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Ekati Diamond Mine
2014 Closure and Reclamation Progress Report

December 2014

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December 31, 2014

Wek'èezhìi Land and Water Board
#1, 4905-48th Street
Yellowknife, NT X1A 3S3

Attention: Ms. Violet Camsell-Blondin, Chair

Dear Ms. Camsell-Blondin

2014 Closure and Reclamation Progress Report

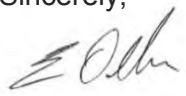
Dominion Diamond Ekati Corporation (DDEC) is pleased to provide its annual 2014 Closure and Reclamation Progress Report. The purpose of the report is to meet DDEC's annual regulatory water licence reporting requirements (Part K Item 4 of the Ekati Mine Water Licence, W2012L2-0001).

Section 6 is designated for WLWB approval and outlines ICRP updates. New ICRP updates are proposed as a result of new permitted Ekati developments at Lynx, Pigeon and Misery Powerline. Additionally, the previously proposed and reviewed 2013 ICRP update around the change in landfill closure objective is resubmitted in this report as per the WLWB's request. Some updates outlined in this section represent the inclusion into the ICRP of items that have already been approved by the WLWB through other means. For example, reclamation measures for the future Lynx site have already been reviewed and approved by the WLWB as part of the project permitting. As such, these items are not intended for further review and approval, only for the WLWB's confirmation that they have been accurately incorporated into the ICRP.

Section 7 is also designated for WLWB approval and outlines proposed updates to the RECLAIM security estimate, most of which are the resultant cost implications of the proposed ICRP updates calculated within the already-established RECLAIM model. The proposed security updates include newly proposed 2014 updates and all of the previously proposed 2013 updates that were deferred by the WLWB. A revised RECLAIM security estimate that incorporates all proposed 2013 Security Updates and new updates proposed for 2014 has been provided. DDEC is of the view that the WLWB has the appropriate information at hand to conduct a review and approval of all of the proposed security updates. DDEC requests that the WLWB amend Schedule 2 of the Water Licence accordingly based on approval of the RECLAIM estimate updates.

Should you have any questions related to the contents of the report, please contact Lukas Novy, Senior Environment Advisor - Closure and Reclamation at lukas.novy@ Ekati.DDCORP.ca or the undersigned at eric.denholm@Ekati.DDCORP.ca.

Sincerely,



Eric Denholm, Superintendent - Traditional Knowledge and Permitting

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1. Introduction

1.1 Interim Closure and Reclamation Plan

Reclamation planning at Ekati is guided by the Reclamation Goal "to return the Ekati site to viable, and wherever practicable, self-sustaining ecosystems that are compatible with a healthy environment, human activities, and the surrounding environment". The Ekati Diamond Mine Interim Closure and Reclamation Plan (ICRP) Version 2.4 was approved by the Wek'eezhii Land and Water Board (WLWB) in November 2011, with various updates approved by the WLWB through these annual progress reports.

The ICRP is interim in nature because Dominion Diamond Ekati Corporation (DDEC) is still in the process of mining operations, learning from environmental monitoring, and undertaking various research studies that assist with how the mine will be successfully reclaimed. A final closure plan is required to be submitted at least 2 years before end of mining operations under the Ekati Mine Water Licence (W2012L2-0001).

1.2 Report Purpose

The 2014 Closure and Reclamation Plan Progress Report (Progress Report) is intended to meet DDEC's annual regulatory water licence reporting requirements, which are to highlight and report reclamation progress and recommend revisions to future reclamation planning. The water licence requirement for annual closure and reclamation reporting is:

- Water Licence W2012L2-0001, Part K Item 4: "The Licensee shall submit an annual Closure and Reclamation Plan Progress Report which shall be in accordance with direction from the Board".

2. Engagement

2.1 Introduction

DDEC engages with potentially affected communities and stakeholders in an open, timely, and comprehensive manner. Community engagement activities are completed on a regular and routine basis as part of its management of the Ekati Mine in accordance with the WLWB-approved Engagement Plan. DDEC works to give Traditional Knowledge (TK) full consideration along with other scientific knowledge and a specific Reclamation Research Plan RP 7.1 has been designed for the inclusion of traditional knowledge into closure and reclamation planning activities.

2.2 Reclamation Site Visits

In 2014 Ekati reclamation engagement efforts were orientated towards community and regulatory site visits of specific reclamation projects including Cell B Long Lake Containment Facility Reclamation Research (LLCF), Panda Diversion Slope Stabilization, and Old Camp Reclamation (Appendix A).The site tours and discussion were an effective means of observing reclamation success and discussing closure and reclamation planning.

2.3 Technical Conferences

The geochemical and geotechnical results of the 2013 LLCF Site Investigation program were presented at the 2013 and 2014 Yellowknife Geoscience Forums as follows:

- Ekati Diamond Mine: Long Lake Containment Facility Pore Water Geochemistry– B.L. Bailey, K.L. Norlund, M. Wen, L. Novy, and H. Butler.
- 2013 Geotechnical Investigation at the Long Lake Containment Facility, at Ekati Diamond Mine – E.A. Garven, L. Novy, and G. Koop.

The Yellowknife Geoscience Forum is annual event that enables the exchange of information on mineral and petroleum exploration, resource development activities, and government and academic geoscience research across Canada's North. Through the forum DDEC engages with various groups on reclamation work being completed at Ekati and also reclamation being completed at other areas in the North. DDEC has recently submitted an abstract on LLCF reclamation research for the 2015 Mine Closure Conference. Mine Closure is an internationally recognized conference that provides industry specialists with an opportunity to share the latest research findings and leading practices in mine closure. DDEC considers presenting LLCF reclamation research as a

good opportunity to provide exposure and technical insight into the research being completed and also discussion of new ideas for future closure planning and research.

2.4 IEMA Closure and Reclamation Workshop

On December 3, 2014 a presentation around Cell B Reclamation Research, Old Camp Reclamation and Panda Diversion Slope Stabilization was provided by DDEC at a community workshop organized by the Independent Environmental Monitoring Agency (see Appendix B for presentation). The overall intent of the presentation was to provide reclamation updates to community members and also help facilitate discussion on future reclamation planning.

2.5 Lynx Project Reclamation Engagement

In September 2013, Dominion Diamond Ekati Corporation (Dominion Diamond) submitted an application to the Wek´èezhìi Land and Water Board (WLWB) requesting a Land Use Permit and Water Licence to enable mining of the Lynx kimberlite pipe as an extension of current mining activities at the Misery site. A Land Use Permit and Water Licence Amendment were issued by the Wek'eezhii Land and Water Board in June 2014. The review and approval included the associated "Lynx" reclamation measures and reclamation security. As part of this project DDEC conducted community and regulatory engagement, which included reclamation of the new planned facilities, according to the approved Ekati Mine Engagement Plan. Additionally, the regulatory review process provided engagement, which included reclamation of the Lynx site. The Lynx Land Use Permit requires that the approved Lynx reclamation measures be incorporated into the ICRP through this Progress Report (see section 6).

2.6 Jay Project Reclamation Engagement

In October 2013, Dominion Diamond Ekati Corporation (Dominion Diamond) submitted an application to the Wek´èezhìi Land and Water Board (WLWB) requesting a Land Use Permit and Water Licence to enable mining of the Jay kimberlite pipe (Jay pipe) as an extension project of the Ekati Diamond Mine (Ekati Mine). The Jay Project is currently undergoing environmental assessment by the Mackenzie Valley Environmental Impact Review Board and no development work has been conducted to date. As part of this project DDEC has completed a significant engagement effort according to the approved Ekati Mine Engagement Plan. Community and regulatory engagement for the Jay Project are outlined in Section 4 of the Developer's Assessment Report, which is publicly available on the website of the Mackenzie Valley Environmental Impact Review Board. As part of the overall engagement, reclamation of proposed new facilities and changes to reclamation of current Ekati facilities was outlined and discussed.

Information collected from this engagement was utilized in the development of closure measures for the Jay Project and is provided in Section 3.0 of the Developer's Assessment Report. DDEC will continue its engagement on all aspects of the Jay Project, including reclamation, in addition to the on-going engagement conducted through the environmental assessment process. Changes to the ICRP from the Jay project would be incorporated into the ICRP if the Project is approved.

3. Mine Scheduling

3.1 Current Schedule

Scheduling of mine operations at the Ekati Mine is reviewed and updated routinely based on a number of operational, economic and business factors. The scheduling of reclamation research and activities presented in this report is based on the current general mine schedule that extends to 2019.

1. **Fox**
   - Open pit operations ended in 2014.
   - Assessment of the potential for mining the lower benches of the open pit and the deeper parts of the Fox kimberlite pipe are ongoing.
2. **Pigeon**
   - Construction of waste rock storage area pad and open pit access road and water diversion berms commenced in 2014.
   - Open pit operations is planned to commence in 2015.
3. **Misery**
   - Open pit is in operations.
4. **Panda**
   - Open pit operations have been completed, and the lower section of the pit has been reclaimed in preparation for pit flooding.
   - Underground operations have been completed, and reclaimed in preparation for pit flooding.
5. **Koala North**
   - Open pit operations have been completed and reclaimed.
   - Underground is in operations.
6. **Koala**
   - Open pit operations have been completed and reclaimed.
   - Underground is in operations; progressive reclamation of completed areas is conducted.

7. **Beartooth**
    - Open pit operations have been completed.
    - In-pit deposition of FPK and underground mine water is underway.

8. **Lynx**
    - Open pit operations are tentatively scheduled to begin in 2015.

3.2 Jay Project

Open pit mining of Jay Pipe is estimated to represent an additional 10 years of mine life beyond the currently planned closure date of 2019. Regulatory review of the Jay Project (environmental assessment) is underway. On November 6, 2014 the Developer's Assessment Report (DAR) was submitted to Mackenzie Valley Environmental Impact Review Board. As part of the DAR submission, a conceptual closure plan was provided for the Jay Project.

The Jay Project, if approved, would materially affect the reclamation planning schedule. It is anticipated that changes to the ICRP, including changes to the Reclamation Research Plans, that result from the Jay Project will be completed through an update of the Interim Closure and Reclamation Plan.

4. Reclamation Research

4.1 Overview

Reclamation research at Ekati has been underway since commencement of mine operations. In 2011 the WLWB approved a Reclamation Research Plan that focused on the closure plan laid out in the 2011 ICRP. The Research Plan (Appendix 5.1-4 of the ICRP) contained 27 individual research areas to address uncertainties in how the approved reclamation plan will be completed. The Research Plans have evolved to accommodate on-going updates in research findings, mine operating schedule, Environmental Management Plans, and changes in the Closure and Reclamation Plan. Provided in Table 4.1-1 and Table 4.1-2 are the current 2014 Research and Strategy Plans. Provided in Table 4.1-3 is a tracking summary table of reclamation research reports that have been provided to stakeholders through the WLWB's online registry system since the approval of the ICRP (i.e., since 2012).

Table 4.1-1 2014 Reclamation Research Plans

1.0 PIT LAKES	
1.1 Pit Perimeter Safety	1.5 Water Withdrawal from Source Lakes
1.2 Pit Perimeter Stability	1.6 Water Cap Over PK
1.3 Pit Lake Perimeter and Connector Channel Design	1.7 Groundwater Study
1.4 Pit Lake Water Quality	
2.0 UNDERGROUND MINES	
No underground Research Plans at this time	
3.0 WASTE ROCK STORAGE AREAS (WRSA)	
3.1 Permafrost Growth in WRSA	3.2 WRSA Seepage and Water Quality
4.0 PROCESSED KIMBERLITE CONTAINMENT AREAS (PKCA)	
4.1 Long Term LLCF Water Quality	4.4 PK Plant Species and Communities
4.2 Permafrost Growth in the LLCF	4.5 Stabilization of EFPK in the LLCF
4.3 Processed Kimberlite Weathering	4.6 LLCF Pilot Study
5.0 DAM, DIKES AND CHANNELS	
No Dams, Dikes and Channels Research Plans at this time	
6.0 BUILDINGS AND INFRASTRUCTURE	
No buildings and infrastructure Research Plans at this time	
7.0 GENERAL SITE	
7.1 TK Incorporation in Reclamation Research	7.5 Closure Criteria for Enhancement of Natural Recovery at Disturbed Sites
7.2 Closure Criteria for Wildlife Safety	7.6 Closure Criteria for Geotechnical Stability
7.3 Riparian Plant Species & Communities	
7.4 Upland Plant Species & Communities	

Table 4.1-2 2014 Reclamation Strategy Plans

SP 1: Pit Flooding Construction Plan
SP 2: Site Decommissioning Plan
SP 3: Quarry Management Plan
SP 4: LLCF Closure Construction Plan
SP 5: Site Water Management Plan

Table 4.1-3 Reclamation Research Plan Reports

Date Submitted	Report Title	Reclamation Research Plan (RP)
Dec 31, 2014	Ekati Diamond Mine 2014 Vegetation Annual Report (Appendix D 2014 Progress Report)	RP 7.3 – Riparian Plant Species & Communities RP 7.4 – Upland Plant Species & Communities
Jul 4, 2014	2013 Long Lake Containment Facility Investigation	RP 4.2 – Permafrost Growth in the LLCF
May 8, 2014	Ekati Diamond Mine Revegetation Projects Annual Report - 2013	RP 4.4 – PK Plant Species and Communities RP 7.3 – Riparian Plant Species & Communities RP 7.4 – Upland Plant Species & Communities RP 7.5 – Closure Criteria for Enhancement of Natural Recovery
Dec 18, 2013	2012 EKATI Diamond Mine: Literature Review – Exclusion Barriers and Wildlife	RP 1.1 – Pit Perimeter Safety
Dec 18, 2013	Literature Review In-Pit Tailings Disposal Ekati Diamond Mine	RP 1.6 – Pit Lake Water Cap over Processed Kimberlite
Dec 18, 2013	Literature Review of Traditional Knowledge Incorporation in Closure and Reclamation Projects	RP 7.1 – TK Incorporation in Reclamation Research
Dec 18, 2013	Review of Past and Current Traditional Knowledge Projects	RP 7.1 – TK Incorporation in Reclamation Research.
Dec 18, 2013	RP 7.2 Wildlife Closure Objectives and Criteria Tasks 1 and 2 - Review of Existing Mines and the Ekati Wildlife Effects Monitoring Program	RP 7.2 – Closure Criteria for Wildlife Safety
Dec 18, 2013	Ekati Diamond Mine Long Lake Containment Facility Reclamation Pilot Study	RP 4.6 – LLCF Pilot Study
Nov 22, 2013	EKATI DIAMOND MINE Modelling Predictions of Water Quality for Pit Lakes	RP 1.4 – Pit Lake Water Quality
Aug 15, 2013	ICRP RP 1.3 Task 3 Pit Lake and Channel Elevations Revision I Ekati Diamond Mine	RP 1.3 – Pit Lake Perimeter and Connector Channel Design

(continued)

Table 4.1-3 Reclamation Research Plan Reports (continued)

Date Submitted	Report Title	Reclamation Research Plan (RP)
Aug 12, 2013	Ekati Diamond Mine Revegetation Projects Annual Report - 2012	RP 4.4 – PK Plant Species and Communities RP 7.3 – Riparian Plant Species & Communities RP 7.4 – Upland Plant Species & Communities RP 7.5 – Closure Criteria for Enhancement of Natural Recovery
Feb 2012	Ekati Diamond Mine Revegetation Projects Annual Report - 2011	RP 4.4 – PK Plant Species and Communities RP 7.3 – Riparian Plant Species & Communities RP 7.4 – Upland Plant Species & Communities RP 7.5 – Closure Criteria for Enhancement of Natural Recovery

4.2 2014 Reclamation Research Summary

4.2.1 Introduction

Provided below is a summary of main reclamation efforts completed for the various Ekati research areas. Individual details for all the research plans are provided in Appendix C. In effort to provide distinct updates for 2014 and to avoid repetition with information outlined in the ICRP and previous progress reports (2012 and 2013), information is provided only on the research undertaken in 2014 and the reclamation schedule. New information on the recommended task scopes is provided, however in situations where there are no new changes to previously outlined research scope (Progress Reports and ICRP) outlining of the research scopes is not repeated.

