# APPENDIX 3B

# CONCEPTUAL CLOSURE AND RECLAMATION PLAN

**October 21, 2014**

## DOMINION DIAMOND EKATI CORPORATION
## LAC DU SAUVAGE
## NORTHWEST TERRITORIES
## CANADA

# Jay Project Conceptual Closure and Reclamation Plan Report

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REPORT

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# 1.0 INTRODUCTION

Dominion Diamond Ekati Corporation (Dominion Diamond) has retained Golder Associates Ltd. (Golder) to conduct a pre-feasibility design for the mining of the Jay kimberlite pipe deposit (Jay Project) at its Ekati Diamond Mine (Ekati Mine) in the Northwest Territories (NWT). The Jay Project will extend the existing operations at the Ekati Mine by 10 or more years beyond the currently scheduled closure in 2019, and it will use existing mine facilities.

The Ekati Mine is located approximately 300 kilometres (km) northeast of Yellowknife, NWT, and it consists of a series of open pits with some underground workings that have been developed for the mining of various kimberlite pipes on the Ekati claim block. Operations at the Ekati Mine started in 1998.

The Jay Project involves the development of the Jay kimberlite pipe, which is located beneath Lac du Sauvage, using an open-pit mining method. The proposed approach for the development of the open pit for the Jay pipe is to construct a water-retaining dike that will isolate the local portion of Lac du Sauvage where the deposit exists (diked area). The isolated portion of the lake will be dewatered to expose the pipe for kimberlite extraction. The dewatered water level will be maintained through the life of the mining operations by pumping. After the mining is completed, the diked area will be back-flooded.

The extracted kimberlite will be hauled to the existing Ekati Mine plant for processing. Fine processed kimberlite (FPK) will be stored within the existing Panda and Koala pits near the processing plant. Coarse processed kimberlite will continue to be stored in the existing waste rock storage areas (WRSAs). Coarse kimberlite rejects will continue to be stored in the existing coarse kimberlite reject management area. Waste rock will be placed in a storage area on the western shore of Lac du Sauvage. There is a potential to mine additional reserves with underground mining methods after the open pit is complete, and this could add six or more years to the mine life.

This report presents a conceptual plan for the closure and reclamation of the Jay Project and identifies the enhancements to the existing closure and reclamation plan for the overall Ekati Mine that result from the development of the Jay Project. The conceptual plan for the closure and reclamation of the Jay Project has been prepared following the closure and reclamation goal and objectives described in the existing Interim Closure and Reclamation Plan (ICRP) Version 2.4 for the Ekati Mine, as approved by the Wek'èezhìı Land and Water Board (WLWB) (BHP Billiton 2011).

This document has been prepared to support the Developer's Assessment Report (DAR) for the Jay Project. Later, as part of the licensing process, the information presented in this report will be used to amend the existing approved ICRP to include the Jay Project.

This report has been prepared in accordance with the "Study Limitations" presented at the beginning of the report. The reader's attention is specifically drawn to this information for reference during use of this report.

## 1.1 Jay Project Facilities

The Jay Project will include the development of new mine facilities specific to the Jay Project. The Jay Project will also result in the modification of the closure and reclamation plan for Ekati Mine facilities as outlined in the existing approved ICRP. Closure and reclamation of existing Ekati Mine facilities that require modification will become part of the Jay Project.

The conceptual closure plan presented in this report presents the activities proposed for the closure and reclamation of the following Jay Project facilities:

- Jay Project (new Ekati Mine facilities):
  - open pit;
  - WRSA;
  - dike, channel, sumps, and dewatering ramps; and,
  - buildings and infrastructure: roads, pipeline benches, pads, power line, pumping and pipeline systems.
- Ekati Mine facilities:
  - mined-out open pits:
    - Misery Pit – to be used for water management during the dewatering and operation stages of the Jay Project;
    - Panda and Koala pits – to be used as containment areas for FPK from the Jay Project; and,
    - Lynx Pit – to be used to receive the natural lake water from the later stages of dewatering of the Jay Project.

## 1.2 Progressive Reclamation during the Jay Project

Progressive reclamation takes place prior to permanent closure to reclaim components and/or to decommission facilities when they no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, to reduce the duration of environmental exposure, and to enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may also provide valuable experience on the effectiveness of certain measures that may be implemented during permanent closure (MVLWB/AANDC 2013).

The development of the Jay Project and increased Ekati Mine life will provide opportunities for progressive reclamation. Progressive reclamation will make beneficial use of the operational resources available at the Ekati Mine to conduct the work efficiently. Conducting this work as progressive reclamation during the Jay Project rather than as “Final Closure” after cessation of mine operations will also provide valuable information for ongoing reclamation research and design projects that will enhance the Final Closure and Reclamation Plan. Generally speaking, progressive reclamation activities may be scheduled for mine areas where there is no potential for future benefits or business opportunities or in areas where there is immediate

environmental risk. Provided below are reclamation activities that will be completed as progressive reclamation during the Jay Project:

- Pigeon Pit – After the open-pit mining operations have ceased, the open pit will be flooded due to potential concerns with exposed meta-sediment rock in the pit walls. All flooding activities will be completed as part of the existing approved ICRP (BHP Billiton 2011).
- Processed kimberlite containment area – This area includes Cells A, B, and C of the existing Long Lake Containment Facility (LLCF). Cell B is no longer receiving FPK, and LLCF cover reclamation research is currently underway in this cell. It is planned that research and reclamation activities will continue for Cell B and for the other Cells (A and C) once they are no longer operational. All reclamation of the LLCF will be completed as part of the existing approved ICRP (BHP Billiton 2011).

The evaluation of other potential reclamation activities (approved in the ICRP), to be implemented as progressive reclamation during the Jay Project, will be completed on an individual basis. The evaluation of these activities will consider their potential future values and any immediate environmental risks.

## 1.3 Ekati Mine Facilities Used by Jay Project

The use of the Ekati Mine facilities will continue during the Jay Project, and the closure and reclamation of these facilities will be carried out after the Jay Project operations have ceased and there is no further value in them. The closure and reclamation plan for these facilities will not require significant modifications and in general will be undertaken as part of the existing approved ICRP (BHP Billiton 2011). These facilities include the following:

- processing plant and associated facilities;
- Ekati Main camp, airstrip, explosives storage and manufacture facilities, and associated facilities;
- Misery camp and associated facilities;
- Cells D and E of the existing LLCF;
- Misery Road; and,
- coarse kimberlite reject management area.

# 2.0 JAY PROJECT LOCATION AND ACCESS

The Ekati Mine is located approximately 300 km northeast of Yellowknife, NWT. The mine is located 100 km north of the treeline in the sub-Arctic tundra and is accessible by air year-round or by winter road for 10 weeks of the year. The closest community is Wekweètì, located 180 km to the southwest.

The Ekati Mine consists of a series of open pits with some underground workings that have been developed for the mining of various kimberlite pipes on the Ekati claim block. Operations at the Ekati Mine started in 1998.

The main site at the Ekati Mine includes the processing plant, main camp, and processed kimberlite containment facility. The general location plan, including the main camp area, Misery Road, Misery Pit, and Misery camp facilities, is presented in Figure 2-1. Lac du Sauvage and the general location of the Jay kimberlite pipe within the lake are also shown in the figure.

The Jay kimberlite pipe is located approximately 1.2 km from the western shoreline of Lac du Sauvage in a bathymetric low that is covered by approximately 35 metres (m) of water, based on 2013 Lac du Sauvage bathymetry data.

The Misery Pit operations are located approximately 7 km to the southwest of the Jay kimberlite pipe. There is an existing haul road between the Misery camp and the main Ekati Mine and processing plant. The main Ekati Mine is located approximately 30 km northwest of the Misery camp.

# 3.0 PROJECT ENVIRONMENT

This section provides a brief description of the project environment based on the findings of the baseline studies prepared for the DAR for the Jay Project (Dominion Diamond 2014a).

## 3.1 Topography

The topography surrounding the Jay Project area is generally flat with local surface relief rising up to 50 to 70 m. Elevation (El.) ranges from approximately 416.1 to 465 metres above sea level (masl). The area is covered with sparse, mainly tundra, vegetation, commonly referred to as barrenlands.

## 3.2 Meteorology and Climate

This section provides a summary of meteorological and climatic conditions. The reader is referred to the Air Quality and Meteorological Baseline Report and the Hydrology Baseline Report (Dominion Diamond 2014a, Annex I, Annex X) for additional details.

The Jay Project is located in a region of the NWT that experiences a sub-Arctic climate characterized by long, dark, very cold winters, and short, cool to mild summers accompanied by long daylight hours. During the approximately seven months when temperatures are below freezing, moisture in the soil and subsoil is frozen. Summer warmth is insufficient to thaw more than the active layer that varies from approximately 1.0 to 2.7 m in thickness, so permafrost prevails under most land areas. In general, permafrost does not exist under large permanent waterbodies such as Lac du Sauvage.

Annual total precipitation averages 345 millimetres (mm) and is composed of almost equal amounts of rainfall and snowfall. Precipitation occurs mainly as rainfall from June through September, with rainfall accounting for 42 percent (%) of total precipitation in these four months. Precipitation occurs mainly as snowfall in the remaining eight months of the year (October to May), when snowfall represents approximately 50% of total precipitation. The wettest month of the year is August, when 58 mm or 16% of mean annual total precipitation occurs, and the driest month is February, when only 12 mm or 3.3% of mean annual total precipitation occurs.

The annual air temperature at the site ranges from -12 degrees Celsius (°C) to -6°C, with a mean annual air temperature of -9.6°C. Monthly air temperatures are consistently below 0°C for seven months of the year, from October to April, and are consistently above 0°C for only three months, from June to August. Monthly air temperatures in May and September may be above or below 0°C. Maximum and minimum mean monthly temperatures are lowest in February, which has a mean air temperature of -27.9°C. July is the warmest month, with a mean air temperature of 12.5°C.

There was substantial seasonal variation in relative humidity recorded at the Jay Project, with average values ranging from near 67% in June to near 92% in October.

## 3.3 Surface Water

### 3.3.1 Hydrology

This section provides a summary of hydrological conditions. The reader is referred to the Annex X of the DAR (Dominion Diamond 2014a) for additional details.

The Lac du Sauvage and Lac de Gras drainage basins are located within the Canadian Shield physiographic region. The landscape is dominated by features characteristic of glaciated terrain and exposed bedrock. There are numerous small lakes, wetlands, and creeks in the basin, indicating poorly drained conditions. The upland areas are generally well drained. Periodic ice blockages at outlets of small lakes and wetlands increase downstream flood peak discharges and affect the flood characteristics.

Waterbodies cover approximately one-third of the 266,300-hectare (ha) Ekati claim block. The low terrain has resulted in a diffuse drainage pattern, and streams typically meander in braided channels through extensive boulder fields between lakes and ponds. High flows are observed during spring runoff, while low flows and dry stream channels are typical in late summer.

Lac du Sauvage has a basin area of 1,461 square kilometres ($km^2$) and a surface area of 86.5 $km^2$. It is the largest tributary of Lac de Gras, to which it drains via a narrows between the two lakes. Lac de Gras has a basin area of 4,131 $km^2$, including the Lac du Sauvage basin, and a surface area of 572 $km^2$. The average water level in Lac du Sauvage is El. 416.1 masl.

### 3.3.2 Water and Sediment Quality

This section provides a summary of key water and sediment quality conditions. The reader is referred to the Water and Sediment Quality Baseline Report (Dominion Diamond 2014a, Annex XI) for additional details.

The baseline report describes the baseline conditions based on the 2013 open-water monitoring program. Water and sediment data collected by other monitoring programs in the baseline study area were also summarized in the baseline report to place the 2013 data in context.

The 2013 study characterized lakes and streams in the baseline study area as being relatively clear, well oxygenated (except at depth in two lakes: Lake Af1 and Lake E1; see Dominion Diamond 2014a, Annex XI for lake locations), very soft in hardness, having low alkalinity (which makes them highly sensitive [lakes] or sensitive [streams] to acid inputs), and with waters containing low concentrations of major ions, nutrients, and metals.

Lake sediments were typically fine (silty-clay), whereas stream sediments were more variable. Natural levels of arsenic, chromium, and occasionally copper concentrations in sediments were higher than Sediment Quality Guidelines (CCME 2001). The results of the 2013 study are similar to those found in other baseline and monitoring programs in the baseline study area.

