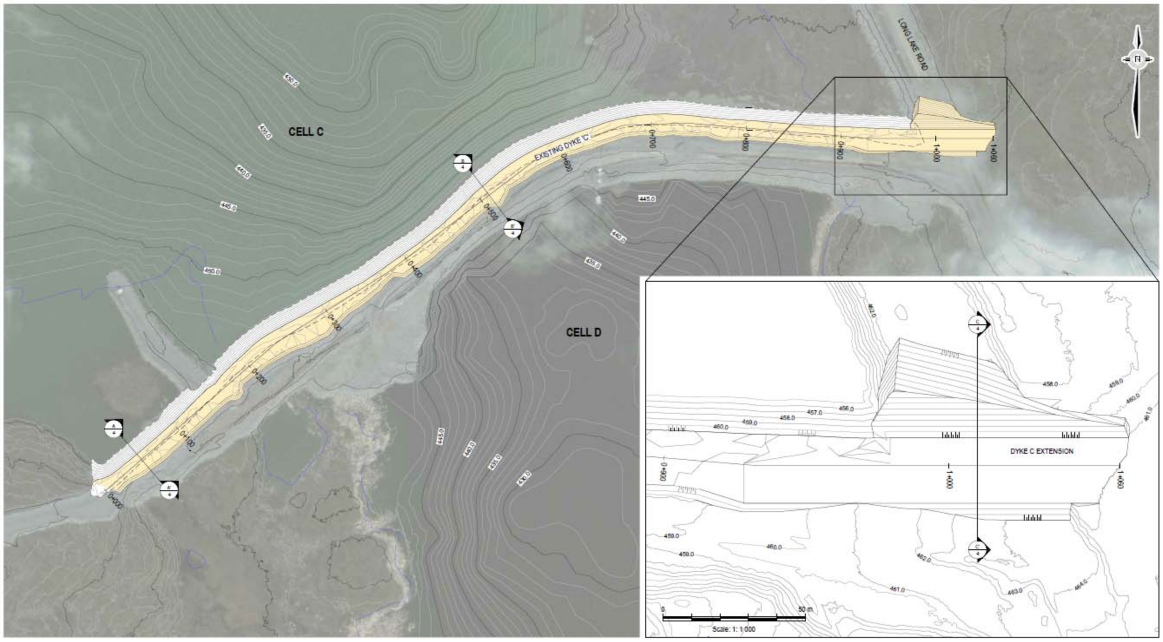

Figure 18. Possible Dike C Raise Design

A new access road and pipeline would be constructed at approximately elevation 471 m on the west side of Cell A, starting at the west end of Dike C. This elevation is within the Cell C catchment area and is consistent with the current Cell A North and Cell B West access roads, providing consistency throughout the facility.

Deposition from the Cell C west road would result in formation of a low area near the center of the cell and this would ultimately become the post-closure drainage routing for runoff within the local catchment and upstream areas of Cells A and B.

The primary FPK pumping system is capable of delivering FPK to the end spigots in Cells A and B. However, current pump capacity limits use of the secondary line further west than Spigot B7 (Figure 5). Therefore if 100% of the FPK stream is required to be pumped to the Cell C west area, additional pumping capacity would likely be required.

The Dike C raise could be completed in summer 2012 and the Cell C west road and pipeline could be constructed in summer 2013 such that this option could be available by late 2013.

3.3.1.3 Environment

The modeled water quality in the LLCF for this option would be the same as for the current plan (Figures 12 and 13). This assessment shows that water quality in Cell E is not predicted to worsen substantively through the life of mine and the ability to discharge compliant water would not be affected. Average annual discharge volumes through mine operations are predicted to be in the order of 8M m^3/yr, well within EKATI's established operating capabilities.

This option eliminates the risk related to EFPK settlement in Cell D, as compared to the current plan. An additional environmental benefit of this option is to further defer FPK deposition into Cell D and, thereby, continue the use of Cell D as an additional water polishing pond.

No additional environmental risks would be anticipated that are not addressed through EKATI's operating plans and procedures or that would not be readily addressed through minor revisions to those.

3.3.1.4 Closure

The current approach for closure of FPK beaches would not change for this option. However deposition of FPK over a larger area of Cell C would increase the area to be reclaimed in Cell C by approximately 81 ha, as indicated on Figure 18. If the additional FPK deposition into Cell C was adequate to eliminate the need for any FPK beaching in Cell D, then the increased cost for reclamation in Cell C would be offset by eliminating the need to reclaim beaches in Cell D (est. 90 ha). However, this is not the case and it cannot be guaranteed that some FPK beaching in Cell D would not still be required even if the Cell C West option were to be implemented. Therefore, costing of the additional Cell C West reclamation areas should be provided for this option.

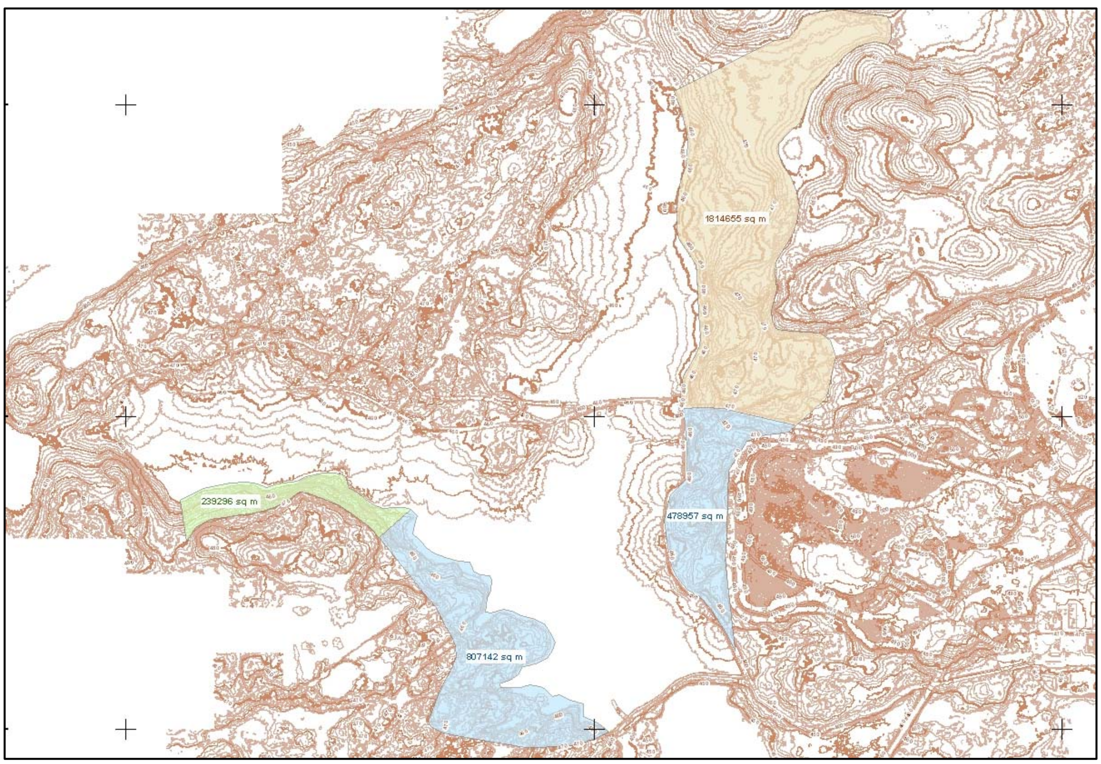

Figure 19. Possible Additional FPK Reclamation Areas, Cells A, B and C

Post-closure water management through Cell C would be slightly different under this option. Consistent with the current plan, a post-closure pool of water will be present against Dike C to allow for energy dissipation and settlement of sediment. Under the current plan surface runoff water would be routed along the west side of the cell to the dyke (Figure 4). Some of this water would flow over the FPK surface to get to the west side and would require constructed drainage swales. A conceptual design for the swales is illustrated on Figure 19 and the ICRP includes an Engineering Study that will provide a detailed engineering design. The design will address the risk of excess sedimentation resulting from possible erosion or thaw degradation of the underlying FPK, particularly in areas of extensive ice lensing.

Under the Cell C West option FPK would be present in the west area of Cell C as a beach sloping generally towards the center of the cell. Therefore, post-closure runoff water would be routed across the FPK surface in the center area of the cell to dike C, as conceptualized on Figure 20. This concept represents an incremental increase to the closure risk associated with internal drainage swales because of the greater length of channel to be constructed over FPK. However, the risk is partially offset by the likely absence of extensive ice lensing within the FPK underlying the channel. The incremental increase in closure risk associated with the central drainage swale is considered manageable through appropriate FPK deposition into Cell C during on-going operations (particularly to minimize ice lensing) and appropriate engineering design of the swale(s) for closure.

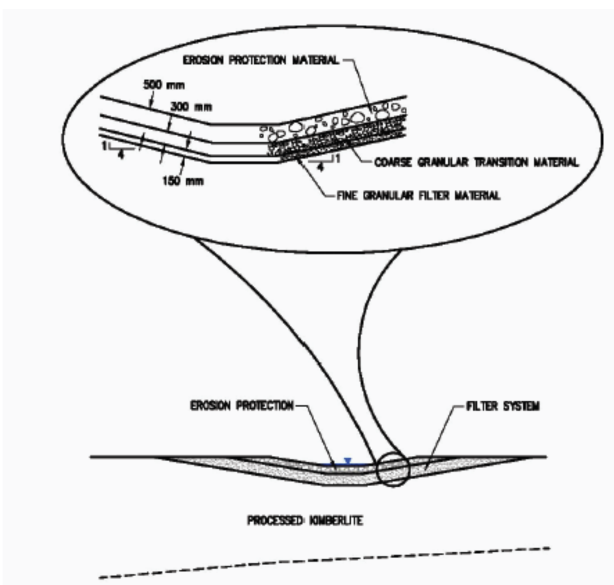

Figure 20. Conceptual Channel Section on Fine Processed Kimberlite

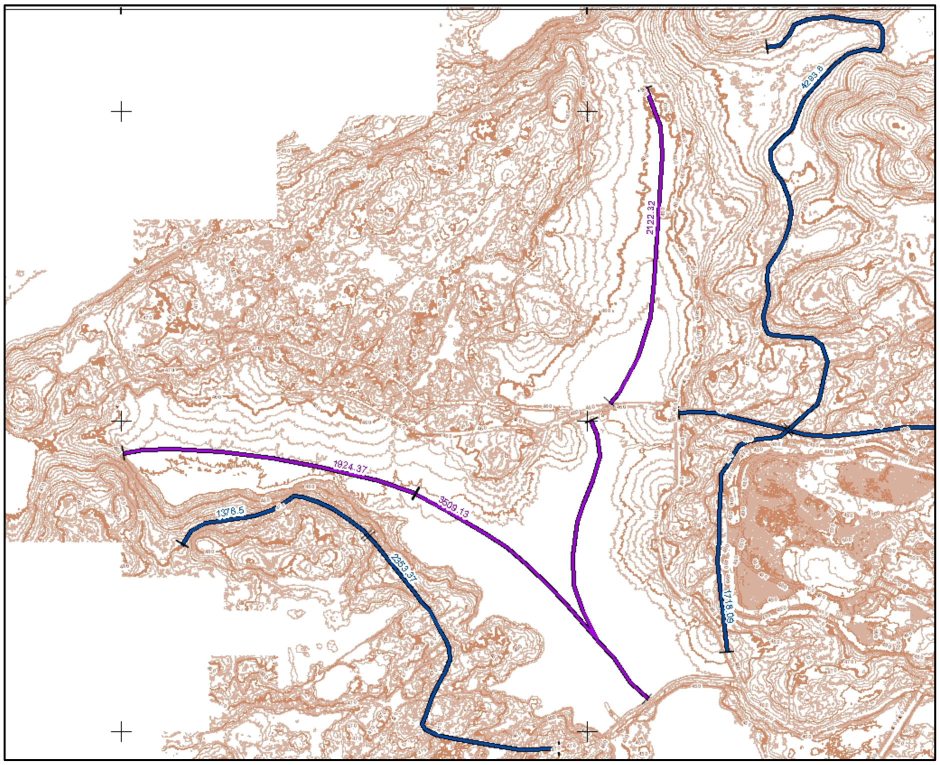

Figure 21. Possible Pipeline Locations and Post-Closure Runoff Swales for the Cell C West, Cell A South and Cell B East Options

Post-closure water levels in Cells A, B and C would be conceptually more favourable under this option than the current plan. A dike elevation of 461 could conceptually lead to a final Cell C water level in the order of 459 m (i.e., 2 m weir depth). An elevation of 459 m would tie in well to upstream facilities and FPK beaches, creating a well-integrated scheme for closure.

3.3.1.5 Cost

The primary cost items for this option are the Dike C Raise, construction of the Cell C West road/deposition pipeline, installation of additional FPK pump capacity, reclamation of the additional FPK beach area, and reclamation of the drainage swale across Cell C. These costs are estimated to be in the order of $9M.

By comparison to the current plan, a water filtration plant is not required. Operating costs would not change significantly as compared to the current plan.

3.3.2 Cell A South

3.3.2.1 FPK Storage Volume

The available capacity of Cell A was increased in 2008 by construction of a new north access road at a higher elevation than the initial road and jetties. Deposition from this north road is ongoing, with the FPK beach sloping to the south side of the cell. The available storage capacity in Cell A could be further increased by construction of a similar access road on the south perimeter of the cell with FPK beaches sloping towards the north side of the cell (Figures 21 and 22). This is the approach that has been successfully implemented at Cell B to increase its use. Deposition from a Cell A south access road would provide an estimated 4M m^3 additional capacity.

This option is based on already having constructed the Cell C West road as the starting point for accessing Cell A south.

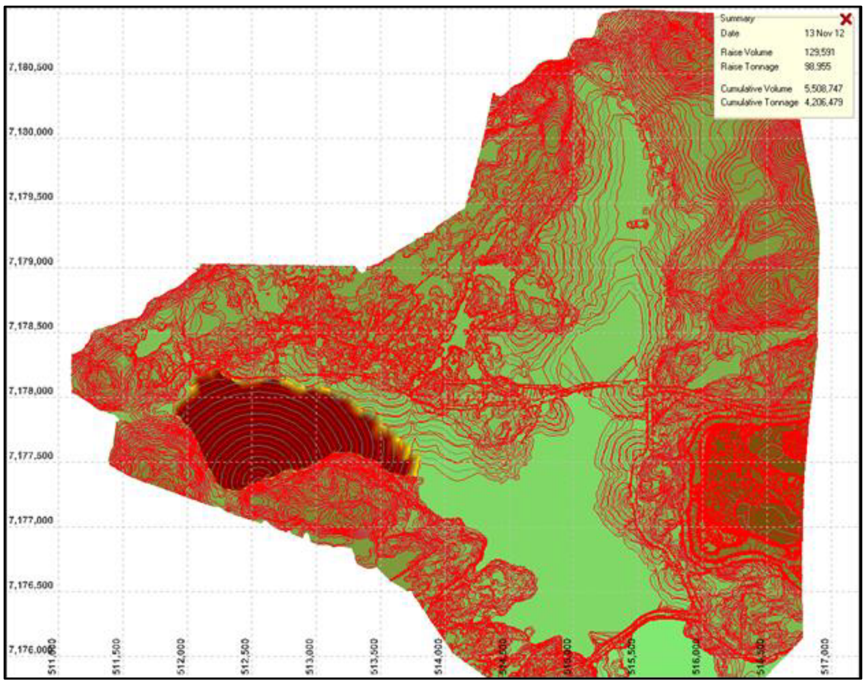

Figure 22. FPK Deposition Concept, Cell A South

3.3.2.2 Implementation

A new access road and pipeline would be constructed at approximately elevation 471 m on the south side of Cell A, starting at the end of the (assumed) pre-existing Cell C West access road. As the current north access road and pipeline is at a similar elevation, deposition would be controlled in the same way on both sides of the cell, specifically with regard to care being exercised not to build up a beach that could result in backup at the west end of the cell where the maximum permitted beach elevation is about 463 m (monitored by visual observation and survey). It is recommended that the south and north roads be connected at the upper end of Cell A (Figure 22) as was done with the Cell B east and west roads. This provides additional accessibility for inspections and maintenance work.

Deposition from both the north and a new south road would result in formation of a low area near the center of the cell and this would ultimately become the post-closure drainage routing for runoff within the local catchment.

The primary FPK pumping system is capable of delivering FPK to the end spigots in Cells A and B. However, current pump capacity limits use of the secondary line further west than Spigot B7 (Figure 5). Additional pumping capacity will likely be required to ensure operational efficiency for deposition from the Cell A South pipeline.

This option could be available by mid-2014, based on completion of the Cell C West road/pipeline by late 2013.

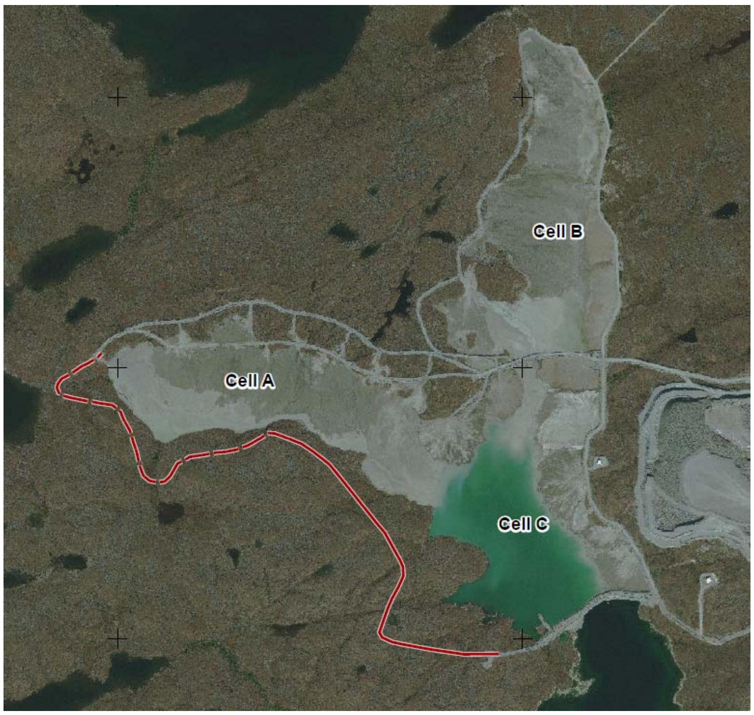

Figure 23, Cell A South Road

3.3.2.3 Environment

The predicted water quality in the LLCF is the same as for the current plan, for which chloride is modeled in Figure 12 as a representative conservative parameter. Note that the guideline value shown on Figure 12 (180 mg/L) is a first-level screening level tool based on the hardness modified, site-specific water quality objective derived for the EKATI site (Rescan 2009) and is not a regulatory limit on effluent quality. This assessment shows that water quality in Cell E should remain generally as observed through past performance under this option, as it would for all options that continue to provide 100% of the FPK stream to the LLCF. Average annual discharge volumes through mine operations are predicted to be in the order of 8M m^3/yr, well within EKATI's established operating capabilities.

The environmental benefit of this option is to further defer FPK deposition into Cell D and, thereby, continue the use of Cell D as an additional water polishing pond. No additional environmental risks would be anticipated that are not addressed through EKATI's operating plans and procedures or that would not be readily addressed through minor revisions to those.

3.3.2.4 Closure

The current approach for closure of FPK beaches would not change for this option. However deposition of FPK over a larger area of Cell A would increase the area to be reclaimed by approximately 24 ha, as indicated on Figure 18. If the additional FPK deposition into Cell A was adequate to eliminate the need for any FPK beaching in Cell D, then the increased cost for reclamation in Cell A would be offset by eliminating the need to reclaim beaches in Cell D (est. 90 ha). However, this is not the case and it cannot be guaranteed that some FPK beaching in Cell D would not still be required even if the Cell A South option were to be implemented. Therefore, costing of the additional Cell A South reclamation areas should be provided for this option.

Post-closure water management through Cell A would be slightly different under this option. Under the current plan, runoff water from within the local catchment is envisioned to collect and flow to Cell C along the south side of Cell A where the FPK Beaches generally contact the original ground (Figure 4). Some of this water would flow over the FPK surface to get to the south side and would require constructed drainage swales. A conceptual design for the swales is illustrated on Figure 19 and the ICRP includes an Engineering Study that will provide a detailed engineering design. The design will address the risk of excess sedimentation resulting from possible erosion or thaw degradation of the underlying FPK, particularly in areas of extensive ice lensing.

Under the Cell A South option FPK beaches would slope from both the south and north sides of the cell towards the center and, therefore, post-closure runoff water would be routed down the center area of the cell to Cell C, as conceptualized on Figure 20. This concept represents an incremental increase to the closure risk associated with internal drainage swales because of the greater length of channel to be constructed in an area of suspected ice lensing. The incremental increase in risk represented by the Cell A South option is considered to be greater than this same incremental risk for the Cell C West option because of the possible ice lensing in Cell A. Nonetheless, the Cell A South option does not introduce any new closure risks and the incremental increase in closure risk associated with the central drainage swale is considered manageable through appropriate FPK deposition into Cell A during on-going operations (particularly to minimize ice lensing) and appropriate engineering design of the swale(s) for closure. Cost

The primary cost items for this option are construction of the Cell A South road/deposition pipeline (starting at the pre-existing Cell C West road), installation of additional FPK pump capacity, reclamation of the additional FPK beach area, and reclamation of the drainage swale across Cell A. These costs are estimated to be in the order of $4.5M.

By comparison to the current plan, a water filtration plant is not required. Operating costs would not change significantly as compared to the current plan.