4.2.2 2014 Pit Lakes Research

RP 1.5 Water Withdrawal from Source Lakes deals with evaluating the effects on aquatic habit as a result of pit flooding. Reclamation research has been focused on optimising the pit flooding schedule. Based on the optimization results DDEC proposed an optimized pit flooding plan for using the LLCF to flood Fox Pit (ICRP Update Ref #2013-5) in the 2013 Progress Report. As part of the WLWB public review, further reclamation research information was requested around the potential impacts to aquatic species. In order to address these concerns, a 2014 spring and summer field data and modelling study was completed. Research tasks included a fish habitat literature review, fish habitat field observations, hydrometric field program, stream profile surveys and stream flow modelling. The overall result of the additional field and modelling study showed that water can safely be pumped from the LLCF without creating impacts to aquatic species.

RP 1.6 Water Cap over PK deals with settling process of processed kimberlite in Beartooth Pit and how this determines the thickness of water and pit lake water quality. In 2014 operational monitoring water quality data and depth to PK solids measurements were obtained for Beartooth Pit. Evaluation of monitoring data from Beartooth is on-going and will continue in 2015 with more detailed depth PK profiling work.

4.2.3 2014 PKCA Research

Field-scale reclamation research in Cell B of the LLCF continued in 2014. This research work is primarily covered under RP 4.4 PK Plant Species and Communities and RP 4.6 LLCF Pilot Study and also has linkages to RP 4.3 Processed Kimberlite Weathering, RP 7.1 TK Incorporation in Reclamation Research and a RP 7.6 Closure Criteria for Enhancement of Natural Recovery.

Rock placement cover construction at the Cell B reclamation research area was completed within the 2013 seeded areas (7 ha) in the winter of 2014. Four rock cover configurations were constructed consisting of windrows, boulder field, and rock grid pattern. In the spring of 2014, an additional 18 hectares were seeded with barley and rye crops to establish an initial ground cover. Species trials within various areas of Cell B were also completed. First year of monitoring was completed on seeded ground covers (annual and perennial) and the various rock configurations. Preliminary results are supportive of the ability to establish an initial ground cover on processed kimberlite. A 2014 LLCF Reclamation Report that outlines the completed reclamation research in Cell B and initial findings is scheduled to be issued in early 2015.

4.2.4 2014 WRSA Research

RP 3.1 Permafrost Growth in WRSA and RP 3.2 WRSA Seepage and Water Quality are in place to evaluate the rate of permafrost growth in the rock piles and also to evaluate the long term seepage water quality. Based on recommendations from the WLWB, DDEC is developing a risk-based framework that would link the two research plans and create an overall tool for assessing environmental risk from the rock piles in closure. The risk-based framework includes the development of an ecological risk assessment (ERA) and also completion of thermal analysis modelling. Initial reporting to the WLWB on this work is planned for March 2015.

4.2.5 2014 Vegetation Monitoring

RP 7.3 Riparian Plant Species & Communities, RP 7.4 Upland Plant Species and Communities and RP 7.7 Closure Criteria for Enhancement of Natural Recovery involved the development of sustainable plant communities that are compatible with surrounding tundra environment. In support of vegetation reclamation research annual vegetation monitoring activities are completed at various sites. Vegetation monitoring

activities completed in 2014 are summarised in the Ekati Diamond Mine 2014 Vegetation Annual Report (Appendix D) and included the following vegetation reclamation sites:

- Pigeon Stream Diversion;
- Fay Bay Reclamation;
- Culvert Camp;
- Fred's Channel and Esker South; and
- Rock Pad Research Area.

4.3 Reclamation Research Schedule

Implementation and scheduling of reclamation research tasks is completed by DDEC based on an overall need to address reclamation uncertainties. This overall process for addressing reclamation uncertainties and scheduling of tasks involves stakeholder inputs. For example, in 2014 further reclamation research was initiated and completed for using the LLCF as flooding based on the comments and recommendations of the WLWB and key stakeholders.

Provided in Appendix C is the revised Reclamation Research Schedule. In order to provide a tracking mechanism of the progress and schedule changes to the reclamation research plans, DDEC has adopted the following tracking techniques to the schedule:

- 'Complete' in black text indicates tasks were completed previous to 2013
- '**COMPLETED'** in bolded black text indicates task was completed in 2013
- '**COMPLETED'** in bolded blue text indicates task was completed in 2014
- in blue indicates all proposed 2014 changes to the schedule
- > in white background indicates task was deferred
- > in green background indicates research work on the task is ongoing
- **'>'** in black indicates 2013 deferment of tasks or ongoing work
- **'>'** in blue indicates 2014 deferment of tasks or ongoing work

5. Reclamation Activities

5.1 Old Camp Reclamation

The Old Camp Closure and Reclamation Plan was submitted to the WLWB in December of 2013 and approved by the WLWB in April, 2014. Some reclamation work had been previously completed such that the plan outlined the remaining reclamation activities for the site including reclamation of the Phase 1 tailings containment area, removal of the remaining hydrocarbon-contaminated material, and landscaping of the camp pad area. Based on a review of operational planning for equipment and resources DDEC outlined a plan to complete the reclamation of Phase 1 South Pond in 2014. Reclamation construction commenced in July of 2014 and ended in October. Provided below is a summary of completed activities at the Phase 1 South Pond:

- Upgrades to Haul Road: Sections of the road from Misery haul road to Old Camp area were widened to comply with safety Mines Act standards for use of CAT777 haul trucks.
- Airport Lights: In order to facilitate safe excavation airport lights located with Phase 1 Pond were by-passed during construction activities.
- Water Removal: Collected water inside the pond was sampled and met discharge criteria, and was pumped over the South Berm into the lowland area flowing into Larry Lake. Additional water that accumulated in the pond did not meet discharge criteria was trucked to minewater sumps located at the Ekati Main Camp for subsequent transfer to the LLCF.
- Processed Kimberlite (PK) Removal: Processed kimberlite was excavated and hauled to the Coarse Rejects Storage (CRSA) located at Main Camp.
- Liner Material Removal: Plastic and clay liner materials co-mingled with excavated kimberlite materials were disposed into the Ekati landfill located at Main Camp.
- Grading: After removal of PK materials clean esker material was graded and shaped to provide positive drainage through the excavated area. The esker material also provides cover for residual PK that could not be removed during excavation.
- South Berm Breaching: In preparation for freshet flow next spring the South Berm of the pond was breached to permit flow through the reclaimed area into the lowland discharge area flowing into Larry Lake.

Provided below is a summary of remaining reclamation activities scheduled for the Phase 1 Pond:

- *Channel Construction:* A shallow channel will be excavated to route surface flow through the reclaimed area. The channel will be excavated through the esker material and approximately 0.2 m into the original ground. Riprap erosion protection will be place on the channel bed and on the side slopes to the crest; and
- *Grading and Debris Clean-up:* After observations of freshet flow, minor re-grading of the esker material to further promote drainage is expected. Additional housekeeping and clean-up of any residual liner materials will also be completed.

Water quality monitoring will be completed in 2015 to monitor the performance of the completed reclamation activities for the Phase 1 Pond. Larry Lake has been designated as the final; receiving environment post-reclamation. At a minimum water quality monitoring data will be collected twice per year, once during spring freshet, and again in late summer or fall. The following water quality locations are planned, per the approved closure plan:

- measurement of surface water quality flowing from the breached area into the lowland discharge area;
- measurement of surface water quality flowing into Larry Lake from the lowland discharge area; and
- measurement of water quality within Larry Lake.

Similar to the process in 2014, DDEC will completed a review of operational planning and resources, and collected water quality data to evaluate scheduling of the remaining Old Camp reclamation stages (North Pond and Camp Pad).

5.2 Panda Diversion Channel Slope Stabilization

Phase 1 of the bank stabilization work (soil section south of the ‘canyon’ area) was completed in 2010. Phase 2 work was completed on the north side of the PDC in the ‘canyon’ section in 2011. The final work (Phase 3 on the north side of the “canyon” section was completed in the winter of 2014. The PDC construction was conducted according to Construction Drawings and Specifications completed by Tetra Tech – EBA and involved four distinct and overlapping tasks:

- *Site preparation,* which involved building the protective ice pad within the channel and access roads;

- *Mining activities,* which included construction of access for mining activities, drilling, blasting, excavating and hauling, scaling, defining the lower slope and bulk clean-up;
- *Material placement,* which included placement of erosion protection and waste rock fillets, grading and sediment control berm construction; and
- *Clean-up activities,* which included protective ice pad clean-up and notching the ice pad for freshet flow.

A final construction report for the slope stabilization project was submitted to the Wek'èezhìi Land and Water Board and is available through its online registry. The report was submitted under Part F Item 8 of Water Licence W2012L2-0001. This report documents the background and construction history of the PDC slope stabilization project, reviews construction methodologies and contains interim construction reports for all three phases. As per water license requirements, this report was prepared by a Professional Engineer. DDEC considers the stabilizaiton work completed and with the submission of the construction report DDEC is requesting relinquishment of the construction activities as outlined in the RECLAIM financial security estimate (see Section 7 of the report).

5.3 Koala Underground Reclamation

Mining and development in the Koala underground workings continued through 2014. Production in four mining areas (KN2185, KN2205) were completed and reclaimed. Reclamation of available areas in the Panda underground workings had been previously completed. Reclamation of underground workings involves the following activities:

- Removal of hazardous materials are removed from the underground level and sent to appropriate areas as per the Ekati waste management plan. Hazardous materials could include fuel, oils, glycols, batteries, explosives, electrical transformers;
- Removal of all debris and garbage that could become floatable after flooding of the underground workings is completed;
- Removal of materials that are considered to have salvageable value to Ekati. These materials could include pipes, cables, electrical gear or any other fixed materials; and
- Installation of barricades to control access.

5.4 Revegetation and Topsoil Salvage

In 2014 additional seedlings were planted at the Pigeon Stream Diversion (PSD). Description 2014 of the PSD revegetation activities and also of monitoring results of 2013 revegetation efforts is provided in the 2014 Annual Vegetation Report (Appendix D).

Top soil materials have been salvaged for future reclamation during the 2014 development of the Pigeon Open Pit and its associated infrastructure (rock diversion berms and waste rock pad). Salvaged topsoil was added to the stockpile located in the north eastern portion of the Panda Koala Waste Rock Storage Area. See the 2014 Annual Vegetation Report in Appendix D for further discussion on top soil salvaging activities.

6. ICRP Updates

6.1 Introduction

ICRP updates outlined in the Annual Progress Report are considered of such scope that that they do not warrant a general re-write of the ICRP, and can be handled as individual updates that can be written into the ICRP as part of the next general rewrite. ICRP updates can be the result of various factors but generally they originate from the results of reclamation research and design and from new developments at the Ekati mine. ICRP updates can consist of updating of figure or material quantities or changes to specific ICRP closure objective or closure design. Provided in Table 6.1-1 is a tracking summary of all previous updates to the ICRP that have been proposed and new proposed ICRP updates proposed in 2014.

Table 6.1-1 ICRP Updates Tracking Table

Update Ref #	ICRP Update	Status
2014-1	Lynx Project Reclamation including revised pit flooding plan	Outlined in 2014 Progress Report
2014-2a	Pigeon WRSA Closure Design update of encapsulation strategy	Outlined in 2014 Progress Report
2014-2b	Pigeon WRSA Closure Design removal of caribou access ramps	
2014-3	Misery Powerline Reclamation	Outlined in 2014 Progress Report
2013-1	Final Closure LLCF Landscape	Accepted by WLWB (April 16, 2014 reasons for decision)
2013-2	Landfarm Surface Update	Approved by WLWB (April 16, 2014 reasons for decision)
2013-3	Pit Flooding Volumes for Pigeon Pit	Accepted by WLWB (April 16, 2014 WLWB reasons for decision)
2013-4a	Operational Landfill Capping Closure Objective	Resubmitted in 2014 Progress Report (Nov 26, 2014 WLWB reasons for decision)
2013-4b	Demolition Landfill Capping Closure Objective	
2013-5	Pit Flooding Plan using the LLCF a source lake	Approved by WLWB (Nov 26, 2014 reasons for decisions based on supplementary information provided by Dominion Diamond September 2014)

6.2 Proposed Updates (2014 and 2013)

This section outlines proposed 2014 updates to the ICRP as a result of new permitted Ekati developments. As per direction from the WLWB the 2013 ICRP update around change in the landfill closure objective is being resubmitted. Some updates outlined in this section represent the inclusion into the ICRP of items that have already been approved by the WLWB through other means. For example reclamation measures for the future Lynx site have already been reviewed and approved by the WLWB as part of the project permitting. As such, these items are not intended for further review and approval, only for the WLWB's approval that they have been accurately incorporated into the ICRP.