## 3.4 Geology

This section provides a summary of key geological conditions. The reader is referred to the Geology Baseline Report and the Soils Baseline Report (Dominion Diamond 2014a, Annex III, Annex V) for additional details.

The Jay Project lies within the northwestern Canadian Shield physiographic region, which is characterized by rolling hills and low-relief terrain controlled by the abundant, near-surface, resistant Precambrian rock. The region is dominated by rolling terrain with terrain elevations rising up to 100 m. The regional terrain has been strongly influenced by glaciations, with glaciers flowing in a variety of directions during the Quaternary period. Deglaciation involved a general east-northeasterly retreat of glacial ice and abundant supply of meltwater that influenced the resulting regional terrain through deposition and erosion.

Esker and kame terrain features are common in the region, and were formed by glaciofluvial processes associated with the transport and deposition of coarse material by glacial meltwater. The bedrock geology comprises supracrustal rocks (metamorphosed greywacke-mudstone turbidites) of the Neoarchean post-Yellowknife Supergroup that are intruded by syn-tectonic to post-tectonic plutons, made up predominantly of granite, granodiorite, and tonalite. In addition, five mafic Proterozoic dyke swarms, ranging in age from approximately 2.23 to 1.27 billion years, intrude the area. The Lac du Sauvage area is intersected by several mafic dykes, belonging mainly to the Malley, MacKenzie, and Lac de Gras dyke swarms.

## 3.5 Seismicity

The Jay Project site is located in the relatively low seismic central part of Canada and is a low seismic hazard area. A seismic hazard calculation for the site was obtained from Natural Resources Canada based on 2010 National Building Code Seismic Hazard Calculation (NBCC 2010). The predicted peak ground acceleration (PGA) values at corresponding occurrence probabilities are summarized in Table 1.

**Table 1: Peak Ground Acceleration Values for Various Return Periods**

| Return Period (years) | PGA[(a)] (g) |
|---|---|
| 1 in 100 | 0.003 |
| 1 in 475 | 0.011 |
| 1 in 1,000 | 0.019 |
| 1 in 2,475 | 0.036 |

Note: Approximate coordinates (Jay WRSA used): Latitude: 64.6166; Longitude: -110.1734.

a) Spectral and peak hazard values are determined for firm ground.
(NBCC 2010 soil class C – average shear wave velocity of 360 to 750 m/s).
PGA = peak ground acceleration; g =gravitational acceleration; WRSA = waste rock storage area; NBCC = National Building Code of Canada; m/s = metres per second.

## 3.6 Permafrost

This section provides a summary of the permafrost conditions. The reader is referred to the Permafrost Baseline Report (Dominion Diamond 2014a, Annex IV) for additional details.

The Jay Project is located within a region of continuous permafrost. In this region, the layer of permanently frozen subsoil and rock is generally deep and overlain by an active layer that thaws during summer. The depth of the active layer in the Misery Pit area ranges from approximately 1.0 to 2.7 m. The depth of the active layer in the Jay Project area (on-land facilities) is expected to be similar to that measured near the Misery Pit area. Based on available thermistor data collection and interpretation, the permafrost conditions at the site indicate a depth of permafrost that is estimated to be approximately 320 to 485 m under locations that are not affected by waterbodies.

Unfrozen zones (talik zones) occur beneath waterbodies, and permafrost is expected to be absent below all but the margins of Lac du Sauvage. Permafrost usually exists under the lake shoreline where the depth of water is less than approximately 1 m and winter lake ice freezes to the lake bottom. Although permafrost occurs under islands and adjacent to waterbodies, the permafrost depth is expected to be less than the depth under land located away from waterbodies. It will vary below the islands and peninsulas in Lac du Sauvage depending on their sizes.

## 3.7 Hydrogeology

This section provides a summary of the hydrogeological conditions. The reader is referred to the Hydrogeology Baseline Report (Dominion Diamond 2014a, Annex IX) for additional details.

### 3.7.1 Hydrostratigraphy

A hydrogeological baseline conceptual model for the Jay Project area has been developed to describe key features of the hydrogeological regime before mining. The conceptual model for the site consists of five hydrostratigraphic units composed of overburden, weathered rock, competent rock, kimberlite, and enhanced permeability zones associated with sub-vertical faults.

Permafrost is assumed to be essentially impermeable with the exception of the basal cryopeg (conservatively assumed to be at 300 m below ground surface). This portion of the permafrost that may contain unfrozen groundwater due to freezing point depression is assumed to be entirely unfrozen and have a hydraulic conductivity equivalent to the unfrozen rock at that depth.

### 3.7.2 Groundwater Quality

Groundwater is low in total dissolved solids (TDS) in the shallow (active layer) zone and in Lac du Sauvage. In the deep groundwater flow regime, the groundwater is expected to increase in TDS with depth. Groundwater at the Jay Project is generally sodium-magnesium-calcium-chloride (Na-Ca-Cl-[Mg]) type water with moderately high TDS (up to 2,390 milligrams per litre at 440 m depth). The pH of the project groundwater samples ranged from 7.6 to 7.7. The majority of total and dissolved metals concentrations

(with concentrations above the detection limit) showed an increasing trend with depth in the three samples collected. Exceptions included barium, magnesium, manganese, and silicon, which showed no obvious trend. Based on this evidence, concentrations of solutes are likely to be moderate, and concentrations of major ions are expected to be between those in the Diavik Diamond Mine (Diavik Mine) groundwater and the Ekati Mine groundwater.

Total dissolved solids (TDS) concentrations are expected to increase with depth as has been observed at other sites in the Canadian Shield. Based on trends in concentrations of major ions with depth observed in the Ekati Jay/Panda and Diavik Mine datasets, concentrations of calcium, magnesium, sodium, potassium, and strontium are expected to increase with depth. Metals concentrations are expected to be low.

### 3.7.3 Groundwater Flow Regimes

Two groundwater flow regimes occur at the Jay Project area: a deep groundwater flow regime beneath permafrost and a shallow groundwater flow regime located in the active (seasonally thawed) layer near the ground surface. With the exception of areas of taliks beneath lakes, the two groundwater regimes are isolated from one another by the thick permafrost.

The shallow groundwater regime is active only seasonally during the summer months, and the magnitude of flow in this layer is expected to be several times less than runoff from snowmelt. Groundwater in the active layer primarily flows to local depressions and ponds that drain to larger lakes; therefore, the total travel distance would generally extend only to the nearest pond, lake, or stream. Water in the active layer is stored in ground ice during the cold season, and then released when the ice thaws in late spring or early summer, thus providing flow to surface waterbodies. During the warm season, groundwater in the active layer is recharged primarily by precipitation.

Groundwater flow within the deep groundwater flow regime is limited to the sub-permafrost zone and potentially within the basal cryopeg. The deep groundwater flow regime is connected to the ground surface by open taliks underlying larger lakes. The elevations of these lakes are expected to control groundwater flow direction in the deep groundwater flow regime, along with density gradients. The elevations of these lakes in the baseline study area suggest that Lac du Sauvage is primarily a groundwater discharge zone with the exception of the southern extent of the lake where groundwater flow likely is directed towards Lac de Gras. Hydraulic gradients are expected to be near hydrostatic or weakly upward over most of the lake area. The TDS of groundwater (or salinity) is expected to increase with depth, resulting in increased density of groundwater with depth. This increase in density with depth will result in fluid density gradients that counteract the upward gradient to Lac du Sauvage to an extent because the less dense fresher water will have greater buoyancy than deeper saline groundwater.

## 3.8 Air Quality

The reader is referred to the Air Quality and Meteorological Baseline Report (Dominion Diamond 2014a, Annex I) for details.

## 3.9 Noise

The reader is referred to the Noise Baseline Report (Dominion Diamond 2014a, Annex II) for details.

## 3.10 Terrestrial

The reader is referred to the Soils Baseline Report, Vegetation Baseline Report, and Wildlife Baseline Report (Dominion Diamond 2014a, Annex V, Annex VI, Annex VII) for details.

## 3.11 Aquatics

The reader is referred to the Plankton Baseline Report, Benthic Invertebrate Baseline Report, and Fish and Fish Habitat Baseline Report (Dominion Diamond 2014a, Annex XII, Annex XIII, Annex XIV) for details.

## 3.12 Human Environment

### 3.12.1 Socio-Economic

The reader is referred to the Socio-Economic Baseline Report for details (Dominion Diamond 2014a, Annex XV).

### 3.12.2 Archaeology

The Archaeology Baseline Report (Dominion Diamond 2014a, Annex XVI) for the Jay Project provides an inventory of the archaeological sites based on a review of the cultural setting in the study area and an Archaeological Overview Assessment of the proposed Jay Project area to identify potential undocumented sites within the project footprint. As a result of the assessment and considering compiled data from 1994 to 2013, there are no sites in the baseline study area assigned a high cultural or scientific significance. The reader is referred to Annex XVI of the DAR for additional details (Dominion Diamond 2014a).

### 3.12.1 Traditional Knowledge

The Traditional Land Use and Traditional Knowledge Baseline Report (Dominion Diamond 2014a, Annex XVII) provides information and preliminary assessments based on available knowledge and land use data in the vicinity of the Ekati Mine. It also summarizes available traditional knowledge and use values related to the Jay Project area.

The proposed Jay Project is located within lands that have traditionally been used by Inuit, Dene, and Métis peoples. Traditionally, these groups supported themselves by harvesting resources from the land through activities such as hunting, fishing, trapping, and the gathering of berries and other plant materials. Travelling on foot or by canoe, kayak, dogsled, or snowshoe, the Inuit, Dene, and Métis used trails leading to and from Lac de Gras and were guided by landscape features such as mountains, hills, eskers, waterbodies, Inuksuit, and the caches and cairns left by previous travellers. The reader is referred to Annex XVII of the DAR for additional details (Dominion Diamond 2014a).

# 4.0 JAY PROJECT FACILITIES DESCRIPTION

The Jay Project will involve the development of the Jay kimberlite pipe, which is located beneath Lac du Sauvage, using an open-pit mining method. The mine development will include the following stages:

- construction, spanning a duration of approximately three years, when activities are focused on construction of an access road and associated facilities and on dewatering of the portion of Lac du Sauvage within the water-retaining dike;
- operations, spanning a duration of approximately 10 years, when activities are focused on mining the Jay Pit; and,
- closure, spanning a duration of approximately four years, after end of mine operations.

The current average Lac du Sauvage water level is approximately El. 416.1 masl. The proposed approach for the development of the open pit for the Jay pipe is to construct a water-retaining dike that will isolate the local portion of Lac du Sauvage where the deposit exists (diked area). Dewatering of the isolated portion of the lake will occur to expose the pipe for kimberlite extraction. A diversion channel to intercept runoff from sub-basin B (predominantly the outflow from Christine Lake) and divert it to Lac du Sauvage south of the Jay Dike (Sub-Basin B Diversion Channel) will be constructed. The diked area will be approximate 4.2 $km^2$ and the total dewatered volume 29.6 million cubic metres (million $m^3$). The dewatered water level will be maintained through the life of the mining operations by pumping.

An approximate total volume of 93.8 million $m^3$ will be excavated from the Jay Pit. The extracted kimberlite will be hauled to the Ekati Mine plant for processing. Fine processed kimberlite (FPK) will be stored within the existing Panda and Koala pits near the processing plant. Coarse processed kimberlite will continue to be stored in the existing WRSAs. Coarse kimberlite rejects will continue to be stored in the existing coarse kimberlite reject management area. Waste rock will be placed in a storage area on the western shore of Lac du Sauvage. There is a potential to mine additional reserves with underground mining methods after the open pit is complete, and this could add six or more years to the mine life.

Water management during dewatering of the Jay Project will be facilitated using the Misery Pit and Lynx Pit, and during operations it will be facilitated using the Misery Pit.

The facilities of the Jay Project and the existing facilities at the Ekati Mine that will be modified by the Jay Project, as listed in Section 1.1, are described in the following sections based on the design information available to date. The design of new facilities is ongoing. This section has been prepared based on the available information provided in the DAR Section 3, Project Description (Dominion Diamond 2014a) and various supporting design reports that accompany the DAR.

A general arrangement of the Jay Project facilities at the end of the operations stage is presented in Figure 4-1.

