EKATI DIAMOND MINE WASTEWATER AND PROCESSED KIMBERLITE MANAGEMENT PLAN

CONCEPTUAL JAY PROJECT AMENDMENT

DRAFT

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PREAMBLE TO THE CONCEPTUAL AMENDMENT

This Conceptual Amendment to the Ekati Mine Wastewater and Processed Kimberlite Management Plan (WPKMP) describes the additions and changes to the WPKMP that are likely to be required to incorporate the Jay Project. The current WPKMP for the Ekati Mine is Version 4.1, May 2014 (Dominion Diamond 2014a).

This Conceptual Amendment has been developed solely as information for the Environmental Assessment review of the Jay Project, and as such, reflects conceptual Project design information. Following completion of the Environmental Assessment, the final amendment to the WPKMP would be developed to meet the requirements of the Ekati Mine Water Licence, which requires approval by the Wek'èezhìı Land and Water Board.

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Abbreviations

Abbreviation	Definition
AANDC	Aboriginal Affairs and Northern Development Canada
AN	ammonium nitrate (AN prill)
EFPK	Extra Fine Processed Kimberlite
FPK	Fine Processed Kimberlite
GNWT	Government of the Northwest Territories
ICRP	Interim Closure and Reclamation Plan
IEMA	Independent Environmental Monitoring Agency
LLCF	Long Lake Containment Facility
MWMP	Mine Water Management Plan
TDS	total dissolved solids
TSS	total suspended solids
WLWB	Wek'èezhìi Land and Water Board
WPKMP	Wastewater and Processed Kimberlite Management Plan
WRSA	waste rock storage area

Units of Measure

Unit	Definition
%	percent
km	kilometre
m	metre
m^3	cubic metres
masl	metres above sea level

1 INTRODUCTION

Section 1 will be updated to document inclusion of the Jay Project. Of particular note:

- *A new figure will be added that is an update of existing Figure 11 and that illustrates fine processed kimberlite (FPK) deposition to the Panda/Koala pits; and,*
- *A new figure will be added that is an update of existing Figure 14 and that illustrates the Jay Project mine water management plan at the Jay/Misery site.*

2 MANAGEMENT OF MINEWATER

Section 2 will be updated to describe the most current status of the existing Ekati Mine minewater management areas. Specific changes of import to the Jay Project will be made as follows:

- *Current sub-Section 2.1.4, Surface Minewater at Misery Site, will be re-written to describe the use of the mined-out Misery Pit as the primary surface minewater management facility, with King Pond as a contingency minewater management facility.*

Section 2.1.4 Management of Surface Minewater - Misery Site

The Misery Site (Figure 6 of the WPKMP) is located approximately 27 kilometres (km) by road southeast of the Ekati Mine main camp. Site drainage is collected by a series of containment sumps and drainage into the Misery Pit. After a suspension of Misery Pit mining activities in 2005, activities resumed in 2011 as part of the Misery Pushback and are scheduled for completion by 2018. The Misery Pit Pushback will allow mining activities to extend to a depth of approximately 300 metres (m) below the surface, all within permafrost.

The waste rock storage area (WRSA) for the Misery operation is situated within four managed drainage catchments that are captured by Waste Rock Dam, Desperation Pond, the Misery Pit, and King Pond, respectively, as shown in Figure 3 of the WPKMP. A small area of the site facilities pad drains northeast to Cujo Lake.

Runoff from the WRSA is monitored, assessed and reported to the Wek'èezhìı Land and Water Board (WLWB) under the Water Licence Annual Report and the 3 year WRSA Seepage Monitoring Report, which are requirements of the Water Licence. Runoff and discharge from the Waste Rock Dam and Desperation Pond catchments may contain elevated total suspended solids (TSS), total metals, and/or ammonia concentrations. Water that does not meet Water Licence discharge criteria is pumped to King Pond for release in a controlled manner to the downstream receiving environment (Cujo Lake) once Water Licence discharge criteria have been met. Water that meets Licence discharge criteria may be discharged directly to the receiving environment.