6.2.1 2014 Lynx Project Reclamation (Ref #2014-1)

6.2.1.1 Introduction

On September 23, 2013 DDEC submitted an application for a new land use permit and water licence to support development and mining activities at the Lynx kimberlite pipe. On April 30, 2014 Land Use Permit W2013D0006 was granted and on June 6, 2014 Water Licence W2012L2-0001 was amended to incorporate the Lynx Project. Condition 54 of the Land Use Permit indicates the following requirement for reclamation planning:

> *"The Permittee shall submit, for approval by the Board, an updated Closure and Reclamation Plan (CRP) with the next Annual CRP Progress Report required by the Water Licence."*

Closure and reclamation for the Lynx Project, including reclamation security, was reviewed through the WLWB's public review process, and was subsequently approved by the WLWB. As outlined in the submitted project description and during the permitting approval process the reclamation of the Lynx Project developments is a relatively minor addition to the ICRP and the components can be directly incorporated into the ICRP without requiring new closure measures, methods or research. The mine components that will need to be reclaimed resulting from the Lynx Project are as follows:

- Lynx Open pit;
- Extension to the Misery WRSA;
- Lynx access road; and
- Lynx buildings and infrastructure.

Provided in Sections 6.2.1.2 through 6.2.1.6 are the approved ICRP updates resulting from the Lynx Project.

6.2.1.2 Open Pit Reclamation

Open pit reclamation will be completed based on the objects and criteria outlined in Section 5.2.7 of the ICRP. Open Pit reclamation activities will follow those outlined in the ICRP for the other open pits (Tables 5.2-10 through 5.2-16). The pit will be filled with natural runoff, precipitation and source water pumped from Lac de Gras. It is approximated that the Lynx Pit will take about 2 ½ months to fill an approximated volume of 4,617,000 m^3 at a flow rate of 0.8 m^3/s from Lac de Gras.

Provided in Appendix E is an update to the pit flooding plan for including Lynx Pit. Note the pit flooding plan is based on the WLWB approval of using the LLCF a source to fill Fox Pit as outlined in the WLWB November 26, 2014 reasons for decision.

6.2.1.3 Misery WRSA Extension Reclamation

The proposed extension to the Misery WRSA as a result of the Lynx project will not impact the reclamation plan for Misery WRSA. Reclamation objectives for the WRSA are outlined in Section 5.4.6 of the ICRP and reclamation activities for the Misery WRSA are outlined in Table 5.4-13 of the ICRP.

6.2.1.4 Access Road Reclamation

Reclamation of the access roads will follow as outlined in the ICRP and will consist of scarifying the surface and removing any culverts and safety berms.

6.2.1.5 Buildings and Infrastructure

Reclamation of buildings and infrastructure will follow as outlined in the ICRP and will consist of dismantling any building and infrastructure and placement in the demolition landfill. Any materials with salvage will be evaluated for potential backhaul down the winter road.

6.2.1.6 Closure Monitoring

Monitoring for physical and chemical stability and maintenance of the reclaimed Lynx components will be required after closure and during post-closure until closure objectives and criteria are met. 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 Lynx Project facilities will be incorporated into the post-closure monitoring programs identified in the ICRP.

6.2.2 2014 Pigeon WRSA Closure Design (Ref #2014-2a and 2b)

6.2.2.1 Introduction

As part of plans to commence preparatory activities at the Pigeon site DDEC submitted to the WLWB a final design report for the Pigeon Waste Rock Storage Area and an amendment to Ekati Mine Waste Rock and Ore Storage Management Plan (WROMP). The WLWB approved WROMP addendum on March 10, 2014. The reclamation plan for the Pigeon WRSA is outlined in Section 5.4.4.2 and Table 5.4-10 of the ICRP. Based on the approved WROMP and updated design the proposed encapsulation strategy outlined in the ICRP requires update. Additionally based on the final design of flatter slopes the construction of access ramps for caribou for the Pigeon WRSA will not be required. All other reclamation activities for the Pigeon WRSA outlined in the ICRP remain the same and do not require updating. Provided below is the approved update to the ICRP Pigeon WRSA cover closure design and proposed ICRP update for not requiring caribou access ramps for the Pigeon WRSA.

6.2.2.2 Pigeon WRSA Encapsulation Strategy Update

The ICRP originally outlined that reactive metasediment would be placed in the WRSA in a way as to completely encapsulate by granite waste rock. The updated WRSA design conservatively manage all of the Pigeon waste rock as if it were potentially acid generating and consisted of a final cap of 3 m glacial till plus 1 m granite. This design change was necessary because granite in the Pigeon open pit has been identified as being finely inter-fingered with metasediment such that granite cannot be mined separately. The thermal modelling reported in the WRSA Design Plan demonstrated that the combination till/granite cover provides the same level of long-term environmental protection as a 5 m thick cover of granite.

6.2.2.3 Pigeon WRSA Caribou Access Ramps

The ICRP indicates that access ramps will be constructed to permit access and egress from the WRSA by wildlife specifically caribou after closure of Ekati. Preliminary locations of the access ramps have been provided in the ICRP.

To safely accommodate the till cover, the sides lopes of the Pigeon WRSA will be continuous slopes rather than benched, and the overall slope angle will be flatter than other Ekati Mine WRSA's as documented in the Pigeon WRSA Design report. Additionally, although not included into the Design Report, the continuous and flatter side slopes mean that caribou and other wildlife can safely access and egress the WRSA. Based on this design wildlife ramps will not be required for the Pigeon WRSA. DDEC is requesting removal of construction of wildlife access ramps as a reclamation activity for the Pigeon WRSA.

6.2.3 2014 Misery Powerline Reclamation (Ref #2014-3)

6.2.3.1 Introduction

On May 22, 2014 DDEC submitted an application for a new land use permit to support construction and use of the Misery Powerline. The Misery power line is being constructed (2014/15) along the length of the 30-km Misery haul road, from the Main camp to the Misery site. Granite pads for the placement of the power poles will be constructed at regular intervals along the north side of the Misery haul road. On August 11, 2014 Land Use Permit W2014I0001 was granted for construction and use of the Misery Powerline. Condition 34 of the Land Use Permit indicates the following requirement for reclamation planning:

> *"The Permittee shall submit details regarding the reclamation of the Misery power line to the Board for approval; these details shall be included in the 2014 Annual CRP Progress Report and incorporated into the next version of the Interim Closure and Reclamation Plan"*

Provided below is the reclamation strategy for the Misery Powerline for WLWB approval.

6.2.3.2 Misery Power Line Reclamation Strategy

The reclamation of the power line will be encompassed into the Building and Infrastructure Component of the ICRP (Section 5.7). Once no longer operational the power lines will be cut at the ground surface and placed into the demolition landfill. Any materials from the power line that have salvageable value will be shipped on the winter road. Constructed granite pads will be reclaimed as part of the overall reclamation of the Misery Haul Road and will be scarified.

6.2.4 2013 Landfill Capping Closure Objective (Ref #2013-4a and 4b)

6.2.4.1 Introduction

The 2013 Progress Report proposed physical stabilization to prevent wind and water erosion as an appropriate cover objective for inert landfill materials rather than full permafrost encapsulation. The WLWB public review process that was completed for this item included the following:

- IEMA requested further details via the WLWB online review system (wildlife, leachate generation, frost heave and ice jacking) as an Information Request IEMA-5. DDEC provided their responses to IEMA-5.
- On April 16, 2014 the WLWB did not approve the proposed updated closure objective due to the potential of contaminated seepage (in active layer) from coarse kimberlite rejects used as an intermediate cover material.

- As part of the supplementary response to the 2013 Annual Progress Report (September 15, 2014) DDEC proposed to address the Board's concern by using granite rock as the final intermediate fill material in the active layer. This design change would result in seepage through the active layer only contacting inert landfill materials and granite. WLWB staff requested reviewers to comment on this proposed update and no comments were received.
- In the WLWB reasons for decision (November 26, 2014) it was indicated that the Board's concerns were addressed by DDEC in their design. The WLWB further requested that DDEC re-issue the proposed update in the 2014 Progress Report as the Board was not sure that reviewers had understood this to be an update of the closure objective, rather than a closure activity.

Provided below is the proposed change in the ICRP landfill material cover closure objective for WLWB approval. DDEC requests that stakeholder review of this item take into consideration the information that has been already been provided through the public review process.

6.2.4.2 Proposed Change in ICRP Closure Objective

Ekati operational waste management and recording keeping and reclamation research (RP 3.1) conclusions indicated that only inert solid materials are deposited in the current operations landfill and are planned for the demolition landfill. These materials would not be expected to have any potential impacts on the receiving environment.

DDEC proposes a change from the ICRP closure objective of permafrost encapsulation for landfill materials to physical stabilization to prevent wind and water erosion and to promote wildlife and human safety**.** The planning estimate for a physical stabilization cover of landfill materials is 1 m of granite rock as the final capping depth. In order to ensure that seepage through the active layer would contact only inert materials granite rock will also be used as the final intermediate fill layer.

7. Security Updates and Relinquishment

7.1 Introduction

7.1.1 Water Licence Security

On June 17th, 2013, the WLWB determined the security required to be held under Dominion Diamond Ekati Corporation (DDEC) renewal Water Licence (W2012L2-0001) to be $253,473,000. On November 6, 2014 the Government of the Northwest Territories formally accepted three surety bonds, in an amount totalling $253,473,000, as security required under the Water Licence. Additional security for the future possible Sable and Lynx projects is required prior to construction.

The security amounts to be held were determined by the WLWB from the public review of the reclamation security estimated submitted by DDEC on March 22, 2013. The estimate was submitted using the RECLAIM model in response to preferences and requests of the WLWB and other parties. As requested by the WLWB and in keeping with the intent of the WLWB-approved ICRP as a holistic, all-inclusive workplan for reclamation of the Ekati Mine, the security estimate provided for all of the reclamation activities required for reclamation of the Ekati Mine as described within the ICRP. A copy of the RECLAIM security estimate corresponding to the June 17, 2013 WLWB reasons for decisions was provided to the WLWB on March 20, 2014 and is posted on the WLWB's online registry.

7.1.2 Environmental Agreement Security

In addition to the Water Licence reclamation security, an additional security deposit is held by the GNWT under the Ekati Mine Environmental Agreement. Letters of the credit in the amount of approximately $42.7 continue to be held by the GNWT as the security deposit. Based on a review of the Environmental Agreement obligations DDEC considers the Environmental Agreement security deposit to be duplicative of reclamation security included in the current Water License and Land Use Permits. DDEC is actively pursuing resolution of this issue to ensure that the combined reclamation security held under various regulatory instruments is not duplicative.

7.2 RECLAIM Estimate Updates

7.2.1 Introduction

Updates to the RECLAIM security estimate can result from updates in the reclamation activities/quantities, and unit costs codes. Generally speaking updates to reclamation

activities or quantities originate from ICRP updates and changes to the unit costs resulting from updated reclamation costing information. Additionally updates to the RECLAIM estimate may result if any discrepancies are identified in reclamation costing calculations.

The 2013 Progress Report outlined reclamation activity/quantity updates to the RECLAIM estimate as a result of proposed ICRP updates and also due to discrepancy in the pit flooding labour calculation. No updates to the unit costs were presented as part of the 2013 Progress Report. The WLWB approved a number of the proposed ICRP updates, but deferred any decision on the proposed updates to reclamation security until supplementary information was provided on using the LLCF as a flooding source. As part of its November 26 reasons for decisions the WLWB indicated that DDEC should submit a RECLAIM estimate in the 2014 Progress Report. As request by the WLWB provided in Appendix F is a revised security estimate that incorporates all of the proposed 2013 Security Updates and new updates proposed for 2014. The revised RECLAIM security estimate and all proposed updates outlined in Sections 7.2.2 and 7.2.3 are designated for WLWB review and approval.

Provided in Table 7.2-1 is a tracking table of all proposed RECLAIM security updates. In the RECLAIM security estimate changes as a result of using RECLAIM Version 7.0 (Ref #2014-1) are indicated in blue text and all other updates are referenced and highlighted in yellow. All outlined changes are for the Grand Total (including projecting management, engineering, and contingencies) of the RECLAIM security estimate as compared to the RECLAIM estimate based on the June 17, 2013 Reasons for Decision. The outlined changes are intended to showcase the effect of an individual update to the Grand Total to the RECLAIM estimate The outlined individual changes incorporate using RECLAIM Version 7.0 (Ref #2014-1) but do not include any additional overlapping proposed updates.

The total proposed change in security for the 2013 and 2014 ICRP updates described herein is a decrease of $41,975,394. DDEC requests that the WLWB amend Schedule 2 of the Water Licence accordingly based on approval of the RECLAIM updates. All RECLAIM updates based on approved or proposed ICRP updates and for relinquishment (see Table 7.2-1) are calculated from costs codes in an established RECLAIM model has been reviewed and approved by the WLWB. Therefore, DDEC suggests that WLWB approval of the security updates of this nature are solely based on evaluating whether DDEC has accurately represented an approved ICRP update or relinquishment item in the established RECLAIM model.