## 4.1 Open Pits

### 4.1.1 Jay Pit

Dominion Diamond will work with Fisheries and Oceans Canada and Aboriginal communities to develop a fish-out plan for dewatering the diked area within Lac du Sauvage. Once fish salvage and dewatering has been carried out, the pit will be accessed by heavy equipment. Mining of the Jay kimberlite pipe will proceed as an open pit development using the operational practices that have evolved to a highly effective state through 16 years of open-pit mining at other Ekati Mine open pits.

The Jay Pit will be mined using conventional open-pit truck-shovel operations in 15 m bench heights, with single and double bench configurations. A single access ramp that is designed at 29.5 m in width is sufficient for two-way haul truck traffic, allows for dewatering pipes, and includes a safety berm, to be placed along the road edge. Pit development is anticipated to proceed to a depth of approximately 370 m below grade. The pit footprint will have an approximate ultimate surface area of 700,000 square metres ($m^2$) (70 ha) (Figure 4-1). The mined waste rock will comprise approximately 75% non-potentially acid generating (non-PAG) material (i.e., granite, overburden soils) and approximately 25% material to be managed as potentially acid generating (PAG) (i.e., metasediment).

The estimated volume of water to be pumped from the dewatered portion of Lac du Sauvage during the construction phase of the Jay Project is 29.6 million $m^3$. During the operational phase of the project, the anticipated average annual volume to be managed is 9.75 million $m^3$. A detailed dewatering plan will be prepared specifically for the Jay Project and will be submitted to the WLWB in future (consistent with current requirements of the Ekati Mine Water Licence).

A water balance model has been developed to evaluate the proposed water management infrastructure over the life of the mine and under closure conditions. A description of the mine water management plan (MWMP) for the Jay Pit and diked area and a description of the water balance are provided in the MWMP (Dominion Diamond 2014a, Appendix 3A).

### 4.1.2 Misery Pit

The existing Misery Pit will be used for water management during the dewatering and operation stages of the Jay Project.

The Misery kimberlite pipe is located 29 km to the south of the processing plant. The pipe is located within the former Misery Lake, which was dewatered prior to mining (Dominion Diamond 2013). The initial open pit was mined from approximately 2000 to 2005. The current pit has been mined as a “push back” open pit, which commenced in 2011, and is planned to be active until approximately 2017.

Mining at Misery Pit is by conventional open-pit techniques similar to the other Ekati open pits (BHP Billiton 2011). It is anticipated that pit development will proceed to a final depth of approximately 300 m. The final pit volume at closure will be approximately 40 million $m^3$ and it will have a surface area of 30 ha. The Misery Pit will be excavated entirely within permafrost; therefore, no deep groundwater inflows are anticipated.

### 4.1.3 Panda and Koala Pits

The existing Panda and Koala pits will be used as containment areas for FPK from the processing of ore from the Jay Pit.

Processing of the Jay kimberlite is expected to generate approximately 45.6 million tonnes of processed kimberlite. The Panda and Koala pits (including the interconnected underground workings) will be the primary deposition locations for FPK resulting from the Jay Project. The use of mined-out open pits for FPK deposition has been generally acknowledged as a preferred approach dating back to the original Ekati Mine Environmental Assessment in 1996. The concept has been demonstrated to be viable and beneficial through the current use of the mined-out Beartooth Pit for this purpose. The Panda and Koala pits were excavated to the approximate base of permafrost, and the underground workings are excavated in the deeper, unfrozen ground.

### 4.1.4 Lynx Pit

The Lynx Pit will be used to receive water from the later stages of dewatering of the Jay Project.

The Lynx kimberlite pipe is a small satellite pipe in close proximity to the existing Misery site. The final pit volume at closure will be approximately 5.2 million $m^3$. The Lynx Pit will be excavated entirely within permafrost, to an approximate depth of 130 m; therefore, no deep groundwater inflows are anticipated.

## 4.2 Waste Rock Storage Area

Ekati Diamond Mine Waste Rock and Ore Storage Management Plan (WROMP) Version 4.1 (Dominion Diamond 2014b) describes the current management of waste rock at the Ekati Mine. The Jay WRSA is designed to be consistent with the WROMP.

Waste rock storage areas (WRSAs) at the Ekati Mine are constructed to minimize runoff and to encourage permafrost formation. Potentially acid generating (PAG) materials are encapsulated within a thermally protective cover that avoids seasonal active layer thaw into the reactive material. The thermally protective cover will comprise 5 m of granite at the Misery WRSA and 3 m of glacial till plus a nominal 1 m of granite at the Pigeon WRSA. These measures will limit the potential for acid generation or metal leaching from the WRSAs. The cover for the Jay WRSA will comprise 5 m of granite.

The foundation of the Jay WRSA is expected to be physically stable glacial till and rock. The foundation will be in permafrost.

### 4.2.1 Geochemical Characterization of Waste Rock

The Geochemistry Baseline Report (Dominion Diamond 2014a, Annex VIII) provides a detailed summary of the results of geochemical testing of samples collected from the Ekati Mine.

### 4.2.2 Configuration

The proposed layout for the Jay WRSA provides a total storage volume capacity of 120.2 million $m^3$. Overburden (overburden soil and lakebed sediments) excavated for the Jay Pit will be stored in the WRSA along with the waste rock. The Jay WRSA capacity provides storage for the combined waste rock and overburden volume of 108.7 million $m^3$ from the Jay Pit and also provides an additional 11.5 million $m^3$ for contingency storage.

The elevation needed to store the required Jay Pit waste volume of 108.7 million $m^3$ is approximately El. 492 masl, which would result in a maximum height of approximately 57 m over the average tundra elevation. The elevations of the terrain within the WRSA rise from the western edge of Lac du Sauvage at El. 416 to El. 453 masl within the central area of the WRSA footprint. The remainder of the last lift of the WRSA to El. 500 masl will provide contingency storage, if required, and would result in a maximum height of approximately 65 m over the average elevation of the tundra.

Consistent with the Ekati Mine WROMP, the design height of the Jay WRSA is a balance between surface footprint and height. The Jay WRSA footprint is constrained by several setbacks that comprise a minimum 100 m setback from Lac du Sauvage, a minimum of 30 m setback from other smaller waterbodies and streams, and a minimum 200 m setback from the adjacent esker. The Jay WRSA has a footprint area of 251 ha (Figure 4-1).

The Jay WRSA is designed to be built in 15 m lifts with angle of repose (1.3H:1V) side slopes, and a 25 m setback bench between each lift. This geometry will result in an overall 3H:1V slope for the WRSA.

The layout of the Jay WRSA incorporates the features for managing waste rock from the current Ekati WROMP Version 4.1 (Dominion Diamond 2014b). The key design features for the Jay WRSA are as follows:

- placement of a 2 m thick blanket of non-PAG waste rock (granite) over original ground within the WRSA footprint;
- mixed deposition of both PAG and non-PAG materials within the WRSA; and,
- placement of a 5 m thick encapsulating cover layer of non-PAG (granite) waste rock.

Seepage water from the south area of the WRSA (i.e., runoff) will naturally flow to the diked area of Lac du Sauvage where it will be incorporated into the surface minewater management system during mine operations. Seepage from the north area of the WRSA will naturally flow towards Lac du Sauvage. The setback distance of 100 m from Lac du Sauvage (consistent with established practice at the Ekati Mine) provides space for attenuation of seepage flows on the tundra. Experience at the Ekati Mine shows that seepage flow rates are typically low and that most seepage water is attenuated on the tundra within 100 m from the toe of a WRSA. Seepage water will be monitored during mine operations and closure such that adaptive management actions can be implemented if necessary, per established practice at the Ekati Mine.

Physical stability assessments were carried for the WRSA. The results of the analyses indicate that the WRSA will be physically stable in the long term. Access/egress ramps for wildlife will be in place for closure, per the general closure approach for WRSA's at the Ekati Mine.

## 4.3 Processed Kimberlite Containment Areas

The Panda and Koala pits will be the primary deposition locations for FPK resulting from the Jay Project as discussed in Section 4.1.3. Cell D of LLCF will continue to act as a contingency deposition location for FPK. There is more than adequate FPK storage capacity for the Jay Project in the Panda and Koala pits (including the interconnected underground workings), such that Cell D of the LLCF would be utilized on a contingency basis. Cells D and E of the LLCF will continue to act as minewater management ponds prior to discharge.

Coarse processed kimberlite will continue to be stored in the existing waste rock storage areas.

## 4.4 Dike, Channel, Sump, and Dewatering Ramps

### 4.4.1 Dike

The Jay Project design concept for an isolation dike is similar to the approach used at Diavik Mine, including a semicircular ring dike extending from shoreline, with a cross-section and construction technique similar to that used at Meadowbank Mine.

The Jay Project conceptual dike design includes the following general components:

- a broad rockfill shell;
- a central zone of crushed granular fine and coarse filters; and,
- a composite low permeability element along the centreline of the dike.

The low permeability element comprises a composite of elements, dependent on the depth to bedrock:

- cement soil bentonite cut-off wall;
- jet grouted columns extending from the base of the cement soil bentonite cut-off wall to the bedrock contact in locations where bedrock is deeper; and,
- grouting of the shallow bedrock and the contact between the bedrock and cut-off wall.

The dike will be constructed within the lake, before any dewatering. Three typical dike sections have been developed for the conceptual design based on the depth to bedrock. Typical sections for the shallow, intermediate, and deep areas are shown in Figure 4-2 and described as follows:

- **Shallow –** The shallow section is assumed to be constructed where the bedrock surface elevation is 408 masl or higher. The central trench will be excavated to bedrock and fine filter will be in contact with the bedrock surface. The base of the cut-off wall will be founded on bedrock. Grouting of the shallow bedrock and the bedrock contact will be conducted.

- **Intermediate –** The intermediate section is assumed to be constructed where the bedrock surface elevation is between 408 and 402 masl. The central trench will be excavated to bedrock and fine filter will be in contact with the bedrock surface. The base of the cut-off wall will be founded on bedrock. Grouting of the shallow bedrock and the bedrock contact will be conducted.
- **Deep –** The deep section is assumed to be constructed where the bedrock surface is lower than El. 402 masl. In the central portion of the dike, lakebed sediment will be removed and a granular fine filter will be placed in contact with competent soil. The base of the cut-off wall will be founded on competent soil. Jet grouted columns will be constructed from the base of the cut-off wall to the bedrock contact. Grouting of the shallow bedrock and the bedrock contact will be conducted.

The subsurface geotechnical characteristics at the dike area are presented in the conceptual engineering report (Golder 2014a).

A series of geotechnical instrumentation will be installed within the dike structure and foundation to monitor the performance during dewatering and operation. The instrumentation will monitor the physical performance of the dike to confirm that the structure is operating according to the design intent. Monitoring of the instrumentation will be continued into closure, until the dike is breached (see Section 5.4.1.3.1 for dike closure details).

### 4.4.2 Sub-Basin B Diversion Channel (Christine Lake Outflow Channel)

The proposed Sub-Basin B Diversion Channel will be constructed to divert inflow from sub-basin B, which is a small drainage to the west of Lac du Sauvage (Christine Lake outflow). Surface runoff will be intercepted as it drains towards the dewatered area and diverted to the south of the Jay Project site into the main basin of Lac du Sauvage. The channel will be approximately 1,275 m in length.

The following considerations were used to develop the design of the channel:

- reduce inflows to the proposed diked area and Jay Pit from the sub-basin B and Lac du Sauvage main watersheds;
- provide for the movement of caribou across the Jay Project area;
- facilitate fish movement through the channel; and,
- provide additional discharge capacity as a contingency against ice blockage during freshet.

A design flow with a 1 in 100 year return period, plus a minimum 0.3 m of freeboard, was used to design the diversion channel, which mitigates the risk of overflowing during extreme freshet seasons. Culverts required to convey the flow of water beneath the haul roads were also sized to accommodate the 1 in 100 year daily flow (with no surcharging), which mitigates the risk of overtopping or erosion damage of the haul roads. The culvert design uses two barrels at each culvert crossing to mitigate for potential ice blockage. At each crossing, the culverts will be vertically offset to mitigate the risk of ice blockage occurring in both barrels simultaneously. All culverts will be constructed using corrugated steel pipe material.

It is proposed that the channel be lined with rip-rap, underlain by a 0.15 m thick drainage layer and non-woven geotextile. The channel will have a trapezoidal cross-section, with a bottom width of 1.5 m, a lined depth of 1.5 m, a 0.1% minimum longitudinal slope, and 2H:1V side slopes. An allowance for caribou crossings is included in the design. The caribou crossing is conceptually designed as a 50 m long section of the channel with 5H:1V side slopes. The number, location, and characteristics of caribou crossings will be defined in the next stages of design in concert with wildlife trail mapping and discussions during community engagement programs.