Runoff from the Misery camp pad flows to King Pond, where it is incorporated into the minewater management system.

Use of the existing water management facilities (King Pond, Desperation Pond, and Waste Rock Dam) for the duration of the Misery Pit Pushback activities will continue as per established practice. A water balance schematic is included as Figure 14 of the WPKMP. Following completion of the Misery Pit Pushback activities, surface minewater will be managed according to the Jay Project Mine Water Management Plan (Jay MWMP) as described below.

As described in the Jay MWMP (Golder 2014; Appendix 3A of the Jay Project Developer's Assessment Report [DAR], Dominion Diamond 2014a), the mined-out Misery Pit will be used as a settling facility for lake water containing elevated TSS during the final dewatering of the diked area of Lac du Sauvage (in conjunction with the Lynx Pit). The Misery Pit has an estimated ultimate storage capacity of approximately 40 million cubic metres (m^3). Approximately 7.9 million m^3 of lake water will be pumped to the Misery Pit during the dewatering phase of the Project.

During the Jay Pit operations phase, the Misery Pit will be used to manage minewater from the Jay Pit and diked area. Open pit minewater (anticipated to contain naturally elevated total dissolved solids [TDS]) will be pumped to near the base of the Misery Pit; surface minewater will be pumped to the top of the Misery Pit. This will create a TDS profile in the Misery Pit, resulting in lower TDS concentrations in the upper part of the Misery Pit that are compliant with the Water Licence for discharge to Lac du Sauvage. Water quality in the Misery Pit will be monitored throughout the early stages of mining at the Jay Pit to confirm predictions and to enable the implementation of adaptive management responses if necessary.

Minewater will be contained in the Misery Pit until the water level in the Misery Pit reaches the designated operating range, projected to be in Year 5 of mining in the Jay Pit, or later. At this point, the compliant minewater will be pumped from the top of the Misery Pit to Lac du Sauvage for discharge through a diffuser outfall.

For the duration of the Jay Project, the King Pond Settling Facility will be maintained for possible use as a minewater contingency measure. King Pond could be utilized as part of a contingency or adaptive management response to managing minewater. Possible adaptive management strategies that could be considered include use as an additional TSS management facility during construction and operations phase, or for short-term emergency minewater storage.

- *A new sub-Section under Section 2.1 will be created to describe surface minewater management at the Jay site.*

2.1.x Management of Surface Minewater - Jay Site

The Jay site is located approximately 5 km by road northeast of the Misery Road. As defined in the Jay MWMP, minewater includes runoff from facilities associated with the Project and all water or waste pumped or flowing out of the pit. Surface minewater sources include diked area runoff, including runoff from the Jay WRSA, and Jay Dike seepage. Open-pit minewater sources include inflows to the Jay Pit via groundwater and runoff on pit walls.

As described in the Jay MWMP, the mine area for the Jay Project is mainly located within and around the diked area, with roads and pipeline extending to the Misery site. Activities in the mine area will include open pit mining, local hauling, and disposal of waste rock. Water management for the Jay Project will consist of the collection and management of minewater and the diversion of natural runoff from sub-basin B (Sub-Basin B Diversion Channel). The natural catchment draining to the diked area is relatively small due to construction of the Sub-Basin B Diversion Channel. Thus, surface minewater represents a minor contributor to minewater to be managed for the Jay Project.

Runoff from the Jay WRSA will be monitored, assessed, and reported to the WLWB under the Water Licence Annual Report and the 3-year WRSA Seepage Monitoring Report, which are requirements of the Water Licence.

During the Jay Pit operations phase, open pit minewater from the Jay Pit will be pumped to near the base of the Misery Pit. Jay Pit surface minewater draining towards the diked area will be collected in the Jay runoff sump and pumped to the top of the Misery Pit. The use of separate discharge locations in the Misery Pit for the open pit minewater (bottom of the Misery Pit) and the surface minewater (top of the Misery Pit) will create a TDS profile in the Misery Pit, resulting in lower TDS concentrations in the upper part of the Misery Pit at any given time.