Table 7.2-1 RECLAIM Estimate Updates Tracking Table

Ref #	RECLAIM Update	Status
2014-1	Change in unit costs from updating to RECLAIM Version 7.0 (excluding camp accommodations, addressed separately) $2,880,565 decrease	Submitted in 2014 Progress Report.
2014-2	Updated costs for worker accommodations during primary reclamation activities $5,737,001 increase	Submitted in 2014 Progress Report.
2014-3	Updates costs and volumes for drilling and blasting, and ripping of granite for reclamation capping $4,097,458 decrease	Submitted in 2014 Progress Report.
2014-4	Lynx Project Reclamation Activities (ICRP Update #2014-1) $2,752,118 future increase (to be provided prior to construction)	Submitted in 2014 Progress Report.
2014-5	Powerline Reclamation (ICRP Update #2014-2) $65,500 increase	Submitted in 2014 Progress Report.
2014-6	Pigeon WRSA Design Caribou Ramps (ICRP Update #2013-3b) $491,219 decrease	Submitted in 2014 Progress Report.
2014-7	Panda Slope Stabilization Relinquishment $2,775,522 decrease	Submitted in 2014 Progress Report.
2013-1	LLCF Closure Landscape (ICRP Update #2013-1) $119,200 increase	Resubmitted in 2014 Progress Report
2013-2	Landfarm Surface Area (ICRP Update #2013-2) $2,255,134 decrease	Resubmitted in 2014 Progress Report
2013-3	Revised Pigeon Pit Volume (ICRP Update #2013-3) $878,363 increase	Resubmitted in 2014 Progress Report
2013-4a 2013-4b	Operational Landfill Capping (ICRP Update #2013-4a) Demolition Landfill Capping (ICRP Update #2013-4b) $8,207,888 decrease	Resubmitted in 2014 Progress Report
2013-5	Pit Flooding Plan using LLCF Source Lake.(ICRP Update #2013-5) $28,518,537 decrease	Resubmitted in 2014 Progress Report
2013-6	Pit Flooding Labour $2,052,578 decrease	Resubmitted in 2014 Progress Report

7.2.2 2014 RECLAIM Updates

7.2.2.1 RECLAIM Version 7.0 (Ref #2014-1)

As part of the review of the security for Diavik Diamond Mine (DDMI) it was determined by the WLWB that it is appropriate to use the GNWT's latest version of RECLAIM 7.0, as issued by the GNWT. Discussions with WLWB staff indicated that it is expected that this new version of RECLAIM will be adopted by DDEC in future submission security estimates to the WLWB.

It is indicated by the WLWB that in Version 7.0 unit costs have been increased by inflation and in some cases have been increased based on costing information provided by the Contaminants and Remediation Directorate (CARD) of AANDC. All cost items (excluding worker accommodations) that utilized RECLAIM Version 6.1 built in costs were updated in the submitted 2014 RECLAIM security estimate (updates indicated as blue text) The incorporation of RECLAIM Version 7.0 unit cost codes (excluding camp accommodations, see below) results in an overall decrease by $2,880,565. The decrease in the security estimate is largely attributed to new lower built in costs for pit flooding labor, post closure monitoring and maintenance, and the method of sub-totalling cost components within the RECLAIM model.

7.2.2.2 Accommodations (Ref #2014-2)

RECLAIM version 7.0 provided updated default costs for worker accommodations which specified a low cost of $100 per man-day ($3,041.67 per man-month) and a high cost of $175 per man-day ($5,322.92 per man-month). The new RECLAIM costs are significantly higher than the previous version of RECLAIM and, in DDEC's view, not appropriate for Ekati. Based on a review of Ekati current operational camps costs DDEC proposes an increase in cost from $1,491.19 per man-month to $2,280 per man-month. This updated cost is the current Ekati cost for worker accommodations and would be representative of third-party rates for what would be needed during completion of the primary reclamation activities. This proposed change corresponds to an increase of $5,737,001. For the pit flooding period DDEC notes that the Ekati camp size and corresponding costs for running the camp would decrease due a much lower level of effort required to complete the pit flooding program and considers the previous RECLAIM default value for an existing camp of $1,481.19 per man-month as being an appropriate for this period.

7.2.2.3 Granite Rock Capping (Ref #2014-3)

For the RECLAIM security estimate based on the June 17, 2013 WLWB reasons, it is assumed that the majority of the granite material required for capping would be accessible by ripping with heavy equipment and that other areas will require additional effort (i.e., drilling and blasting). Provided below are the assumptions that were made for all activities requiring waste rock capping.

- 25% of the rock capping volume will require drilling and blasting at a unit cost of $\$5.28/m^3$ (Drill = $3.45 and Blast = $1.83/m^3$). The cost for drilling was based on Ekati operating cost for conventional open pit drilling and blasting activities.
- 75% of the rock capping volume will require ripping at default of RELCAIM version 7.0 cost of $0.96/m^3$ for dozing activities.

Since May 2014 a large quantity of granite has been mined from the north east portion of the Panda/Koala WRSA for the construction of the granite pad for the Pigeon WRSA. DDEC completed an overall review of the material volumes and costs attributed to drilling and blasting and ripping of granite. This activity is what would be expected for the capping of the LLCF and the rock piles during reclamation, and reinforces the concept of using real and recent costs for estimation of reclamation. In general it was discovered that a higher amount of rock volume needed to be drilled and blasted but at an overall lower cost when compared to conventional open pit drilling and blasting operation. The lower costs for drill and blasting are as a result of not needing the same level of effort and blasting energy. Provided below are the estimated third-party reclamation costs for obtaining rock for capping activities that were deduced from current Ekati operational costs.

- 56% of the rock was drilled and blasted a unit cost of $2.13/m^3 (Drill = $1.36/m and Blast = $0.77/m^3).
- 44% of the rock was ripped at the unit cost representative of $1.05/m^3 (default value for dozing in RECLAIM Version 7.0).

These updates to the drill and blast costs correspond to a decrease of $4,097,458.

7.2.2.4 Lynx Project (Ref #2014-4)

A preliminary estimate for the reclamation of the Lynx Project as described in Section 6.2.1 of the Progress Report was provided as a response to information request #7 in the Lynx Project Water Licence Application Process and subsequently written into the Water Licence. An updated estimate to the reclamation of the Lynx Project is provided in the submitted 2014 RELCAIM estimate. The proposed estimate was updated to incorporate RECLAIM Version 7.0. The revised cost of reclamation of the Lynx Project is $2,775,522. DDEC suggests that this value, based only on revisions made to accommodate RECLAIM Version 7, be used to update Schedule 2 of the Water Licence.

7.2.2.5 Misery Power Line Reclamation (Ref #2014-5)

A lump sum cost increase of $50,000 (Grand Total of $65,500 including associated project management, engineering, insurance and bonding, and contingency costs) was provided for the reclamation of the Misery Powerline as outlined in Section 6.2.3. The cost estimate includes the 30-km length of the Misery Powerline and all other power lines located at the Ekati main camp area.

7.2.2.6 Pigeon WRSA Access Ramps (Ref #2014-6)

Based on the approved Pigeon WRSA Design of flatter slopes construction of WRSA access ramps is not required (ICRP Ref #2014-3b). Removal of the reclamation construction of the wildlife access ramps corresponds to a decrease of $491,219.

7.2.3 2013 RECLAIM Updates

The 2013 Progress Report outlined updates to the security as a result of proposed ICRP updates and also due to discrepancy in the pit flooding labour calculations. The 2013 proposed updates are repeated here, as updated to accommodate RECLAIM Version 7, per the WLWB request.

- *Final Closure Landscape (2013-1):* This ICRP update was accepted by the WLWB and corresponds to an increase of $119,200. It should be noted that there was a typo in the 2013 Progress Report and this change was incorrectly outlined as decrease rather than an increase.
- *Landfarm Surface Area (2013-2*): A decrease in the landfarm surface area was accepted by the WLWB and corresponds to a decrease of $2,255,134.
- *Pit Flooding Volume (2013-3):* The ICRP for an increase to the Pigeon Pit flooding volume was accepted by the WWLWB and corresponds to an increase of $878,363.
- *Landfill Capping Depth (2013-4a and 4b):* As requested by the WLWB this proposed change in the closure objective was re-submitted as a 2014 ICRP update. A change in the landfill capping depth corresponds to a total decrease of $8,207,888. DDEC requests that a review of the reclamation estimate is completed in conjunction with its review as a resubmitted 2014 ICRP update.
- *Pit Flooding Plan (2013-5):* The use of the LLCF as a flooding source was approved as an ICRP update. The corresponding change in security is a decrease of $28,518,537.
- *Pit Flooding Labour (2013-6):* This change is not based on an ICRP update and corresponds to a discrepancy of not subtracting for pit flooding labor in the Mobilization/Demobilization RECLAIM component. This change corresponds to a decrease of $2,052,578.

7.3 Security Relinquishment

7.3.1 Introduction

DDEC intends, at appropriate times, to request reductions in reclamation security based on the completion of reclamation activities. This approach is consistent with government policy such as the 2002 Mine Reclamation Policy and the 2014 Guidelines for Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. DDEC considers timely reduction of security based on completion of reclamation activities as a critical step in the reclamation security process. DDEC has outlined a request for reduction in security based on the progressive reclamation

completion of the Panda Diversion Channel Slope Stabilization. For the purpose of clarity DDEC has outlined this security update separately for WLWB Approval.

7.3.2 Panda Diversion Slope Stabilization (Ref #2014-6)

Completion of work for the Panda Diversion Slope Stabilization is described in Section 5.2 of the Progress Report. DDEC considers the completion and submittal of the of the final construction report on October 31, 2014 as the supporting documentation that objectives have been met for the projection and security relinquishment can be completed. DDEC is requesting a reduction in the security by $2,775,522. This reduction is referenced as Ref #2014-7 in the submitted revised RECLAIM security estimate.

Appendix A

2014 Engagement Site Tours

Date	Stakeholder / Affected Party& Participants	DDEC Participants	Description
Sept 23, 2014	Wek'eezhii Land and Water Board (WLWB) Elissa Berril Environment and Natural Resources (ENR) Kate Witherly Government of Northwest Territories (GNWT) Gerald Enns Environment Canada (EC) Sarah-LaceyMcMillan Brad Summerfield, Fisheries and Oceans Canada (DFO) Veronique D'Amours Julie Marentette Mackenzie Valley Environmental Impact Review Board (MVEIRB) Chuck Hubert, Sachi DeSouza Independent Environmental Monitoring Agency (IEMA) Kevin O'Reilly Tim Byers	Lukas Novy Claudine Lee Eric Denholm Nicole Spencer Harry O'Keefe Gary Koop Wilf Petherbridge	Inter-Agency Coordinating Team (IACT Site Visit) Visit focused on providing stakeholders with update on Ekati reclamation projects including Cell B LLCF reclamation and research and Old Camp Reclamation.
June 11, 2014	Independent Environmental Monitoring Agency (IEMA) Bill Ross Tim Byers Jaida Ohokannoak Tony Pearse Arnold Enge Kevin O'ReillyJessica Simpson Kim Poole	Chantal Lavoie Rick Bargery Claudine Lee Eric Denholm Nicole Spencer Kate Shea Harry O'Keefe Charles Klengenberg Lukas Novy Nick Ballantyne	Site visit to Cell B LLCF reclamation area.

Date	Stakeholder / Affected Party& Participants	DDEC Participants	Description
June 10, 2014	Wek'eezhii Land and Water Board (WLWB) Elissa Berril Environment and Natural Resources (ENR) Lionel Marcinkoski Mary Tapsell Joel Holder Laurie McGregor Brad McInnes Shelly Acton David Jessiman Matt Seaboyer Environment Canada (EC) Sarah-Lacey McMillan Dave Fox Fisheries and Oceans Canada (DFO) Veronique d'Amours-Gauthier Francois Larouche Independent Environmental Monitoring Agency (IEMA) Kevin O'Reilly	Chantal Lavoie Rick Bargery Claudine Lee Eric Denholm Nicole Spencer Kate Shea Jamie Steele Harry O'Keefe Jamie Steele Andrew Howton Charles Klengenberg Lukas Novy	Site visit to Cell B LLCF reclamation research area and the Panda Diversion Slope Stabilization.
June 10, 2014	Tlicho –Behchoko 12 total members including 11 students and 1 chaperone	Claudine Lee Corey Champion Stephanie Lloyd Dave Clarke Joe Hatch John Bekale	Site visit to Cell B LLCF reclamation research area
June 5, 2014	Tlicho Government Members Including: Michel Moosenose, Freddy Flunkie, Liza Mackenzie, Larry Barens, and 6 students	Rick Bargery, Charles Klengenberg Helen Larocque, Lukas Novy	Site visit to Cell B LLCF reclamation research area

Date	Stakeholder / Affected Party& Participants	DDEC Participants	Description
June 4, 2014	Yellowknives Dene First Nation (YKDFN) Chief Edward Sangris Chief Ernest Betsina Alfred Baillargeon Jonas Sangris Napoleon Mackenzie	Chantal Lavoie Claudine Lee Charles Klengenberg	Site visit to Cell B LLCF reclamation research area
June 3, 2014	Tlicho – Gameti Chief David Wedawin Garry Bekale Alfred Arrowmaker Charlie Gon Jenny Arrowmaker Borris Eyakfwo Julian Black	Richard Bargery Keith Sangris John Bekale Rebecca Plotner Lukas Novy Shannon Hayden (Golder)	Site visit to Cell B LLCF reclamation research area