3.3.3 Cell B East

3.3.3.1 FPK Storage Volume

The available capacity of Cell B was increased in 2007 by construction of an access road and deposition pipeline on the west side of the cell. The available capacity in Cell B created by construction of this road will have been utilized around the end of 2011 and deposition into Cell B is expected to cease at that time, with the possible exception of small areas addressed for reclamation purposes. The available capacity of Cell B could be further increased by construction of a new road and deposition pipeline on the east side of the cell at an elevation similar to the west road (about 470 m). Deposition would again take place from the east side (where it had been initially undertaken from a lower elevation) with FPK beaches sloping to the west (Figure 23). This is a continuation of the approach that has been successfully implemented to date at Cell B. This option would provide an estimated 5M m^3 of additional capacity.

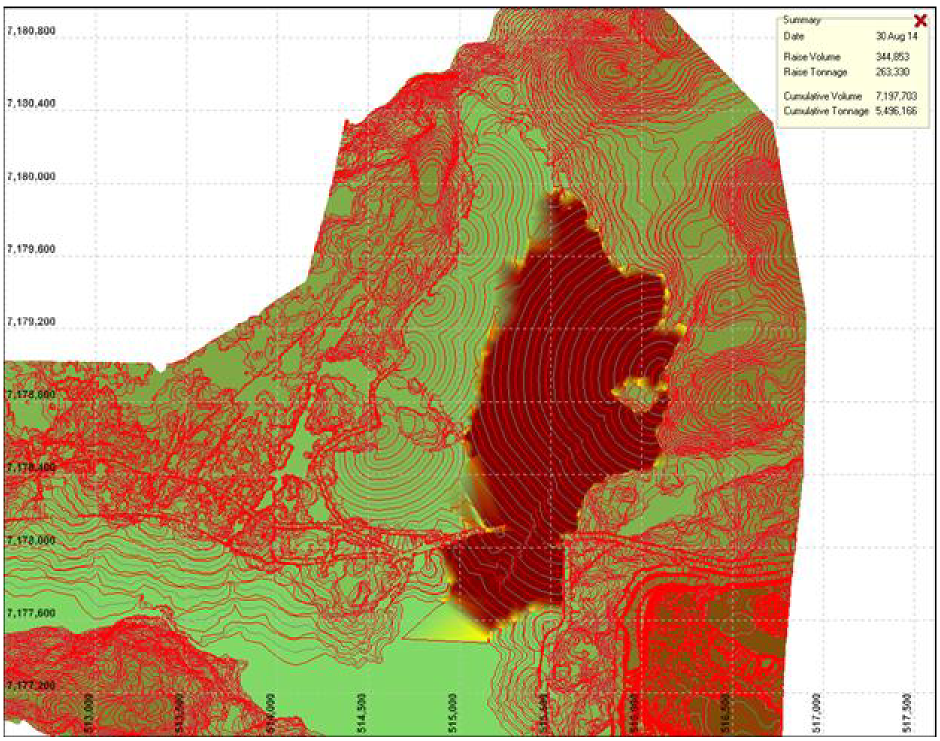

Figure 24. FPK Deposition Concept, Cell B East

3.3.3.2 Implementation

A new access road and pipeline would be constructed to the east of the current road at an elevation of about 470 to 475 m. In addition, it would be necessary to construct a dike or berm at the north end of the cell to control beaches that might otherwise be at risk of extending northwards towards the Exeter drainage.

Deposition of material from the southern spigots that would be installed on such a new access road, would probably result in an overtopping of Dike B. Thus it would be necessary to either increase the height of the dike or construct a bridge across the dike to carry the pipelines across the dike.

Deposition from the new east road would result in formation of a low area near the center of the cell and this would ultimately become the post-closure drainage routing for runoff within the local catchment. This option is considered to preclude the ability to construct an “East Diversion Ditch” as per the current closure plan (Figure 4) and, therefore, the runoff routing would include runoff from Big Reynolds Lake, Peltzer Pond and general eastern drainage area. By comparison, this is a substantively greater volume of water than for Cell A.

The primary FPK pumping system is capable of delivering FPK to the end spigots in Cells A and B. However, current pump capacity limits use of the secondary line further west than Spigot B7 (Figure 5). Additional pumping capacity will likely be required to ensure operational efficiency for deposition from the Cell A South pipeline.

This option could be available by late 2012.

3.3.3.3 Environment

The predicted water quality in the LLCF is the same as for the current plan, for which chloride is modeled in Figure 12 as a representative conservative parameter. Note that the guideline value shown on Figure 12 (180 mg/L) is a first-level screening level tool based on the hardness modified, site-specific water quality objective derived for the EKATI site (Rescan 2009) and is not a regulatory limit on effluent quality. This assessment shows that water quality in Cell E should remain generally as observed through past performance under this option, as it would for all options that continue to provide 100% of the FPK stream to the LLCF. Average annual discharge volumes through mine operations are predicted to be in the order of 8M m^3/yr, well within EKATI’s established operating capabilities.

The environmental benefit of this option is to further defer FPK deposition into Cell D and, thereby, continue the use of Cell D as an additional water polishing pond. No additional environmental risks would be anticipated that are not addressed through EKATI’s operating plans and procedures or that would not be readily addressed through minor revisions to those.

An additional environmental risk is created through this option at the north end of Cell B where there is a risk of FPK flow northwards towards the Exeter drainage. This risk is considered manageable through diligent planning and control on deposition combined with installation of an impermeable liner on the inside of the road along the north side, as has been done in the past in Cell B.

3.3.3.4 Closure

The current approach for closure of FPK beaches would not change for this option. However deposition of FPK over a larger area of Cell B would increase the area to be reclaimed by approximately 182 ha, as indicated on Figure 18. This area is much greater than for the Cell C West and Cell A South options, representing a substantive increase in the EKATI footprint of disturbed land. If the additional FPK deposition into Cell B was adequate to eliminate the need for any FPK beaching in Cell D, then the increased cost for reclamation in Cell B would be partially offset by eliminating the need to reclaim beaches in Cell D (est. 90 ha). However, this is not the case and it can not be guaranteed that some FPK beaching in Cell D would not still be required even if the Cell B East option were to be implemented. Therefore, costing of the additional Cell B East reclamation areas should be provided for this option.

Post-closure water management through Cell B would be slightly different under this option. Under the current plan, natural runoff water from the eastern catchment is envisioned to be diverted around the east side of Cell B in a diversion ditch (Figure 4). Runoff within Cell B itself and the smaller western catchment is envisioned to collect and flow to Cell C generally along a flow path near the east side of the cell. Some of this water would flow over the FPK surface to get to the east side and would require constructed drainage swales. A conceptual design for the swales is illustrated on Figure 19 and the ICRP includes an Engineering Study that will provide a detailed engineering design. The design will address the risk of excess sedimentation resulting from possible erosion or thaw degradation of the underlying FPK, particularly in areas of extensive ice lensing.

Under the Cell B East option a diversion ditch is not considered feasible due to unfavourable surface topography and, therefore, all of the eastern catchment area drainage would be routed through Cell B. FPK beaches would slope from both the east and west sides of the cell towards the center and, therefore, post-closure runoff water would be routed down the center area of the cell to Cell C, as conceptualized on Figure 20. This concept represents an incremental increase to the closure risk associated with internal drainage swales because of the substantially greater volume of runoff water and greater length of channel to be constructed in an area of suspected extensive ice lensing. The incremental increase in risk represented by the Cell B East option is considered to be greater than this same incremental risk for the Cell C West and Cell A South options because of the greatly increased water flow rates and because the FPK underlying the channel is, in part, initial deposition before operating strategies to minimize ice lensing were fully developed. In this sense, the incremental increase in closure risk is considered substantive and would require special design and mitigation measures if this option were to be implemented.

This option would not allow the planned Cell B Reclamation Pilot Study to proceed. This study intends to test reclamation methods for the LLCF at a field scale and, therefore, is important to further development of detailed reclamation designs. The inability to use a completed area of Cell B for this study would hamper reclamation planning.

3.3.3.5 Cost

The primary cost items for this option are construction of the Cell B East road/deposition pipeline with lined section at the north end, bridging pipelines and facilities across Dike B, installation of additional FPK pump capacity, reclamation of the additional FPK beach area, and reclamation of the drainage swale across Cell B. There is a savings in closure costs related to removal of the East Diversion Ditch. These costs are estimated to be in the order of $13M.

By comparison to the current plan, a water filtration plant is not required. Operating costs would not change significantly as compared to the current plan.

3.3.4 Cell C East

3.3.4.1 FPK Storage Volume

The available capacity of Cell C could be increased by construction of a new road and deposition pipeline on the east side of the cell. This option is essentially already part of Option 3a as selected during the 5-year review (Figure 2). The new road would be constrained to the east by the Panda/Koala waste rock storage area. This option requires a raise of Dike C to nominal crest elevation of 461 m, which is described and contemplated as part of the Cell C West option and is not included here.

Deposition would take place from the raised road to provide an estimated 2M m^3 additional capacity (indicated on Figures 16 and 17).

3.3.4.2 Implementation

Cell C could be extended to the east up to the toe of the existing waste rock dump. This would involve construction of a new access road along the toe of the waste rock dump at an elevation somewhat greater than 461 m at the south end and rising to about 470 m at the north end.

Access to the current incinerator would have to be provided by constructing a new eastern road from the incinerator pad to the new waste-rock-dump-toe access road.

This option could be available by late 2013 based on concurrent or prior completion of the Dike C Raise. Construction will require an interruption to FPK deposition through the current Cell A north, Cell B and Cell C pipelines. An integrated scheme that deferred construction of the Cell C East option until Cell C West and/or Cell A south were operational would alleviate this operational interruption.

3.3.4.3 Environment

The predicted water quality in the LLCF is the same as for the current plan, for which chloride is modeled in Figure 12 as a representative conservative parameter. Note that the guideline value shown on Figure 12 (180 mg/L) is a first-level screening level tool based on the hardness modified, site-specific water quality objective derived for the EKATI site (Rescan 2009) and is not a regulatory limit on effluent quality. This assessment shows that water quality in Cell E should remain generally as observed through past performance under this option, as it would for all options that continue to provide 100% of the FPK stream to the LLCF. Average annual discharge volumes through mine operations are predicted to be in the order of 8M m^3/yr, well within EKATI's established operating capabilities.

The environmental benefit of this option is to further defer FPK deposition into Cell D and, thereby, continue the use of Cell D as an additional water polishing pond. No additional environmental risks would be anticipated that are not addressed through EKATI's operating plans and procedures or that would not be readily addressed through minor revisions to those.

3.3.4.4 Closure

The current approach for closure of FPK beaches would not change for this option. However deposition of FPK over a larger area of Cell C would increase the area to be reclaimed by approximately 48 ha, as indicated on Figure 18. If the additional FPK deposition into Cell C was adequate to eliminate the need for any FPK beaching in Cell D, then the increased cost for reclamation in Cell C would be offset by eliminating the need to reclaim beaches in Cell D (est. 90 ha). However, this is not the case and it can not be guaranteed that some FPK beaching in Cell D would not still be required even if the Cell C East option were to be implemented. Therefore, costing of the additional Cell C East reclamation areas should be provided for this option.

3.3.4.5 Cost

The primary cost items for this option are construction of the Cell C East road/deposition pipeline and reclamation of the additional FPK beach area. These costs are estimated to be in the order of $4M.

By comparison to the current plan, a water filtration plant is not required. Operating costs would not change significantly as compared to the current plan.

3.4 DEPOSITION OPTIONS: OPEN PITS

3.4.1 Beartooth Pit

3.4.1.1 FPK Storage Volume

The Beartooth Open Pit (Figure 24) is no longer mined. The portion of the kimberlite pipe that extends below the depth of the open pit has been evaluated by BHP Billiton and assessed as not economically feasible to mine. Therefore, the pit is a currently available option for FPK deposition.

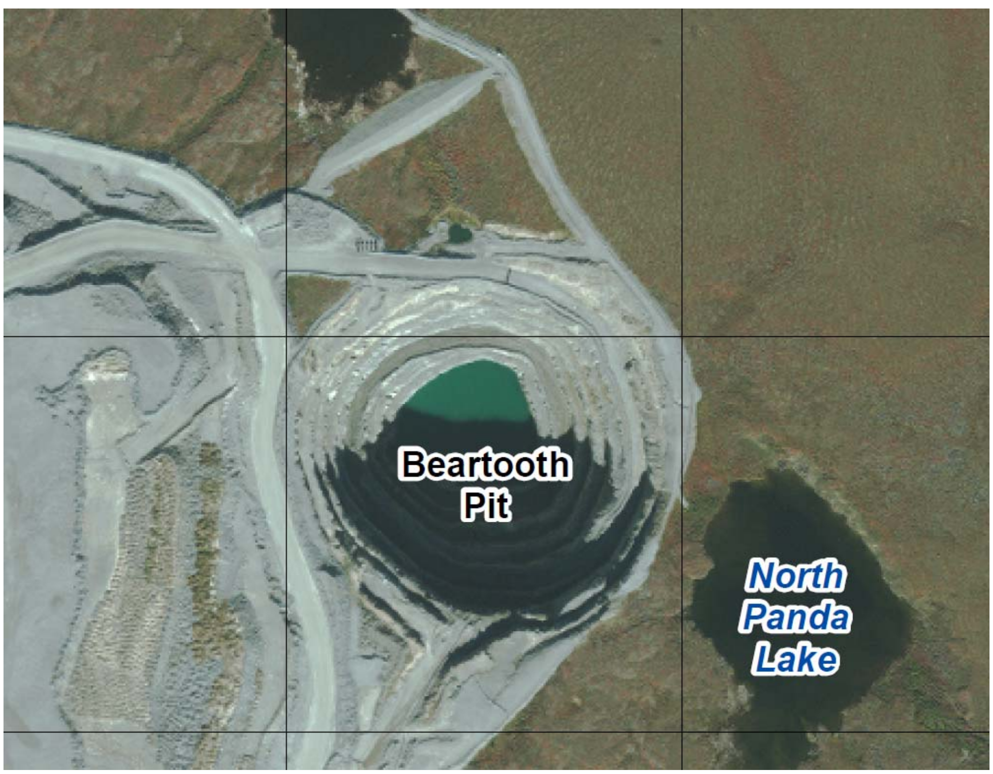

Figure 25. Beartooth Pit, Summer 2010

Beginning in late 2009, underground minewater and some surface sump water have been pumped to the Beartooth pit as a means of diverting nitrate and chloride-rich minewater away from the LLCF for such time as is beneficial to water quality in the LLCF. For this study it is assumed that this water will continue to be directed to the Beartooth open pit for the remainder of the life of mine. This is a benefit to an FPK deposition option because elevated salinity (i.e., chloride) is considered a settling aid for EFPK. An operating freeboard requirement of 2 m below the overflow elevation of 457 m has previously been established for the Beartooth pit.

The initial Environmental Assessment of the EKATI Mine planned for depositing FPK into open pits and conceptualized a 30 m deep cover of clean water over the FPK for closure. This depth of water is considered to be potentially over-conservative and the most appropriate depth of water for closure could be technically optimized through environmental and engineering studies. For this study the initial concept of 30 m depth of water for closure has been used. The use of Beartooth pit for FPK deposition is specifically included into the scope of the EKATI Water Licence.

The concept of completely filling Beartooth pit to surface with FPK is not considered in this study because this would necessitate major changes to the closure plan for Beartooth Pit, which are not within the scope of the study. Conceptually, complete filling of Beartooth pit with FPK would provide additional FPK storage capacity but would require either construction of a permanent water diversion channel around the pit or the permanent routing of a substantive surface flow over the contained FPK. It is recognized also that complete filling would involve the need to make provision for the long-term consolidation and settlement of the FPK and placement of a stable cover over the final surface. These approaches are considered to be technically feasible and could be re-visited in future if desired and if FPK deposition into Beartooth pit is initiated and found to be effective.

For the purposes of this options analysis, a conservative (small) storage volume for FPK in Beartooth pit of 7M m^3 has been assumed. The total volume of Beartooth Pit to the projected closure overflow elevation of 457 m is approximately 12.2M m^3 (Figure 25). The volume required for a 30 m deep cover of water over FPK at closure (i.e., between 457 m and 427 m elevation) is approximately 4M m^3. This suggests an available storage volume for FPK of approximately 8.2M m^3. However for initial planning and options analysis a lower target volume of 7M m^3 has been used in recognition that some operating methods would need to be developed and proven through implementation. This creates an upside potential for FPK storage volume if operating methods are shown to achieve the anticipated results.

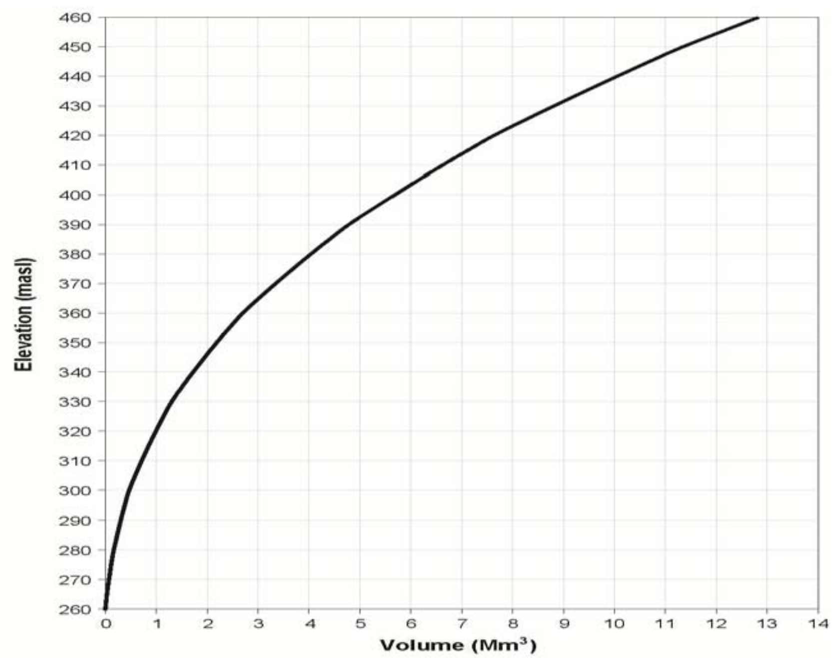

Figure 26. Beartooth Pit, Storage Capacity Curve

This option requires that water is pumped out of Beartooth pit during operations, either for recycle to the process plant or for discharge through the LLCF (Figure 26). Otherwise, the pit would fill overly quickly with slurry water and the amount of FPK solids deposited would be reduced to the point where the value of the option could be questionable. It is not feasible to pump water out of the pit until the water level rises to an elevation that can be safely accessed by operating personnel. Continuous access to a pumping station (likely a barge) is required. Therefore, a pumping system for removal of water from the pit would be implemented sometime after deposition begins.

Delivery of the full FPK stream may not be preferred because the inflow energy of this volume of FPK slurry into a relatively confined area (particularly at the outset of deposition when the pit area is smaller) could negatively affect FPK/EFPK settlement. Additionally, the accelerated rate of filling related to the full FPK stream could shorten the life of the option with the risk of overly turbid water to be managed at closure. Delivery of the secondary FPK stream (approximately 33%) would provide for a more controlled deposition that is more conducive to adequate settlement. This approach provides greater future optionality dependent on performance. It may be preferred that the option is initiated for FPK deposition from the secondary system for some period of time and that the rate of FPK delivery could be increased if monitoring information indicates this would be beneficial.

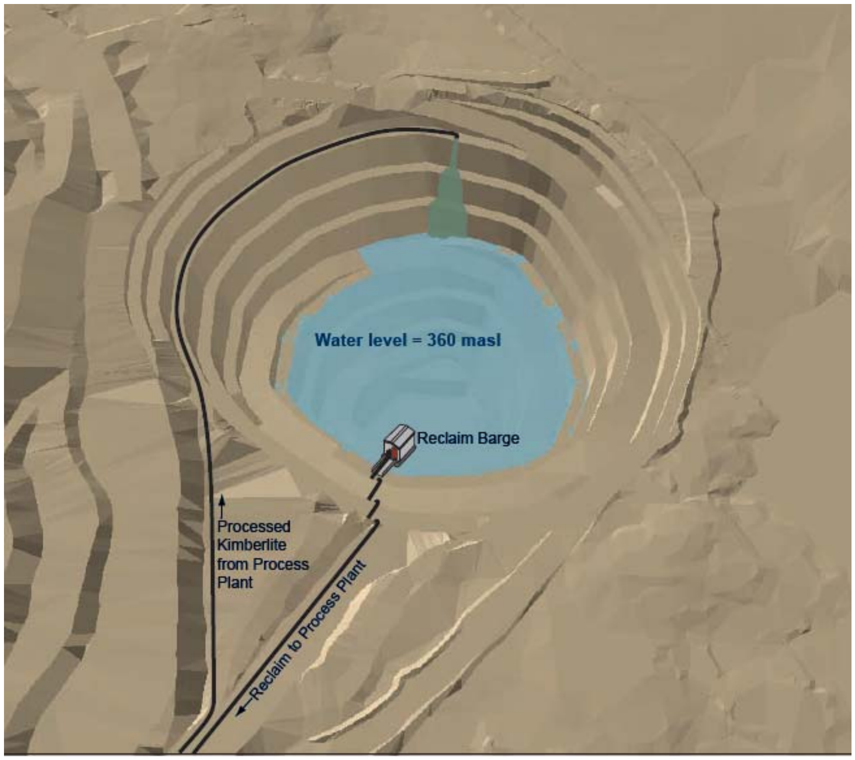

Figure 27. FPK Deposition Concept, Beartooth Pit

Note to Figure 25: The pipeline and barge locations and pumping water level are conceptual, not planned.

3.4.1.2 Implementation

Implementation of this option would involve construction of pipes & pumps to convey FPK to the Beartooth pit and, later, pit supernatant water to the process plant or LLCF. The length of piping to the process plant is about 7 km. Construction could start immediately upon delivery of pipeline and FPK deposition could likely begin in late 2012. A recycle water barge/pump would be required when the in-pit water level had risen to an elevation that was safely accessible. This approach also reduces the vertical pumping head out of the pit.