### 4.4.3 Sumps

Two collection sumps are proposed for minewater management:

- **Jay Runoff Sump –** The Jay runoff sump will be located in a natural depression in the lakebed surface within the dewatered diked area to the west of the Jay Pit. Surface runoff water that flows into the diked area will naturally drain to the Jay runoff sump through a series of drainages and depressions within the diked area. A pumping system will be installed in these depressions to facilitate transfer to the Jay runoff sump, if required. The water collected in this sump will be pumped to the top of the Misery Pit.
- **Mine Inflows Sump –** The mine inflows sump will be located in a natural depression of the Lac du Sauvage lakebed within the diked area, near to the crest of the Jay Pit. Mine inflows (groundwater inflows and direct precipitation to the Jay Pit area) will be collected from temporary sumps in the pit and pumped to the mine inflows sump before being pumped to the base of the Misery Pit.

### 4.4.4 Dewatering Ramps

Rockfill ramps will be required in select locations along the dewatering pipeline alignment to provide access to the low spots within the isolated portion of Lac du Sauvage. The ramps will provide access to pump barges and will also serve as benches for the dewatering pipelines. The pump barges will be required in the deeper portions of the dewatered area. The ramps will extend from the dike to the barge locations. The typical dewatering ramp will have a crest width of 25 m.

## 4.5 Buildings and Infrastructure

### 4.5.1 Roads, Pipeline Benches, and Pads

A single haul road with spur roads will be constructed to connect the Jay Project to the Misery Road (Figure 4-1). The following site roads will be constructed:

- The **Jay Road** will connect the existing Misery Road with the south abutment of the Jay Dike. The road is the only crossing of the Lac du Sauvage esker and the only heavy vehicle connection to the remainder of the Ekati Mine.
- The **Jay North Road** will connect the Jay Road with the north abutment of the Jay Dike.
- The **Jay Pipeline Road** will connect the Jay Road with the crest of the Misery Pit. The road will be used as a platform for the dewatering pipelines.

- The **waste haul road** will connect the Jay Pit with the Jay WRSA.
- The **ore haul road** will connect the Jay Pit with the Jay Road, and will intersect the ore transfer pad.

A pipe bench will be constructed alongside the Jay Road where needed. The pipe bench will be located on the downslope side of the road to allow the placement of an overland power line on the upslope side. The pipe bench will deviate from the Jay Road near King Pond to follow the Jay Pipeline Road alignment.

Wildlife crossings are to be constructed in areas along the road alignment where wildlife movement is expected, and will be based on existing caribou trail mapping and discussions during community engagement, with wildlife specialists, and Dominion Diamond's environmental team.

Roads with a pipe bench will be approximately 30 m wide and will be constructed using granite to a standard that is safe for use by mine operating equipment. The pipeline routing will follow the road alignment to minimize the Jay Project footprint.

Lay-down areas will be constructed near the Jay pit using granite rock (Dominion Diamond 2014a, Section 3); however, wherever practicable, the existing facilities of the Misery workshop facility will be used.

The development of two temporary kimberlite stockpile areas (pads) is proposed as part of the Jay Project:

- A stockpile west of the south abutment close to the Jay Pit will be developed, which will occupy an area of approximately 0.16 $km^2$.
- A stockpile occupying an area of approximately 0.4 $km^2$ will be located at the junction of the Misery Road and the proposed Jay Road.

These storage areas, as well as the existing stockpile area at the Ekati Mine, will be used to temporarily store kimberlite from the Jay Project prior to it being hauled to the processing plant at the Ekati main camp as a means of providing necessary operational flexibility to accommodate brief road closures (e.g., due to weather or caribou). These pads will be constructed of granite and will be built in accordance with practices already implemented at the Ekati Mine.

### 4.5.2 Power Line

The power line will be located along the proposed Jay Road. The Jay power line will be an extension of the existing (under construction 2014) Misery power line from the Ekati central powerhouse to the Misery site. This continues the operating and environmental benefits of centralized diesel power generation.

### 4.5.3 Surface Facilities for Jay Pit Mining

A lunchroom, office, and washroom facility with temporary emergency shelter and supplies will be constructed near the Jay Pit. A magazine and a laydown/truck ready area will also be required.

### 4.5.4 Water Management Pumping and Pipeline Systems

As part of the water management system, the Jay Project will include the establishment of pipelines between the Jay Pit area and the Lynx and Misery pits. A pipe bench as described in Section 4.5.1 will be constructed to accommodate the pipelines, which will follow existing and proposed road alignments to minimize the project footprint. The pumping and pipeline systems will have three different arrangements to accommodate three separate stages of water management during the construction and operational phase of the Jay Project, named pumping system (PS) 1, PS2, and PS3.

The pumping system PS1 will be used during initial and final dewatering to pump water to Lac du Sauvage and to the Misery Pit, respectively. During operations, PS1 will be moved to the mine inflows sump and will be used to pump open-pit minewater to the base of the Misery Pit.

The pumping system PS2 will be used during initial and final dewatering to pump water to Lac du Sauvage and to the Misery Pit, respectively. During operations, PS2 will be moved to the Jay runoff sump and will be used to pump surface minewater to the top of the Misery Pit.

The pumping system PS3 will be used during initial and final dewatering to pump water to Lac du Sauvage and to the Misery Pit, respectively. During operations, PS3 will be moved to the Misery Pit and will be used to pump water from the top of the Misery Pit to Lac du Sauvage beginning in Year 5 of operations when the in-pit water level is projected to approach the maximum operating level.

A booster pumping and pipeline system will be installed at the Misery site to pump water to Lynx Pit during the final dewatering stage. Pipeline characteristics and pumping rates are provided in the MWMP (Dominion Diamond 2014a, Appendix 3A).

## 4.6 Water Quality

A water quality model was developed for the Jay Project during operations, closure, and post-closure stages. The water quality module was built into the water balance model using the GoldSim™ Version 11.1 contaminant transport module. This section has been prepared based on the information provided in the MWMP (Dominion Diamond 2014a, Appendix 3A) and it provides a summary of the water quality predictions for the closure and post-closure stages. The reader is referred to the Appendix 3A of Dominion Diamond 2014a for details on water quality predictions during the operations stage and for additional details on the closure and post-closure stages.

In summary, the water quality predictions for the post-closure stage are as follows (see section 5.4 for permanent closure and reclamation activity details):

- **Misery Pit:** The post-closure period for the Misery Pit will commence following back-flooding of the open pit (creation of the 60 m freshwater cap). At this time, the low density freshwater cap (mixolimnion) will overflow to Lac de Gras. The model incorporates conservative assumptions to incorporate the possibility of movement of a small amount of the denser water with elevated concentrations of TDS from the lower layer of the Misery Pit Lake (monimolimnion) into the upper layer and into the deep groundwater regime beneath the pit lake. The water quality predictions indicate the following:

- A component of the water stored in the monimolimnion may mix with the mixolimnion prior to layers' stabilization by density (meromictic conditions) being established in the Misery Pit Lake.
- Mixolimnion concentrations of all parameters are predicted to increase during the post-closure period to maximum long-term steady state concentrations approximately 200 years into the post-closure period, but the maximum concentrations will be much less than the peak concentrations observed during operations.
- Meromictic conditions will develop and will permanently isolate the monimolimnion from mixing with the freshwater cap in the Misery Pit.
- There will be no groundwater inflows to the pit during the post-closure period (the walls of the open pit will be surrounded with permafrost). Seepage that may move from the base of the open pit would be replaced with water stored in the mixolimnion. As a result, concentrations in the monimolimnion are predicted to decrease to the projected long-term steady state concentrations in the mixolimnion.

- **Jay Pit*:*** The water in the upper part of the Misery Pit will be pumped to the mined-out Jay Pit, followed by flooding with lake water pumped form Lac du Sauvage (for the creation of the freshwater cap). The water quality predictions indicate the following:
  - Meromictic conditions will develop following back-flooding of the Jay Pit, permanently isolating freshwater stored in the overlying mixolimnion. Because the concentrations in the monimolimnion will contain residual operational minewater, concentrations of TDS, chloride, nitrate, and total phosphorus will be elevated.
  - Prior to the development of meromictic conditions, some water stored in the Jay Pit monimolimnion may mix with the overlying mixolimnion.
- **Jay WRSA:** The water quality predictions consider that nitrate and ammonia will be present in the WRSA resulting from the use of ammonium nitrate fuel oil (ANFO) explosives in the mining of the Jay Pit. Because ANFO is highly soluble, it is expected that it will be leached from the WRSA through time. Depletion of nitrogen source term levels was not considered in the water quality model to provide a conservative loading to the Lac du Sauvage aquatic effects assessment. In fact, it is expected that long-term WRSA nitrate concentrations will be much lower than the values estimated by the model.

# 5.0 CLOSURE AND RECLAMATION ACTIVITIES

## 5.1 Reclamation Goal and Objectives

The reclamation goal for the Ekati Mine, as approved by the WLWB through the ICRP report (BHP Billiton 2011, 2012), is “to return the Ekati Mine site to viable, and wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment, human activities, and the surrounding environment.” The reclamation goal is supported by specific objectives and completion criteria for each type of development (e.g., open pits, underground workings, roads). The proposed closure and reclamation plan for the Jay Project facilities has been designed to fit into this established framework. The specific objectives for reclamation of the Lac du Sauvage dewatered area are presented in the MWMP (Dominion Diamond 2014a, Appendix 3A).

The proposed closure and reclamation activities for the Jay Project facilities and the Ekati Mine facilities that are covered in this conceptual closure plan (as listed in Sections 1.1 to 1.3), are described in the following sections. Where applicable, the closure and reclamation activities for temporary closure, progressive reclamation, and permanent closure have been adopted from the ICRP and the annual Interim Closure and Reclamation Plan Progress Reports (e.g., BHP Billiton 2012).

The *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* issued by the Mackenzie Valley Land and Water Board (MVLWB) and Aboriginal Affairs and Northern Development Canada (AANDC) (MVLWB/AANDC 2013) have been considered for the development of the closure and reclamation activities proposed in this section.

## 5.2 Temporary Closure Measures

### 5.2.1 Temporary Closure Activities

Temporary closure occurs when a mining operation ceases with the intent of later resuming activities. Temporary closure could be due to an unplanned closure or a planned closure of certain facilities in a complex mining project (MVLWB/AANDC 2013). These temporary closures could be short term (last for weeks) or long term (last for years).

The goal of temporary closure activities is to ensure the ongoing protection of humans, wildlife, and the environment, including necessary environmental monitoring during the cessation of mining activities until the mining operations can resume.

Temporary closure assumes that full operations would resume when the factors causing the shutdown are normalized. Therefore, it is assumed that no final closure of major mine components would be completed during this period and the current licensing and permitting agreements would continue to be in force.

The temporary closure measures outlined below would be dependent on the duration of the shutdown as well as on the stage of the Jay Project development.

Based on the temporary closure activities proposed in the existing approved ICRP (BHP Billiton 2011) and the Northwest Territories Closure and Reclamation Guidelines (MVLWB/AANDC 2013), the following activities would continue during a period of temporary closure:

- continue the inventory program in place, including inventory of chemicals, reagents, petroleum products and any other hazardous materials; these products would either be removed or continue to be secured;
- securely store on-site mobile equipment;
- maintain security to restrict access to the site to authorized personnel only;
- continue with ongoing monitoring and maintenance programs to ensure the stability and performance of all Jay Project components;
- continue with all activities required for the compliance with all applicable federal and territorial laws and regulations;
- continue water management and release of water that meets Water Licence criteria;
- place warning signs around the perimeter of the open pits and active components of the LLCF; and,
- block the Jay Pit access haul roads.

### 5.2.2 Temporary Closure Monitoring, Maintenance, and Reporting

The required monitoring and reporting during the temporary closure would be the same as the required monitoring procedures and reporting requirements carried during operations and in compliance with all applicable federal and territorial laws and regulations. The monitoring procedures and reporting requirements during operations will be defined in the Water Licence, Land Use Permits, Fisheries Authorization, and other environmental agreements for the Jay Project.

In the case of a temporary closure, the numbers of personnel on site would be reduced considerably relative to operational numbers. Staff present on site during temporary closure would be sufficient in number and expertise to successfully carry out care, maintenance, and monitoring duties and to respond to unplanned occurrences.