Appendix B

IEMA Workshop Presentation

Dominion Diamond Ekati Corporation

IEMA Workshop
December 3, 2014

DOMINION DIAMOND

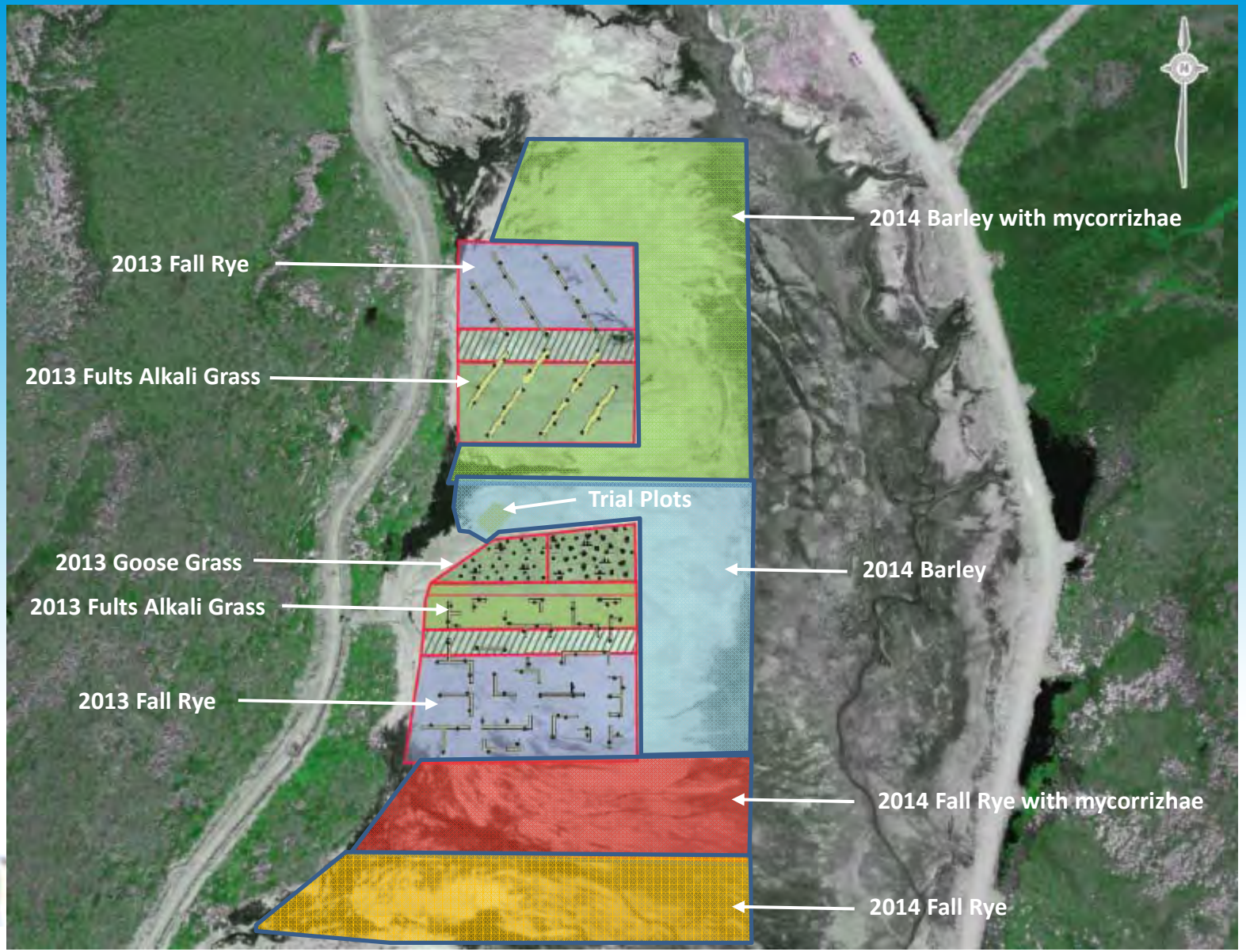
Cell B Reclamation & Research

Design and construction of a long term cover on the LLCF with a landscape that will be safe for human and wildlife use

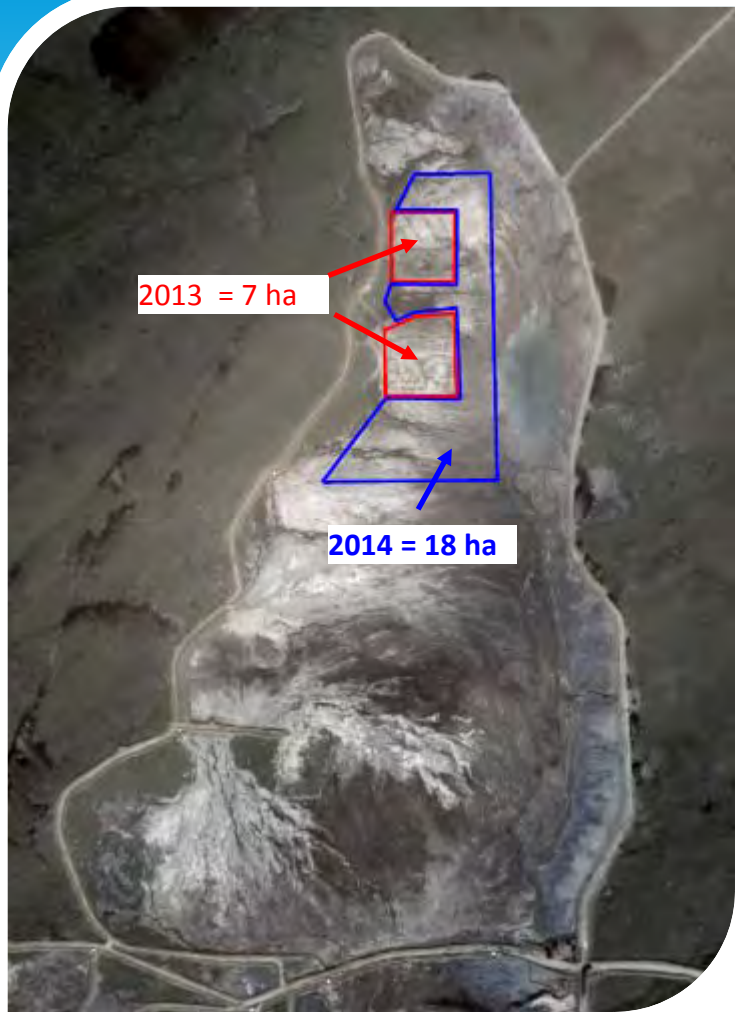
- Evaluate vegetation as a long term cover option
  - Annual versus perennial ground cover on PK
  - Conduct species trials on PK
  - Evaluate PK amendments
  - Evaluate equipment options
- Evaluate rock as a component of the cover design
  - Influence on vegetation growth
  - Erosion Control

DOMINION DIAMOND

2013 and 2014 Seeding



Cell B Total Seeding To Date = 25 ha



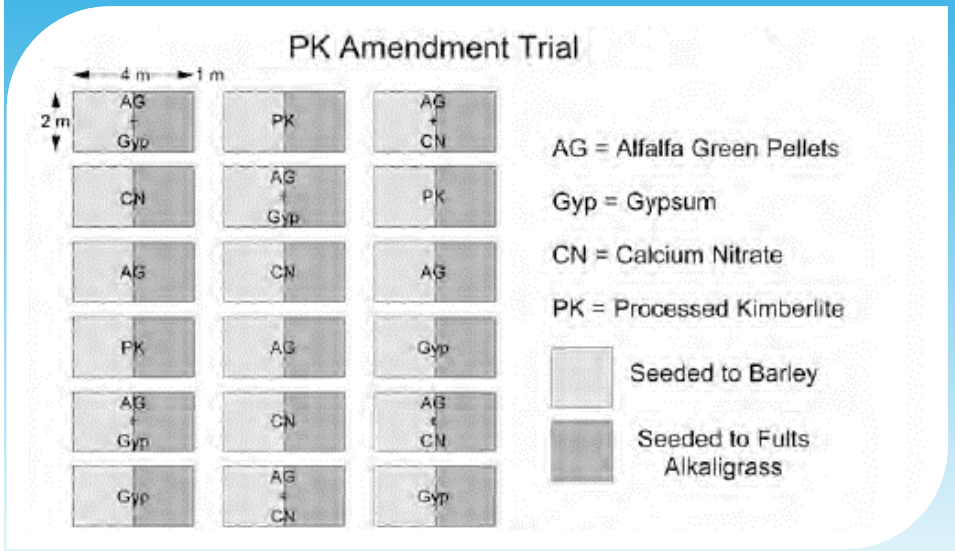
DOMINION DIAMOND

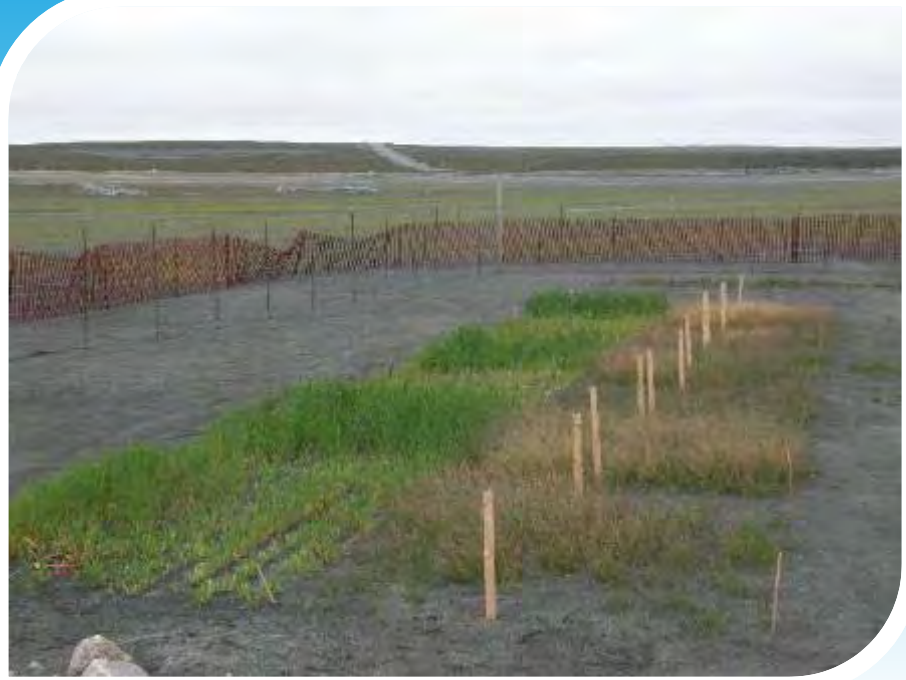
Species Trials

Sedge and Cotton Grass Seedlings

DOMINION DIAMOND

PK Amendment Trials





DOMINION DIAMOND

2013 Lessons Learned (D6 & Breaking Disc)

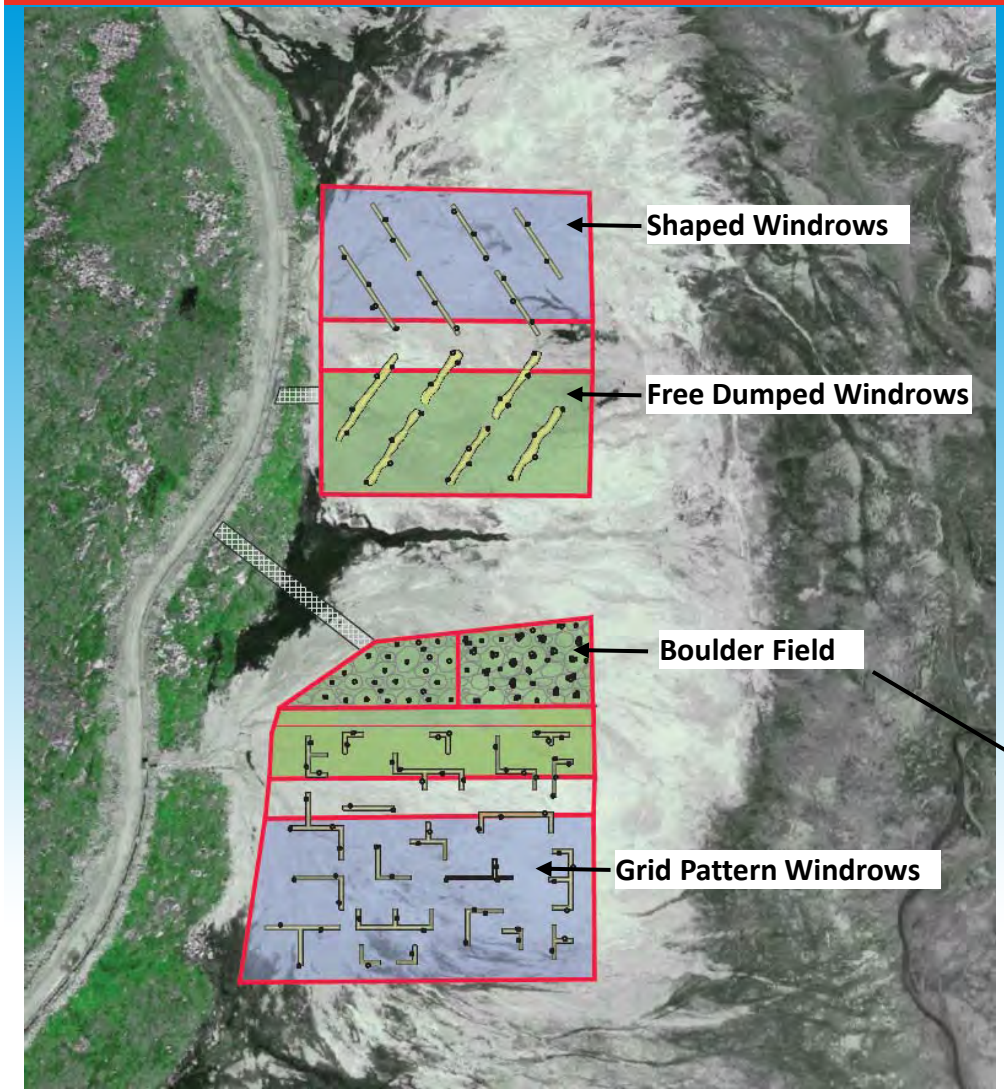
DOMINION DIAMOND

Step 1: Harrowing (Initial Soil Break Up)