There are logistical challenges in designing a reliable and operable recycle barge/pump system within an open pit where access into the pit may not be feasible for safety reasons. The pumping elevation would need to be within the pit to ensure adequate safety freeboard below the overflow elevation. Additionally, pumping of recycle water to the process plant could only proceed if the pumped water were sufficiently clear of sediment.

The current pit slopes are stable (EBA 2009). The Main 310 fault where it daylights in the pit has been supported with cable bolting and shear pinning. If the pit is used for deposition, pit flooding could induce localized kinematically controlled instability. Fractured bench crests and smaller wedges in the pit walls may fail due to freeze-thaw action. Once the pit is filled, potential instability should be in essence limited by the infilling. This risk is manageable by restricting or preventing personnel access into unsafe areas of the pit.

EBA (2009) conducted an assessment of the potential for water seepage from the Beartooth pit to the Panda/Koala underground workings. The assessment concluded that leakage from a filled Beartooth Pit to the Panda and Koala underground workings is conceivable but unlikely. The Panda underground workings are no longer mined, which provides an additional buffer between possible seepage water and workers in the Koala workings.

A closure water quality contingency is in place as was stated by BBCI at the time of permitting the use of Beartooth pit for minewater storage. Water in the pit at closure would be tested and, if not acceptable for closure water quality, would be managed by pumping into the underground workings beneath Panda Pit or by slow release to the environment (likely through the LLCF) in a manner that achieved the appropriate effluent quality criteria. Pumping water into the Panda underground could not be brought into action until mining and reclamation of the underground workings in the Panda, Koala and Koala North areas has been completed, which is expected to be after the end of the current life of mine (Figure 6).

3.4.1.3 Environment

The Beartooth pit is already permitted and in use as a minewater retention pond with a specified minimum safety freeboard of 2m. Its current use for receiving underground minewater and other surface sumps would not fill the pit to the freeboard elevation within the current life of mine. The current operating plan also provides a long-term contingency that unacceptably poor quality water at closure could be either pumped into the Panda underground workings (via the Panda pit) or released in a controlled manner through the LLCF.

The use of Beartooth pit for FPK deposition does not alter the general water management approach. The pit will fill much faster with FPK deposition and there is an additional risk of elevated sediment in the water column within the pit if FPK settlement is much poorer than anticipated. The FPK deposition plan will operate within the minimum 2 m freeboard requirement for water and the minimum 30 m depth below the final overflow elevation for FPK/EFPK solids. The same water management contingencies apply at closure.

The use of Beartooth pit provides an operational water quality benefit for water quality in the LLCF. This benefit is currently being observed as reducing concentrations of chloride, nitrate and other parameters as a result of the diversion of underground minewater to the LLCF. The beneficial effect would be substantively enhanced by the diversion of FPK (either full or secondary streams) and process water away from the LLCF. This is considered a strong benefit of this option as it will aid in managing the water that is currently in Cell D and reduce loadings released to the environment generally.

The additional benefit of this option is to further defer FPK deposition into Cell D and, thereby, continue the use of Cell D as an additional water polishing pond. No additional environmental risks would be anticipated that are not addressed through EKATI’s operating plans and procedures or that would not be readily addressed through minor revisions to those.

3.4.1.4 Closure

The current closure plan for the Beartooth pit is to fill the pit with natural water from a nearby source lake. Once the pit is full and the water quality meets discharge criteria, inlet and outlet channels would be connected to the natural streams from Bearclaw Lake and to Upper Panda Lake (Figure 27). The pit perimeter may be modified to provide safety for people and wildlife and to facilitate the establishment of a self-sustaining aquatic ecosystem in the pit lakes.

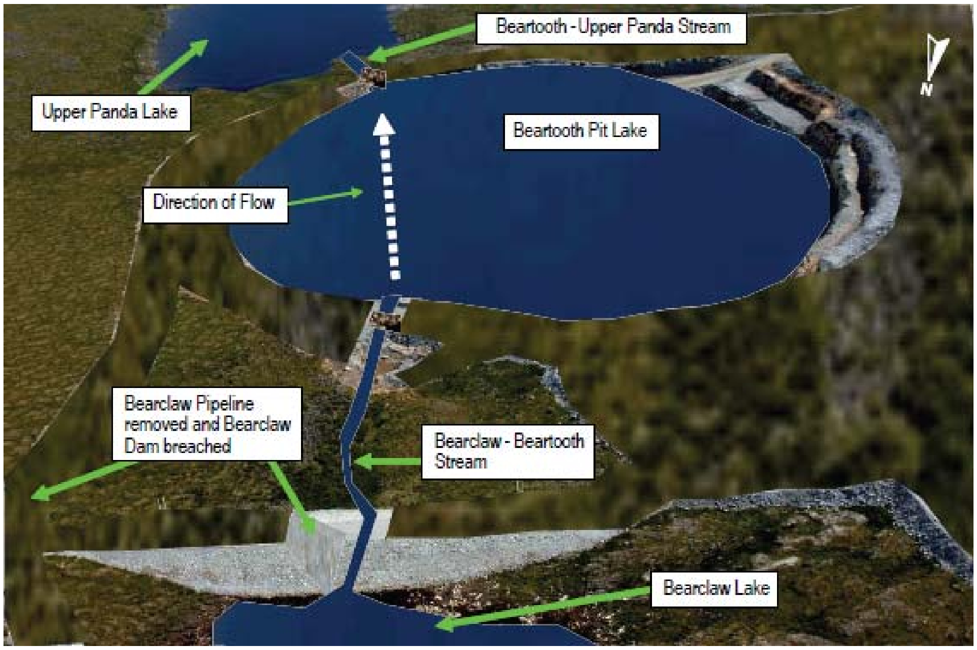

Figure 28. Final Landscape of Beartooth Pit Lake (BHP Billiton 2011)

The option for FPK deposition would not change the general approach to reclamation of the pit. It is likely that less natural fill-water would be required. The minimum water depth over FPK of 30 m is deep enough to not affect the work to be done around the pit perimeter. Water quality would have to meet discharge criteria before the pit lake could be allowed to overflow.

However, this option introduces a water quality risk related to poor settlement of FPK that could hamper ability to initially achieve the water quality criteria or that could represent an on-going risk of re-suspension of FPK through wave action. This risk is considered manageable on the basis of the following:

- A limit on FPK deposition of minimum 30 m below overflow elevation is in place, with 30 m being considered a potentially over-conservative (high) depth for protection against re-suspension of sediment. This specification would not change unless a change is validated by additional studies.
- A safety freeboard of minimum 2 m below overflow is in place that protects against preemptive overfilling with water and provides protection against accidental overflow in the event of extreme storms. The 2 m safety freeboard was determined to provide storage capacity for a 1 in 100 year event (BHP Billiton 2008).
- The assessment of FPK settlement in Cell C (Section 2) indicates that settlement of EFPK is likely enhanced in water containing elevated salinity, as will exist in Beartooth pit during operations. In comparison to the current plan (deposition into Cell D of the LLCF), conditions

are considered to be more conducive to settlement of EFPK in Beartooth pit than in Cell D of the LLCF.

- BHP Billiton has committed to achieving closure water quality criteria and has identified two possible contingency actions (pumping water to Panda underground or slow release through the LLCF). Other contingencies or adaptive management approaches may become evident based on the circumstances at hand.
- Although the planned approach for closure of Beartooth pit is to fill with natural water as soon as practical (est. 1-year pumping program), BHP Billiton will be conducting longer-term (i.e., 15-20 years) water pumping programs for the larger pits and a consideration of site-wide scheduling could allow for deferment of pumping into Beartooth pit if additional time was deemed helpful in promoting adequate settlement of EFPK. This adaptive management approach represents a potential contingency measure against water quality risk.
- A closure water quality prediction model for the pit lakes (Beartooth included) is being developed as part of the reclamation planning process and can provide an indication of anticipated trends in water quality such that operational changes or contingency measures can be implemented in a timely manner.

This option provides the benefit of reducing the quantity of FPK deposited into the LLCF, and specifically into Cell D of the LLCF. This reduces the long term water quality risks, reduces the area of beached FPK requiring cover and contributes to further deferral of FPK deposition into Cell D (preserving Cell D as a long-term water polishing pond).

3.4.1.5 Costs

The primary cost items for this option are construction of pipelines and future installation of a water recycle barge/pump in Beartooth pit. Although cost savings are likely through reduced FPK beach areas to be reclaimed in the LLCF, this cannot be guaranteed and so is not considered at this time. The costs are estimated to be in the order of $5M.

By comparison to the current plan, a water filtration plant is not required. Operating costs would not change significantly as compared to the current plan.

3.4.2 Panda/Koala Pits

3.4.2.1 FPK Storage Volume

Neither the Panda nor Koala Pits is currently available for FPK deposition. Both are currently connected to actively mined underground workings which are physically and/or hydraulically open to the overlying open pit and to each other (Figure 29). Once underground mining ends beneath both of these pits and reclamation (removal of certain equipment and installations) is complete, then one or both could be available for FPK deposition. This will be after the current life of mine. There can not be any FPK deposition into either pit considered prior to that time.

These are both large open pits with attendant underground workings that represent an FPK storage capacity of at least 10 years.

The non-availability of these pits until after the current life of mine prohibits their consideration as part of a deposition plan for the current Life of Mine. However, these pits could play a role in a deposition plan for future development options beyond the current Life of Mine.

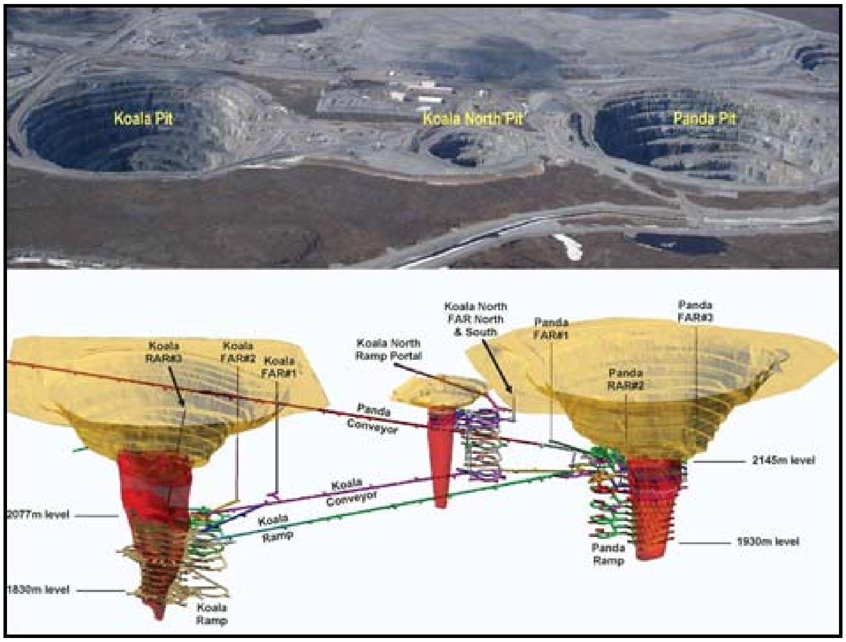

Figure 29. Panda and Koala Mine Workings

3.4.2.2 Implementation

Implementation of this option would be similar to FPK deposition into the Beartooth open pit, with the distance to the process plant being closer. The timeframe for accessing water recycle would be longer than for Beartooth pit and, therefore, the initial installation would be only the deposition pipelines. In order to place the FPK deep in the pit/underground workings, a discharge location(s) overhanging the pit edge could be considered.

The entire FPK stream (i.e., primary plus secondary) could be planned for deposition.

3.4.2.3 Environment

FPK deposition into these large pits provides long timeframes for settlement of solids, which is of benefit. Otherwise, the environmental considerations are similar to the Beartooth pit.

3.4.2.4 Closure

The much greater depth of these pits combined with the underground workings which receive chloride-rich groundwater inflows makes these pits more susceptible to mermoxis (stratification of the water column into layers of differing density) after closure. In the event that long-term stable meromixis did develop, this would be of benefit because the lower, oxygen-depleted portions of the pit lake would provide very secure storage areas for FPK (or other reactive mine wastes). Technical investigations into the potential for meromixis are scheduled in the ICRP.

Otherwise the closure considerations are similar to Beartooth pit

3.4.2.5 Costs

The costs for deposition into these pits would be similar to the Beartooth pit option.

3.4.3 Fox Pit

3.4.3.1 FPK Storage Volume

The Fox pit is not currently available for FPK deposition. Mining is scheduled until near the end of the current Life of Mine Plan (mid 2016, Figure 9) and this would be followed by a brief period for reclamation of the pit (removal of equipment and installations). There cannot be any FPK deposition considered prior to that time. The Fox pit is a large open pit that represents an FPK storage capacity in the order of 10 years.

Although it appears that there could be a short time (approximately one-year) for FPK deposition under the current Life of Mine, it is highly unlikely that the necessary infrastructure and costs would be incurred for such a short timeframe. Therefore this option is not considered feasible as part of a deposition plan for the current Life of Mine. However, this pit could play a role in a deposition plan for future development options beyond the current Life of Mine.

3.4.3.2 Implementation

Implementation of this option would be similar to FPK deposition into the Beartooth open pit, with the distance to the process plant being substantively greater. The timeframe for accessing water recycle would be longer than for Beartooth pit and, therefore, the initial installation would be only the deposition pipelines. In order to place the FPK deep in the pit, a discharge location(s) overhanging the pit edge could be considered.

The entire FPK stream (i.e., primary plus secondary) could be planned for deposition.

3.4.3.3 Environment

FPK deposition into the Fox pit would provide long timeframes for settlement of solids, which is of benefit. Otherwise, the environmental considerations are similar to the Beartooth pit.

3.4.3.4 Closure

Closure considerations are similar to Beartooth pit.

3.4.3.5 Costs

The costs for deposition into Fox pit would be substantively greater than the Beartooth pit option due to the greater distance from the process plant.

3.5 COMPARATIVE EVALUATION

3.5.1 FPK Storage Volume

The volumes quoted in this report have been estimated using the computer code RIFT. Input to the code includes the estimated beach slope. In practice, as noted on the 2008 and 2010 LiDAR surveys, actual beach slopes vary from 1.2 to 3 percent. Beach slopes vary with location and over time as a function of FPK gradation, the length of beach, winter conditions, and pool elevations. The calculated volumes are sensitive to the assumed beach slopes. Thus the volumes quoted here may in fact vary as a function of actual beach slopes, in some cases being larger than calculated and in some cases being less than calculated.

3.5.2 Evaluations per Topic

Tables 4 through 8 provide the evaluation of each option according to the five topic areas discussed.

Table 4. Options Evaluation, FPK Storage Volume

Option	Summary Comment (Relative to Current Plan)	Rating
Cell D Without Dyke *(Current Plan)*	Easily provides 20M m^3 for Life of Mine. Could provide up to +12M m^3 additional capacity.	0
Cell D With Dyke	Provides 12-15M m^3, less than Life of Mine requirement Possible slight increases in capacity by optimizing dike location. *Slightly less favourable than current plan.*	-1
Cell C West/Dyke C Raise	Provides 6M m^3, less than Life of Mine requirement *Less favourable than current plan.*	-2
Cell A South	Provides 4M m^3, less than Life of Mine requirement *Less favourable than current plan.*	-2
Cell B East	Provides 5M m^3, less than Life of Mine requirement *Less favourable than current plan.*	-2
Cell C East	Provides 2M m^3, less than Life of Mine requirement *Much less favourable than current plan.*	-3
Beartooth Pit	Provides 7M m^3, less than Life of Mine requirement Possible upside potential due to settling environment and potential for optimization of water cover depth. *Slightly less favourable than current plan.*	-1
Panda/Koala Pit	Easily provides 20M m^3 for Life of Mine. Could provides large additional capacity (>10-years total). *Similar to current plan.*	+2
Fox Pit	Easily provides 20M m^3 for Life of Mine. Could provides large additional capacity (>10-years total). *Similar to current plan.*	+2

Table 5. Options Evaluation, Implementation

Option	Summary Comment (Relative to Current Plan)	Rating
Cell D Without Dyke *(Current Plan)*	Straightforward construction; possible disruption to water recycle capability during construction; availability end 2012 dependent on reducing current Cell D water level.	0
Cell D With Dyke	Very complex deep water construction; long timeframe for design, approval and construction; availability end 2013 dependent on reducing current Cell D water level and preparation of construction materials. *Much less favourable than current plan (deep-water construction).*	-3
Cell C West/Dyke C Raise	Established construction methods for filter dike; additional pump capacity required; availability late 2013 dependent on construction schedule. *Less favourable than current plan (dike raise).*	-2
Cell A South	Straightforward construction; availability mid 2014 dependent on completion of Cell C West access road. *Slightly less favourable than current plan (availability).*	-1
Cell B East	Straightforward construction (longer road with one section lined); additional pump capacity required; availability late 2012 dependent on construction schedule *Slightly less favourable than current plan (long road).*	-1
Cell C East	Straightforward construction; new access road to incinerator; availability late 2013 dependent on prior or concurrent completion of the Dike C Raise. *Slightly less favourable than current plan (requires Dike C Raise).*	-2
Beartooth Pit	Straightforward pipeline construction; logistical challenge re. water recycle barge; no new road construction; availability late 2012. *Similar to current plan.*	0
Panda/Koala Pit	Straightforward pipeline construction; logistical challenge re. water recycle barge; no new road construction; availability late 2016. *Much less favourable than current plan (availability).*	-3
Fox Pit	Straightforward but long pipeline construction; logistical challenge re. water recycle barge; no new road construction; availability late 2016. *Much less favourable than current plan (availability/long pipeline).*	-3

Table 6. Options Evaluation, Environment

Option	Summary Comment (Relative to Current Plan)	Rating
Cell D Without Dyke *(Current Plan)*	Considerable uncertainty regarding FPK settlement/sediment in water column; planned contingency of water filtration plant.	0
Cell D With Dyke	Eliminate FPK settlement/sediment risk; retain Cell D_S as polishing pond; retain current nitrate/chloride risk. *Slightly more favourable than current plan.*	+1
Cell C West/Dyke C Raise	Eliminate FPK settlement/sediment risk; maintain Cell D as polishing pond; retain current nitrate/chloride risk. *More favourable than current plan.*	+2
Cell A South	Eliminate FPK settlement/sediment risk; maintain Cell D as polishing pond; retain current nitrate/chloride risk. *More favourable than current plan.*	+2
Cell B East	Eliminate FPK settlement/sediment risk; maintain Cell D as polishing pond; retain current nitrate/chloride risk. *More favourable than current plan.*	+2
Cell C East	Eliminate FPK settlement/sediment risk; maintain Cell D as polishing pond; retain current nitrate/chloride risk. *More favourable than current plan.*	+2
Beartooth Pit	Eliminate FPK settlement/sediment risk; retain Cell D as polishing pond; reduce current nitrate/chloride risk. *Much more favourable than current plan.*	+3
Panda/Koala Pit	Eliminate FPK settlement/sediment risk; retain Cell D as polishing pond; reduce current nitrate/chloride risk. *Much more favourable than current plan.*	+3
Fox Pit	Eliminate FPK settlement/sediment risk; retain Cell D as polishing pond; reduce current nitrate/chloride risk. *Much more favourable than current plan.*	+3

Table 7. Options Evaluation, Closure

Option	Summary Comment (Relative to Current Plan)	Rating
Cell D Without Dyke *(Current Plan)*	Established plan; combination rock/vegetation cover on FPK beaches.	0
Cell D With Dyke	FPK beaches reclaimed per established plan; may retain Cell D_S as a polishing area (if used in combination with other options). *Slightly more favourable than current plan.*	+1
Cell C West/Dyke C Raise	FPK beaches reclaimed per established plan; slight uncertainty in water routing over FPK; may retain Cell D as a polishing area (if used in combination with other options); creates conceptually favourable water elevations for closure. *Similar to current plan.*	+1
Cell A South	FPK beaches reclaimed per established plan; uncertainty in water routing over FPK; may retain Cell D as a polishing area (if used in combination with other options). *Slightly less favourable than current plan (closure water routing).*	-2
Cell B East	FPK beaches reclaimed per established plan; larger area disturbed/reclaimed; larger uncertainty in water routing over FPK; prevents LLCF Reclamation Pilot Study; may retain Cell D as a polishing area (if used in combination with other options). *Less favourable than current plan (closure water routing).*	-3
Cell C East	FPK beaches reclaimed per established plan; may retain Cell D as a polishing area (if used in combination with other options). *Slightly more favourable than current plan.*	+1
Beartooth Pit	Reduced area disturbed/reclaimed in LLCF; may retain Cell D as a polishing area (if used in combination with other options). *More favourable than current plan.*	+2
Panda/Koala Pit	Reduced area disturbed/reclaimed in LLCF (post current Life of Mine); potential for stable meromixis/ultra-secure FPK storage area. *Much more favourable than current plan.*	+3
Fox Pit	Reduced area disturbed/reclaimed in LLCF (post current Life of Mine). *More favourable than current plan.*	+2

Table 8. Options Evaluation, Costs

Option	Summary Comment (Relative to Current Plan)	Rating
Cell D Without Dyke *(Current Plan)*	Capital order of $10M. Operating contingency order of $5M plus $0.5M/yr.	0
Cell D With Dyke	Capital order of $42M. *Much less favourable than current plan.*	-3
Cell C West/Dyke C Raise	Capital order of $9M. *Similar to current plan.*	0
Cell A South	Capital order of $4.5M (contingent on Cell C West access road already built). *Much more favourable than current plan.*	+3
Cell B East	Capital order of $13M. *Less favourable than current plan.*	-2
Cell C East	Capital order of $4M. *Much more favourable than current plan.*	+3
Beartooth Pit	Capital order of $5M. *Much more favourable than current plan.*	+3
Panda/Koala Pit	Capital order of $5M. *Much less favourable than current plan.*	+3
Fox Pit	Capital order of $10M. *Similar to current plan.*	0

3.5.3 Evaluation Summary

The individual evaluations per topic were pooled as shown in Table 9 to provide a summary rating for each option.