Sufficient equipment and supplies/reagents would be left on site for any maintenance or environmental protection activities that may need to take place.

## 5.3 Progressive Reclamation

### 5.3.1 Progressive Reclamation Activities

Progressive reclamation takes place prior to permanent closure to reclaim components and/or to decommission facilities when they no longer serve a purpose. These activities can be completed during operations with the available resources to reduce future reclamation costs, to reduce the duration of environmental exposure, and to enhance environmental protection. Progressive reclamation may shorten the time for achieving closure objectives and may also provide valuable experience on the effectiveness of certain measures that may be implemented during permanent closure (MVLWB/AANDC 2013).

The progressive reclamations activities proposed in the following sections are based on the current practices at Ekati for progressive reclamation provided in the existing approved ICRP (BHP Billiton 2011).

Progressive reclamation will make beneficial use of the operational resources available at the Ekati Mine to conduct the work efficiently. Conducting this work as progressive reclamation during the Jay Project rather than as "Final Closure" after cessation of mine operations will also provide valuable information for ongoing reclamation research and design projects that will enhance the Final Closure and Reclamation Plan. Generally speaking, progressive reclamation activities are scheduled for mine areas where there is no potential for future benefits or business opportunities or in areas where there is an opportunity to mitigate potential environment risk.

The progressive reclamation activities that will be completed as progressive reclamation during the Jay Project as listed in Section 1.2 are presented in the following section. The evaluation of implementation of other reclamation activities as progressive reclamation will be completed on an individual basis. The evaluation of these activities will consider potential future values and or any immediate environmental risks.

#### *5.3.1.1 Processed Kimberlite Containment Area*

The existing approved ICRP considers that the LLCF will be reclaimed during the closure stage of the Ekati Mine, after the mining operations have ceased. With the Jay Project, Cells A, B, and C of the existing LLCF will be progressively reclaimed during the operation of the project.

Cell B is no longer receiving FPK, and LLCF cover reclamation research is currently underway in Cell B. It is planned that research and reclamation activities will continue for Cell B and for the other Cells (A and C) when they are no longer operational.

The closure of these facilities would proceed as described in the existing approved ICRP.

#### *5.3.1.2 Pigeon Pit*

It is planned that the Pigeon Pit will be flooded due to potential concerns with exposed meta-sediment in the pit walls after open-pit mining operations have ceased. All flooding activities will be completed as described in the existing approved ICRP.

## 5.4 Permanent Closure and Reclamation

Permanent closure is the final closure of a mine site with no foreseeable intent by the existing proponent to return to either active exploration or mining. Permanent closure indicates that the proponent intends to have no activity on the site aside from post-closure monitoring and potential contingency actions. Permanent closure does not, however, preclude the proponent or another party from pursuing opportunities at the existing site or in the area at a time beyond the foreseeable future (MVLWB/AANDC 2013). It is possible that viable opportunities for ongoing use of site facilities by others may be identified, and these would be considered.

The following sections provide the permanent closure and reclamation activities for the facilities covered in this conceptual plan as listed in Sections 1.1 and 1.3. Where applicable, the closure and reclamation activities have been adopted from the existing approved ICRP (BHP Billiton 2011) for the Ekati Mine.

A general arrangement after permanent closure of the Jay Project facilities and the other Ekati facilities that are covered in this plan is shown in Figure 5-1.

## 5.4.1 Jay Project (New Ekati Mine Facilities)

### *5.4.1.1 Open Pit*

The Jay Pit will be back-flooded at closure. The total volume of water required to back-flood the diked area and Jay Pit, based on the information available to date, is summarized in Table 2.

**Table 2: Total Jay Project Back-Flooding Volume Requirement**

| Area | Volume at Completion (million $m^3$) | Total Volume at Completion (million $m^3$) | Start Back-Flooding |
|---|---|---|---|
| Jay Pit | 93.84 | 120.48 | Year 2030[(a)] |
| Diked area | 26.64 | | |

a) Back-flooding assumed to start in the winter of 2030 at the start of closure.
$m^3$= cubic metres.

At completion of mining the Jay pipe, and as part of the closure measures for the Misery Pit, the water level in the Misery Pit will be lowered to approximately 60 m below the final overflow elevation. This water is expected to have elevated concentrations of TDS and will be pumped into the mined-out Jay Pit, where it will occupy the lower half (based on elevation). Once this has been completed, the remaining volume will be back-flooded with water from Lac du Sauvage to create a freshwater cap. Water will come from a combination of runoff, precipitation, and from Lac du Sauvage. Water from Lac du Sauvage will be pumped over the dike in a controlled manner to control the generation of total suspended solids (TSS). Once water quality within the back-flooded area meets acceptability criteria, then the dike will be locally breached and the Sub-Basin B Diversion Channel will be regraded to promote natural drainage (see Sections 5.4.1.3.1 and 5.4.1.3.2 for details). Closure and post-closure water quality predictions are summarized in Section 4.6.

During the back-flooding period, the Sub-Basin B Diversion Channel will remain in place and will discharge into Lac du Sauvage; therefore, water from sub-basin B will not be used for back-flooding. Back-flooding will occur year round.

The proposed closure back-flooding procedure was modelled with GoldSim to predict the expected time for back-flooding, using the data presented in the Hydrology Baseline Report for modelling (Section 3.3.1; Dominion Diamond 2014a, Annex X). The predicted times for back-flooding the dewatered area are presented in Table 3.

**Table 3: Proposed Closure Back-Flooding Summary**

| Area | Estimated Time for Back-Flooding[(a)] | Back-Flooding Volume (million $m^3$) | Pumped Volume (million $m^3$) | Other Inflows (million $m^3$)[(b)] |
|---|---|---|---|---|
| Jay Pit | 1,135 days (approx. 3 years, 1 month) | 93.84 | 85.17 | 8.67 |
| Diked area | 247 days (approx. 8 months) | 26.64 | 25.02 | 1.62 |
| Total | 1,382 days (approx. 3 years, 9 months) | 120.48 | 110.20 | 10.28 |

a) Based on pumping rates described above with closure commencing on January 1, 2030.

b) Other Inflows include local precipitation within the diked area, seepage, and local runoff.

$m^3$ = cubic metres.

Based on the modelling results, back-flooding would be achieved in approximately four years (assuming average conditions). The back-flooding process is expected to have minimal impacts on the level and local hydrological regime in Lac du Sauvage and Lac de Gras (as summarized in Table 4 below). Specific percent reductions were provided for annual cumulative discharges and both the high and low discharges expected under the average meteorological conditions.

**Table 4: Regional Hydrological Effects Summary for Proposed Closure Back-Flooding**

| Area of Estimated Effect | Annual Water Discharge Reduction at Lake Outlet (%) | Reduction in Average High Flows (%) | Reduction in Average Low Flows (%) | Reduction in Average High Lake Levels (m) | Reduction in Average Low Lake Levels (m) |
|---|---|---|---|---|---|
| Lac du Sauvage | 15 | 14 | 24 | 0.05 | 0.05 |
| Lac de Gras[(a)] | 5 | 5 | 7 | 0.05 | 0.03 |

a) Lac de Gras is recharged by a catchment area of approximately 4,131 $km^2$. Average annual recharge of 620 million $m^3$ (GoldSim Model 2009-2040).

% = percent; m = metre; $km^2$ = square kilometre; $m^3$ = cubic metre.

Replacement of the proposed pumping system from Lac du Sauvage by control weirs, to be constructed in the dike at selected locations, will be evaluated in future as an alternative means for back-flooding the dewatered area.

### *5.4.1.2 Waste Rock Storage Area*

The Jay WRSA has been designed to remain in place after operations and it will be reclaimed in a manner similar to the existing WRSAs at the Ekati Mine. As described in Section 4.2, the Jay WRSA has been designed to be inherently and physically stable structure, both during mine operations and in the long term. It has been designed and will be constructed to minimize runoff and encourage permafrost formation through placement sequence of materials. The intent is that water infiltrating the waste rock will encounter permafrost conditions and freeze within the pile. This will limit runoff to the outer surface of the waste rock (i.e., the active layer).

Placement of the encapsulating cover will be completed during mine operations and will consist of placement of a granite cap (5 m cover of non-PAG waste rock) on top of any inactive areas of the Jay WRSA that have reached final grade.

Final reclamation may include levelling of the upper surface to discourage snow accumulation, and providing access/egress ramps for wildlife. Access/egress ramps for wildlife may be in place during the operations stage; additional ramps will be constructed as part of the closure stage, if required. The location of wildlife ramps will be determined in discussion with communities and regulators.

If WRSA seepage requires active management during the operations stage of the Jay Project, construction of seepage management structures (i.e., collection sumps) may be required. These structures will be decommissioned once water quality monitoring results from the WRSA demonstrate that water quality is acceptable. Sumps would be backfilled with local soils to prevent dusting and erosion.

### *5.4.1.3 Dike, Channel, Sumps, and Dewatering Ramps*

#### 5.4.1.3.1 Dike

Once the water quality within the back-flooded area of Lac du Sauvage has been demonstrated to be suitable for direct mixing with the lake, the dike will be strategically breached in local areas. A schematic sketch of the breaching concept and the proposed dike breaching locations is provided in Figure 5-1. Considerations for the breaches are as follows:

- The water level on the Lac du Sauvage side of the dike cannot be lowered to enable the breaching work to be completed “in the dry.” Therefore, water levels will be approximately equalized on both sides of the dike by back-flooding the dewatered area in a controlled manner prior to dike breaching.
- During excavation of the breaches, silt curtains or other sediment/turbidity mitigation measures will be utilized to reduce risks to water quality, where necessary.
- The dike will be breached to a depth of approximately 2 to 3 m below the minimum water level at Lac du Sauvage to account for ice formation, fish passage, and navigable water requirements. Excavated materials (crushed granite rock) will be locally placed to extend shallower areas on the residual sides of the dike and breaches.
- Rockfill material from the breach excavation, or other appropriate erosion mitigation measures, will be installed as necessary to provide for long-term physical stability of the dike breach slopes.

The riparian (shoreline) and littoral (shallow) areas within the diked area will be reclaimed where necessary to enable natural regrowth of riparian and aquatic vegetation. The reclamation work is envisioned to include localized repair of erosion, and re-vegetation of select areas with aquatic and riparian plants. This work will be based on experience gained through reclamation research, operations and closure of other areas of the Ekati Mine.

#### 5.4.1.3.2 Sub-Basin B Diversion Channel (Christine Lake Outflow Diversion)

The Sub-Basin B Diversion Channel (Christine Lake outflow diversion) will be regraded to promote drainage through the natural drainage pattern to Lac du Sauvage once the water quality in the back-flooded area meets acceptability criteria. The reclaimed diversion channel will be made safe for movement of wildlife, particularly caribou, and people.

#### 5.4.1.3.3 Sumps

The Jay runoff sump and the mine inflows sump will be back-flooded during the back-flooding of the diked area.

#### 5.4.1.3.4 Dewatering Ramps

The rockfill ramps area will be back-flooded during the back-flooding of the diked area.

### *5.4.1.4 Buildings and Infrastructure*

#### 5.4.1.4.1 Roads, Pipeline Benches, and Pads

The reclamation of these facilities will be carried out following procedures described in the existing approved ICRP.

Roads will be finally decommissioned once they are no longer required for post-closure monitoring and maintenance. Access roads will be regraded to promote natural drainage and to create microsites for natural plant colonization. This will also allow the surface to be safe for wildlife use and travel. Culverts will be removed.

Reclamation of pads will be completed after the above ground structures have been removed, and an environmental site assessment has been completed where appropriate (i.e., known hydrocarbon or other spills). Revegetation may be completed in areas with physical characteristics suitable to establish and support vegetation, as required.

Stored soil materials will be used in critical areas to improve the growth medium, and therefore aid in recovery of vegetation.

#### 5.4.1.4.2 Power Line

The power poles and lines will be reclaimed by removal for salvage or disposal at the on-site landfill.

#### 5.4.1.4.3 Surface Facilities for Jay Pit Mining

The reclamation of these facilities will be carried out as per the existing approved ICRP.

Surface facilities that support the Jay Project will be decommissioned once they are no longer required for post-closure monitoring and maintenance. They areas will be reclaimed in a manner similar to that used for the laydown pads (see Section 5.4.1.4.1).