Step 2: Broadcast Seeding

Step 3: Harrowing and Rolling

2013: Rock Placement



DOMINION DIAMOND

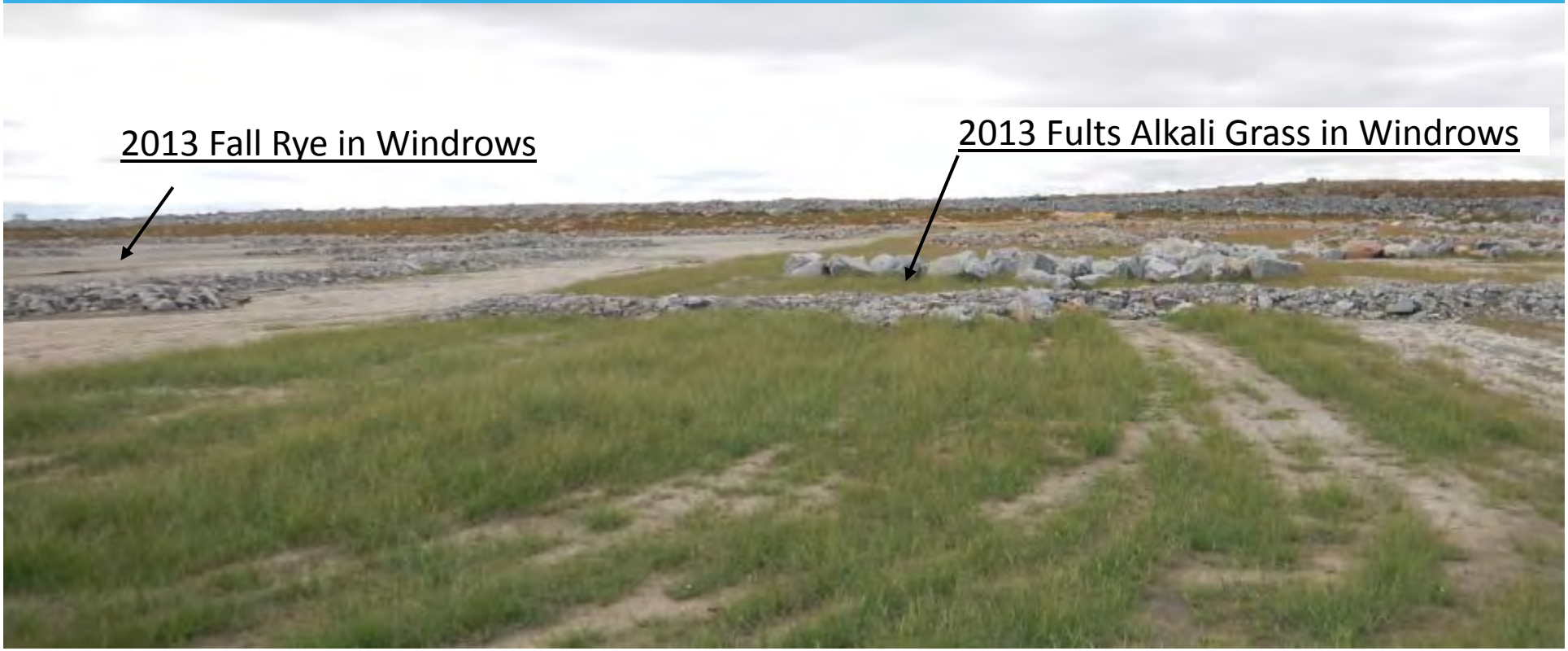
2014 Observations

DOMINION DIAMOND

2014 Observations

2013 Goose Grass in Boulder Field

2014 Observations

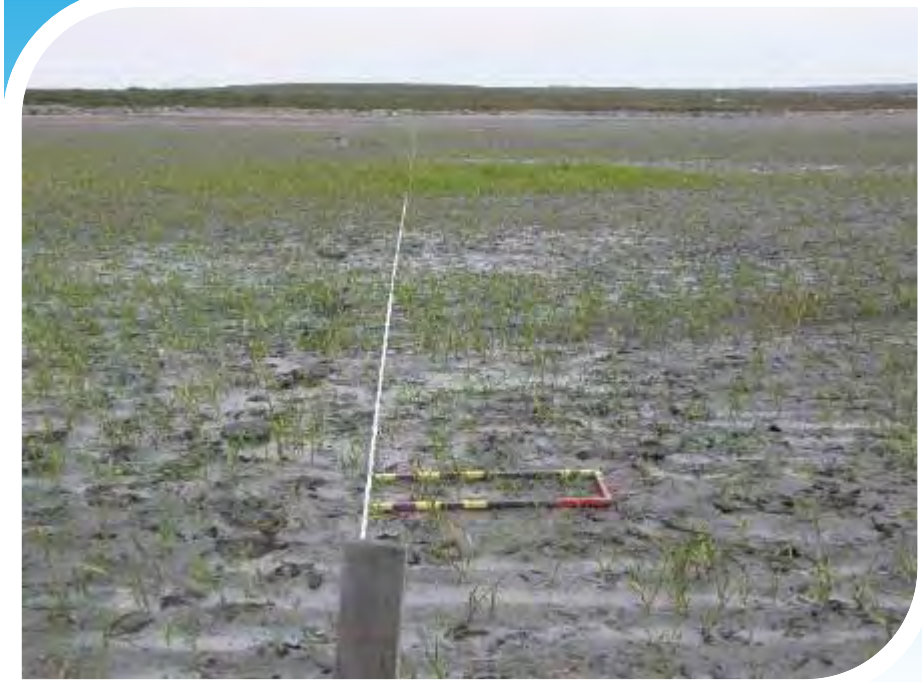


DOMINION DIAMOND

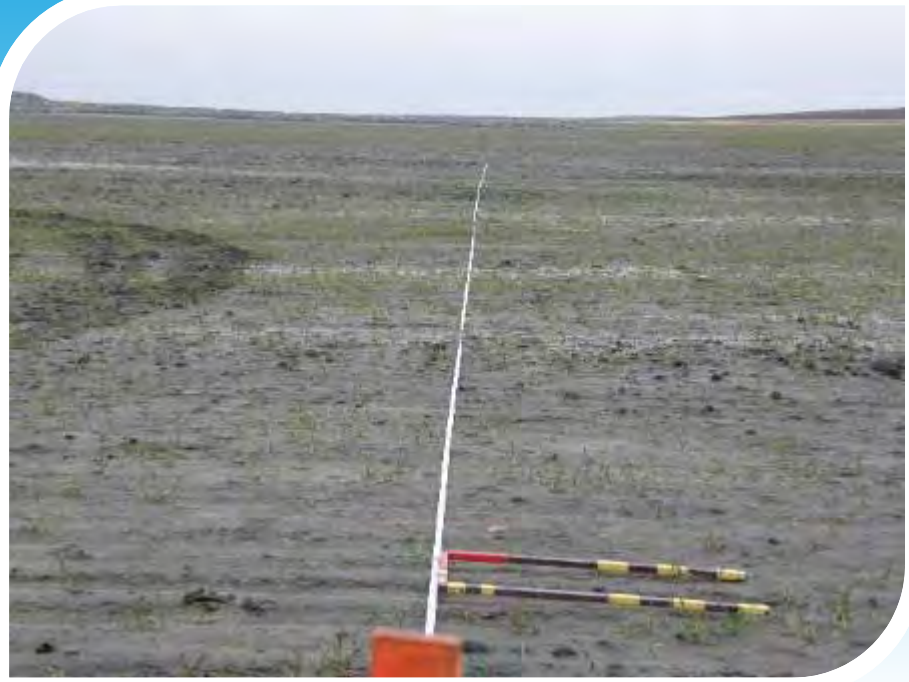
2014 Observations

2014 Observations

2014 Barley



2014 Fall Rye



DOMINION DIAMOND

Cell B Future Work

Next year's and future reclamation research at Cell B is in the planning stages and is based on monitoring conducted in 2014.

- On going monitoring of 2013 rock placement and 2013-2014 seeding
- Continuation of species trials and monitoring
- Surface water management
- Local species harvesting
- Seeding additional areas
- Reseeding PK amendments

DOMINION DIAMOND

Old Camp Reclamation

- Old Camp Closure and Reclamation Plan Approved by WLWB on April 14, 2014
- Reclamation of the South Pond PKCA commenced in July of 2014 and ended in October
  - Upgrades to Haul Road
  - Change Management Plan for Airport Traffic
  - Pumping out of Water
  - Removal of Processed Kimberlite (PK)
  - Removal of Liner Materials
  - Breaching of South Berm
  - Grading of esker berms to promote natural drainage
- Remaining Activities for South Pond
  - Channel construction to route runoff through the reclaimed area
  - Minor grading and housekeeping of liner debris
  - Water quality monitoring

DOMINION DIAMOND

South Pond Before Reclamation

DOMINION DIAMOND

After Reclamation Looking South

After Reclamation Breached South Berm

DOMINION DIAMOND

After Reclamation Looking South

Panda Diversion Slope Stabilization

- Final Phase III of construction was completed from January to May 2014
- PDC construction was conducted according to Construction Drawings and Specifications
  - **Site preparation** included ice pad and access road
  - **Mining activities included** drilling, blasting, excavating and hauling, scaling, defining the lower slope and bulk clean-up
  - **Material placement** which included placement of erosion protection and waste rock fillets, grading and sediment control berm construction
  - **Clean-up activities** which included protective ice pad clean-up and notching the ice pad for freshet flow.
- Construction report for all three construction phases was submitted to DFO and the WLWB in October of 2014
- Relinquishment of financial security for Panda Division Channel Stabilization will be requested as part of the 2014 Annual Progress Report.

DOMINION DIAMOND

Mining Activities

DOMINION DIAMOND

Material Placement and Clean Up

DOMINION DIAMOND

Appendix C

2014 Reclamation Research Plans Update

RESEARCH PLAN 1.1 – PIT PERIMETER SAFETY

Uncertainty

Safety of wildlife and people near open pits during pit flooding and post closure.

Research Objectives

- Design barriers around open pit perimeters that will deter people and wildlife from accessing the pits over the flooding period.
- Design a landscape around the pit perimeters that will be accessible and safe for people and wildlife to use after the pits are flooded.

Research Undertakings and Findings in 2014

- Collection of WEMP monitoring data (Task 2) continued. Findings for the WEMP monitoring will continue to feed into the selection of the type and design of barriers proposed for open pits at closure.
- No specification community discussion on wildlife movement around the open pits (Task 2) was completed in 2014. Community engagement around wildlife movement was primarily on the Misery Powerline and the Jay Project (crossing of esker).
- Identification of perimeters requiring barriers (Task 3) and safe shoreline access for Pit Lakes (Task 4) was not initiated in 2014.

Schedule

It is not expected that the short delay (1-2 years) of initiating work on Task 3 and Task 4 will impact addressing the overall research uncertainty. The research tasks are planned to continue as part of the overall process for the Pit Lake Perimeters and Connector Channel Design (RP 1.3). The scheduling of these tasks has been realigned to be in line with the RP 1.3 schedule. Additionally it is expected that monitoring barrier effectives through the WEMP and incorporating community discussion (Task 2) will be completed as part of RP Task 3 and Task 4 and the schedule has been realigned to accommodate this change.

RESEARCH PLAN 1.2 – PIT PERIMETER STABILITY

Uncertainty

The areas of instability in pit walls, the processes that will affect instability and how it could be mitigated to ensure safe use of the pit lake by people and wildlife at mine closure.

Research Objectives

- Assess ground stability at pit lake edges and pit walls during and after pit flooding.
- Determine expected pit wall degradation processes (geochemical stability and surface erosion) during and over the next 50 years, including post flooding.

Research Undertakings and Findings in 2014

- Work for the standard practice summary of closure procedures for Open Pit Perimeters initiated in 2013 had been put on hold for 2014
- Work on wall failure analysis (Task 3) has not been initiated in 2014.

Schedule

Similarly as in RP 1.1 work for this RP feeds into the overall design for Pit Lake Perimeters and Connector Channel Design (RP 1.3). Due to a continue delay in the stakeholder engagement for RP 1.3 work has also been delayed RP 1.2. The design process as outlined for RP 1.3 is scheduled to continue till the development of the final closure plan and a short delay in completing Task 2 and beginning the wall failure analysis does not impact this process significantly. An allocation of additional year and a half to complete Task 1 has been made in the schedule.

RESEARCH PLAN 1.4 – PIT LAKE WATER QUALITY

Uncertainty

Water quality of the flooded open pits at mine closure.

Research Objective

- Through the use of modelling, predict pit lake water quality during and after flooding and identify the key drivers of water quality.

Research Undertakings and Findings in 2014

The process of review the model inputs and updating the model parameters (Task 6) was initiated in 2014. The overall goal of this process it to keep a running track of updates to the various elements of the pit lake model for the next updated runs. These could include but not be limited updates to climate data, pit flooding schedule, pumped flow rates runoff and watershed information, groundwater flow rates and incorporation of monitoring data.

Schedule

This research plan is on schedule for evaluating the water quality of the flooded pits at mine closure. Reviewing and updating of the model parameters (Task 6) will continue in 2016. As part of this process will include preliminary evaluation of Beartooth Operational water quality data (RP 1.6).

Presentation of the finding of the Pit Lake Modelling (Task 5) did not occur in 2014. As previously indicated the overall need for the presentation will be addressed with stakeholders based on their review and comments of the pit lake quality report. Changes to the schedule have been made to accommodate a possible presentation to stakeholders in 2015/2016.

RESEARCH PLAN 1.5 – WATER WITHDRAWAL FROM SOURCE LAKES

Uncertainty

Effects of water withdrawal on aquatic habitat in source lakes and adjoining streams.

Research Objectives

- Determine the volumes, rates and threshold limits for water withdrawal from source lakes for individual pit flooding that does not negatively impact aquatic habitats in the source lakes, and downstream water bodies.

Research Undertakings and Findings in 2014

Further pit flooding optimization (Task 4) was completed around potential downstream impacts to aquatic species from using the LLCF as a flooding source for Fox Pit. A field data collection and modelling study was completed and provided below is a summary of the study and its key results:

- A literature review and field observations identified stream connectivity as the critical parameter for maintaining good fish habitat. Connectivity is most important in early summer months (early May, June, mid-July) to allow migration of adults and outmigration of juvenile fish. It was indicated that some connectivity in the later months (mid-July to October) is still desirable but not as important.
- A hydrological monitoring program was conducted to asses flow thresholds in Nero-Nema stream linking Nero and Nema Lakes. The Nero-Nema stream was selected for the analysis as it was identified as having the best quality fish habitat in the upstream watershed area most influenced by the LLCF. Additionally, measures designed to maintain connectivity at Nero-Nema stream would also be protective of other streams in the area (i.e., Leslie-Moose and Moose-Nero).
- Field observations and data analysis indicated that a threshold between good and limited connectivity for the Nero-Nema stream was a flow rate approaching 0.8 m^3/s. Flows above this threshold value would ensure good connectivity. For flows lower than this threshold (typical of sub-Arctic streams) connectivity will be poorer, but not necessarily to the extent that prevents fish movement.
- In months where natural flows are expected to exceed 0.8 m^3/s (e.g.,freshet flow, June, and July), flows in Nero-Nema Stream would be maintained at or above 0.8 m^3/s. In months where natural flows could be less than 0.8 m^3/s (e.g., May prior to freshet, August, September, October), flows in Nero-Nema Stream would

be maintained at the level of natural flows to support the natural level of stream connectivity in these months.