Table 9. Options Evaluation, Summary

Option	FPK Storage Volume (Mm^3)	Implementation	Environment	Closure	Costs	Summary Rating
Cell D Without Dyke *(Current Plan)*	0 (20-32)	0	0	0	0	0
Cell D With Dyke	-1 (12-15)	-3	+1	+1	-3	-5
Cell C West/Dyke C Raise	-2 (6)	-2	+2	+1	0	-1
Cell A South	-2 (4)	-1	+2	-2	+3	0
Cell B East	-2 (5)	-1	+2	-3	-2	-6
Cell C East	-3 (2)	-2	+2	+1	+3	+1
Beartooth Pit	-1 (7)	0	+3	+2	+3	+7
Panda/Koala Pit	+2 (>50)	-3	+3	+3	+3	+8
Fox Pit	+2 (>50)	-3	+3	+2	0	+4

The ratings in Table 9 suggest the following summary observations and conclusions:

- The only options that could singly accommodate 20M m3 of FPK for the remainder of the current Life of Mine is Cell D without Dyke (current plan). The Panda/Koala Pit and Fox Pit options are not available for current Life of Mine
- FPK deposition into Panda/Koala pit and into Beartooth pit is the superior options. The unavailability of Panda/Koala pit until after the current Life of Mine means that the Beartooth pit option should be pursued as a priority.
- The Cell D with Dike and Cell B East options are less desirable and should not form part of a recommended deposition plan.
- The Cell C East option is desirable but provides a relatively small FPK storage capacity.
- The Cell C West/Dike C Raise and Cell A South options (considered here together since Cell C West must preceded Cell A south) have a combined rating similar to the current plan. However the benefit of deferring or, in concert with other options, possibly avoiding FPK deposition into Cell D to the end of the current Life of Mine would be in accordance with BBCI's commitments and makes these combined options more desirable than the current plan.

3.5.4 Uncertainty

There are uncertainties associated with all of the options. To a large extent these are shared uncertainties and the difference between options is a matter of degree.

Common to all of the options is some uncertainty regarding the volume of FPK that can be deposited into a given area. In the cells of the LLCF this is governed to a large degree by the beach angles, which are, in turn, governed by various physical and operating parameters. This uncertainty is managed through monitoring, refinement of operating procedures where needed, and adjustment of expectations where appropriate. For example, this study utilizes an annual volume requirement of 5M m^3 based on the monitoring information even though this is greater than traditionally anticipated. The open pit options, particularly Beartooth because of its smaller size and absence of underground workings, provide better constraint on this uncertainty because the deposition area is confined and much less affected by beach angles.

Uncertainty regarding the rate of settlement of EFPK is also common to each option and the level of uncertainty varies greatly. The monitoring information described in this report indicates good settlement of EFPK in Cell C of the LLCF, likely linked to pond water salinity and effects of ice formation under constrained, shallow-water conditions. This indicates that continued FPK deposition into Cells A, B and C can be undertaken with good EFPK settlement anticipated. The uncertainty increases dramatically when considering FPK deposition into Cell D because the same conditions will not be present. The salinity in Cell D water will be less than Cell C and ice formation will not be a factor because of the large size and depth of Cell D. This creates the risk of excess sediment in the water of Cell D. For the open pit options, settlement of EFPK is expected to be good due to the elevated salinity, the constrained physical setting and the ability to manage water levels once accessible for pumping. Additionally, the limit on FPK/EFPK deposition of 30 m below pit overflow preserves a surface water body considered to be of at least sufficient depth to protect the surface environment over the long term. EFPK settlement is a factor considered in the evaluation of “Environment” in this study and is one of the reasons why all options were evaluated as better than the current plan (Cell D without intermediate dyke). Detailed planning for the long-term management of EFPK through closure and reclamation is being undertaken by BHP Billiton through the ICRP.

The safe routing of runoff water over the FPK surface in the LLCF for closure is an uncertainty that already exists and for which detailed engineering designs are being developed through the ICRP. The uncertainty relates to the risk of thaw degradation of the FPK underlying the water channel that could result in excess sediment entering the water. The descriptions of “Closure” aspects for the Cell A, B and C options show that the degree of uncertainty increases through the Cell C West, Cell A South and Cell B East options to the point where the viability of the Cell B East option is questioned. This uncertainty can be managed, with the possible exception of the Cell B East option, by minimizing ice lensing in the FPK deposits in the LLCF during operations and by appropriate engineering design for closure. This is not a consideration for the open pit options, which is part of the reason for their higher evaluation ratings under “Closure”.

4 RECOMMENDED DEPOSITION PLAN

4.1 Approach and Sequencing

The options evaluation indicates that the only option that can singly accommodate FPK deposition to the end of the current life of mine is the current plan, Cell D without internal dike. Several other options scored higher, however, in the rating and are initially preferred on that basis.

Several options that received >0 overall rating have been assembled in an approach and sequence that provides for FPK deposition through the remainder of the current life of mine. This approach provides a number of benefits, most notably continuing to defer, and possibly eliminate, the use of Cell D for FPK deposition. The ultimate need to use Cell D will depend on the effectiveness of the other options.

The selected sequence of options also increases the operational flexibility for FPK deposition over different areas. Upside potential, expandability and contingency options will ensure that the EKATI mine does not fall unexpectedly short of FPK storage capacity. The selected sequence of options is summarized as follows:

	Volume
1. Continue in Cell A North, Cell B West and Cell C North	15 Mm^3
2. Beartooth Pit (secondary FPK stream)	7 Mm^3
3. Dike C Raise / Cell C West	6 Mm^3
4. Cell A South	4 Mm^3
5. Cell C East	2 Mm^3
	34 Mm^3

6. Cell D (without intermediate dike) as Contingency during Life of Mine and as feasible beyond Life of Mine

7. Fox/Panda/Koala Pits feasible beyond Life of Mine

4.1.1 Implementable Plan for LOM (Figure 30)

Stage 1 (immediate)

- Utilize the remaining capacity in Cells A, B and C under the current operating paradigm.

Stage 2 (1 to 3 years)

- Prioritize the Beartooth pit option and bring it on line as quickly as feasible (est. late 2012).

- Sequentially construct the Dike C Raise, Cell C West road/pipeline and Cell A South road/pipeline and bring on line as quickly as feasible (est. late 2013 – late 2014).

Stage 3 (4 to 5 years)

- Construct and bring on line the Cell C East road/pipeline on an appropriate schedule based on the assessment of deposition needs (likely 2015).
- Assess deposition status in all areas and adapt the deposition plan accordingly to prioritize the full utilization of Beartooth pit.
- Maintain the Cell D (without dike) option as a contingency against unforeseen events.

Stage 4 (5+ years)

- Assess final FPK deposition needs and whether the options developed above are adequate for the most recent Life of Mine Plan.
- If the options developed above are not adequate, conduct an assessment of the Panda/Koala pit option versus Cell D (without Dike) for final FPK deposition, and implement the selected option.

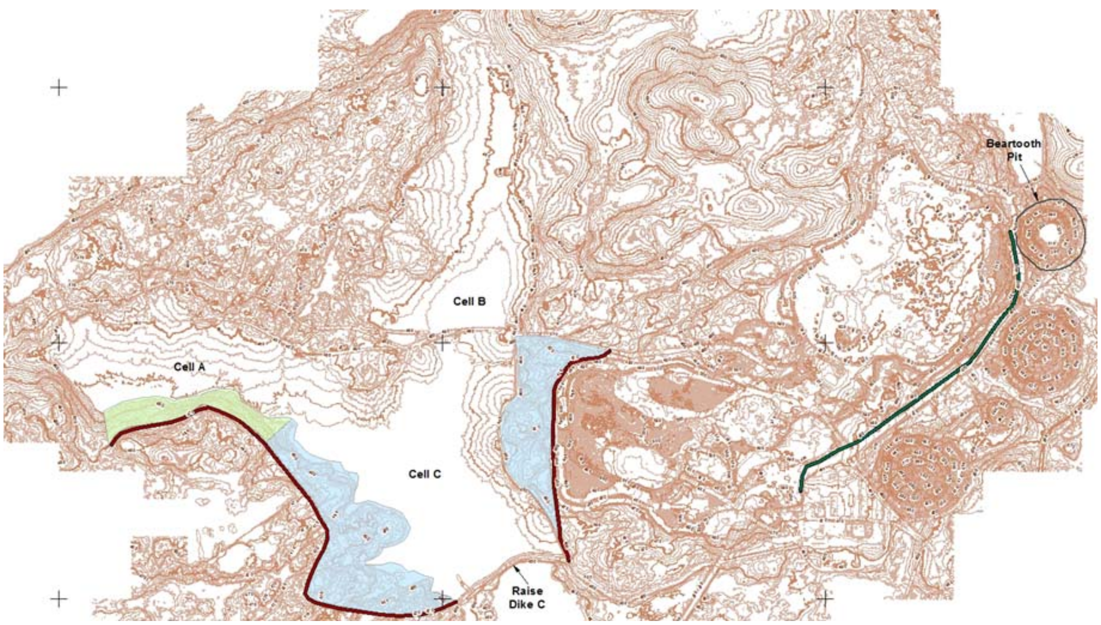

Figure 30. Recommended Deposition Plan for Life of MIne

4.1.2 Feasible Plan for Other Licenced Sources of Ore

- Provided that underground mining in Koala has ceased, utilize the Panda pit for FPK deposition.
- Maintain the Cell D (without dike) option as a contingency against unforeseen events.

4.1.3 Conceptual Plan for Conceptual Sources of Ore

- Provided that underground mining in Koala has ceased, utilize the Panda/Koala pit and Fox pit for FPK deposition.
- Maintain the Cell D (without dike) option as a contingency against unforeseen events.
- Consider a new or relocated process plant and a new FPK containment area local to the kimberlite pipe being mined.

4.2 IMPLEMENTATION

The deposition plan for Life of Mine should be implemented according to the sequence and general timeline described in S.4.1 and in the description of each option in S.3.3. This sequencing should respect BHP Billiton's on-site equipment and manpower resources. A preliminary implementation schedule is provided in Figure 31. This schedule is expected and should change as planning, implementation and monitoring progress.

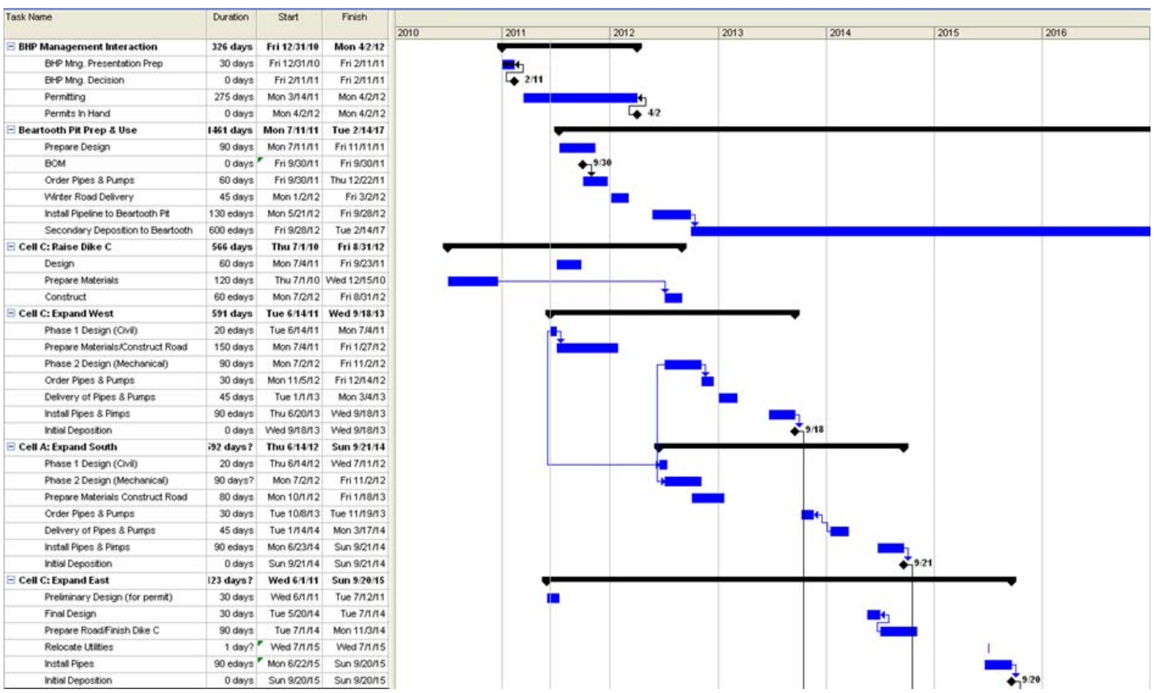

Figure 31. Preliminary Implementation Schedule

The current practice of twice per 12-hour shift operator inspections of all of the depositional areas should be continued. An annual review of the effectiveness of the deposition plan should be conducted based on survey data, water quality data, volume utilization and other relevant information. The annual review should be used as the basis for refining the implementation schedule.

4.2.1 Beartooth Pit

Beartooth pit was the only option that did not score lower than the current plan for implementation, which further supports its selection as the priority option to bring on line. The key milestone for bringing this option on line is delivery of new pipeline on the 2012 winter road. This will require engineering design and procurement by November 2011. Once the pipeline is on site, it is understood that BHP Billiton is able to assemble the pipeline for operation by late 2012.

There are two primary considerations for pipeline routing: along the main haul road and along the east edge of the Panda/Koala WRSA. The trade-off study will be based on operational and safety optimizations and does not include substantive environment or closure risks. The trade-off study can be completed as part of the engineering design.

EBA (2009) concludes that the pit should be considered as a potentially hazardous environment during filling. They note that there is a potential for rock fall and large-scale slope instability that could damage or harm infrastructure and/or personnel. To mitigate these risks, the following are recommended:

- Filling of the pit should be done by methods that do not require personnel to enter the pit.
- Mine personnel access to the pit perimeter and potentially affected surrounding area should be limited and controlled.
- The annual FPK Deposition review should include consideration of any physical stability issues that may have been identified.

Refinements to the detailed deposition procedure as regards periodic shut down intervals, seasonal effects and winter effects should be assessed on an on-going experimental basis.

FPK solids (inclusive of any EFPK layer) should not be deposited above elevation 427 m (30 m below final overflow) unless a technical study has been completed and accepted that validates a higher elevation. Such a study should be based primarily on an assessment of long-term closure considerations.

Water should not be allowed to rise to above 455 m elevation (2 m safety freeboard below overflow). If water approaches this elevation then deposition must cease or water must be removed.

Within one year of initial deposition, a technical study should be completed to identify:

- the water elevation at which pumping of water out of the pit can be implemented;
- the estimated time for when pumping could begin or is desired to begin;
- the preferred pumping location(s) (process plant for recycle, LLCF for discharge, or other); and
- the design parameters for the pumping system.

4.2.2 Dike C Raise / Cell C West / Cell A South

The key milestone for bringing this option on line is preparation of construction materials for the dike raise. Delays in the dike raise translate into delays in deposition. It is understood that BHP Billiton is able to prepare the construction materials in time for dike construction during summer 2012 such that pipeline construction can proceed and FPK deposition begin in Cell C West in late 2013 and in Cell A South in late 2014.

The dike raise should follow the established “flow-through” design.

The (new) Cell A South road should connect to the existing Cell A North road. This will facilitate operational inspections and generally improve accessibility to the upper area of Cell A.

Deposition into the Cell C West and Cell A South areas should follow established procedures for sequencing of spigot locations, use of jetties and prohibition of winter deposition from the uppermost spigot in Cell A.

It is understood that closure designs and studies are being conducted under the *Interim Closure and Reclamation Plan*. Those studies are understood to include optimization of final water elevations and to ultimately specify the locations and depths of weirs of Dikes B and C. This information should be used to refine the deposition plan.

4.2.3 Cell C East

Sequencing the construction of the Cell C East option for after the Cell C West option has been brought on line facilitates issues related to construction interruptions to the Cell C East, Cell B and Cell A North pipelines. Implementation of this option is straightforward at that time.

4.3 Environment

All of the options comprising the recommended deposition plan were rated substantively higher than the current plan for environment. This is based on two important environmental benefits: further deferral, and possible elimination, of FPK deposition into Cell D; and assistance with current water quality issues in Cell D (in the case of Beartooth pit).

A new environmental risk is present related to water quality in Beartooth pit if FPK settlement is poorer than anticipated. This risk is manageable through monitoring and refinements to the deposition plan through the annual review. The risk is limited by the prescribed minimum 30 m water cover over FPK.

Underground minewater pumped to Beartooth Pit should be monitored monthly, when flowing. Other minewater delivered to Beartooth pit should be monitored as appropriate to generally characterize the inputs into the pit.

Water quality in Beartooth pit (water column profile) and in-pit water elevation should be monitored quarterly if possible. The FPK surface profile should be monitored annually if possible as part of the annual review. It is understood that safety concerns currently prohibit access into the pit or, possibly, restrict access to winter months.

4.4 Closure

All of the options comprising the recommended FPK deposition plan except Cell A South were rated more favourable for closure than the current plan. In combination, the recommended options provide the primary benefit of substantively reducing, and possibly eliminating, FPK deposition into Cell D. The benefit for closure is enhancing the use of Cell D as an additional water polishing pond for closure. The Cell A South option was rated lower because of the increased uncertainty related to managing runoff water over FPK along the center of the cell rather than along the southern edge. As described in S.3.3 this uncertainty is not unique to this option and it is considered manageable with appropriate deposition planning.

4.4.1 LLCF

The options selected for the LLCF will create a favourable water management framework for closure that will help to integrate Cells A, B and C while preserving Cell D as a long-term polishing pond. The raise of Dike C to 461 m will be the basis for establishing closure water levels in Cells A, B and C. For instance, if a weir depth in Dike C of approximately 2 m is assumed (to provide emergency freeboard for storm events), then a water elevation at Dike C of about 459 m provides a positive, but not overly steep, gradient to upstream areas that will assist with addressing runoff in swales constructed over FPK. This elevation range is considered more favourable in concept than 2 m lower as would be the case with current Dike C.

It is understood that reclamation research and engineering studies are being conducted under the *Interim Closure and Reclamation Plan* that include optimization of LLCF water levels and design of water management facilities. The recommended FPK deposition plan should provide a good platform for those designs.

The exclusion of the Cell B East option from the recommended deposition plan enables the LLCF Reclamation Pilot Study to proceed. This is an important field-scale trial of reclamation methods for the LLCF that would not be able to proceed if FPK deposition were taking place in Cell B. This is an important benefit to closure planning under the ICRP.

The recommended deposition plan does not require either raising of Dike D or construction of the Dike D perimeter containment structures that were deferred following initial facility development. The need for these structures was effectively called into question during the 5-year review as a result of the focus on maximizing the use of upstream Cells A, B and C. The deposition plan recommended here further confirms that these structures should not be necessary, which eliminates physical structures from the closure plan that would otherwise require reclamation and, possibly long-term, maintenance.

4.4.2 Beartooth Pit

Closure is not negatively affected by the deposition of FPK into Beartooth pit. The long-term risks presented by the Beartooth pit option are considered to be less than the risks presented by the current plan (deposition into Cell D), as described in S.3.4. This option does not affect BBCI's plans for water quality that is safe for fish, pit perimeters that are safe for people and wildlife, and littoral areas that facilitate the establishment of a self-sustaining aquatic ecosystem in the pit lakes.

The specification for 30 m minimum water depth over FPK (inclusive of EFPK) at closure should ensure that re-suspension of FPK sediment into the water column after closure (one of the long-term water quality risks) is well mitigated. In fact, it is recommended that an optimization study be conducted on the most appropriate depth of water cover over FPK for closure because the 30 m specification is considered to be potentially over-protective. The effect in that case is that BBCI is not allowed to make the most beneficial use of the potentially available storage capacity to offset FPK deposition elsewhere.

In the event that water quality does not meet the closure objectives, the already-established contingency plan for either pumping water into the Panda underground workings or pumping slowly to the LLCF can be implemented. An additional contingency option was identified in S.3.4 wherein pump flooding of Beartooth pit could be delayed until later in the site-wide pit flooding scheme (by over 10 years if desired) if a delay was deemed to be beneficial to water quality in Beartooth pit.

4.5 COSTS

The conceptual combined cost of the individual options comprising the recommended FPK deposition plan is in the order of $22.5M.

This compares favourably to a conceptual estimate for the current plan that includes contingency funding. The base construction estimate of $10M plus the contingency funding of $5M for treatment plant construction and $0.5M/yr for 12 years (say 7 years operations plus 5 years post-closure) is in the order of $21M.

In this analysis the cost of the recommended deposition plan can be considered similar to the current plan. However, if the recommended plan prevents the need for FPK deposition into Cell D, the implementation cost for the recommended plan can be reduced by the savings in Cell D reclamation costs, which makes the recommended plan less expensive.

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DOMINION DIAMOND

Appendix E

Geochemical Characterization and ML/ARD in Processed Kimberlite

E Assessment of Potential for ML/ARD in Processed Kimberlite

This appendix addresses the requirements of Clause F.2.a (v) of Licence MV2003L2-0013 in providing a detailed summary of all geochemical characterization testing of processed kimberlite.

This information was previously found in the Geochemical Characterization and Metal Leaching (ML) Management Plan, August, 2007.The information presented here is primarily based on existing information from the following previously published reports:

- *Acid/Alkaline Rock Drainage (ARD) and Geochemical Characterization Plan* reports (Norecol Dames & Moore 1997; SRK 2003a);
- Annual *Waste Rock Storage Area and Seepage Survey Reports* (SRK 2001, 2002, 2003d, 2004, 2005a, 2006);
- Waste Rock and Ore Storage Management Plan reports (BHP 2000a, 2002a, 2003a).