The Jay Dike is designed as a water containment structure with an impermeable dike core. However, some seepage through the Jay Dike is expected to report to the downstream toe of dike (diked area side). This seepage will be collected in ditches and sumps along the dike toe, and either pumped back into Lac du Sauvage or transferred to the Jay runoff sump to be managed with the surface minewater.

- *Current sub-Section 2.2.3, Open Pit Minewater at Misery Pit will be re-written to describe the use of the mined-out Misery pit as the primary surface minewater management facility.*

Section 2.2.3 Management of Open Pit Minewater - Misery Pit

For the duration of the Misery Pit Pushback activities, operational 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.

After mining in the Misery Pit is complete and water management activities for the Jay Project are underway, the mined-out Misery Pit becomes part of the Jay MWMP. As detailed in Jay MWMP and outlined in sub-Section 2.1.4 of this report, during the Jay Pit operations phase, the mined-out Misery Pit will be used to manage minewater from the Jay Pit and diked area.

- *A new sub-Section under Section 2.2 will be created to describe open pit minewater management at the Jay pit.*

2.2.x Management of Open Pit Minewater - Jay Pit

As described in Jay MWMP and sub-Section 2.1.x entitled Jay Surface Minewater Management in this document, open-pit minewater via inflows to the Jay Pit (groundwater and runoff on pit walls) is one of two sources of minewater present at Jay site; for the Jay Project, open pit minewater represents the majority of the volume of minewater to be managed.

The mine inflows sump will be located in a natural depression of the Lac du Sauvage lakebed within the diked area, near the crest of the Jay Pit. Open pit minewater (groundwater inflows to the Jay Pit and pit wall runoff) will be collected at the bottom of the Jay Pit and pumped to the mine inflows sump before being pumped to near the base of the Misery Pit. As described in the Jay MWMP, surface minewater from the Jay site will be collected in the Jay runoff sump and pumped to the top of the Misery Pit.

The use of separate discharge locations in the Misery Pit for the open pit minewater (bottom of the Misery Pit) and the surface minewater (top of the Misery Pit) will create a TDS profile in the Misery Pit, resulting in lower TDS concentrations in the upper part of the Misery Pit at any given time.

3 MANAGEMENT OF SEWAGE

Section 3 will be updated to reflect the use of the Panda/Koala pits for FPK slurry deposition, including the treated effluent from the sewage treatment plant.

4 MANAGEMENT OF PROCESSED KIMBERLITE

Section 4 will be updated to describe the most current status of the existing Ekati Mine minewater management areas. Specific changes of import to the Jay Project will be made as follows:

- *Current Section 4.6, Long Lake Containment Facility, will be updated to describe the discontinuation of FPK deposition into the LLCF.*

4.6 Long Lake Containment Facility

4.6.1 Facility Description

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

Cells – A, B, C, D, and E. Cells A and C of the LLCF will continue to be active FPK deposition locations until FPK deposition into the Panda and Koala open pits has been established, which is scheduled to commence in 2020. There may be an overlapping start-up period for adjusting of operational procedures during which time both the LLCF and the Panda/Koala pits are active deposition locations. 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 on backup or contingency basis. 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 FPK 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 of the WPKMP) 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 processing 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 processing 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 of the WPKMP). Power lines, pipelines, and discharge spigots have not yet been installed on the Cell C West road and the Cell A South road. Power lines have been installed as far as the Outlet Dam. Electric pumps are used to pump the water from Cell E to Leslie Lake to reduce environmental risks associated with diesel pumps.

4.6.2 Water Management

Cells A, B, and C – The levels of water in these cells are 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 of the WPKMP). This water is recycled to minimize the use of freshwater in the processing plant. Dike B has become sealed by the FPK 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 metres above sea level (masl). This raise may be completed in future based on the design long-term water levels and water management strategy for closure.

Cell D – A Reclaim Water Barge is located at the north end of the cell (Figure 10 of the WPKMP), which pumps water from Cell D to the processing plant. The reclaim barge is located in Cell D to ensure adequate quality (i.e., clarity) and quantity of water (about 4.5 million 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.