- A flow routing model was developed and used to assess the effect on flows at Nero- Nema stream of pumping water to Fox pit. The assessment showed that if 0.3 m^3/s were pumped to Fox Pit for 5 months of the year (June to October) and a constant outflow from the LLCF to Leslie Lake was maintained for 5.5 months of the year (0.28 m^3/s for mid-May to end-October), then acceptable connectivity (i.e., preventing adverse effects) would be achieved.

Schedule

Pit flooding optimisation work (Task 4) in 2015 will focus on evaluation of using alternative energy efficient methods (i.e., compared to pumping using diesel fuel) for delivering of the source water into the pit lakes. Alternative methods could include incorporation of passive filling and solar powered pumps. Additionally due to potential Ekati operational changes and or changes in the LOM Plan further updates or optimisation of the pit-flooding schedule could occur.

RESEARCH PLAN 1.6 – PIT LAKE WATER CAP OVER PROCESSED KIMBERLITE

Uncertainty

What is the settling process of PK in Beartooth pit and how does this determine thickness of water cap over PK, and pit lake water quality?

Research Objectives

- Estimate the water cover required for Beartooth Pit to ensure no significant impact to water quality after pit flooding.

Research Undertakings and Findings in 2014

Collection of Beartooth Operational Data (Task 2) continued in 2014. Water quality measurements at various depth profiles and depth to solids measurements using lead plum ball were completed during the spring and fall season. Primarily findings from the collected data suggest as follows:

- Depth measurements at center of the pit there indicated that there is about 70 m of liquid column to the boundary of the processed kimberlite solids profile.
- Water quality measurements in the first 30 m meets Water Licence Criteria and there are no clear trends with depth in the measurements.

Schedule

Collection of Beartooth data (Task 2) will continue in 2015. Based on the preliminary findings detailed and continuous depth profile measurements will be completed using sonar technology. Data will be used to gain insight into PK consolidation performance within the pit and help guide operational deposition strategies. Collected data will also be used for planning purposes for future investigation of the pit liquid column profile (water and extra fine processed kimberlite (EFPK).Preliminary evaluation of Beartooth water quality data will be completed in 2015 as part of the ongoing pit lakes model and parameters updates (RP 1.4 Task 6).

RESEARCH PLAN 1.7 – GROUNDWATER STUDY

Uncertainty

Quality and volume of UG water associated with pit lake water quality.

Research Objectives

- Determine the groundwater and salinity contributions from underground mines to pit lakes.
- Evaluate expected groundwater behaviour during and after pit flooding.

Research Undertakings and Findings in 2014

Development of the conceptual groundwater study (Task 3) was delayed in 2014.

Schedule

The impact of groundwater flow rates have been included in the Pit Lake Water Quality Results (RP 1.4). The development of the conceptual groundwater study is considered to be part of the process of updates for the Pit Lakes Model (RP 1.4). The schedule for the completion of the groundwater study has been revised to be in line with the pit lakes model update schedule.

RESEARCH PLAN 3.1 – PERMAFROST GROWTH IN WASTE ROCK STORAGE AREAS

Uncertainty

What will be the permafrost extent/condition in WRSA at mine closure?

Research Objectives

- Estimate the spatial extent and condition of permafrost in the WRSA at mine closure.

Research Undertakings and Findings in 2014

- Work continued on the literature review (Task 4) and the WRSA Material Figures (Task 5).
- A risk based framework linking permafrost growth with seepage water quality (RP 3.2) is being developed. The overall goal of the framework is to create a tool for assessing environmental risk in the WRA during closure. The risk based framework includes the development of an ecological risk assessment (ERA) as part of RP 3.2 and thermal analysis modelling (Task 7) as part of RP 3.1. Provided below is a summary of the proposed methodology for the thermal modelling.

Task 7 – Instrumentation and Thermal Modelling: Thermal modelling work will be similar to the recent thermal modelling completed for the design of the Pigeon WRSA. It is likely that the model will simulate transient, one-dimensional, and two-dimensional (or three-dimensional axisymmetric) heat conduction with phase change for a variety of boundary conditions. The model will also likely address heat exchange at the ground-air interface, which considers the effects induced by climate conditions including air temperature, wind speed, snow density and thickness, solar radiation, evaporation. Calibration of thermal model will be based on existing and past conditions (GTC instrumentation data) reported in the rock pile.

Schedule

The development of the risk based framework and overall planning with the WLWB has resulted in RP scheduling changes as follows:

- Thermal analysis modelling of the waste rock piles (Task 7) was scheduled to be completed after the geotechnical investigation and instrument installation (Task 6.) Thermal analysis will now begin in 2015 and WRSA thermal modelling

results will delivered to the WLWB in April 2015. The planning of Task 6 will incorporate the thermal model results and is scheduled to start in 2016/2017.

- WRSA material figures will be delivered to the WLWB in April 2015 as part of the ERA and thermal modelling results.
- Information collection for as part of literature review (Task 4) will continue and be used in the development of the ERA and the planning of Task 6.
- Task 8 water balance is considered to be part of the ERA in RP 3.2 and in order to avoid duplicity has been removed from RP 3.1.

RESEARCH PLAN 3.2 – WRSA SEEPAGE AND WATER QUALITY

Uncertainty

Environmental effects of any WRSA seepage that exists post-closure.

Research Objectives

- Predict the long-term WRSA water quality after closure using numerical modelling, best current estimates of source terms, and the LOM Plan.

Research Undertakings and Findings in 2014

- WLWB review and evaluation of the proposed change in closure objective for capping of landfills was on-going in 2014. This proposed ICRP update has been resubmitted as part of the 2014 Progress Report.
- Based on a review of operational seepage data the WLWB indicated concerns around seepage water quality during operations and for closure. As a response to the WLWB concerns DDEC has worked on developing a risk based framework that will evaluate to impacts from seepage water quality during operations and in closure. An ecological risk assessment (ERA) will be the primary tool for evaluating seepage water quality. Additionally as mentioned the risk based framework will incorporate thermal modelling analysis as part of RP 3.1. Task 4 Water Quality Prediction has been renamed as Task 4 – Ecological Risk Assessment and provided below is the proposed methodology for the ERA.

Task 4 – Ecological Risk Assessment: An overall standard methodology for the ERA will be adopted and will consist of the following four components:

- Problem Formulation and Conceptual Model: The Problem Formulation stage describes the context and scope of the risk assessment. It identifies a representative set of receptors that may be present, the relevant biological endpoints that will be assessed, Contaminants of Potential Concern (COPCs) that may be present at levels that are potentially harmful to receptors, and pathways by which receptors may be exposed to COPCs. A conceptual model is the primary outcome of the Problem Formulation stage.
- Exposure Assessment: The Exposure Assessment stage identifies the extent to which receptors might be exposed to COPCs. Aquatic organisms can be exposed to COPCs via direct contact with water and uptake through diet. For most COPCs, the primary exposure route for aquatic organisms is through direct contact with water and uptake occurring across the respiratory surfaces. In cases

where diet is a significant route of exposure for a COPC (e.g., mercury, selenium).

- Effects Assessment: The Effects Assessment stage identifies levels of COPCs that can be taken into the body of aquatic organisms without appreciable health risks. These 'safe' levels of exposure are referred to as toxicity reference values (TRVs) or toxicity benchmark concentrations. TRVs may be defined based on concentrations of the COPC in either the aquatic environment (i.e., in units of mg/L) or in biota tissue (i.e., in units of mg/kg). Chronic toxicological endpoints including growth, reproduction, and survival will be considered in selecting the toxicological endpoints to derive TRVs.
- Risk Characterization: The Risk Characterization stage determines the potential for adverse health effects in receptors by comparing the exposure level (determined in the Exposure Assessment) with the TRV (determined in the Effects Assessment). The first step in evaluation of the potential risk to aquatic organisms that may be exposed to seep-derived COPCs will be based on the calculation of Hazard Quotients (HQ). HQs will be by dividing the exposure concentration of a parameter by the TRV. When the HQ is calculated to be greater than 1.0, it is possible that effects may occur in the aquatic environment. In this case (HQ > 1.0) the data and assumptions used to estimate the risks should be examined more closely in order to determine if the risk is real, or if it is due to the use of conservative assumptions. Therefore, COPCs with HQ greater than 1.0 would be considered further in the Risk Characterization.

Schedule

In order to be in line with the outlined April 2015 submittal for the ERA the schedule for Task 4 has been changed accordingly. Task 2 Kimberlite Characterization will be encompassed into the overall development of the ERA and its schedule has also been changed. The period for evaluating appropriate capping depths for WRSA materials has also been extended by a year.

RESEARCH PLAN 4.1 – LONG TERM LLCF WATER QUALITY

Uncertainty

The water quality of the LLCF and its discharge after closure.

Research Objectives

- Predict the long-term LLCF water quality after closure using numerical modelling and best current estimates of source terms, and the LOM Plan.

Research Undertakings and Findings in 2014

A water quality prediction model for the LLCF and downstream lakes has been developed and calibrated for the operation period at Ekati. This model was extended to predict water quality in the LLCF for closure. The developed closure model was utilized in support of the using the LLCF as a pit flooding source as outlined in the 2013 Progress Report (ERM Technical Memorandum).

In general model results for closure indicate that after the end of operations the water quality within the LLCF is predicted to improve once processed kimberlite and other mine water are not discharged into the facility. Concentrations of most water quality variables are predicted to decrease relatively quickly in the first 5 to 10 years, with concentrations continuing to decrease after that, but at a lower rate.

Schedule

Given its overall similarity with LLCF operational model DDEC does not see it as useful to provide a complete detailed report of the LLCF closure model at this time. Similar to the process for the Pit Lakes the closure model will be updated in the next two years. A key update will include incorporation of pore water expulsion and the final closure design elevations for the breached dykes. It is tentatively planned that a final LLCF closure model report will be provided to stakeholders in 2016.

RESEARCH PLAN 4.2 – PERMAFROST GROWTH IN THE LLCF

Uncertainty

How will permafrost develop through the LLCF and how will porewater and ground pressure be dissipated?

Research Objectives

- Predict how permafrost will grow through the LLCF and what corresponding processes are likely to take place for porewater expulsion and dissipation of ground pressures.

Research Undertakings and Findings in 2014

The 2013 LLCF site investigation report (Task 7) has been completed.

Six of the seven borehole locations were almost completely frozen with depth. Only one borehole located in the southern portion of Cell B (where deposition had occurred in 2012) had a layer of unfrozen material. The results indicate that permafrost has aggraded into majority of processed kimberlite in Cell B. From a water quality perspective this implies that input loadings from Cell B will be for the most part limited to the permafrost active layer. Collected ground temperature instrumentation data (Task 8) will be incorporated into thermal modelling of permafrost development within the whole LLCF (Cells A, B, and C). Permafrost data will be incorporated into revisions and updating of the LLCF closure model (RP 4.1).

Porewater concentration data indicated that PK weathering mechanisms have been occurring within Cell B. Additional data indicated that some expulsion of solutes occurred during the aggradation of permafrost into Cell B. The evaluation of long term porewater concentrations in the LLCF (Cells A, B, and C) will be developed as part of the revision and updating of the long term LLCF closure water quality model. The development of the pore water concentration, specifically for pore water expulsion, will also utilize thermal modelling results of LLCF permafrost development (Task 8).

Schedule

Collection of thermal data from Cell B is on-going (Task 8). It is anticipated that planning for thermal modelling analysis will be completed in 2015 and modelling will be initiated in 2016. Based on the results of the LLCF site investigation DDEC does not see a need for the completion of the consolidation and freeze concentration study (Task 9). The need for this task will be evaluated on annual basis and the schedule has been changed to accommodate this.

RESEARCH PLAN 4.3 – PROCESSED KIMBERLITE WEATHERING

Uncertainty

What are the weathering characteristics of processed kimberlite and how do these physically and chemically affect plant growth and water quality?

Research Objectives

- Determine the long term weathering of PK and effects on vegetation growth in the LLCF and the maintenance of water quality.

Research Undertakings and Findings in 2014

Literature review (Task 1) continues to be developed. Sodium concentrations have been identified as a potential concern for vegetation growth in the LLCF (RP 4.4). The literature review scope has been revised to additionally include evaluation of sodium weathering mechanisms and their possible impacts on vegetation growth (Task 5).

Schedule

As previously outlined the literature review results will help guide future planning of tasks for this research plan. It is anticipated that a literature review and path forward will be provided in early 2015. In order to accommodate the delays in the literature review the evaluation of laboratory tests including those outlined in Task 2-4 have been extended by a year.

RESEARCH PLAN 4.4 – PROCESSED KIMBERLITE PLANT SPECIES AND COMMUNITIES

Uncertainty

The development of sustainable plant communities on processed kimberlite (PK) in the Long Lake Containment Facility (LLCF) that are compatible with the local tundra environment.

Research Objectives

- Determine whether a vegetation cover can be used as a surface stabilizer on PK beaches in the long-term, specifically Central and Water Interface Zones.
- Conduct the research in Cell B, as part of the LLCF Pilot Study.

Research Undertakings 2014

In 2014 additional 18 hectares were seeded with barley and rye corps to establish and initial ground cover. Species trials within various areas of Cell B were also completed. First year of monitoring was completed on seeded ground covers (annual and perennial) and the various rock configurations. Monitoring of the amendment trials was also completed. Preliminary monitoring indicate encouraging results on the ability to establish an initial ground cover on processed kimberlite.

Schedule

All research tasks (1 through 9) are scheduled to be on-going until development of the final closure plan. Given the overall linkage to design of the final LLCF cover system (RP 4.6) an overall 2014 LLCF Reclamation Report that will be provided in early 2015. This report will provide updates and findings to the research tasks outlined for this RP combined with those for RP 4.6. The overall intent of this report is to provide a stream lined approach to stakeholder on LLCF reclamation research activities, monitoring results, and wok plan for future work.

RESEARCH PLAN 4.5 – STABILIZATION OF EFPK IN THE LLCF

Uncertainty

The stabilization of extra fine processed kimberlite (EFPK) in the LLCF to ensure no negative environmental impacts.

Research Objectives

- Investigate the stabilization of the EFPK within the LLCF.