Results presented here for ABA data and metal analysis of the solid fractions of Fine Processed Kimberlite (FPK) samples collected in 2004 and 2005. Data is therefore provided in Table E.5 and E.6.

E.1 Coarse Kimberlite Reject

E.1.1 Pre-Mining Geochemical Characterization

The composition of Coarse Kimberlite Reject (CKR) is very similar to kimberlite. Pre-mining ABA results for the Panda, Koala, Beartooth, Misery and Fox kimberlite are presented in respective sections of Appendix B. These results indicated that the potential for low pH drainage from kimberlite material was minimal.

E.1.2 Detailed Field Investigation

Seepage surveys of stagnant pools on the tundra down gradient of the toe of the CKRSA in 1999 identified water with pHs as low as 3.8, and elevated sulphate (up to 789 mg/L), magnesium (151 mg/L) and calcium (103 mg/L) concentrations (SRK 2001; seepage sampling of stagnant pools was terminated in 2005 as they are not considered representative of seepage chemistry). Subsequent monitoring in the same area from 2000 to 2002 indicated seepage with variable pH (near neutral to no lower than 3), sulphate concentrations up to 4600 mg/L, and with ion balance provided primarily by magnesium. Some of the seeps had characteristics resembling ARD including sodium and potassium concentrations in the tens of mg/L, and aluminum, iron, and magnesium concentrations near 1 mg/L.

The seepage survey results prompted BHP Billiton to initiate specific studies to investigate the mechanism(s) which may be generating the observed high solute concentrations and low pHs downstream of the CKRSA (Day *et al.* 2003). Proposed explanations for the high solute concentrations included re-cycling of water in the processing plant, leaching of sulphate minerals, freeze concentration of pore waters and sulphide oxidation in the CKR. The observed pH depression could be a result of sulphide oxidation without neutralization, natural tundra acidity, or release and subsequent oxidation of iron from dissolution of CKR components by tundra acidity.

Generation of Elevated Solute Concentrations

Water enters the CKRSA as process water incorporated into CKR as it is deposited on the surge pile, and as precipitation occurring as rain or snowfall. Sampling of the surge pile sump indicated ion concentrations much lower than observed in the CKRSA eliminating re-cycling of process water as a source of high sulphate waters.

A freeze concentration test of process water from the surge pile sump conducted by BC Research Inc. (Vancouver, Canada) and described in Day *et al.* (2003), indicated that this mechanism could readily generate the high sulphate and magnesium concentrations observed in the CRKSA waters. The test produced sulphate concentrations very similar to the seepage within the pile. If freeze concentration of process water was the only source of sulphate in the seepage within the pile then other parameters should show similar concentration factors. However, sodium and potassium concentrations produced by the freeze concentration test were much greater than were observed in the seepage and MINTEQA2 (Allison *et al.* 1991) modelling of the freeze concentration water indicated that sulphate concentrations may have been limited by gypsum formation (Day *et al.* 2003). Therefore, although freeze concentration may be magnifying pore water chemistry, other sources of high sulphate concentrations should be considered.

Leaching of sulphate minerals was a possible source of sulphate in the CKR. Although no sulphate minerals were observed, there is detectable sulphur in the form of sulphate in the CKR. The low sulphate concentration in the process water combined with the high solubility of magnesium sulphate suggested that sulphates would likely be calcium rather than magnesium based. Mineralogical analyses by Rollo (2003) and Rollo and Jamieson (2006) confirmed the presence of Ca sulphate in the mud xenoclasts of Panda kimberlite.

Initial results (6 weeks) from a humidity cell test on a sample from the surge pile containing 0.39% total sulphur demonstrated a minimum sulphate release rate of 26 mg/kg/week. Using this value, corrected for temperature using the Arrehnius equation and the assumption that this rate is only effective for 3 months of the year, it was estimated that sulphate concentrations of the order of 5,000 mg/L could be generated by CKR in the top 5 meters (Day *et al.* 2003). This is the approximate active zone of freezing and thawing as determined by thermistor string temperature profiles. Day *et al.* (2003) suggested that the balance of the leachate chemistry could result from the reaction of carbonate and silicate rock components with acid generated by oxidation of pyrite.

Source of Acidity

Due to the high neutralization potential within CKR, it cannot be the source of acidity found down gradient of the CKRSA in 1999. Furthermore, there was no evidence of *in-situ* acid generation or transport in test pits (i.e. iron staining around particles or iron cementation). However, toe seeps, upwelling waters and groundwater samples emerging from near or below the CKR-soil contact contained dissolved iron, a significant proportion of was ferrous (Day *et al*., 2003). Iron appeared to be leached from CKR by naturally acidic tundra soils under reducing conditions and was subsequently oxidized when it contacted the atmosphere, precipitating ferric hydroxide and increasing acidity in the water. Lower pH values observed under laboratory conditions compared to field measurements at the time of sampling supported this theory, as well as and the presence of ferric hydroxide precipitates in pools along the toe of the CKRSA (Day *et al*., 2003).

A shake flask type test was also performed to simulate the tundra and CKR contact. These experiments showed that soil acidity is capable of leaching the CKR and that alkalinity leached from the CKR does not offset the acidity in the soil in the short term. The generation of carbonic acid due to decomposition of vegetation beneath the CKR may have resulted in further dissolution of CKR. Loading of the soft soils may also result in CKR being pushed into the soil allowing contact of acidic soil water with CKR.

Therefore, porewater chemistry within the CKRSA appeared to be controlled by a combination of oxidation of fine-grained pyrite, neutralization of acidity by carbonates and silicates, and freeze concentration of pore water. Acidity down gradient of the CKRSA was likely a result of leaching of iron at the CKR-soil contact under reducing conditions. The reduced iron oxidizes and is hydrolyzed when it makes contact with the atmosphere downstream of the CKRSA causing a pH depression.

E.1.3 Routine Geochemical Monitoring Program

ABA data and metal analysis results for Coarse Kimberlite Reject (CKR) samples collected in 2001 through 2005 are summarized in Tables C.1 and C.2, respectively.

CKR samples had an average total sulphur content of 0.35%, with a range of 0.10% to 0.61%. Sobek NP values were high and ranged from 78 to 337 kg $CaCO_3$/t, with an average of 237 kg $CaCO_3$/t. Resulting Sobek NP/MPA ratios were between 4.8 and 100, and had an average of 22. The average carbonate NP/MPA (CO_3-NP/MPA) ratio is 4.9 and the minimum ratio from all samples is 2.3, indicating that a small proportion of samples contained uncertain potential to generate acidity. Overall, these results indicate that there is sufficient neutralization potential within CKR to neutralize acid produced as a result of oxidation of contained sulphides.

CKR samples contained elevated concentrations of chromium, cobalt and nickel relative to average crustal abundances, which is typical of kimberlite material. Trace metal concentrations were within the range of concentrations observed for Fox waste kimberlite and Koala kimberlite (Appendix B).

Table E.1: Summary of Coarse Kimberlite Reject Acid-Base Accounting Data

Description		Summary Statistic	Paste pH	Total S	Sulphate	Sulphide	CO_3-NP	NP	MPA	NNP	NP/MPA	CO_3-NP/MPA
		Units	s.u.	S%	S%	S%	kg $CaCO_3$/t					
Pre-Mine (1997)	Panda CK		8.5	0.38	0.02	0.36	-	392	11	381	35	-
	Fox CK		10	0.04	0.01	0.03	-	308	0.9	308	329	-
Routine Monitoring (2001 - 2005)	CKR	Average	8.2	0.35	0.03	0.33	53	237	11	226	22	4.9
		Max	9.0	0.61	0.12	0.58	95	337	19	324	100	11.0
		95th Percentile	8.5	0.57	0.07	0.52	73	316	18	309	58	8.2
		Median	8.3	0.35	0.03	0.33	55	256	11	244	21	4.8
		5th Percentile	7.8	0.14	0.01	0.15	34	88	4.4	76	6.8	2.8
		Min	7.4	0.10	0.01	0.04	20	78	3.1	70	4.8	2.3
		Count	104	104	90	90	90	104	104	104	104	90

Notes: All results reported as 'below detection' were replaced with detection limit values for the calculation of summary statistics.
'NP': neutralization potential as determined by the standard Sobek method.
'MPA': maximum potential acidity.
'NNP': net neutralization potential.
'CO_3-NP': carbonate neutralization potential.
'-': indicates parameter not measured.
CK - Coarse Kimberlite; CKR - Coarse Kimberlite Reject

Table E.2: Summary of Metal Concentrations in Coarse Kimberlite Reject

Description	Summary Statistic	Al	As	Ba	Ca	Co	Cr	Cu	Fe	K	Mg	Mn	Mo	Na	Ni	Zn
	Units	%	ppm	ppm	%	ppm	ppm	ppm	%	%	%	ppm	ppm	%	ppm	ppm
Routine Monitoring (2001- 2005)	Average	3.8	5.7	830	2.1	56	678	25	4.0	1.0	12	697	2.5	0.66	947	58
	Max	7.3	19	1260	2.8	82	1510	48	5.1	1.7	15	880	11	2.3	1530	76
	95th Percentile	5.1	10	1080	2.7	75	982	32	4.7	1.4	15	833	7.0	1.3	1397	72
	Median	3.7	5.0	830	2.1	55	650	24	3.9	1.1	12	694	2.0	0.61	893	57
	5th Percentile	2.5	3.0	576	1.7	42	465	17	3.3	0.58	9.6	562	1.0	0.23	667	48
	Min	1.7	2.0	380	1.2	29	231	15	3.0	0.47	6.4	500	1.0	0.12	410	38
	Count	93	93	93	93	93	93	93	93	93	93	93	93	93	93	93

Notes: Values below detection were replaces by detection limits for calculation of summary statistics.

E.2 Fine Processed Kimberlite

E.2.1 Pre-Mining Geochemical Characterization

Re-circulating leach column tests were completed on two samples of simulated Fine Processed Kimberlite (FPK) samples, one from the Panda Pipe and one from the Fox Pipe; however the Fox Pipe sample allowed very slow percolation and did not produce sufficient leachate for analysis (NDM 1997). Acid base accounting data for the samples is summarized in Table 6.4. The Panda Pipe sample had a pH of 8.4 and a total sulphur content of 0.33%. The Fox Pipe was considerably more alkaline (pH of 9.9) and contained less sulphur (0.12%). Both samples contained high neutralization potentials (491 and 335 kg $CaCO_3$/t, respectively) and were classified as non-acid generating.

Eight weeks of FPK column leaching data were carried out and the Panda FPK sample displayed results similar to those observed for the Panda coarse reject sample (Section 6.1.1). The pH remained stable between 7 and 8 and the general trend for release of metals was an initially rapid increase followed by erratic concentrations without an apparent increasing or decreasing trend.

E.2.2 Processed Kimberlite – Water Interactions Study

Rollo (2003) conducted a study to chemically and mineralogically define the components of the mineral – water system that exists within the processed kimberlite containment facility (LLCF), and the processes controlling the observed water chemistry. Geochemical and mineralogical analyses were conducted on unprocessed Panda kimberlite and processed kimberlite fines collected from the LLCF. Water chemistry was determined on samples of in-situ porewater, discharge water, and LLCF surface water. Results have been published in a Queen's University M.Sc. thesis (Rollo 2003) and in a recent journal article (Rollo and Jamieson 2006).

The composition of kimberlite ore and processed fines consisted of more than 70% serpentine and forsteritic olivine, with lesser spinel, pyroxene, garnet, phlogopite, pyrite, calcite, and smectite. Mud xenoclasts were present throughout the Panda kimberlite as clasts ranging in size from millimetres to several centimetres. X-ray diffraction analysis of the mud xenoclasts indicated that smectite, quartz, and pyrite were the main minerals present. Due to the similarity in appearance of the kimberlite groundmass material and the mud xenoclasts, it was not possible to determine how much mudstone was contained in the kimberlite.

Both sulphide and sulphate minerals were found to be restricted to the mud xenoclasts. The average sulphide concentration in xenoclasts was 2.54% (compared to 0.21% in the kimberlite), and the average sulphate concentration, most likely calcium sulphate, in the xenoclasts was 0.27% (compared to 0.14% in the kimberlite). The Ca-sulphate was found as fine-grained disseminations and fracture filling precipitates within the clasts.

The processed kimberlite fines were a medium green-grey and had mineralogy similar to the kimberlite ore. Saponite, chrysotile and phlogopite were identified by XRD in the clay fraction. Similar to the kimberlite ore, that average concentration of sulphide was 0.25% and found only as framboidal grains (0.5-1.0 µm) in the mudstone fragments. The pyrite grains did not exhibit any evidence of oxidation, such as rims or Fe oxide staining around the grains. Rollo and Jamieson (2006) suggest that the insignificant difference between sulphide contents in the ore and the processed fines is an indication that oxidation of sulphides is not the primary source of dissolved sulphate in porewaters and discharge water. In contrast to the sulphides, sulphate was almost absent from the fines (average of 0.04%), indicating dissolution during processing. An opposite pattern to that of sulphate was observed for inorganic carbon, which showed higher concentrations in the processed fines (average of 2.38%) than in the ore (average of 1.40%). These results suggested that carbonate minerals have precipitated in the fines at some point after mining (Rollo and Jamieson 2006). However, it could also just mean that the composition has changed during processing.

During dry periods in the summer, a fine-grained white efflorescent crust (precipitate) forms on subareally deposited processed kimberlite fines in the LLCF. As soon as it rains, the white precipitate immediately dissolves. Analysis of this material indicated that it was predominantly hexahydrite ($MgSO_4 \cdot 6H_20$)

Porewater samples were characterized by high SO_4 (up to 4080 mg/L), Mg (up to 870 mg/L) and Ca (up to 473 mg/L). Reaction and inverse modeling suggest that much of the water-rock interaction takes place within the processing plant and involves the dissolution of chrysotile and Ca sulphate, and precipitation of silica and Mg carbonate.

Rollo and Jamieson (2006) suggested that the composition of the water in the LLCF is primarily the result of water-rock interactions occurring within the processing plant. This statement is false. Currently, underground connate water is has the greatest influence on the water chemistry of the LLCF. However, the study provides useful information on the changes in solids chemistry that occur during and after processing and deposition. This information, together with the porewater data, is used to predict the chemical loadings from the tailings to the LLCF (Section 4.2.4 of report). This loadings component, thought a minor component, will be used for future water quality modeling of the LLCF.

E.2.3 Routine Geochemical Monitoring Program

ABA data and metal analysis results for the solid fractions of Fine Processed Kimberlite (FPK) samples collected in 2004 and 2005 as part of the FPK monitoring program are provided in Appendix C.1 and are summarized in Tables C.3 and C.4.

The FPK solids had total sulphur concentrations ranging between 0.10% and 0.58%, with an average of 0.28%. Average Sobek NP values were quite high (311 kg $CaCO_3$/t) resulting in high average Sobek NP/MPA ratios (average of 36). These results were similar to those of kimberlite ore and suggested that there was sufficient neutralization potential within the FPK to neutralize acid produced as a result of oxidation of contained sulphides.

The FPK solids contained elevated concentrations of chromium, cobalt and nickel, typical of kimberlite material. Trace metal concentrations are within the range of concentrations observed for Koala kimberlite and Fox waste kimberlite.

Table E.3: Summary of Fine Processed Kimberlite Acid-Base Accounting Data

Description		Summary Statistic	Paste pH	Total S	Sulphate	Sulphide	CO_3-NP	NP	MPA	NNP	NP/MPA	CO_3-NP/MPA
		Units	s.u.	S%	S%	S%	kg $CaCO_3$/t					
Pre-Mine (1997)	Panda Simulated FPK		8.4	0.33	0.02	0.31	-	491	9.7	481	51	51
	Fox Simulated FPK		9.9	0.12	0.01	0.11	-	335	3.4	332	98	98
Routine Monitoring (2004 - 2005)	FPK Solids	Average	8.2	0.28	0.06	0.22	185	311	8.7	303	36	21
		Max	8.5	0.58	0.14	0.52	292	379	18	374	116	49
		95th Percentile	8.4	0.52	0.10	0.41	268	367	16	362	93	40
		Median	8.2	0.28	0.05	0.23	175	311	8.8	297	34	23
		5th Percentile	7.9	0.12	0.02	0.08	130	266	3.7	250	19	12
		Min	7.9	0.10	0.01	0.06	117	256	3.1	246	16	10
		Count	37	37	37	37	37	37	37	37	37	37

Notes: All results reported as 'below detection' were replaced with detection limit values for the calculation of summary statistics.
'NP': neutralization potential as determined by the standard Sobek method.
'MPA': maximum potential acidity.
'NNP': net neutralization potential.
'CO_3-NP': carbonate neutralization potential.
'-': indicates parameter not measured.
FPK - Fine Processed Kimberlite

Table E.4: Summary of Metal Concentrations in Fine Processed Kimberlite

Description	Summary Statistic	Al	As	Ba	Ca	Co	Cr	Cu	Fe	K	Mg	Mn	Mo	Na	Ni	Zn
	Units	%	ppm	ppm	%	ppm	ppm	ppm	%	%	%	ppm	ppm	%	ppm	ppm
Routine Monitoring (2004- 2005)	Average	2.4	6.1	760	1.9	69	798	26	4.4	0.6	16	691	2.5	0.15	1343	54
	Max	3.9	14	1320	3.0	93	1080	41	5.0	1.1	21	782	6.0	0.51	1870	65
	95th Percentile	3.5	9.2	1108	2.9	87	971	38	4.9	1.0	20	768	4.2	0.40	1713	65
	Median	2.6	5.0	740	1.8	68	787	24	4.4	0.6	15	695	2.0	0.12	1310	53
	5th Percentile	1.6	5.0	496	1.4	55	635	17	3.9	0.3	12	599	1.0	0.06	1003	46
	Min	0.8	5.0	470	1.2	50	557	15	3.7	0.3	11	568	1.0	0.04	937	45
	Count	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37

Notes: Values below detection were replaces by detection limits for calculation of summary statistics.

Table E.5 - Analytical Results for Fine Processed Kimberlite Solids

Sample Description	Acid-Base Accounting												
	pH	**Sulphide**	**Sulphate**	**Sulphide**	**C**	**CO_2**	**CO_3-NP**	**NP**	**MPA**	**NNP**	**NP/MPA**	**CO_3-NP/MPA**	**FIZZ RATING**
	Unity	**S%**	**S%**	**S%**	**%**	**%**	**kg $CaCO_3$/t**				**Unity**		**Unity**
FK 13-SEP-04	8.1	0.16	0.03	0.13	0.54	2.0	167	379	5.0	374	75.8	33	3
FK 3-JAN-04	8.1	0.16	0.02	0.14	0.59	2.2	183	366	5.0	361	73.2	37	3
FK 7-FEB-04	8.1	0.10	0.02	0.08	0.37	1.4	117	363	3.1	360	116.2	38	3
FK 4-APR-04	8.1	0.15	0.01	0.14	0.37	1.4	117	369	4.7	364	78.7	25	3
FK 7-JUN-04	8.1	0.13	0.04	0.09	0.47	1.7	142	349	4.1	345	85.9	35	3
FK 5-JUL-04	8.1	0.24	0.07	0.17	0.55	2.0	167	335	7.5	328	44.7	22	3
FK 6-AUG-04	7.9	0.51	0.11	0.40	0.87	3.2	267	313	15.9	297	19.6	17	3
FK 8-AUG-04	8.2	0.12	0.06	0.06	0.56	2.0	167	349	3.8	345	93.1	44	3
FK 11-AUG-04	7.9	0.47	0.14	0.33	0.95	3.5	292	309	14.7	294	21.0	20	3
FK 12-AUG-04	8.2	0.32	0.04	0.28	0.47	1.7	142	294	10.0	284	29.4	14	3
FK 15-AUG-04	8.0	0.34	0.08	0.26	0.80	2.9	242	320	10.6	309	30.1	23	3
FK 16-AUG-04	8.1	0.33	0.10	0.23	0.79	2.9	242	309	10.3	299	30.0	23	3
FK 23-AUG-04	8.1	0.58	0.06	0.52	0.57	2.1	175	311	18.1	293	17.2	10	3
FK 28-AUG-04	8.2	0.28	0.06	0.22	0.60	2.2	183	328	8.8	319	37.5	21	3
FK 31-AUG-04	8.3	0.17	0.04	0.13	0.47	1.7	142	316	5.3	311	59.5	27	3
FK 12-SEP-04	8.2	0.11	0.01	0.10	0.56	2.0	167	324	3.4	321	94.3	49	3
FK 20-SEP-04	8.3	0.15	0.02	0.13	0.48	1.7	142	354	4.7	349	75.5	30	3
FK 1-OCT-04	8.1	0.44	0.08	0.36	0.51	1.9	158	337	13.8	323	24.5	11	3
FK 18-OCT-04	8.2	0.35	0.07	0.28	0.64	2.4	200	316	10.9	305	28.9	18	3
FK 25-OCT-04	8.1	0.27	0.05	0.22	0.58	2.1	175	268	8.4	260	31.8	21	3
FK 30-OCT-04	8.1	0.31	0.07	0.24	0.91	3.3	275	274	9.7	264	28.3	28	3
FK 25-DEC-04	8.2	0.54	0.07	0.47	0.66	2.4	200	267	16.9	250	15.8	12	3
FK 23-JAN-05	8.2	0.28	0.08	0.20	0.68	2.5	208	299	8.8	290	34.2	24	3
FK 25-FEB-05	8.2	0.29	0.05	0.24	0.54	2.0	167	275	9.1	266	30.3	18	3
FK 24-MAR-05	8.3	0.34	0.10	0.24	0.66	2.4	200	299	10.6	288	28.1	19	3
FK 24-APR-05	7.9	0.37	0.09	0.28	0.65	2.4	200	262	11.6	250	22.7	17	3
FK 25-MAY-05	8.2	0.28	0.05	0.23	0.73	2.7	225	326	8.8	317	37.3	26	3
FK 23-JUN-05	8.3	0.21	0.04	0.17	0.53	2.0	167	296	6.6	289	45.1	25	3
FK 24-JUL-05	8.3	0.16	0.05	0.11	0.53	2.0	167	294	5.0	289	58.8	33	3
FK 23-AUG-05	8.2	0.30	0.06	0.24	0.58	2.1	175	300	9.4	291	32.0	19	3
FK 28-SEP-05A	8.4	0.29	0.03	0.26	0.43	1.6	133	313	9.1	304	34.5	15	3
FK 28-SEP-05B	8.5	0.31	0.03	0.28	0.44	1.6	133	256	9.7	246	26.4	14	3
FK 24-OCT-05	8.0	0.29	0.05	0.24	0.68	2.5	208	273	9.1	264	30.1	23	3
FK 28-NOV-05A	8.5	0.26	0.08	0.18	0.74	2.7	225	290	8.1	282	35.7	28	3
FK 28-NOV-05B	8.3	0.27	0.09	0.18	0.70	2.6	217	314	8.4	306	37.2	26	3
FK 23-DEC-05	8.4	0.29	0.05	0.24	0.72	2.7	225	295	9.1	286	32.6	25	3
FIK PPD	8.2	0.12	0.04	0.08	0.48	1.8	150	274	3.8	270	73.1	39	3