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. The outlet dam 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 million m^3 annually). The water level is maintained less than 449 m to maintain 1 m freeboard against Dike D.

- *Current Section 4.7, Beartooth Pit, will be updated to describe the discontinuation of FPK deposition into the Beartooth Pit.*

4.7 Beartooth Pit

Beartooth Pit is a smaller sized open pit located approximately 3 km from the processing plant to the north of and adjacent to the 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 ammonium nitrate (AN) Storage Facility, Polar Explosives, and underground minewater from Panda and Koala pits have been directed to the Beartooth Pit. The diversion of this minewater away from the LLCF was a key part of the Ekati Mine 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. The use of Beartooth Pit as a minewater retention pond will be discontinued once FPK deposition into the Panda and Koala Pits is established, which is currently scheduled for 2020. At that time, there will be no dewatering of the underground workings and other needs for surface minewater retention will be provided by the Panda/Koala Pits and the LLCF.

The use of Beartooth Pit as a deposition location for FPK was proposed in Version 3.0 of the WPKMP, which was approved by the WLWB in October 2012. Deposition of processed kimberlite commenced in February 2013 and is ongoing. The use of Beartooth Pit as a deposition location for FPK will be discontinued once FPK deposition into the Panda and Koala Pits is established, which is currently scheduled for 2020.

- *A new sub-Section under Section 4 will be created just before current sub-Section 4.8 to describe the Panda/Koala pits as the primary FPK deposition location.*

4.x Panda/Koala Open Pits

Open-pit mining at the Panda Pit commenced in August 1998 and continued through to July 2003. Underground production at the Panda Pit began two years later in June 2005 and was completed in 2010 after which the underground workings were decommissioned for closure. Open-pit mining at the Koala Pit commenced in 2003 and was completed in 2007. Underground production at the Koala Pit commenced in 2007 and is anticipated to continue until 2019.

The Panda and Koala open pits (and associated underground workings) have previously been identified as potential FPK deposition locations following completion of underground mining in the Koala kimberlite pipe (i.e., WPKMP Version 2, October 2011). The underground workings are interconnected such that FPK and minewater have not been deposited into either open pit to date.

Beginning after completion of underground mining and reclamation in the Koala kimberlite pipe, the mined-out Panda and Koala pits, and associated underground workings, will be used for FPK deposition.

This approach eliminates the need for the active use of Cell D of the LLCF for FPK deposition or for an expansion of the land area occupied by the LLCF.

- *Current sub-Section 4.8, Processed Kimberlite Management Plan, will be updated to describe the use of the Panda/Koala pits as the primary FPK deposition location.*

4.8 Processed Kimberlite Deposition Plan

4.8.1 Background

All of the FPK produced to date (beginning 1998) has been deposited into the LLCF, apart from a relatively small amount of test and start-up FPK deposited into the Phase 1 Containment Area (closed in 1998) and the FPK deposited in Beartooth Pit since February 2013. The LLCF comprises the basin and structures that are designed to contain FPK and other Waste as defined by the Water Licence and this Plan (Figures 2, 3, and 10 of the WPKMP). The LLCF was designed to safely contain all of the anticipated FPK for the Ekati 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.

Alternative operation and development options were presented to Ekati Mine stakeholders during a series of three meetings in 2004 and early 2005. The meetings, facilitated by Robertson Geoconsultants, were attended by Ekati Mine staff, consultants, 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. 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 extra fine processed kimberlite (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.
- Minimize internal catchment areas to lessen concentrated flow across the beach.

- Optimize diversion facilities, where feasible, to preclude concentrated flow from external catchment areas flowing onto the beaches.
- Establish internal ponds 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.

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.

In 2011, the deposition plan was further optimized through an evaluation of options undertaken with Robertson Geoconsultants and presented in the report titled Ekati Mine 2011 FPK Deposition Alternative Study (provided as an Appendix to Version 2 of the WPKMP, October 2011). This deposition plan identified the beneficial use of Beartooth Pit, Cell C West, and Cell A South for FPK deposition, and is the plan to be implemented until FPK deposition into the Panda/Koala Pits is established. The selected sequence of options initiated in 2011 is summarized in Table 4.8-1.