#### 5.4.1.4.4 Water Management Pumping and Pipeline Systems

The reclamation of these facilities will be carried out as per the existing approved ICRP.

All water lines and pumping systems will be dismantled and removed off site for salvage or disposed of at the on-site landfill. The disturbed areas along the water lines will be reclaimed with the adjacent road (see Section 5.4.1.4.1 for details on road and bench decommissioning).

## 5.4.2 Ekati Mine Facilities

### *5.4.2.1 Open Pits*

#### 5.4.2.1.1 Mined-out Misery Pit

The recommendations for the Misery Pit back-flooding have been prepared considering the reclamation goal and objectives established for the Ekati Mine and the Jay Project.

Final closure of the Misery Pit will involve lowering the in-pit water level (resulting from the dewatering and operation stages of the Jay Project) to approximately 60 m below the final overflow elevation by pumping water into the mined-out Jay Pit once the Jay Project operations have ceased, and then creating a 60 m cap of fresh water pumped from Lac du Sauvage above the elevated TDS water in the Misery Pit. The remaining elevated TDS laden water will remain in the lower part of the Misery Pit following the creation of the freshwater cap due to density stratification. A combination of catchment area runoff, precipitation, and fresh water pumped from Lac du Sauvage will be used to create the freshwater cap. Consideration may be given during future stages of design to pumping freshwater from Lac de Gras instead. Closure and post-closure water quality predictions are summarized in Section 4.6.

The volume for the top 60 m of the Misery Pit is approximately 16.75 million $m^3$. It is expected that this volume will be pumped from Lac du Sauvage in 443 days. Once the freshwater cap is created and water quality has been demonstrated to be suitable for discharge, a hydraulic connection to the natural channel to Lac de Gras will be re-established to allow for discharge of water overflows from the surface of the Misery Pit Lake to the environment as described in the existing approved ICRP.

The existing approved ICRP considers flooding the Misery Pit with water from Lac de Gras. The Misery Pit back-flooding scenario proposed for the Jay Project is an enhancement over the existing approved ICRP because it results in a smaller volume of freshwater that will be required (i.e., approximately 16.75 million $m^3$ for the cap creation versus the current estimate of approximately 40 million $m^3$ from Lac de Gras for flooding the open pit). Other aspects of reclamation of the Misery Pit would proceed as described in the existing approved ICRP.

#### 5.4.2.1.2 Mined-out Panda and Koala Pits

As presented in Section 4.1.3, the Panda and Koala pits will be the primary deposition locations for processed kimberlite resulting from the Jay Project. The processed kimberlite will be deposited in the Koala and Panda pits to a maximum elevation of 30 m below the final overflow elevation during mining of the Jay pipe.

This design constraint for in-pit deposition of processed kimberlite at a maximum elevation of 30 m below the final pits overflow elevation 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 2014c). Therefore, Dominion Diamond could conduct additional technical studies in future to optimize a site-specific depth of water required over FPK for closure and reclamation.

After Jay pipe mining 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 existing approved ICRP considers flooding these pits and the associated underground workings by pumping freshwater into the pits. The placement of the processed kimberlite from the Jay Project will reduce the freshwater pumping requirement relative to that stated in the ICRP (i.e., approximately 19 million $m^3$ versus the current estimate of approximately 80 million $m^3$). This will reduce pumping requirements from source lakes. Other aspects of reclamation of the Panda and Koala pits would proceed as described in the existing approved ICRP.

#### 5.4.2.1.3 Lynx Pit

Closure of the Lynx Pit was initially proposed to consist of back-flooding using water from Lac de Gras.

As part of the Jay Project, the Lynx Pit will be used as a settling facility for TSS laden water during the final dewatering of the diked area of Lac du Sauvage (in conjunction with the Misery Pit). This approach accomplishes the proposed reclamation of the Lynx Pit using water from the diked area rather than Lac de Gras, and avoids the consideration of additional water management/settlement facilities for the Jay Project.

The Lynx Pit has an estimated maximum storage capacity of approximately 5.2 million $m^3$. However, only 4.9 million $m^3$ of TSS laden water will be pumped to the Lynx Pit. For final closure, the approximate 3 m or 300,000 $m^3$ remaining volume will be filled with natural net inflows. It is expected that this volume will be filled in 2.5 years, and this time is expected to be sufficient to allow for TSS settling within the Lynx Pit Lake. After the 2.5 years, runoff reporting to the Lynx Pit Lake will discharge through the natural Lynx channel to Lac de Gras. Other aspects of reclamation of the Lynx Pit would proceed as described in the existing approved ICRP.

### 5.4.3 Ekati Mine Facilities Used by Jay Project

The use of the following Ekati Mine facilities will continue during the Jay Project, and the closure and reclamation of these facilities will be carried out after the Jay Project operations have ceased and there is no further value in them. The closure and reclamation plan for the facilities listed below will not require significant modifications and in general will be undertaken as part of the existing approved ICRP:

- processing plant and associated facilities;
- Ekati main camp, airstrip, explosives storage and manufacture facilities, and associated facilities;
- Misery camp and associated facilities;
- Cells D and E of the existing LLCF; and,
- Misery Road.

## 5.5 Community Engagement in Closure Aspects

Community engagement is an important component of the closure and reclamation activities for the Ekati Mine, and therefore of the closure and reclamation activities for the Jay Project. The Ekati Mine operates under a Community Engagement Plan that is a requirement of the Water Licence and that has been approved by the WLWB. Engagement that was conducted specifically for the most recent version of the Ekati Mine ICRP is described in the *Ekati Diamond Mine, Interim Closure and Reclamation Plan* (BHP Billiton 2011).

Engagement has been underway on all aspects of the Jay Project through 2013 and 2014, and will continue into the future through and beyond the Environmental Assessment. Engagement activities specific to the Jay Project are described in Section 4 of the DAR (Dominion Diamond 2014a).

# 6.0 POST-CLOSURE MAINTENANCE AND MONITORING

Monitoring for physical and chemical stability and maintenance of the reclaimed facilities will be required after closure and during post-closure until closure objectives and criteria are met (ultimate closure conditions are reached).

Post-closure monitoring is discussed in the ICRP (BHP Billiton 2011, Appendix 5.1-6). The monitoring programs that will have been in place for mine operations will be used as basis and adapted to meet closure and post-closure specific needs.

Post-closure monitoring for the closure and reclamation of the Jay Project facilities will be incorporated into the post-closure monitoring programs identified in the ICRP, including the following:

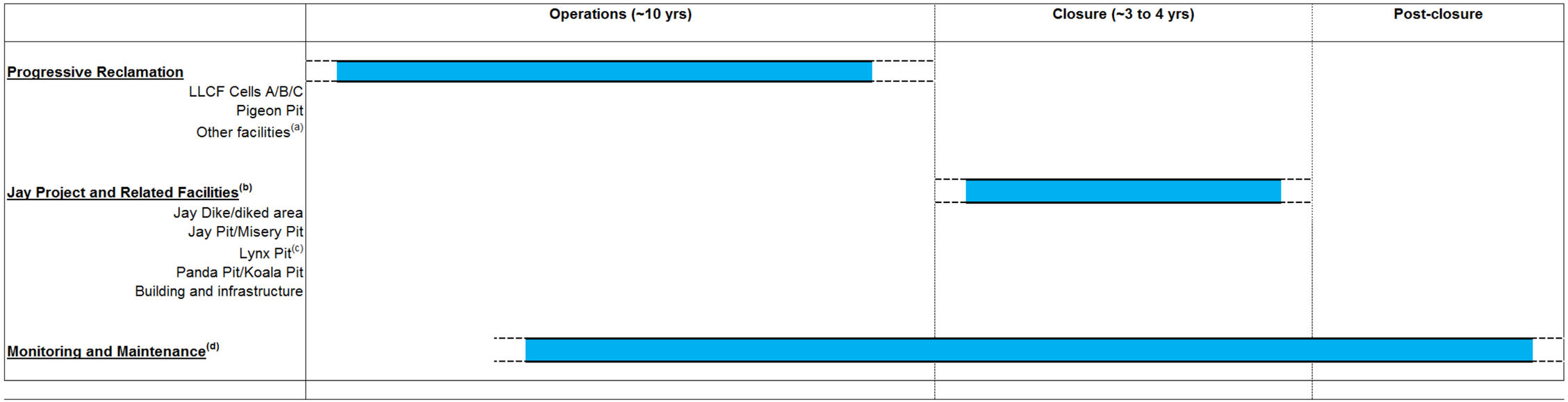
- Aquatic Effects Monitoring Program;
- Surveillance Network Program;
- Geotechnical Inspections;
- Air Quality Monitoring Program;
- Vegetation Monitoring Program;
- Health, Safety, Environment and Community and ISO 14001 audits;
- Inspections for the *Mine Health and Safety Act*;
- Seepage Monitoring Program; and,
- Archaeology Monitoring Program.

The ICRP establishes general post-closure monitoring timeframes of 5 to 10 years following reclamation of an area or facility. Individual component timeframes would be established and periodically reviewed on a case-by-case basis depending on monitoring results and other circumstances. It is expected that monitoring of the physical stability of the dike will cease once it is breached. Water quality monitoring will be required at Lac du Sauvage for a period after the dike is breached,

# 7.0 CLOSURE SCHEDULE

A conceptual reclamation schedule is provided in Table 5.

**Table 5: Conceptual Reclamation Schedule**




a) Other facilities may be evaluated for progessive reclamation on a case-by-case basis.
b) Reclamation of Jay Project facilities takes place over a three-year period, except the Jay Dike/diked area over four years.
c) Lynx Pit shown with Jay Project facilities because it serves as an operational contingency through operations.
d) Monitoring and Maintenance typically considers a component-specific 5- to 10-year timeframe following reclamation of individual components.
yrs = years; ~ = approximately; LLCF = Long Lake Containment Facility.

# 8.0 CLOSURE

The reader is referred to the Study Limitations, which precede the text and form an integral part of this report.

We trust the above meets your present requirements. If you have any questions or requirements, please contact the undersigned.

**GOLDER ASSOCIATES LTD.**

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Ken Bocking, P.Eng.
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John Cunning, P.Eng.
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Ermanno Rambelli, P.Geo. (BC)
Associate, Senior Engineering Geologist
Project Manager

IM/KAB/PC/ER/JCC/jc/kp/rs/it

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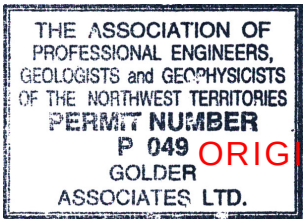



ORIGINAL SIGNED

# REFERENCES

BHP Billiton (BHP Billiton Canada Inc.). 2011. Ekati Diamond Mine, Interim Closure and Reclamation Plan. Submitted to Wek'èezhìi Land and Water Board. Dated August 2011. Project 0648-105-01, Report Version 2.4.

BHP Billiton. 2012. Ekati Diamond Mine, 2012 Annual Interim Closure and Reclamation Plan Progress Report (pages 35 to 42).

CCME (Canadian Council of Ministers of the Environment). 2001. Canadian Sediment Quality Guidelines for the Protection of Aquatic Life: Introduction. Updated. Canadian Environment Quality Guidelines, 1999. Winnipeg, MB, Canada.

Dominion Diamond (Dominion Diamond Ekati Corporation). 2013. NI43-101 Technical Report- Ekati Diamond Mine, Northwest Territories, Canada. Prepared by M. Heimersson and J. Carlson. Dated May 24, 2013.

Dominion Diamond. 2014a. Developer's Assessment Report for the Jay Project. Yellowknife, NWT. Canada.