Notes: 'NP': neutralization potential as determined by the standard Sobek method.
'MPA': maximum potential acidity. Calculated from Total Sulphur.
'NNP': net neutralization potential.
'CO_3-NP': carbonate neutralization potential. Calculated from CO_2%

Table E.5 - Analytical Results for Fine Processed Kimberlite Solid (continued)

Sample Description	**Metals - by Aqua Regia Digestion**																											
	Ag	**Al**	**As**	**Ba**	**Be**	**Bi**	**Ca**	**Cd**	**Co**	**Cr**	**Cu**	**Fe**	**Hg**	**K**	**Mg**	**Mn**	**Mo**	**Na**	**Ni**	**P**	**Pb**	**S**	**Sb**	**Sr**	**Ti**	**V**	**W**	**Zn**
	ppm	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**%**	**%**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**%**	**ppm**	**ppm**	**ppm**
FK 13-SEP-04	0.5	0.78	5	630	0.5	2	1.74	0.5	81	912	22	4.73	0.01	0.32	17.95	742	2	0.06	1655	470	3	0.15	5	275	0.09	39	10	48
FK 3-JAN-04	0.5	2.56	6	630	0.5	2	2.03	0.5	87	1080	22	4.88	0.01	0.51	18.95	782	2	0.16	1700	550	7	0.18	5	339	0.11	46	10	51
FK 7-FEB-04	0.5	1.34	5	470	0.5	2	1.24	0.5	93	774	15	4.98	0.01	0.25	20.8	763	1	0.04	1870	330	3	0.1	5	206	0.07	31	10	46
FK 4-APR-04	0.5	1.62	6	480	0.5	2	1.38	0.5	88	895	16	4.94	0.01	0.34	20	768	1	0.09	1765	370	4	0.17	5	230	0.08	37	10	49
FK 7-JUN-04	0.5	1.8	5	550	0.5	2	1.62	0.5	84	738	17	4.75	0.01	0.35	19.4	747	1	0.09	1695	410	6	0.15	5	266	0.09	37	10	47
FK 5-JUL-04	0.5	2.45	5	780	0.6	2	1.98	0.5	81	848	26	4.83	0.01	0.56	18.2	770	2	0.12	1600	600	8	0.28	5	330	0.13	58	10	56
FK 6-AUG-04	0.5	3.91	8	970	0.9	2	2.87	0.5	56	851	40	4.2	0.02	0.94	12.45	679	5	0.14	1045	970	11	0.57	5	444	0.2	86	10	65
FK 8-AUG-04	0.5	1.93	5	770	0.5	2	2.04	0.5	73	648	23	4.31	0.01	0.37	17.2	711	1	0.07	1465	650	7	0.13	5	374	0.1	44	10	47
FK 11-AUG-04	0.5	3.89	9	1060	0.9	2	2.91	0.5	55	811	41	4.08	0.02	0.93	12.15	654	4	0.13	1010	970	14	0.49	5	480	0.2	83	10	62
FK 12-AUG-04	0.5	2.05	5	730	0.6	2	1.74	0.5	62	787	20	3.95	0.01	0.43	14.35	635	2	0.07	1190	530	8	0.35	5	291	0.12	58	10	51
FK 15-AUG-04	0.5	3.46	5	1060	0.8	2	2.66	0.5	66	787	37	4.47	0.02	0.82	14.75	725	4	0.11	1270	840	13	0.41	5	445	0.18	76	10	65
FK 16-AUG-04	0.5	3.24	5	840	0.8	2	2.42	0.5	61	735	32	4.16	0.02	0.72	13.8	685	3	0.09	1200	740	12	0.35	5	403	0.17	71	10	58
FK 23-AUG-04	0.5	2.6	5	700	0.6	2	1.7	0.5	73	866	24	4.51	0.02	0.6	15.65	651	2	0.1	1400	520	4	0.6	5	283	0.12	56	10	52
FK 28-AUG-04	0.5	2.63	10	780	0.6	2	2.05	0.5	76	811	27	4.65	0.01	0.58	17.05	730	3	0.09	1490	610	5	0.3	5	347	0.13	60	10	56
FK 31-AUG-04	0.5	2.72	5	610	0.5	2	1.96	0.5	68	665	24	4.39	0.01	0.44	15.6	737	2	0.51	1350	480	5	0.19	5	280	0.13	52	10	50
FK 12-SEP-04	0.5	1.63	5	590	0.5	2	1.7	0.5	76	688	18	4.41	0.01	0.3	17.75	715	1	0.06	1535	420	8	0.12	5	267	0.09	36	10	45
FK 20-SEP-04	0.5	1.76	7	580	0.5	2	1.54	0.5	85	923	19	4.76	0.01	0.35	19.05	753	1	0.07	1685	410	4	0.15	5	252	0.09	39	10	48
FK 1-OCT-04	0.5	3.11	6	950	0.8	2	2.19	0.5	66	879	33	4.47	0.03	0.85	14.7	695	4	0.1	1245	830	12	0.47	5	366	0.19	97	10	65
FK 18-OCT-04	0.5	2.89	5	820	0.7	2	2.15	0.5	71	832	29	4.42	0.02	0.66	15.05	688	3	0.12	1315	680	11	0.37	5	352	0.16	65	10	57
FK 25-OCT-04	0.5	3.01	5	840	0.8	2	2.13	0.5	67	785	25	4.52	0.01	0.75	14.65	753	2	0.19	1295	700	13	0.29	5	352	0.16	63	10	59
FK 30-OCT-04	0.5	2.29	8	750	0.5	2	1.55	0.5	58	557	21	3.86	0.01	0.59	13.85	580	2	0.13	1175	490	7	0.32	5	277	0.13	51	10	52
FK 25-DEC-04	0.5	2.55	6	700	0.6	2	1.77	0.5	58	871	25	4.16	0.02	0.66	13.15	604	2	0.12	1105	610	3	0.55	5	302	0.15	57	10	54
FK 23-JAN-05	0.5	2.62	14	830	0.6	2	1.84	0.5	58	778	27	4.12	0.01	0.68	13.9	648	2	0.14	1145	630	10	0.3	5	345	0.16	58	10	53
FK 25-FEB-05	0.5	2.37	5	710	0.5	2	1.58	0.5	62	866	23	4.1	0.01	0.61	13.95	609	2	0.11	1185	510	7	0.34	5	289	0.14	52	10	51
FK 24-MAR-05	0.5	2.63	8	740	0.6	2	1.76	0.5	50	676	29	3.68	0.02	0.73	11.4	568	6	0.19	937	600	6	0.36	5	318	0.16	54	10	62
FK 24-APR-05	0.5	2.65	5	910	0.6	2	1.97	0.5	53	680	38	4.02	0.02	0.89	12.25	613	4	0.12	975	680	4	0.37	5	381	0.16	62	10	55
FK 25-MAY-05	0.5	1.95	5	640	0.5	2	1.58	0.5	61	697	21	3.96	0.01	0.63	13.95	628	2	0.14	1185	560	5	0.29	5	288	0.13	49	10	51
FK 23-JUN-05	0.5	1.63	7	570	0.5	2	1.49	0.5	70	827	19	4.37	0.01	0.43	16.8	678	2	0.08	1410	460	2	0.21	5	246	0.1	40	10	53
FK 24-JUL-05	0.5	1.87	5	680	0.5	2	1.84	0.5	74	772	24	4.71	0.01	0.42	18.35	752	2	0.07	1505	550	2	0.18	5	311	0.11	45	10	52
FK 23-AUG-05	0.5	2.05	5	750	0.5	2	1.73	0.5	73	944	25	4.62	0.01	0.6	16.65	722	4	0.1	1415	600	4	0.33	5	300	0.13	58	10	59
FK 28-SEP-05A	0.5	2.35	6	540	0.5	2	1.39	0.5	68	958	19	4.26	0.01	0.69	15.6	672	3	0.24	1310	530	3	0.29	5	253	0.13	55	10	52
FK 28-SEP-05B	0.5	2.76	5	600	0.6	2	1.55	0.5	71	1025	26	4.54	0.01	0.8	16.35	718	2	0.35	1380	590	5	0.32	5	282	0.14	60	10	58
FK 24-OCT-05	0.5	2.66	6	790	0.6	2	1.79	0.5	57	684	23	4.26	0.01	0.67	14.35	644	3	0.12	1110	560	2	0.32	5	324	0.15	53	10	52
FK 28-NOV-05A	0.5	3.09	5	1300	0.7	2	2.95	0.5	59	639	37	4.26	0.01	1.11	13.35	681	4	0.4	1115	920	4	0.3	5	455	0.21	82	10	59
FK 28-NOV-05B	0.5	3.07	5	1320	0.7	2	2.93	0.5	60	618	34	4.23	0.01	1.1	13.35	676	3	0.4	1115	910	7	0.3	5	455	0.2	79	10	59
FK 23-DEC-05	0.5	2.29	6	940	0.5	2	2.15	0.5	62	769	26	4.36	0.01	0.88	14.9	702	2	0.23	1200	740	5	0.33	5	365	0.16	63	10	55
FIK PPD	0.5	1.61	7	500	0.5	2	1.43	0.5	82	849	18	4.54	0.01	0.33	18.65	703	2	0.06	1655	410	2	0.12	5	246	0.09	34	10	46

Table E.6 - Analytical Results for Fine Processed Kimberlite Process Water

		Physical Tests						Dissolved Anions								Nutrients						
Sample Information		pH	Cond	TDS	Total Hardness	TSS	Turbidity	Alkalinity-Total	Bicarbonate-Alaklinity CaCO3	Carbonate-Alkalinity CaCO3	Hydroxide-Alaklinity CaCO3	Total Organic Carbon	Cl	F	SO4	Ammonia-N	Tot-Kjeldahl-N	Nitrate-N	Nitrite-N	Nitrate + Nitrite	Ortho-phosphate	Total Phosphate
ID	Sample Date	pH	uS/cm	mg/L	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
PPD	28-Feb-00	8.8	417	260	148	84	3.1	64	52	13	<5		19		67.2	1.75	2.10	14.5		14.7	0.002	0.056
PPD	9-Apr-00	7.7	632	389	242	7	1.5	54	66	<5	<5		12		155	1.35	2.35	18.9		20	0.012	0.022
PPD	9-Apr-00	7.7	630	391	260	4	0.93	54	66	<5	<5		12		153	1.36	2.02	18.2		19.3	0.015	0.023
PPD	8-May-00	6.8				3	0.54									1.11	1.56	5.42			0.003	0.028
PPD	23-May-00	7.3	433	240	141	5	0.76	56	69	<5	<5		15		82.3	1.93	1.10	9.27	0.09		0.001	0.025
PPD	19-Jun-00	8.2	413	234	124	43	1.2	60	73	<5	<5		18		78.8	1.09	1.29	6.9	0.29		<0.001	0.039
PPD	3-Jul-00	7.1	486	287	168	12	19.6	37	45	<5	<5		13		145	1.25	1.63	4.63	0.92		<0.001	0.021
PPD	1-Aug-00	7.8	718	456	299	21	1.6	53	65	<5	<5		12		251	2.01	1.85	7.02	0.21		<0.001	0.037
PPD	13-Aug-00	8.4	610	365	221	5	1.5	71	83	<5	<5		18		170	1.27	1.32	7.79	0.24		0.009	0.022
PPD	28-Aug-00	8.1	547	303	158	6	1.6	68	83	<5	<5		18		118	0.91	1.29	7.88	0.15		0.021	0.035
PPD	22-Sep-00	7.2	670	387	200	9	1.7	60	73	<5	<5		15		198	0.87	1.13	5.77	0.15		0.003	0.027
PPD	10-Oct-00	6.9	645	402	196	10	3.5	105	128	<5	<5		17		157	2.06	2.16	10.2	0.56		0.017	0.050
PPD	6-Nov-00	6.7	667	385	253	8	3.8	35	42	<5	<5		48		179	1.09	1.43	5.13	0.31		0.03	0.024
PPD	3-Dec-00	7.1	548	327	144	11	4	61	75	<5	<5		20		111	1.77	1.90	14.1	0.17		0.012	0.040
PPD	7-Jan-01	7.2	523	314	163	5	2.8	63	76	<5	<5		20		125	1.02	1.51	7.49	0.14		0.021	0.038
PPD	4-Feb-01	7.6	555	317	183	7	1.8	74	90	<5	<5		20		121	0.82	1.16	6.77	0.28		0.018	0.020
PPD	5-Mar-01	7.6	553	316	181	4	2.4	70	85	<5	<5		21		126	1.04	1.42	7.73	0.13		0.013	0.036
PPD	2-Apr-01	6.8	754	445	286	26	12	83	101	<5	<5		23		207	0.28	1.00	6.6	0.07		0.027	0.081
PPD	8-Jul-01	8.0	559	313	132	7	2.7	69	84	<5	<5		34		96.7	0.57	1.51	5.6	0.25		0.016	0.036
PPD	5-Aug-01	8.1	798	450	220	44	10	63	77	<5	<5		<1		262	1.25	1.15	0.027	0.002		0.02	0.026
PPD	3-Sep-01	7.7	919	556	295	<3	3	73	89	<5	<5		22		289	<0.005	1.77	7.39	0.20		0.003	0.055
PPD	7-Oct-01	7.7	970	626	342	7	2.4	63	77	<5	<5		37		311	1.61	2.43	9.34	0.25		0.005	0.031
PPD	4-Nov-01	7.2	672	391	196	3	1.8	53	64	<5	<5		35		174	1.26	1.45	5.41	0.42		0.012	0.010
PPD	10-Dec-01	6.5	904	578	290	4	2.3	43	52	<5	<5		54		281	1.09	2.31	7.2	0.65		0.028	0.031
PPD	9-Jan-02	7.2	681	395	286	6	1.9	67	81	<5	<5		38		179	0.73	1.13	4.77	0.30		0.021	0.033
PPD	3-Feb-02	7.0	733	447	210	9	3.3	77	94	<5	<5		50		169	1.11	1.11	6.36	0.21		0.006	0.025
PPD	4-Mar-02	7.7	780	448	241	<3	2.1	91	111	<5	<5		49		154	1.55	2.50	7.23	0.36		0.003	0.035
PPD	5-Apr-02	7.5	853	497	210	12	6.2	83	101	<5	<5		69		152	1.89	3.01	14	0.26		0.011	0.050
PPD	5-May-02	8.0	785	471	219	<3	0.41	75	92	<5	<5		76		139	1.50	1.57	9.1	0.17		0.02	0.020
PPD	9-Jun-02	6.9	546	316	154	<3	1	43	52	<5	<5		24		143	0.91	1.28	3.37	0.35		0.008	0.026
PPD	7-Jul-02	8.1	1340	868	467	4	0.35	76	92	<5	<5		58		486	1.52	1.98	6.92	0.54		0.01	0.021
PPD	1-Sep-02	7.4	636	394	166	13	2.5	56	68	<5	<5		32		173	1.20	1.20	4.17	0.82		0.007	0.016
PPD	7-Oct-02	7.0	737	499	235	8	2.5	47	57	<5	<5		24		230	1.31	1.87	9.4	1.86		<0.001	0.050
PPD	11-Nov-02	6.5	634	392	141	3	0.41	19	23	<5	<5		18		208	0.85	1.38	4.13	1.49		0.001	0.023
PPD	3-Dec-02	6.7	707	448	205	23	10	27	33	<5	<5		29		234	1.15	2.06	5.25	1.17		<0.001	0.023
PPD	5-Jan-03	7.5	474	308	121	12	4.1	57	70	<5	<5		27		94.9	1.46	1.44	12.6	0.32		0.012	0.031
PPD	9-Feb-03	7.0	563	358	126	34	17	45	55	<5	<5		55		115	1.52	1.64	8.7	0.30		<0.001	0.059
PPD	8-Mar-03	7.2	514	328	112	10	4.3	50	61	<5	<5		51		93.6	1.02	1.48	7.54	0.35		0.003	0.015
PPD	5-Apr-03	7.6	578	375	111	6	2.1	50	61	<5	<5		62		109	1.91	2.46	9.07	0.46		0.014	0.035
PPD	5-May-03	7.6	673	399	168	4	1.7	51	62	<5	<5		68		104	1.72	2.91	11.9	0.55		0.002	0.024
PPD	8-Jun-03	7.3	493	298	172	4	1.5	16	20	<5	<5		25		136	1.21	1.37	9.33	0.33		<0.001	0.012
PPD	6-Aug-03	8.1	621	346	205	5	1.6	56	69	<5	<5		28		140	0.91	0.79	7.5	0.65		0.004	0.016
PPD	13-Sep-03	8.1	561	320	180	10	0.13	50	61	<5	<5		51		106	1.03	1.02	7.1	0.54		0.005	0.016
PPD	9-Nov-03	7.5	670	421	260	28	1.7	39	47	<5	<5		30		227	0.88	1.45	4.41	0.29		<0.001	0.022
PPD	8-Dec-03	8.6	490	294	153	8	1.7	65	73	<5	<5		47		92.9	1.38	1.43	6.25	0.27		0.013	0.020
PPD	4-Jan-04	8.2	541	318	165	8	<0.1	60	74	<5	<5		62		92.5	0.90	1.82	6.77	0.32		0.017	0.020
PPD	8-Feb-04	7.8	787	487	324	5	1.2	51	62	<5	<5		36		242	1.06	1.46	10	0.18		<0.001	0.016
PPD	29-Feb-04	7.6	910	587	409	6	1.6	50	61	<5	<5		33		315	0.77	1.20	9.07	0.98		<0.001	0.015
PPD	4-Apr-04	7.3	762	475	334	7	1	50	61	<5	<5		33		233	1.11	1.89	9.98	0.13		<0.001	0.039
PPD	5-Jul-04	7.7	862	550	345	7.9	1.82	60	<1	<1	60		31.4	0.068	298	1.07	1.18	4.66	0.81		0.0055	0.015
PPD	6-Aug-04	8.0	1010	651	353	<3	1.92	60.3	<1	<1	60.3		71.6	0.097	288	2.86	2.86	14.9	0.48		0.0014	0.023
PPD	1-Oct-04	8.1	1400	943	576	5.3	3.14	77.1	<1	<1	77.1		54.1	0.11	556	1.62	1.68	8.2	0.60		<0.001	0.011
PPD	5-Nov-04	7.8	761	466	227	<3	0.47	61.8	<1	<1	61.8		62.7	0.076	162	<0.005	0.45	13.1	0.00		0.0213	0.029
PPD	26-Dec-04	7.8	661	398	196	6.7	3.39	59.6	<1	<1	59.6		49.2	0.078	148	1.62	2.08	8.73	0.18		0.0215	0.032
PPD	10-Jan-05	7.3	706	419	195	4	0.5	65.5	<1	<1	65.5		59.9	0.054	112	2.58	4.05	13.1	0.70		<0.001	0.013
PPD	25-Jan-05	7.7	681	405	137	<3	1.27	64.4	<1	<1	64.4		57.3	0.024	114	2.25	3.30	16.2	0.99		<0.001	0.011
PPD	6-Feb-05	7.8	757	440	186	<3	2	70.5	<1	<1	70.5	2.4	59.8	<0.02	124	2.85	2.94	15.5	0.51		0.002	0.019
PPD	25-Feb-05	8.1	757	446	170	3.5	3.93	79.6	<1	<1	79.6	2.37	63.5	0.056	111	3.01	3.06	17	0.52		<0.001	0.022
PPD	25-Mar-05	7.9	778	464	202	3.8	1.03	88.2	<2	<2	88.2	2.21	61.9	0.067	127	2.64	2.84	12.9	1.62		0.0015	0.007
PPD	24-Apr-05	8.3	639	378	88.3	6.7	9.75	72	<2	<2	72	3.05	55.4	0.069	115	1.55	1.92	5.73	0.14		0.0131	0.039
PPD	26-May-05	7.8	1000	603	251	4.1	1.07	52.6	<2	<2	52.6	4.49	89.6	0.046	209	2.73	3.08	16.7	0.57		<0.001	0.004
PPD	23-Jun-05	7.1	932	320	296	12.3	5.1	44.6	<2	<2	44.6	7.22	66.4	<0.1	267	2.84	25.50	12.5	1.12		<0.001	0.013
PPD	24-Jul-05	7.6	1080	701	327	13	6.31	61.3	<1	<2	61.3	7.16	72.1	0.049	334	1.54	2.20	8.74	0.15		<0.001	0.019
PPD	23-Aug-05	7.7	1280	849	369	<3	1.8	60.7	<2	<2	60.7	3.33	102	0.07	376	2.50	2.45	13.6	0.69		0.0058	0.012
PPD	24-Oct-05	7.9	1300	868	436	<3	0.94	71.3	<2	<2	71.3	3.2	97	<0.1	391	3.16	2.95	19.3	0.81		<0.001	<0.002
PPD	23-Dec-05	7.0	1850	1210	127	<3	0.7	53.2	<2	<2	53.2	5	190	<0.2	427	2.25	3.07	19.7	0.38		<0.001	<0.002