Table 4.8-1 Fine Processed Kimberlite Volumes Associated with Deposition Options

Option Description	Volume
Continue in Cell A North, Cell B West, and Cell C North *(FPK deposition in Cell B has subsequently been completed)*	15 Mm^3
Beartooth Pit (secondary FPK stream)	7 Mm^3
Cell C West	6 Mm^3
Cell A South	4 Mm^3
Cell C East	2 Mm^3
TOTAL	**34 Mm^3**
Cell D as Contingency	

FPK = fine processed kimberlite; Mm^3 = million cubic metres.

4.8.2 Deposition Plan

Once underground mining in the Koala kimberlite pipe and reclamation of the underground workings has been completed (scheduled for 2020), the Panda and Koala pits will be the active FPK deposition location.

The Panda and Koala pits (with associated underground workings) provide a combined storage volume in the order of 55 million m^3 to an elevation 30 m below the planned ultimate overflow for closure (see Table 4.8-2). The design constraint for in-pit deposition of FPK will remain at a maximum elevation of 30 m below the final pit lake overflow elevation. This design constraint is taken from the initial description of the concept in the original Ekati Mine Environmental Assessment in 1996. During permitting by the WLWB of processed kimberlite deposition into the mined-out Beartooth Pit in 2012, the Ekati Mine's technical consultant (Robertson Geoconsultants) considered 30 m to possibly be overly conservative (Dominion Diamond 2014b). Therefore, Dominion Diamond could conduct additional technical studies in the future to optimize a site-specific depth of water required over FPK for closure and reclamation.

Table 4.8-2 Storage/Elevation/Area Relationships for Panda and Koala Pits

Panda			Koala		
Elevation (masl)	Pit Lake Area (m^2)	Volume (m^3)	Elevation (masl)	Pit Lake Area (m^2)	Volume (m^3)
170	12,873	1,880,565[(a)]	-	-	-
180	16,502	2,023,567	-	-	-
190	20,577	2,209,280	-	-	-
200	26,933	2,445,914	-	-	-
210	33,975	2,739,625	210	2,248	5,302,514[(b)]
220	37,776	3,100,566	220	8,351	5,365,461
230	41,235	3,495,322	230	16,311	5,488,346
240	52,988	3,939,300	240	30,263	5,694,607
250	64,164	4,530,309	250	38,084	6,048,163
260	69,707	5,200,127	260	43,748	6,458,169
270	79,350	5,928,555	270	65,680	6,928,563

Table 4.8-2 Storage/Elevation/Area Relationships for Panda and Koala Pits

Panda			Koala		
Elevation (masl)	Pit Lake Area (m^2)	Volume (m^3)	Elevation (masl)	Pit Lake Area (m^2)	Volume (m^3)
280	91,203	6,800,717	280	60,353	7,512,212
290	96,523	7,737,811	290	64,271	8,134,665
300	112,926	8,747,894	300	75,923	8,816,837
310	121,314	9,929,216	310	90,277	9,667,554
320	127,445	11,170,037	320	102,905	10,630,999
330	143,927	12,487,504	330	120,535	11,727,547
340	152,559	13,985,134	340	132,399	13,008,401
350	159,611	15,542,629	350	140,090	14,371,053
360	178,075	17,185,014	360	153,797	15,819,321
370	190,757	19,057,348	370	165,370	17,433,868
380	199,250	21,003,937	380	174,175	19,128,216
390	217,653	23,047,972	380	189,491	20,916,527
400	228,306	25,289,925	400	205,750	22,931,860
410	239,910	27,625,569	400	205,750	22,931,860
420	260,155	30,085,421	420	258,331	27,529,084
430	278,037	32,800,923	430	289,882	30,313,235
440	294,070	35,653,092	440	331,024	33,401,920
450	316,763	38,695,581	450	432,525	36,936,886
459	345,268	41,671,243	454	522,378	38,859,201

a) Includes 1,800,000 m^3 for underground workings below this level.
b) Includes 5,300,000 m^3 for underground workings below this level.
- = not applicable; masl = metres above sea level; m^2 = square metres; m^3 = cubic metres.