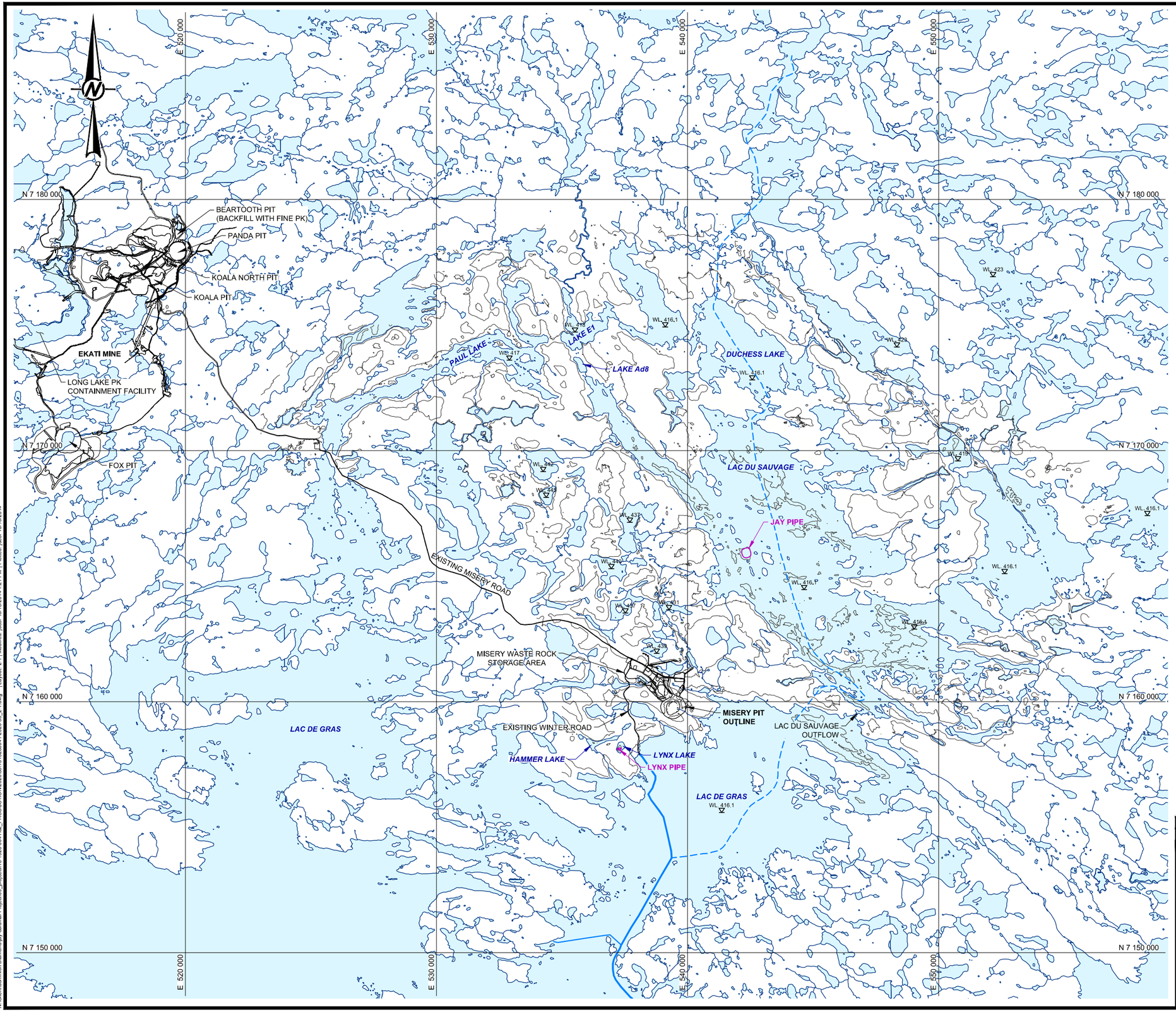
Dominion Diamond. 2014b. Waste Rock and Ore Storage Management Plan (WROMP): Version 4.1, January 2014.

Dominion Diamond. 2014c. Wastewater and Processed Kimberlite Management Plan (WPKMP): Version 4.1, May 2014.

Golder (Golder Associates Ltd.). 2014a. Jay Project Geotechnical and Hydrogeological Field Investigation Factual Report Vol. 1: Proposed Dikes. Prepared for Dominion Diamond Ekati Corporation. July 23, 2014.

MVLWB/AANDC (Mackenzie Valley Land and Water Board / Aboriginal Affairs and Northern Development Canada). 2013. Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. November 2013.

NBCC (National Building Code of Canada). 2010. 2010 National Building Code Seismic Hazard Calculation. Available at: http://www.earthquakescanada.ca. Accessed: July 8, 2014.




## LEGEND

- WATERBODY
- WATERCOURSE
- EXISTING ROAD
- WINTER ROAD - ON DEMAND CONSTRUCTION
- WINTER ROAD - YEARLY CONSTRUCTION
- KIMBERLITE PIPE LOCATION
- WATER LEVEL ELEVATION

## NOTES

1. ALL UNITS ARE IN METRES UNLESS OTHERWISE NOTED.
2. ELEVATIONS ARE IN METERS ABOVE SEA LEVEL (masl).
3. COORDINATES ARE SHOWN IN DATUM: NAD 83, PROJECTION: UTM ZONE 12.

## REFERENCES

1. CONTOUR AND BATHYMETRIC DATA PROVIDED BY AURORA GEOSCIENCES LTD., FILE: Final 1m Contours - Priority Area.dxf, DATE RECEIVED: OCTOBER 29, 2013
2. WATER OBTAINED FROM CANVEC NATURAL RESOURCES CANADA, 2012.
3. JAY PIPE LOCATION RECEIVED FROM DOMINION DIAMOND CORPORATION, FILE: jay_kimberlite_pipe_OL.dxf, DATED: JULY 19, 2013.
4. LYNX PIPE LOCATION RECEIVED FROM DOMINION DIAMOND CORPORATION, FILE: lynx_polyline.dxf, DATED: JUNE 25, 2013.

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PROJECT
DOMINION DIAMOND™
JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
# GENERAL LOCATION PLAN

Golder Associates

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| PROJECT No. | 13-1328-0041.2020.55 | | FILE No. | 1313280041-2020-55_2-1 | |
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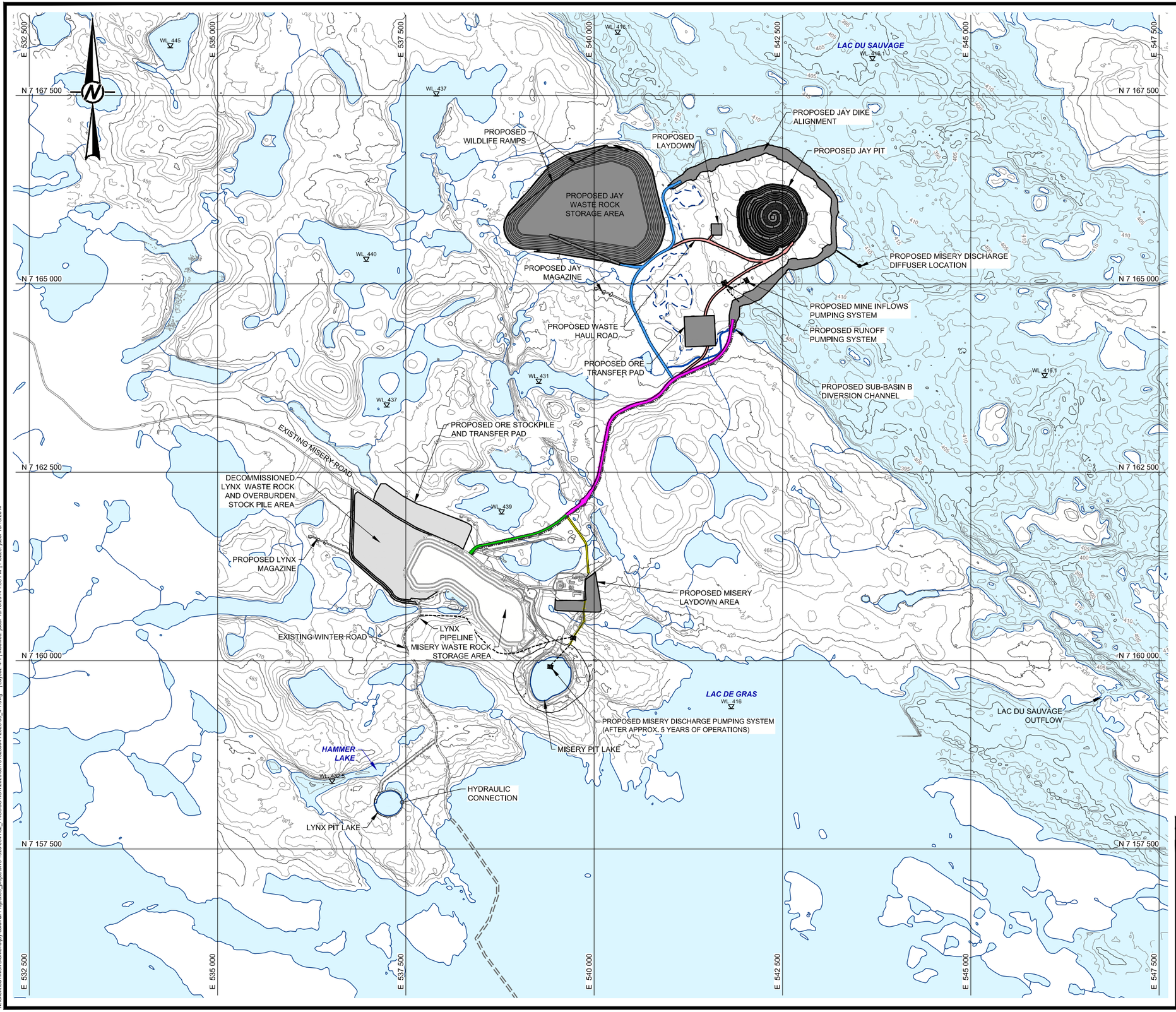


## LEGEND

- WATERBODY
- WATERCOURSE
- EXISTING SHORELINE OF DEWATERED AREA
- ROAD
- WINTER ROAD - YEARLY CONSTRUCTION
- PROPOSED PUMPING SYSTEM
- PROPOSED POWER LINE
- WL — WATER LEVEL ELEVATION

**JAY PROJECT FOOTPRINT**

- PROPOSED DIVERSION CHANNEL
- PROPOSED MISERY DISCHARGE
- PROPOSED JAY PROJECT INFRASTRUCTURE
- PROPOSED JAY ROAD NORTH (HAUL ROAD)
- PROPOSED JAY ROAD (HAUL ROAD AND POWER LINE)
- PROPOSED JAY ROAD (HAUL ROAD, PIPELINE AND POWER LINE)
- PROPOSED JAY PIPELINE ROAD (ACCESS ROAD AND PIPELINE)
- PROPOSED WASTE AND ORE HAUL ROADS

**LYNX PROJECT FOOTPRINT**

- LYNX PROJECT INFRASTRUCTURE

## NOTES

1. ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (masl).
2. GROUND SURFACE AND BATHYMETRY CONTOURS ARE SHOWN AT 5 m INTERVALS.
3. COORDINATES ARE SHOWN IN DATUM: NAD 83, PROJECTION: UTM ZONE 12.
4. PIPELINES, AND POWER LINE ARRANGEMENT TO BE DETAILED AS PART OF FURTHER PRE-FEASIBILITY DESIGN. APPROXIMATE CORRIDOR WIDTHS ARE SHOWN.

## REFERENCES


1. CONTOUR AND BATHYMETRIC DATA PROVIDED BY AURORA GEOSCIENCES LTD., FILE: Final 1m Contours - Priority Area.dxf, DATE RECEIVED: OCTOBER 29, 2013.
2. WATER OBTAINED FROM CANVEC NATURAL RESOURCES CANADA, 2012.