Table E.6 - Analytical Results for Fine Processed Kimberlite Process Water

		Total Metals																																
Sample Information		Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti	U	V	Zn
ID	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
PPD	28-Feb-00	1.54		0.023	0.906	<0.001		0.034	0.0006	24.5	0.0245	0.0033	0.004	4.07	0.00250		35.9	0.172		0.19	0.082		18.6		32.9	<0.0004	8.1	0.40				0.0016	0.016	0.0180
PPD	9-Apr-00	<0.02		0.0086	0.151	<0.001		0.024	0.0007	29.6	<0.0008	0.0007	<0.001	0.02	<0.0001		40.8	0.037		0.29	0.048		22.1		4.6	<0.0004	8.9	0.42				0.0003	0.002	<0.004
PPD	9-Apr-00	<0.02		0.0109	0.215	<0.001		0.021	0.0005	35.5	<0.0008	0.0006	<0.001	<0.02	<0.0001		41.7	0.010		0.24	0.031		22.2		4.7	<0.0004	9.2	0.35				0.0003	0.0033	<0.004
PPD	8-May-00	<0.02		0.0119	0.6	<0.001		0.024	0.0005	12.8	<0.0008	0.0005	<0.001	0.04	<0.0001		29.7	0.008		0.28	0.013		27.9		4.4	<0.0004	9.7	0.32				0.0001	0.0023	<0.004
PPD	23-May-00	0.13		0.0115	0.572	<0.001		0.020	0.0004	11.9	0.0029	0.0008	0.002	0.37	0.00020		27.1	0.018		0.18	0.023		20.7		5.2	<0.0004	7.8	0.29				0.0002	0.0032	0.0070
PPD	19-Jun-00	0.14		0.0112	0.559	<0.001		0.032	0.0005	10.9	0.0026	0.0006	0.003	0.35	0.00100		23.4	0.016		0.18	0.014		26.5		5.3	<0.0004	8.4	0.27				0.0001	0.0035	0.0100
PPD	3-Jul-00	<0.02		0.0034	0.302	<0.001		0.026	0.0003	17.8	<0.0008	0.0006	0.002	1.89	0.00030		30.1	0.242		0.17	0.018		25.8		4.6	<0.0004	8.2	0.39				<0.0001	0.0006	0.0060
PPD	1-Aug-00	<0.02		0.0063	0.172	<0.001		0.034	0.0005	36.3	<0.0008	0.0007	<0.001	<0.02	<0.0001		50.6	0.025		0.27	0.04		26.5		7	<0.0004	15.9	0.55				0.0003	0.0018	<0.004
PPD	13-Aug-00	0.03		0.0076	0.304	<0.001		0.025	0.0004	19.2	0.0011	0.001	0.001	0.07	0.00010		42.1	0.011		0.25	0.021		28.3		4.8	<0.0004	9.7	0.44				<0.0001	0.0016	<0.004
PPD	28-Aug-00	<0.02		0.0153	0.356	<0.001		0.041	0.0008	12.0	0.001	0.0006	<0.001	0.08	<0.0001		31.0	0.010		0.47	0.019		38.6		4.8	<0.0004	9.2	0.34				0.0002	0.0039	<0.004
PPD	22-Sep-00	<0.02		0.0097	0.186	<0.001		0.029	0.0006	19.3	<0.0008	0.0006	<0.001	<0.02	<0.0001		36.8	0.012		0.31	0.019		43.9		4.5	<0.0004	11.3	0.41				0.0002	0.003	0.0040
PPD	10-Oct-00	0.16		0.0122	0.26	<0.001		0.045	0.0007	18.7	0.0021	0.0009	<0.001	0.34	0.00020		36.2	0.017		0.37	0.029		48.0		5.3	<0.0004	14.3	0.41				0.0002	0.0044	<0.004
PPD	6-Nov-00	0.03		0.0215	0.202	<0.001		0.034	0.0009	26.8	<0.0008	0.0005	0.003	0.02	<0.0001		45.1	0.015		0.43	0.018		28.9			<0.0004	11.7	0.46				0.0008	0.0032	0.0040
PPD	3-Dec-00	0.07		0.0164	0.629	<0.001		0.042	0.0008	16.4	0.0013	0.0005	0.004	0.13	0.00010		25.0	0.015		0.40	0.021		42.0			<0.0004	12.4	0.37				0.0005	0.0062	0.0040
PPD	7-Jan-01	0.05		0.0131	0.544	<0.001		0.032	0.0005	14.5	0.0013	0.0005	0.002	0.133	<0.0001		30.8	0.008		0.26	0.019		41.4			<0.0004	11	0.36				0.0003	0.004	0.1040
PPD	4-Feb-01	0.06		0.0062	0.295	<0.001		0.034	0.0008	19.5	0.0008	0.0008	0.005	0.177	0.00010		32.7	0.02		0.39	0.034		35.7			<0.0004	12.1	0.37				0.0002	0.0014	<0.004
PPD	5-Mar-01	0.48		0.0098	0.465	<0.001		0.034	0.0006	15.8	0.0037	0.0017	0.002	1.07	0.00050		34.4	0.029		0.31	0.029		30.0			0.0047	12.2	0.35				0.0002	0.0046	0.0380
PPD	2-Apr-01	1.92		0.0138	0.426	<0.001		0.060	0.0007	27.2	0.0332	0.0052	0.004	3.36	0.00110		52.9	0.071		0.36	0.102		39.5			<0.0004	15.7	0.44				0.0006	0.0122	0.0080
PPD	8-Jul-01	0.03		0.0124	0.345	<0.001		0.064	0.0006	12.0	0.0009	0.0005	<0.001	0.077	<0.0001		24.7	<0.001		0.39	0.022		65.2			<0.0004	13.1	0.29				0.0001	0.0041	<0.004
PPD	5-Aug-01	0.04		0.006	0.169	<0.001		0.041	0.0012	20.0	<0.0008	0.0005	<0.001	0.075	<0.0001		41.4	0.011		0.50	0.016		72.5			<0.0004	16	0.60				<0.0001	0.0017	<0.004
PPD	3-Sep-01	0.13		0.0109	0.099	<0.001		0.045	0.0005	21.8	0.0028	0.0011	0.003	0.366	0.00020		58.3	0.025		0.36	0.032		73.8			<0.0004	13.9	0.42				0.0002	0.0029	0.0090
PPD	7-Oct-01	<0.2		0.008	0.122	<0.01		0.060	<0.002	31.4	<0.008	<0.002	<0.01	0.443	<0.001		64.0	0.032	0.0003	0.55	0.063		85.6			<0.004	16.4	0.58				<0.001	0.003	<0.04
PPD	4-Nov-01	0.02		0.0052	0.210	<0.001		0.031	0.0007	16.7	0.0034	0.0005	<0.001	0.083	0.00010		37.4	0.009		0.38	0.016		55.8			<0.0004	14.5	0.31				0.0001	0.0019	0.0050
PPD	10-Dec-01	0.11		0.0115	0.148	<0.001		0.040	0.001	20.0	0.0032	0.0015	0.003	0.542	0.00050		58.2	0.025		0.42	0.041		87.4			<0.0004	17.2	0.56				0.0005	0.0041	0.0040
PPD	9-Jan-02	0.03		0.0083	0.287	<0.001		0.040	0.001	20.2	0.0013	0.0005	0.001	0.051	0.00020		57.1	0.010		0.35	0.03		25.7			<0.0004	12.1	0.37				0.0005	0.0023	0.0040
PPD	3-Feb-02	0.28		0.0089	0.431	<0.001		0.040	0.0007	16.3	0.0034	0.0011	0.001	0.541	0.00020		41.2	0.017		0.49	0.027		77.3			<0.0004	17.5	0.45				0.0002	0.0048	0.0070
PPD	4-Mar-02	0.2		0.0067	0.389	<0.001		0.020	0.001	21.4	0.0079	0.0013	0.005	0.453	0.00030		45.5	0.013		0.45	0.027		68.4			<0.0004	21	0.48				0.0003	0.0045	0.0080
PPD	5-Apr-02	0.32		0.0084	2.26	<0.001		0.050	0.0004	18.0	<0.0008	0.0016	0.005	0.845	0.00030		40.1	0.024		0.16	0.054		87.9			<0.0004	17.1	6.99				0.0044	0.0169	0.0060
PPD	5-May-02	0.11		0.0078	0.282	<0.001		0.040	0.0009	17.5	0.0029	0.0007	<0.001	0.126	0.00010		42.6	0.013		0.58	0.041		87.1			<0.0004	23.2	0.51				0.0002	0.0032	<0.004
PPD	9-Jun-02	0.06		0.006	0.312	<0.001		0.050	0.0008	12.7	<0.0008	0.0004	<0.001	0.059	<0.0001		29.7	0.007		0.40	0.016		49.6			<0.0004	14.7	0.30				0.0001	0.0026	<0.004
PPD	7-Jul-02	0.03		0.0069	0.068	<0.001		0.050	0.0014	42.3	<0.0008	0.0008	0.001	0.058	0.00010		87.7	0.022		0.65	0.051		93.8			<0.0004	21.9	0.84				0.0003	0.0025	0.0090
PPD	1-Sep-02	0.07		0.0058	0.152	<0.001		0.040	0.001	14.4	<0.0008	0.0007	<0.001	0.196	<0.0001		31.5	0.012		0.53	0.023		71.6			<0.0004	15.4	0.38				0.0001	0.0026	0.0060
PPD	7-Oct-02	1.08		0.0089	0.232	<0.001		0.030	0.0007	20.5	0.014	0.004	0.002	2.66	0.00060		44.6	0.047		0.46	0.071		85.6			<0.0004	16.2	0.44				0.0003	0.0066	0.0070
PPD	11-Nov-02	0.02		0.0068	0.247	<0.001		0.040	0.0008	11.8	<0.0008	0.0008	<0.001	0.063	<0.0001		27.2	0.025		0.56	0.03		76.9			<0.0004	13.5	0.36				<0.0001	0.0023	<0.004
PPD	3-Dec-02	0.1		0.0055	0.186	<0.001		0.030	0.0008	18.7	0.0009	0.0011	<0.001	0.174	0.00010		38.5	0.012		0.42	0.028		64.9			<0.0004	18.0	0.46				0.0002	0.0033	<0.004
PPD	5-Jan-03	0.43		0.0061	0.369	<0.001		0.030	0.0005	11.8	0.005	0.0014	0.002	0.829	0.00030		22.2	0.019		0.31	0.025		43.3			<0.0004	17.0	0.22				0.0001	0.0036	0.0090
PPD	9-Feb-03	1.8		0.0087	0.474	<0.001		0.040	0.0005	11.6	0.0283	0.0062	0.005	4.25	0.00100		23.6	0.074		0.34	0.106		67.9			<0.0004	18.0	0.27				0.0005	0.0092	0.0220
PPD	8-Mar-03	0.21		0.0027	0.394	<0.001		<0.02	0.0004	9.9	0.0019	0.0007	<0.001	0.375	<0.0001		21.2	0.006		0.23	0.012		69.7			<0.0004	18.0	0.16				<0.0001	0.0013	<0.004
PPD	5-Apr-03	0.67		0.0054	0.568	<0.001		<0.02	0.0006	9.7	0.0112	0.003	0.003	1.56	0.00040		21.0	0.028		0.40	0.086		79.9			<0.0004	21.0	0.27				0.0005	0.0038	0.0130
PPD	5-May-03	0.67		0.0044	0.381	<0.001		0.040	0.0007	15.2	0.0113	0.0026	0.003	1.31	0.00030		31.7	0.025		0.47	0.048		72.1			<0.0004	22.0	0.43				0.0002	0.0037	0.0040
PPD	8-Jun-03	0.04		0.0016	0.201	<0.001		<0.02	0.0003	18.1	0.0016	0.0005	<0.001	0.064	<0.0001		30.8	0.004		0.14	0.009		17.7			<0.0004	18.0	0.44				<0.0001	0.0008	0.0190
PPD	6-Aug-03	0.15		0.0017	0.122	<0.001		0.030	0.0008	21.9	0.0023	0.0012	0.004	0.306	0.00060		36.5	0.014		0.13	0.024		19.7			<0.0004	30.0	0.55				0.0006	0.0015	0.0060
PPD	13-Sep-03	0.05		0.0018	0.226	<0.001		0.030	<0.0002	23.2	0.0029	0.0006	<0.001	0.122	<0.0001		29.7	0.009		0.15	0.014		18.3			<0.0004	28.0	0.58				<0.0001	0.0011	0.0150
PPD	9-Nov-03	0.64		0.0015	0.161	<0.001		0.020	0.0003	28.7	0.0102	0.0024	0.004	1.19	0.00030		45.7	0.026		0.17	0.051		17.3			<0.0004	28.0	0.75				<0.0001	0.0024	0.0230
PPD	8-Dec-03	0.34		0.0015	0.309	<0.001		0.020	0.0002	16.9	0.010	0.0017	0.004	1.12	0.00020		26.9	0.020		0.12	0.033		19.2			<0.0004	23.0	0.46				0.0001	0.0023	0.0090
PPD	4-Jan-04	0.25		0.0027	0.236	<0.001		0.030	0.0004	16.6	0.005	0.0013	0.002	0.495	0.00020		30.0	0.013		0.19	0.025		22.3			<0.0004	27.0	0.53				0.0002	0.0032	<0.004
PPD	8-Feb-04	0.51		0.0016	0.189	<0.001		<0.02	0.0002	36.6	0.0108	0.0023	0.010	1.17	0.00030		56.4	0.025		0.13	0.044		13.9			<0.0004	26.0	0.93				0.0001	0.0016	0.0100
PPD	29-Feb-04	0.07		0.0016	0.075	<0.001		<0.02	0.0004	61.2	0.0011	0.0009	<0.001	0.131	<0.0001		62.1	0.023		0.18	0.022		11.6			<0.0004	30.0	0.90				0.0002	0.0008	0.0250
PPD	4-Apr-04	1.12		0.0026	0.204	<0.001		<0.02	0.0004	39.2	0.0157	0.0054	0.002	2.53	0.00040		57.3	0.056		0.23	0.1		13.7			<0.0004	24.0	0.95				0.0003	0.0039	0.0130
PPD	5-Jul-04	0.06	0.0090	0.0048	0.105	<0.0005	<0.0005	0.055	0.0001	32.3	0.0012	0.0008	0.001	0.136	0.00011	<0.005	61.8	0.016		0.28	0.037	<0.3	30.4	0.002	3.82	<0.00001	27.9	0.82	<0.0001	<0.0001	<0.01	0.0003	0.0028	0.0051
PPD	6-Aug-04																																	
PPD	1-Oct-04	1.2	0.0051	0.0043	0.153	<0.01	<0.01	<0.2	<0.001	41.2	0.02	0.0057	0.0025	2.22	<0.001	<0.1	126	0.076		0.45	0.15	<0.3	62.3	<0.02	4.93	<0.0002	28.6	1.40	<0.002	<0.002	0.034	0.0007	<0.02	<0.02
PPD	5-Nov-04	0.06	0.0168	0.0077	0.190	<0.0005	<0.0005	0.124	0.00011	23.4	0.0012	0.0008	0.0007	0.116	0.00007	<0.005	41.9	0.020		0.37	0.049	<0.3	48.2	<0.003	3.1	<0.00001	35.5	0.76	<0.0001	<0.0001	<0.01	0.00079	0.0080	0.0031
PPD	26-Dec-04	0.07	0.0087	0.0049	0.321	<0.0005	<0.0005	0.053	0.00006	18.0	0.0015	0.0006	0.0008	0.147	0.00010	<0.005	37.2	0.010		0.21	0.022	<0.3	40.0	<0.003	3.79	<0.00001	28.6	0.63	<0.0001	<0.0001	<0.01	0.00029	0.0053	0.0038
PPD	10-Jan-05	0.05	0.0105	0.0038	0.366	<0.0005	<0.0005	0.074	<0.00005	20.6	<0.0008	0.0007	0.0012	0.103	<0.00005	<0.005	35.9	0.009		0.25	0.017	<0.3	51.2	<0.001	3.24	<0.00001	39.7	0.55	<0.0001	<0.0001	<0.01	0.00017	0.0028	<0.001
PPD	25-Jan-05	0.02	0.0148	0.0057	0.382	<0.0005	<0.0005	0.09	0.00007	13.8	<0.0005	0.0007	0.0004	0.031	<0.00005	<0.005	25.1	0.006		0.38	0.019	<0.3	45.9	<0.001	2.29	0.00002	31.7	0.55	<0.0001	<0.0001	<0.01	0.00020	0.0047	0.0021
PPD	6-Feb-05	0.06	0.0119	0.0057	0.315	<0.0005	<0.0005	0.058	0.00010	18.5	0.0012	0.0008	0.0005	0.122	<0.00005	<0.005	34.6	0.009		0.24	0.020	<0.3	50.8	<0.001	3.41	<0.00001	33.9	0.59	<0.0001	<0.0001	<0.01	0.00021	0.0039	0.0012
PPD	25-Feb-05	0.10	0.0131	0.0064	0.358	<0.0005	<0.0005	0.08	<0.0006	18.3	0.0015	0.0009	<0.0004	0.223	<0.00005	<0.005	31.9	0.012		0.26	0.031	<0.3	53.2	<0.001	3.49	<0.00001	40.2	0.53	<0.0001	<0.0001	<0.01	0.00024	0.0066	0.0012
PPD	25-Mar-05	0.05	0.0095	0.0034	0.179	<0.0005	<0.0005	0.074	<0.0001	20.9	0.0009	0.0003	0.0004	0.116	<0.00005	<0.005	36.7	0.021		0.32	0.016	<0.3	53.2	<0.001	2.68	0.00004	41.7	0.56	<0.0001	<0.0001	<0.01	0.00026	0.0018	0.0019
PPD	24-Apr-05	0.28	0.0112	0.0097	0.324	<0.001	<0.001	0.081	0.00023	12.5	0.0031	0.0015	0.002	0.497	0.00020	<0.01	15.1	0.014		0.21	0.025	<0.3	52.2	<0.002	4.88	<0.00002	56.3	0.32	<0.0002	<0.0002	0.015	0.00028	0.0323	<0.005
PPD	26-May-05	0.04	0.0106	0.0049	0.240	<0.001	<0.001	0.033	<0.0001	33.5	0.0035	0.0009	0.0006	0.080	<0.0001	<0.01	44.3	0.006		0.30	0.012	<0.3	72.2	<0.002	3.9	<0.00002	49.4	0.68	<0.0002	<0.0002	<0.01	0.00019	0.0055	<0.002
PPD	23-Jun-05	0.27	0.0062	0.0031	0.101	<0.0005	<0.0005	0.021	0.00014	39.6	0.0064	0.0023	<0.002	0.665	0.00020	<0.005	49.7	0.018		0.23	0.032	<0.3	53.1	0.002	5.03	0.00001	41.1	0.81	<0.0001	<0.0001	<0.01	0.00012	0.0030	0.0019
PPD	24-Jul-05	0.22	0.005	0.0023	0.102	<0.001	<0.001	0.032	<0.0002	50.9	0.0040	0.0017	0.001	0.581	0.00019	<0.01	59.2	0.023		0.24	0.034	<0.3	60.1	0.002	6.25	<0.00002	52.3	1.04	<0.0002	<0.0002	<0.01	0.00011	<0.002	0.0069
PPD	23-Aug-05	0.03	0.0088	0.0035	0.068	<0.001	<0.001	0.037	<0.0001	47.4	<0.001	0.0007	<0.0002	0.068	<0.0001	<0.01	63.9	0.010		0.41	0.023	<0.3	108	0.002	3.18	<0.00002	56.1	1.09	<0.0002	<0.0002	<0.01	0.00007	<0.002	0.0022
PPD	24-Oct-05	0.02	0.0066	0.0046	0.075	<0.0005	<0.0005	0.077	0.00013	43.2	0.0007	0.0013	<0.002	0.057	<0.00005	<0.005	82.0	0.019		0.37	0.037	<0.3	68.1	<0.007	5.08	0.00013	55.6	1.19	<0.0001	<0.0001	<0.01	0.00033	0.0039	0.0013
PPD	23-Dec-05	0.01	0.0092	0.0068	0.069	<0.0025	<0.0025	<0.05	<0.00025	20.3	<0.0025	0.001	<0.0005	<0.03	<0.00025	<0.025	18.5	0.004		0.47	0.014	<0.3	110	<0.005	2.95	<0.00005	315	0.43	<0.0005	<0.0005	<0.01	0.00018	<0.005	<0.005