Cell D of the LLCF will continue to be used as a contingency deposition location for FPK. This plan is an essential back-up measure that prevents mine shutdown if a line blockage or breakage occurs between the processing plant and the primary deposition locations, or other reasons.

The current, conceptual plan assumes equal filling of the Panda and Koala pits (and associated underground workings). Future operational planning will optimize the pit filling strategy (e.g., preferentially filling one pit ahead of the other, optimizing in-pit pumping elevation). This is anticipated to be developed as part of the future update of the Ekati Mine WPKMP under the Ekati Mine Water Licence.

The final overflow elevation from the Panda/Koala pit lake is projected to be 453.4 masl. Therefore, at closure, the maximum height of FPK would be 423.4 masl. For preliminary operational planning, a minimum safety operating freeboard of 2 m below overflow is planned. A vertical freeboard of 2 m represents approximately 1.6 million m^3, twice the volume of water projected for a 1:100 extreme wet year (preliminary calculation).

During later years of FPK deposition, excess minewater may be strategically pumped from the Panda/Koala pits to the LLCF for discharge as a means of providing for the necessary 30 m deep freshwater cap at the end of mine operations. This approach avoids the need for pumping of water after the cessation of mine operations. Pumping may begin once the in-pit minewater level reaches an operationally effective elevation (i.e., high enough for safe access for pumping).

The implementation of this plan will involve the construction of pipes and installation of pumps to convey the FPK from the processing plant to the Panda and Koala pits, and later, pit surface water to the LLCF. A water barge/pump would be required when the in-pit water level has risen to the desired pumping elevation. The installation of FPK pipelines to Cell D contingency deposition locations may also be required to mitigate operating risks associated with a single deposition location.

- *Current sub-Section 4.9, Operating Risks and Uncertainties, will be updated to describe the risks and uncertainties relevant to the Jay Project. The update of this section requires the more detailed operational planning that will be developed for the anticipated submission of the WPKMP amendment to the WLWB following the Environmental Assessment review process. The operating risks and uncertainties are considered, at this time, to be reduced for the proposed use of the Panda/Koala open pits for FPK deposition given: shorter slurry pumping pipelines; pipelines contained within the camp/pit minewater management areas; large size of the Panda/Koala open pits; and the successful example provided through use of the Beartooth open pit (for FPK deposition).*

- *Current sub-Section 4.10, Wastewater and Processed Kimberlite Performance Monitoring, will be updated to describe the monitoring program relevant to the Jay Project. The update of this section requires the more detailed operational planning that will be developed for the anticipated submission of the WPKMP amendment to the WLWB following the Environmental Assessment review process. The performance monitoring program will contain the two primary elements currently listed in the WPKMP (Water Quality and Aquatic Monitoring Programs and FPK Deposition Monitoring) plus other relevant monitoring elements.*

5 CLOSURE AND RECLAMATION

Section 5 will be updated to describe the most current closure and reclamation findings and planning for the LLCF and Beartooth Pit. Specific changes of import to the Jay Project will be made as follows:

- *New sub-Sections will be created under Section 5 to describe the closure and reclamation measures for the Panda/Koala pits and for the Misery Pit.*

The Ekati Mine Interim Closure and Reclamation Plan (ICRP) will remain the primary document for closure and reclamation planning; Section 5 of the WPKMP will continue to provide a brief summary for completeness of the WPKMP.

5.x Closure and Reclamation Measures – Panda/Koala Pits

Once deposition of processed kimberlite from the Jay Pipe into the Panda and Koala pits commences, closure and reclamation of these pits (and the associated underground workings) will be categorized under “Processed Kimberlite Containment Areas” as described in the Ekati Mine ICRP (BHP Billiton 2011;

Dominion Diamond 2013). The Jay Project DAR describes the closure and reclamation measures for the Panda/Koala Pits (DAR Section 3.5.8.6; Appendix 3B).