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PROJECT

DOMINION DIAMOND™

JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE

# GENERAL ARRANGEMENT AT THE END OF JAY MINING

Golder Associates

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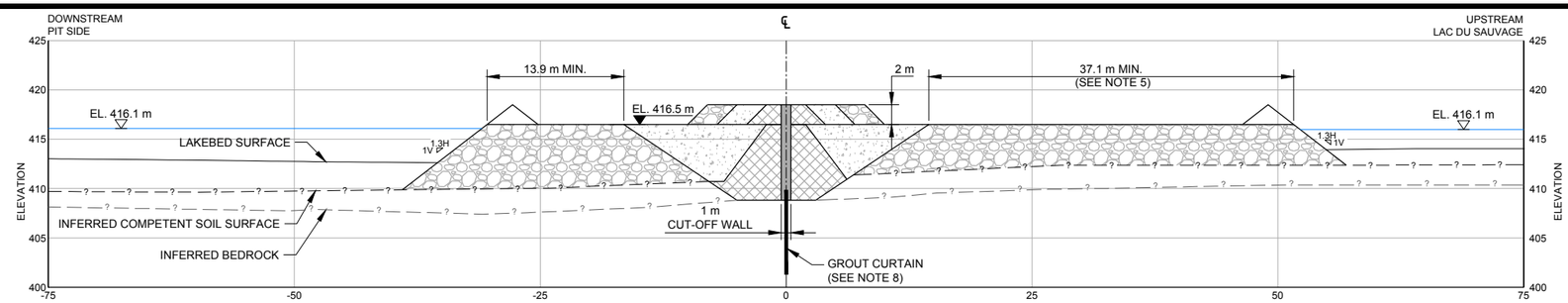


1 - **SHALLOW SECTION - BEDROCK ABOVE 408 masl**
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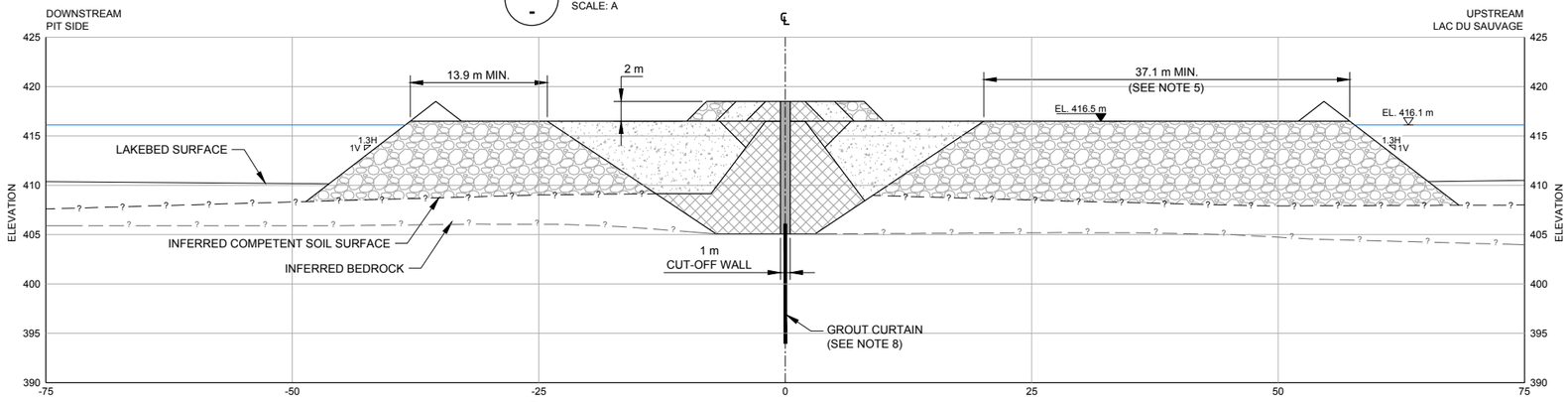


2 - **INTERMEDIATE SECTION - BEDROCK BETWEEN 408 AND 402 masl**
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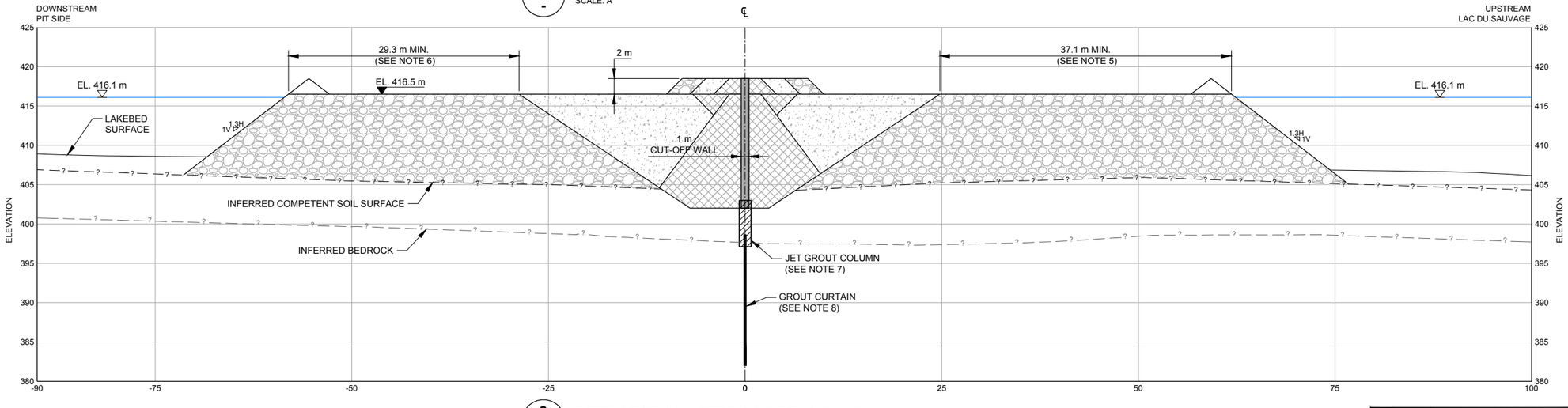


3 - **DEEP SECTION - BEDROCK BELOW 402 masl**
SCALE: A

## LEGEND

- COARSE FILTER
- FINE FILTER
- ROCKFILL
- SAFETY BERM
- CUT-OFF WALL (CEMENT SOIL BENTONITE)
- JET GROUT COLUMN
- GROUT CURTAIN
- LAKE LEVEL
- LAKEBED SURFACE
- INFERRED COMPETENT SOIL SURFACE
- INFERRED BEDROCK SURFACE

## NOTES

1. ALL UNITS IN METRES UNLESS OTHERWISE NOTED.
2. ELEVATION IN METRES ABOVE SEA LEVEL.
3. COMPETENT SOIL AND BEDROCK SURFACES INTERPRETED FROM 2014 GEOTECHNICAL INVESTIGATION AND 2014 GEOPHYSICS SURVEY.
4. UPSTREAM WIDTH OF 37.1 m IS REQUIRED TO ALLOW 2-WAY HAULAGE. DOWNSTREAM WIDTH OF 29.3 m IS REQUIRED FOR THE DOWNSTREAM SIDE OF THE DEEP SECTION TO ALLOW 1-WAY HAULAGE.
5. A 23.4 m WIDE HAUL ROAD WILL BE MAINTAINED AT ALL TIMES.
6. A 15.6 m WIDE HAUL ROAD WILL BE MAINTAINED AT ALL TIMES.
7. JET GROUTING TO TIE INTO CUT-OFF WALL AND BEDROCK BY A MINIMUM OF 1.0 m AND 0.5 m RESPECTIVELY. LENGTH OF JET GROUT COLUMN VARIES BASED ON DEPTH TO BEDROCK.
8. GROUT CURTAIN TO TIE INTO CUT-OFF WALL OR JET GROUTING BY A MINIMUM OF 1.0 m. DEPTH OF GROUT CURTAIN WILL VARY BASED ON HYDRAULIC HEAD AND ROCK QUALITY.

## REFERENCE

1. DRAFT JAY PROJECT PRE-FEASIBILITY DIKE DESIGN. GOLDER, 2014.

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JAY PROJECT
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TITLE
**TYPICAL DIKE SECTIONS**

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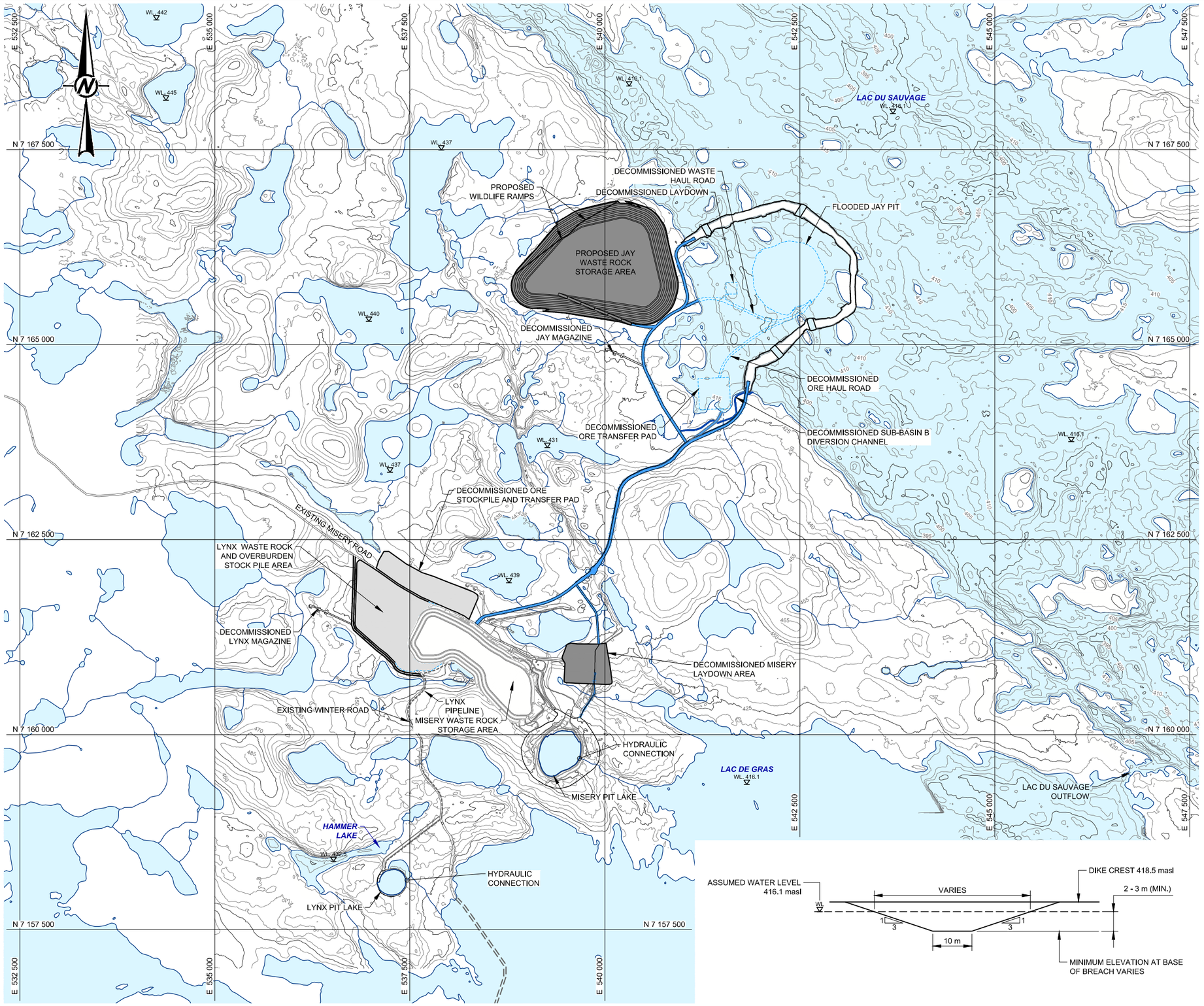


PLAN
SCALE: A




TYPICAL DIKE BREACHING PROFILE
SCALE: B

## LEGEND

- WATERBODY
- WATERCOURSE
- ROAD
- WINTER ROAD - YEARLY CONSTRUCTION
- WL WATER LEVEL ELEVATION
- PROPOSED DIKE BREACH LOCATION

**JAY PROJECT FOOTPRINT**

- DECOMMISSIONED DIVERSION CHANNEL
- DECOMMISSIONED JAY PROJECT INFRASTRUCTURE
- DECOMMISSIONED JAY ROADS
- JAY ROADS / PIT OUTLINE UNDER WATER

**LYNX PROJECT FOOTPRINT**

- LYNX PROJECT INFRASTRUCTURE

## NOTES

1. ELEVATIONS ARE IN METRES ABOVE SEA LEVEL (masl).
2. GROUND SURFACE AND BATHYMETRY CONTOURS ARE SHOWN AT 5 m INTERVALS.
3. COORDINATES ARE SHOWN IN DATUM: NAD 83, PROJECTION: UTM ZONE 12.
4. FINAL LOCATION OF DIKE BREACHES TO BE DETERMINED IN DETAILED DESIGN.

## REFERENCES


1. CONTOUR AND BATHYMETRIC DATA PROVIDED BY AURORA GEOSCIENCES LTD., FILE: Final 1m Contours - Priority Area.dxf, DATE RECEIVED: OCTOBER 29, 2013
2. WATER OBTAINED FROM CANVEC NATURAL RESOURCES CANADA, 2012.


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JAY PROJECT
NORTHWEST TERRITORIES, CANADA

TITLE
# CONCEPTUAL CLOSURE PLAN

Golder Associates

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| REVIEW | KB | 2014-10-16 | | | |

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