Table E.6 - Analytical Results for Fine Processed Kimberlite Process Water

		Dissolved Metals																																
Sample Information		Al	Sb	As	Ba	Be	Bi	B	Cd	Ca	Cr	Co	Cu	Fe	Pb	Li	Mg	Mn	Hg	Mo	Ni	P	K	Se	Si	Ag	Na	Sr	Tl	Sn	Ti	U	V	Zn
ID	Sample Date	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
PPD	28-Feb-00									18.8							24.5						17.6		25.5		9.5							
PPD	9-Apr-00																								4.5									
PPD	9-Apr-00																								4.7									
PPD	8-May-00																								4.3									
PPD	23-May-00																								6									
PPD	19-Jun-00																								6.6									
PPD	3-Jul-00																								4.9									
PPD	1-Aug-00																								7									
PPD	13-Aug-00	0.030	0.024	0.0072	0.30	<0.0005	<0.00005	0.025	0.0004	19.2	0.0005	0.0005	0.0007	<0.01	0.0001		42.1	0.009		0.25	0.019	0.01	28.3	0.0014	5	<0.0002	9.7	0.43	<0.00005	<0.0002	0.0006	<0.0001	0.0014	0.005
PPD	28-Aug-00																								4.9									
PPD	22-Sep-00	<0.01	0.020	0.0097	0.18	<0.0005	<0.00005	0.029	0.0006	19.3	<0.0004	0.0005	<0.0006	<0.01	0.0002		36.8	0.011		0.31	0.018	<0.01	43.9	0.0012	4.4	<0.0002	11.3	0.41	<0.00005	<0.0002	0.0007	0.0002	0.0029	0.006
PPD	10-Oct-00	<0.01	0.031	0.0137	0.19	<0.0005	<0.00005	0.053	0.0007	18.7	<0.0004	0.0005	<0.0006	<0.01	<0.0001		36.2	0.010		0.38	0.021	0.01	48	0.0021	4.5	<0.0002	14.3	0.38	<0.00005	<0.0002	0.0007	0.0001	0.0038	0.012
PPD	6-Nov-00	<0.01	0.033	0.0214	0.20	<0.0005	0.00009	0.033	0.0008	26.8	<0.0004	0.0005	0.0034	<0.01	<0.0001		45.1	0.012		0.43	0.016	0.01	28.9	0.0023		<0.0002	11.7	0.45	<0.00005	<0.0002	0.0006	0.0008	0.0031	0.006
PPD	3-Dec-00	<0.01	0.029	0.0164	0.63	<0.0005	<0.00005	0.042	0.0008	16.4	<0.0004	0.0003	0.0035	<0.01	<0.0001		25.0	0.010		0.41	0.018	0.03	42	0.0011		<0.0002	12.4	0.37	<0.00005	<0.0002	0.0009	0.0005	0.0059	0.002
PPD	7-Jan-01	<0.01	0.026	0.0138	0.44	<0.0005	<0.00005	0.028	0.0005		0.0005	0.0003	0.0011	<0.005	<0.0001			0.006		0.27	0.016	0.02		0.0012		<0.0002		0.34	<0.00005	<0.0002	0.0008	0.0003	0.0038	<0.002
PPD	4-Feb-01	<0.01	0.053	0.0062	0.29	<0.0005	<0.00005	0.036	0.0015	20.1	<0.0004	0.0005	0.0024	<0.005	<0.0001		32.1	0.015		0.81	0.030	<0.01	36.6	0.0009		<0.0002	12.9	0.36	<0.00005	<0.0002	0.0008	0.0002	0.0011	<0.002
PPD	5-Mar-01	0.040	0.024	0.0108	0.31	<0.0005	0.00113	0.020	0.0008		0.0008	0.0004	<0.0006	0.035	0.0001			0.008		0.30	0.014	0.02		0.0014		<0.0002		0.21	<0.00005	<0.0002	0.001	0.0002	0.0026	<0.002
PPD	2-Apr-01	<0.01	0.011	0.0025	0.04	<0.0005	<0.00005	0.049	0.0012	29.0	<0.0004	0.0004	<0.0006	<0.005	<0.0001		43.9	0.025		0.62	0.028	<0.01	39.5	0.0006		<0.0002	14.2	0.58	<0.00005	<0.0002	0.0007	0.0004	0.0008	0.004
PPD	8-Jul-01	<0.01	0.035	0.0128	0.17	<0.0005	<0.00005	0.064	0.0006	12.2	<0.0004	0.0005	<0.0006	0.016	<0.0001		22.3	0.007		0.39	0.021	<0.01	65.3	0.0012		<0.0002	12.4	0.30	<0.00005	<0.0002	<0.0003	0.0001	0.004	0.007
PPD	5-Aug-01	<0.01	0.023	0.0058	0.17	<0.0005	<0.00005	0.040	0.0012	21.5	<0.0004	0.0004	<0.0006	0.005	<0.0001		43.0	0.01		0.49	0.015	0.01	67	0.0017		<0.0002	17.0	0.60	<0.00005	<0.0002	0.0007	<0.0001	0.0016	0.006
PPD	3-Sep-01	<0.01	0.024	0.0104	0.10	<0.0005	<0.00005	0.044	0.0006	21.0	<0.0004	0.0005	0.0008	0.357	<0.0001		53.0	0.025		0.36	0.020	0.02	86.4	0.0023		<0.0002	15.3	0.41	0.0002	<0.0002	0.0014	0.0002	0.0025	0.004
PPD	7-Oct-01	<0.1	0.040	0.008	0.10	<0.005	<0.0005	0.050	<0.001	30.1	<0.004	<0.001	<0.006	0.017	<0.001		61.4	0.028		0.48	0.055		89.9	<0.004		<0.002	16.3	0.53	<0.0005	<0.002	<0.003	<0.001	0.003	<0.02
PPD	4-Nov-01	<0.01	0.018	0.0049	0.21	<0.0005	<0.00005	0.028	0.0006	20.7	0.0015	0.0005	0.0007	0.017	0.0001		43.3	0.009		0.38	0.015		55.8	0.0005		<0.0002	17.1	0.31	0.00045	<0.0002	0.0011	0.0001	0.0016	0.006
PPD	10-Dec-01	<0.01	0.024	0.011	0.14	<0.0005	<0.00005	0.035	0.0009	22.0	<0.0004	0.001	0.0020	0.005	0.0002		52.7	0.021		0.42	0.035			0.0041		<0.0002	16.2	0.54	<0.00005	<0.0002	0.0013	0.0002	0.003	0.002
PPD	9-Jan-02	<0.01	0.025	0.0083	0.30	<0.0005	<0.00005	0.035	0.0013	23.3	0.001	0.0005	0.0014	<0.005	<0.0001		61.0	0.01		0.42	0.029		22.9	0.0059		<0.0002	11.5	0.33	<0.00005	0.0003	0.002	0.0004	0.0022	0.008
PPD	3-Feb-02	<0.01	0.033	0.011	0.38	<0.0005	<0.00005	0.037	0.0008	15.9	<0.0004	0.0005	0.0025	<0.005	<0.0001		37.6	0.009		0.50	0.016		6.7	0.0014		<0.0002	16.5	0.45	<0.00005	<0.0002	0.001	0.0002	0.0038	0.004
PPD	4-Mar-02	<0.01	0.025	0.0064	0.36	<0.0005	<0.00005	0.024	0.0009	19.8	0.0024	0.0006	0.0025	<0.005	0.0001		44.9	0.007		0.45	0.016		63.7	0.0016		<0.0002	19.9	0.49	<0.00005	<0.0002	<0.0003	0.0002	0.0031	0.006
PPD	5-Apr-02	<0.01	0.043	0.0169	0.43	<0.0005	<0.00005	0.034	0.0013	18.3	<0.0004	0.0006	0.0017	<0.005	<0.0001		41.2	0.011		0.85	0.022		86.6			<0.0002	17.0	0.61	<0.00005	<0.0002	0.0007	0.0006	<0.001	0.003
PPD	5-May-02	0.010	0.033	0.0074	0.25	<0.0005	<0.00005	0.042	0.0013	17.7	0.0019	0.0008	0.0007	<0.005	0.0001		36.6	0.012		0.53	0.033		79.9	0.0015		<0.0002	20.0	0.45	0.00005	<0.0002	0.0006	0.0002	0.003	0.005
PPD	9-Jun-02	<0.01	0.021	0.0061	0.34	<0.0005	<0.00005	0.057	0.0006	13.3	<0.0004	0.0003	<0.0006	<0.005	<0.0001		29.3	0.008		0.39	0.014		57.6	0.0006		<0.0002	14.2	0.28	<0.00005	0.0002	0.0008	<0.0001	0.0024	0.003
PPD	7-Jul-02	<0.01	0.018	0.0068	0.06	<0.0005	<0.00005	0.047	0.0012	45.3	<0.0004	0.0007	0.0006	<0.005	0.0003		104	0.022		0.68	0.049		99.6	0.0031		<0.0002	26.6	0.87	0.00006	<0.0002	0.001	0.0003	0.0019	0.003
PPD	1-Sep-02	<0.01	0.025	0.0056	0.15	<0.0005	<0.00005	0.039	0.0008	14.0	<0.0004	0.0004	<0.0006	<0.005	<0.0001		30.7	0.008		0.56	0.019		72.5	0.0016		<0.0002	14.5	0.39	<0.00005	<0.0002	<0.0003	<0.0001	0.002	0.002
PPD	7-Oct-02	0.020	0.023	0.0087	0.18	<0.0005	0.00043	0.031	0.0007	17.6	<0.0004	0.0011	0.0008	0.297	<0.0001		40.1	0.011		0.49	0.022		81.2	0.0022		<0.0002	15.0	0.43	<0.00005	<0.0002	0.0017	0.0001	0.0028	0.002
PPD	11-Nov-02	<0.01	0.024	0.0052	0.21	<0.0005	<0.00005	0.041	0.0011	12.2	<0.0004	0.0005	<0.0006	<0.005	<0.0001		26.7	0.015		0.51	0.021		76.4	0.0009		<0.0002	13.0	0.35	<0.00005	<0.0002	<0.0003	<0.0001	0.0007	0.003
PPD	3-Dec-02	0.040	0.020	0.0054	0.18	<0.0005	<0.00005	0.036	0.0008	18.7	0.001	0.0011	0.0066	0.098	0.0004		36.4	0.011		0.43	0.024		74.3	0.0013		<0.0002	16.7	0.45	<0.00005	<0.0002	0.002	0.0001	0.0029	0.024
PPD	5-Jan-03	<0.01	0.022	0.0072	0.39	<0.0005	<0.00005	0.034	0.0005	12.4	<0.0004	0.0004	0.0008	<0.005	<0.0001		22.4	0.005		0.28	0.009		42.5	0.0006		<0.0002	16.6	0.19	<0.00005	<0.0002	0.0007	0.0001	<0.001	0.005
PPD	9-Feb-03	0.060	0.027	0.0087	0.40	<0.0005	0.00006	0.028	0.0006	9.5	<0.0004	0.0006	0.0009	<0.005	<0.0001		18.6	0.003		0.35	0.010		57.2	0.001		<0.0002	14.8	0.28	0.00009	<0.0002	0.001	0.0002	0.0032	<0.002
PPD	8-Mar-03	<0.01	0.015	0.0031	0.27	<0.0005	<0.00005	0.021	0.0005	5.6	0.003	0.0002	0.0008	<0.005	<0.0001		11.2	0.001		0.22	0.004		35.8	0.0025		<0.0002	9.5	0.16	<0.00005	<0.0002	<0.0003	0.0003	0.0023	0.003
PPD	5-Apr-03	<0.01	0.025	0.0057	0.46	<0.0005	0.0001	0.026	0.0007	22.8	<0.0004	0.0004	0.0010	0.027	<0.0001		32.4	0.371		0.39	0.008		21.4	0.0007		<0.0002	42.9	0.26	<0.00005	<0.0002	0.0012	<0.0001	0.002	0.005
PPD	5-May-03	0.050	0.022	0.0052	0.34	0.0007	0.00057	0.041	0.0013	14.2	<0.0004	0.001	0.0015	0.012	0.0006		27.7	0.003		0.43	0.011		69.6	0.0011		0.0003	20.2	0.39	0.00075	0.001	0.0012	0.0007	0.0022	0.007
PPD	8-Jun-03	<0.01	0.008	0.0018	0.22	<0.0005	0.00008	0.024	0.0002	14.4	0.0007	0.0004	0.0006	<0.005	<0.0001		23.3	0.002		0.15	0.008		15.1	0.001		<0.0002	14.8	0.43	0.00006	<0.0002	0.0005	<0.0001	0.0013	<0.002
PPD	6-Aug-03	<0.01	0.006	0.0015	0.12	<0.0005	<0.00005	0.026	0.0009	20.9	<0.0004	0.0003	0.0009	<0.005	<0.0001		33.3	0.008		0.14	0.016		19.4	0.0006		<0.0002	29.3	0.53	0.00009	<0.0002	0.0005	<0.0001	0.0007	0.003
PPD	13-Sep-03	<0.01	0.008	0.0023	0.22	<0.0005	<0.00005	0.031	0.0003	24.2	0.0009	0.0004	0.0007	0.02	<0.0001		29.2	0.007		0.14	0.010		17.4	0.0007		<0.0002	27.1	0.53	<0.00005	<0.0002	0.0004	<0.0001	0.0023	0.009
PPD	9-Nov-03	<0.01	0.005	0.0017	0.11	<0.0005	<0.00005	0.019	0.0003	44.5	0.0006	0.0004	<0.0006	<0.005	<0.0001		44.9	0.007		0.14	0.013		17.4	0.0015		<0.0002	35.6	0.95	0.00005	<0.0002	<0.0003	0.0001	0.0011	0.157
PPD	8-Dec-03	<0.01	0.007	0.0016	0.25	<0.0005	<0.00005	0.020	0.0003	16.7	0.0008	0.0003	0.0010	<0.005	<0.0001		25.2	0.003		0.12	0.007		17.1	<0.0004		<0.0002	22.2	0.47	<0.00005	<0.0002	<0.0003	<0.0001	0.0011	0.006
PPD	4-Jan-04	<0.01	0.007	0.0025	0.20	<0.0005	0.00012	0.028	0.0004	18.0	<0.0004	0.0004	0.0012	0.012	<0.0001		31.6	0.005		0.17	0.009		20.0	<0.0004		<0.0002	25.7	0.45	0.00011	<0.0002	0.0007	0.0002	0.0021	0.002
PPD	8-Feb-04	<0.01	0.005	0.001	0.16	<0.0005	<0.00005	0.016	0.0003	32.6	0.0015	0.0005	0.0009	0.013	<0.0001		46.7	0.006		0.12	0.011		13.5	0.0009		<0.0002	22.5	0.86	0.00008	0.0011	0.0004	<0.0001	0.0005	0.003
PPD	29-Feb-04	<0.01	0.004	0.0014	0.07	<0.0005	<0.00005	0.015	0.0003	53.5	<0.0004	0.0007	0.0009	<0.005	<0.0001		52.6	0.021		0.18	0.016		10.6	<0.0004		<0.0002	26.3	0.83	0.00006	<0.0002	0.0018	0.0002	0.0006	0.003
PPD	4-Apr-04	<0.01	0.006	0.0025	0.11	<0.0005	0.00006	0.020	0.0004	39.2	<0.0004	0.001	0.0006	0.011	<0.0001		53.8	0.012		0.22	0.019		14.2	0.0014		<0.0002	25.4	0.78	0.00006	<0.0002	0.001	0.0002	0.0013	0.006
PPD	5-Jul-04	0.002	0.010	0.0056	0.10	<0.0005	<0.0005	0.057	0.00011	32.9	<0.0005	0.0006	0.0006	<0.03	0.0001	<0.005	63.9	0.014		0.30	0.033	<0.3	33.4	0.0024	3.53	<0.00001	29.0	0.85	<0.0001	<0.0001	<0.01	0.00020	0.0026	0.0023
PPD	6-Aug-04	<0.002	0.014	0.0073	0.16	<0.001	<0.001	0.091	0.00011	35.8	<0.001	0.001	<0.0002	<0.03	<0.0001	<0.01	64.1	0.021		0.46	0.054	<0.3	46.1	<0.002	3.36	<0.00002	36.9	0.97	<0.0002	<0.0002	<0.01	0.00060	0.0051	0.0023
PPD	1-Oct-04	<0.02	0.009	0.0035	0.06	<0.01	<0.01	<0.2	<0.001	39.0	<0.01	<0.002	<0.002	<0.03	<0.001	<0.1	116	0.021		0.46	0.066	<0.3	62.3	<0.02	2.68	<0.0002	28.3	1.37	<0.002	<0.002	<0.01	0.00041	<0.02	<0.02
PPD	5-Nov-04	0.002	0.018	0.0077	0.20	<0.0005	<0.0005	0.123	0.00006	23.1	<0.0005	0.0005	0.0004	<0.03	<0.00005	<0.005	41.1	0.016		0.39	0.045	<0.3	47.4	<0.003	2.8	<0.00001	35.0	0.77	<0.0001	<0.0001	<0.01	0.00083	0.0079	0.0014
PPD	26-Dec-04	0.002	0.010	0.0048	0.31	<0.0005	<0.0005	0.055	<0.00005	18.0	<0.0005	0.0004	0.0006	<0.03	0.00005	<0.005	36.8	0.007		0.21	0.017	<0.3	39.8	<0.003	3.52	<0.00001	28.5	0.63	<0.0001	<0.0001	<0.01	0.00029	0.0053	0.0018
PPD	10-Jan-05	<0.004	0.011	0.0037	0.28	<0.0005	<0.0005	0.075	0.00008	20.2	<0.0005	0.0006	0.0008	<0.03	0.00009	<0.005	35.1	0.008		0.25	0.014	<0.3	49.7	<0.001	2.98	<0.00001	38.8	0.55	<0.0001	<0.0001	<0.01	0.00017	0.0028	0.0012
PPD	25-Jan-05	<0.002	0.015	0.0056	0.34	<0.0005	<0.0005	0.090	<0.00005	13.8	<0.0005	0.0006	0.0003	<0.03	<0.00005	<0.005	24.9	0.006		0.38	0.018	<0.3	45.8	<0.001	2.13	0.00001	31.6	0.55	<0.0001	<0.0001	<0.01	0.00017	0.0044	<0.001
PPD	6-Feb-05	0.002	0.013	0.0056	0.26	<0.0005	<0.0005	0.056	<0.00005	18.2	<0.0005	0.0007	0.0004	<0.03	<0.00005	<0.005	34.1	0.007		0.24	0.016	<0.3	50.2	<0.001	3.04	<0.00001	33.8	0.59	<0.0001	<0.0001	<0.01	0.00019	0.0039	0.001
PPD	25-Feb-05	<0.001	0.015	0.0064	0.30	<0.0005	<0.0005	0.082	<0.0006	17.9	<0.0005	0.0007	<0.00025	<0.03	<0.00005	<0.005	30.5	0.010		0.26	0.027	<0.3	52.1	<0.001	2.95	<0.00001	39.5	0.54	<0.0001	0.0002	<0.01	0.00022	0.0064	<0.001
PPD	25-Mar-05	0.001	0.011	0.0035	0.18	<0.0005	<0.0005	0.079	<0.0001	20.9	<0.0005	0.0003	0.0002	<0.03	<0.00005	<0.005	36.3	0.021		0.33	0.015	<0.3	53.3	<0.001	2.45	0.00005	41.4	0.58	<0.0001	<0.0001	<0.01	0.00026	0.0018	<0.001
PPD	24-Apr-05	0.010	0.012	0.0097	0.30	<0.001	<0.001	0.078	0.00015	12.5	<0.001	0.0006	0.0007	<0.03	<0.0001	<0.01	13.9	0.006		0.20	0.016	<0.3	53.2	<0.002	2.85	<0.00002	57.4	0.31	<0.0002	<0.0002	<0.01	0.00025	0.030	<0.002
PPD	26-May-05	<0.002	0.012	0.0051	0.24	<0.001	<0.001	0.034	<0.0001	30.8	0.003	0.0008	<0.0004	<0.03	<0.0001	<0.01	42.2	0.006		0.30	0.011	<0.3	71.5	<0.002	3.57	<0.00002	48.9	0.69	<0.0002	<0.0002	<0.01	0.00014	0.0056	<0.002
PPD	23-Jun-05	<0.001	0.007	0.0031	0.08	<0.0005	<0.0005	0.021	0.00012	39.7	0.0006	0.0012	<0.0009	<0.03	<0.00005	<0.005	47.9	0.008		0.23	0.012	<0.3	54.1	0.0019	3.64	<0.00001	42.0	0.79	<0.0001	<0.0001	<0.01	0.00004	0.0022	<0.001
PPD	24-Jul-05	<0.002	0.005	0.0023	0.09	<0.001	<0.001	0.030	<0.0002	45.2	<0.001	0.0005	<0.0002	<0.03	<0.0001	<0.01	52.1	0.014		0.24	0.020	<0.3	60.3	0.0021	4.01	<0.00002	52.1	1.03	<0.0002	<0.0002	<0.01	0.00006	<0.002	0.0025
PPD	23-Aug-05	0.003	0.010	0.0038	0.07	<0.001	<0.001	0.041	<0.0001	46.1	<0.001	0.0006	<0.0002	<0.03	<0.0001	<0.01	61.5	0.009		0.45	0.023	<0.3	104	0.0028	2.96	<0.00002	54.1	1.22	<0.0002	<0.0002	<0.01	0.00008	<0.002	<0.002
PPD	24-Oct-05	<0.001	0.007	0.0046	0.08	<0.0005	<0.0005	0.082	0.00016	42.6	<0.0005	0.0012	<0.0009	<0.03	<0.00005	<0.005	80.0	0.019		0.38	0.035	<0.3	66.9	<0.007	4.83	<0.00001	54.7	1.24	<0.0001	<0.0001	<0.01	0.00032	0.004	<0.001
PPD	23-Dec-05	<0.005	0.010	0.0072	0.07	<0.0025	<0.0025	<0.05	0.00028	20.4	0.0078	0.001	<0.0005	<0.03	<0.00025	<0.025	18.5	0.004		0.49	0.015	<0.3	112	<0.005	2.94	<0.00005	317	0.45	<0.0005	<0.0005	<0.01	0.00019	<0.005	<0.005

DOMINION
DIAMOND

Appendix F

Ekati Diamond Mine Water Quality Modeling of the Koala Watershed, ERM-Rescan