The fundamental approach to closure of the Panda/Koala pits is to create a pit lake, with outflow water quality that is safe for people, wildlife, and fish. This will be accomplished by providing a 30 m deep freshwater ‘cap’ over the FPK within the pits. Once filled with water for closure, the Panda, Koala, and Koala North open pits and the interconnected underground workings become a single pit lake that overflows intermittently to the receiving environment (Kodiak Lake).

The depth of the freshwater cap (30 m) is taken from the initial discussions of the concept in the original Ekati Mine Environmental Assessment in 1996. During permitting by the WLWB for processed kimberlite deposition into the mined-out Beartooth Pit in 2012, a 30 m cap was considered to possibly be over-conservative (Dominion Diamond 2014b). Therefore, Dominion Diamond could conduct additional technical studies in future to optimize a site-specific depth of water required over FPK in the Panda/Koala pits for closure and reclamation.

After in-pit deposition of FPK has ceased, the permanent reclamation of the Panda and Koala pits would proceed by pumping freshwater into the pits as a cap overlying the processed kimberlite. This follows the model established and currently being implemented at the Beartooth Pit. It is planned that the in-pit water level will be reduced, if necessary, to 30 m below overflow by the end of operations as part of the planned operating activities. The presence of FPK in the Panda/Koala pits will reduce the freshwater pumping requirement from source lakes.

The specific reclamation activities associated with the Panda/Koala pits are described in the Ekati Mine ICRP, as updated through the Annual Reclamation Progress Reports.

5.x Closure and Reclamation Measures – Misery Pit

The mined-out Misery Pit is a primary minewater management facility for the Jay Project. The Jay Project DAR describes the closure and reclamation measures for the Misery Pit (DAR Section 3.5.8.2; Appendix 3B).

The fundamental approach to closure of the Misery Pit is to create a pit lake, with outflow water quality that is safe for people, wildlife, and fish. This will be accomplished by providing a 60 m deep freshwater ‘cap’ over minewater that contains elevated salinity (TDS). This approach will create a stable meromictic condition with distinct upper and lower layers. This approach was confirmed through hydrodynamic modelling of the Misery pit lake in post-closure, which is being reviewed through the Environmental Assessment of the Jay Project. Once filled with water for closure, the Misery pit lake will overflow intermittently to the receiving environment (Lac de Gras).

The depth of the freshwater cap (60 m) is taken from the hydrodynamic modelling, which, by necessity, is based on several conservative assumptions. Therefore, Dominion Diamond will collect site-specific data during operations at the Jay Pit and will conduct additional technical studies in future to optimize a site-specific depth of freshwater required for closure and reclamation.

After the use of the Misery Pit as a minewater management facility during operations, the permanent reclamation of the pit would proceed. Final closure of the Misery Pit will involve lowering the in-pit water level to approximately 60 m below the final overflow elevation by pumping water into the mined-out Jay

Pit, and then creating a 60 m cap of freshwater over the higher salinity minewater in the deeper part of the Misery Pit. A combination of catchment area runoff, precipitation, and freshwater pumped from Lac du Sauvage will be used to create the freshwater cap. Consideration may be given during future optimization studies to pumping freshwater from Lac de Gras. Once the freshwater cap is created and water quality has been demonstrated to be suitable for discharge, a hydraulic connection to the natural outflow channel to Lac de Gras will be re-established to allow for safe water overflow from the surface of the Misery pit lake to Lac de Gras.

The specific reclamation activities associated with the Misery pit are described in the Ekati Mine ICRP, as updated through the Annual Reclamation Progress Reports.

6 REFERENCES

BHP Billiton (BHP Billiton Canada Inc.). 2011. Ekati Diamond Mine, Interim Closure and Reclamation Plan. August 2011

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Golder (Golder Associates Ltd.). 2014. Jay Project, Mine Water Management Plan Lac du Sauvage, NWT. Prepared for the Dominion Diamond Ekati Corporation, October 10, 2014