Research Undertakings and Findings in 2014

- Site observations (Task 4) of the water pool within Cell C continue to indicate an overall decrease in the amount of EFPK.
- The EFPK component of the 2013 LLCF site investigation program was not implemented due to an overall lack of free water due to freezing. Freezing of the entire depth of waters located is considered to be a key component in EFPK stabilization (i.e., settling and consolidation). In order to validate the consolidation of EFPK planning for a 2015 summer investigation program was started in 2014. The program will at a minimum consist of plum line surveys to assess the profile of EFPK within the LLCF. Strength testing of the consolidation crust could also be incorporated as part of the investigation program.

Schedule

It is anticipated that EFPK summer site investigation program will be completed in 2015 and results will be reported as part of 2015 Progress Report.

RESEARCH PLAN 4.6 – LLCF PILOT STUDY

Uncertainty

The design and construction of the long term cover on the LLCF and a final landscape that would be safe for human and wildlife use.

Research Objectives

To determine, through an LLCF Pilot Study, a sustainable cover design for the LLCF processed kimberlite beaches following final PK deposition.

Research Undertakings and Findings in 2014

- Rock placement cover construction at the Cell B reclamation research area was completed within the 2013 seeded areas (7 ha) in the winter of 2014. Four rock cover configurations were constructed consisting of windrows, boulder field, and rock grid pattern.
- Summer 2014 Field observations indicated grazing of seeded barley and rye corps by geese and other smaller wildlife (Task 5). Field observations also indicate grazing on goose grass but a lesser rate than the rye and barley corps.
- Four wildlife cameras were installed were within the Cell B reclamation research area (Task 6). Overall short term goal is to monitor and observe grazing impacts and gain a preliminary understand of wildlife movement within the research area.
- Two potential locations were surveyed for the construction of the trial PK water management channels (Task 3). One area was identified in within the Cell B reclamation research area and another was on the west side of Cell B.

Schedule

As part of the LLCF cover design process the process of drainage management (Task 3) and constructability assessment (Task 4) will be on-going similar to Tasks 5 through 8. A combined 2014 LLCF Reclamation Report will be provided in early 2015. This report will consolidate providing an update on the vegetation elements of the cover design process with Task s3 through Task 6 and Task 8 outlined in RP 4.6. The completed 2006 LLCF Risk Assessment (Task 7) will be updated to incorporate new information from the Cell B Reclamation Research. The methods for the risk assessment will follow those from Rescan (2006) with any new additional regulatory guidance on ecological and human health risk assessment methodology. It is anticipated that deliverable of Task 7 will be completed in 2015 or in early 2016.

RESEARCH PLAN 7.1 – TK INCORPORATION IN RECLAMATION RESEARCH

Uncertainty

Traditional Knowledge inclusion in reclamation research for the Ekati mine components.

Research Objectives

- Identify opportunities for inclusion of TK in reclamation research and closure at EKATI.
- Develop methods and approaches to involve and encourage TK input from communities.

Research Undertakings and Findings in 2014

Ekati reclamation engagement efforts have been orientated towards community and regulatory site visits of specific reclamation projects including Cell B Long Lake Containment Facility Reclamation Research (LLCF), Panda Diversion Slope Stabilization, and Old Camp Reclamation. The site tours and discussion were an effective means of observing reclamation success and discussing closure and reclamation planning.

Schedule

DDEC will look for opportunities for engagement on the ICRP reclamation plan (Task 3) and on Reclamation Research (Task 4 and Task 5) in 2015.

RESEARCH PLAN 7.2 – CLOSURE CRITERIA FOR WILDLIFE SAFETY

Uncertainty

The development of appropriate closure objectives and criteria for wildlife safety at EKATI is required to ensure wildlife will have safe access to the mine area once reclamation activities have been completed.

Research Objectives

- Identify the most appropriate closure objectives and criteria that will ensure safe access and use of the EKATI mine site by wildlife following full reclamation.

Research Undertakings and Findings in 2014

No significant work was completed on the development of wildlife closure and criteria in 2014.

Schedule

Task 3 Development of Wildlife Closure Objectives, Task 4 Development of Wildlife Closure Objectives with Communities, and Task 5 Refinement of Closure Objectives and Criteria have been combined into one Task 3 Develop and Refine Wildlife Closure Objectives and Criteria. The schedule has been changed to accommodate this update.

RESEARCH PLAN 7.3 – RIPARIAN PLANT SPECIES AND COMMUNITIES

Uncertainty

The development of sustainable riparian plant communities that are compatible with the surrounding tundra environment, on mine components no longer required for mine operations.

Research Objectives

- Define the composition and locations of riparian sites at mine closure, and determine what plant species and landscaping techniques would be best used to meet the long term goal of sustainable plant communities, that are compatible with surrounding tundra environment.

Research Undertakings and Findings in 2014

Vegetation monitoring activities were completed and are outlined in the 2014 Annual Vegetation Report (Appendix D).

Schedule

Revegetation reclamation research in 2014 was still focused on processed kimberlite species (RP 4.4) as part of LLCF Reclamation Research. The research schedule has been revised to accommodate a longer duration for completion of the necessary research tasks and will become part of the overall final closure plan development.

RESEARCH PLAN 7.4 – UPLAND PLANT SPECIES AND COMMUNITIES

Uncertainty

The encouragement of sustainable plant communities at upland sites that are compatible with the surrounding tundra environment, on mine components no longer required for mine operations.

Research Objectives

- Define the composition and locations of upland sites at mine closure, and determine what plant species and landscaping techniques would be best used to meet the long term goal of sustainable plant communities, that are compatible with surrounding tundra environment.

Research Undertakings and Findings in 2014

Vegetation monitoring activities were completed and are outlined in the 2014 Annual Vegetation Report (Appendix D).

Schedule

Revegetation reclamation research in 2014 was still focused on processed kimberlite species (RP 4.4) as part of LLCF Reclamation Research. The research schedule has been revised to accommodate a longer duration for completion of the necessary research tasks and will become part of the overall final closure plan development.

RESEARCH PLAN 7.5 – CLOSURE CRITERIA FOR ENHANCEMENT OF NATURAL RECOVERY AT DISTURBED SITES

Uncertainty

The use of applicable closure objectives and criteria that demonstrate surface stabilization and the potential for plant communities to naturally recover following mine closure.

Research Objectives

- Research ecological attributes of reclamation sites and determine which of these attributes would be suitable at EKATI to demonstrate natural recovery. From these attributes develop a potential list of closure objectives and criteria that would be used to demonstrate success.
- Field test and define the closure objectives and criteria that will ensure useful application and reasonable assurance that reclaimed sites will recover, and plant communities have the ability to be self-sustainable over the long-term.

Research Undertakings and Findings in 2014

No significant research was undertaken in 2014.

Schedule

Revegetation reclamation research in 2014 was still focused on processed kimberlite species (RP 4.4) as part of LLCF Reclamation Research. The research schedule has been revised to accommodate a longer duration for completion of the necessary research tasks and will become part of the overall final closure plan development.

RESEARCH PLAN 7.6 – CLOSURE CRITERIA FOR GEOTECHNICAL STABILITY

Uncertainty

What closure objectives and criteria should be used to ensure long term geotechnical stability for various mine infrastructure?

Research Objectives

- Development measurable closure objectives and criteria for use in identifying geotechnical stability of WRSA following Quarry Work, LLCF Internal Drainage Channels, Processed Kimberlite Surface Stability, Channel Banks, Remaining Dams and Dikes, Esker Quarry Sites, Camp Pads, Laydown Areas, Sumps, Roads and Airstrip.

Research Undertakings and Findings in 2013

No research undertaken in 2014.

Schedule

The closure criteria for geotechnical stability will be completed as part of the final closure plan development and is scheduled to begin one year prior to submittal of a final closure plan.

Table C-1. 2014 Reclamation Research Schedule

Research Plan # and Title	Research Task	2013	2014	2015	2016	2017
1.0 Pit Lakes						
1.1 Pit Perimeter Safety	*Task 1 - Literature Review*	Complete				
	Task 2 - Monitor Barrier Effectiveness through the WEMP, and Incorporate Community Discussions					
	Task 3 - Identify Perimeter Areas Requiring Barriers	> > > >	> > > >			
	Task 4 - Identify Safe Shoreline Access for Pit Lakes	> > > >	> > > >			
1.2 Pit Perimeter Stability	*Task 1 - Standard Practice Summary of Closure Procedures for Open Pit Perimeters*	> > > >	> > > >			
	Task 2 - Review Open Pit Structural Environment					
	Task 3 - Conduct Wall Failure Analysis	> > > >	> > > >			
	Task 4 - Assessment of Talik Zone Thickness					
	Task 5 – Mitigation Analysis					
1.3 Pit Lake Perimeters and Connector Channels	*Task 1 - Map Pit Operations Perimeters*	Complete				
	Task 2 - Panda/Koala Underground Plugs Options Analysis.	COMPLETED				
	Task 3 - Develop Pit Lake and Channel Elevations	COMPLETED				
	Task 4 - Develop Pit Lake Perimeter and Connector Channel Design Plan	> > > >	> > > >			
1.4 Pit Lake Water Quality	*Task 1 - Waste Characterization*	COMPLETED				
	Task 2 - Water Balance at Closure	COMPLETED				
	Task 3 - Pit Lakes Stability Modelling	COMPLETED				
	Task 4 - Water Load Balance Modelling	COMPLETED				
	Task 5 - Pit Lakes Water Quality Modelling Presentation to Stakeholders	> > > >	> > > >			
	Task 6 - Review Model Inputs and Update Model Runs					
1.5 Water Withdrawal from Source Lakes	*Task 1 - Fish Habitat Evaluation (Ursula and Upper Exeter)*	Complete				
	Task 2 - Potential Effects on Fish Habitat	Complete				
	Task 3 - Lac de Gras Hydrology and Extraction Rates	COMPLETED				
	Task 4 - Pit Flooding Optimization Review	> > > >				
1.6 Pit Lake Water Cap over Processed Kimberlite	*Task 1 - Literature Review*	Complete				
	Task 2 - Beartooth PK Deposition Operational Data					
1.7 Groundwater Study	*Task 1 - Underground Minewater Flow Measurements*	Complete				
	Task 2 - Groundwater Quality Measurements	Complete				
	Task 3 - Develop Conceptual Groundwater Study	> > > >	> > > >			
2.0 Underground (No Research Plans)						
3.0 Waste Rock Storage Areas (WRSA)						
3.1 Permafrost Growth in Waste Rock Storage Areas	*Task 1 - WRSA Performance Evaluation*	Complete				
	Task 2 - WRSA Thermal Modelling	Complete				
	Task 3 - Analysis of Data Available	Complete				
	Task 4 - Literature Review	> > > >	> > > >			
	Task 5 - Development of WRSA Materials Figures	> > > >	> > > >			
	Task 6 - Geotechnical Investigation & Instrumentation Installation	> >	> > > >	> > > >		
	Task 7 - Instrumentation and Thermal Modelling		> > > >			
3.2 WRSA Seepage and Water Quality	*Task 1 - Operational Seepage Monitoring*					
	Task 2 - Kimberlite Geochemical Characterization					
	Task 3 - Determine Effective Capping Depth of Remaining Materials Within the WRSA					
	Task 4 - Water Quality Prediction					

Research Plan # and Title	Research Task	2013	2014	2015	2016	2017
4.0 Processed Kimberlite Containment Area (PKCA)						
4.1 Long Term LLCF Water Quality	*Task 1 - Develop LLCF Closure Water Quality Model*	> > > >	COMPLETED			
	Task 2 - Estimate the Contribution to the LLCF Water of Salts Expelled from PK Pore Water	**COMPLETED**				
	Task 3 - Update Closure Water Quality Model					
4.2 Permafrost Growth in LLCF	*Task 1 - PK Deposition History*	Complete				
	Task 2 - Future PK Deposition Planning					
	Task 3 - Review of the Existing Geotechnical Information	Complete				
	Task 4 - Characterization of the Processed Kimberlite	Complete				
	Task 5 - Literature Review	**COMPLETED**				
	Task 6 - Assestsment of the Existing Ground Temperature Cable Locations.	Complete				
	Task 7 - LLCF Investigation	> > > >	COMPLETED			
	Task 8 - Instrumentation and Thermal Modelling					
	Task 9 - Consolidation and Freeze Concentration Testing Study		> > > >			
4.3 Processed Kimberlite Weathering	*Task 1 - Literature Review*	> > > >	> > > >			
	Task 2 - Freeze/Thaw Durability.	>	> > > >			
	Task 3 - Wet/Dry Durability	>	> > > >			
	Task 4 - Shake Flask Water Quality Testing		> >			
	Task 5 - Initial Vegetation Assessment					
4.4 Processed Kimberlite Plant Species and Communities	*Task 1 - Assess Suitability of PK as a Vegetation Substrate*					
	Task 2 - Survey of Tundra Plant Species with Potential for Vegetation on PK					
	Task 3 - Identify Locations Within the LLCF Pilot Study Area for Vegetation	**COMPLETED**				
	Task 4 - Surface Preparation and Erosion Control					
	Task 5 - Equipment and Methods for Site Preparation					
	Task 6 - Seed Collection, Storage and Propagation					
	Task 7 - Recultivation Methods and Activities	> > > >				
	Task 8 - Effects of Grazing on the Establishment and Maintenance of Plant Cover	> > > >				
	Task 9 - Natural Colonization and Plant Succession on PK	> > > >				
4.5 Stabilization of EFPK in the LLCF	*Task 1 - Plumb Line Surveys*	Complete				
	Task 2 - Evaluate EFPK Sampling Methods	Complete				
	Task 3 - EFPK Site Investigation Program	> > > >	> >			
	Task 4 - EFPK Settlement Monitoring (new)					
	Task 5 - LLCF Closure Ponds (new)					
4.6 LLCF Pilot Study	*Task 1 - Site Investigation*	**COMPLETED**				
	Task 2 - Develop an LLCF Strategy Plan	**COMPLETED**				
	Task 3 - LLCF Pilot Study Drainage Management	> > > >				
	Task 4 - Constructability Assessment					
	Task 5 - Assess Grazing Impacts					
	Task 6 - Wildlife Monitoring					
	Task 7 - Metals Bioaccumulation					
	Task 8 - Geotechnical Monitoring					
5.0 Dams, Dikes and Channels (No Research Plans)						
6.0 Buildings and Infrastructure (No Research Plans)						

Research Plan # and Title	Research Task	2013	2014	2015	2016	2017
7.0 General Site						
7.1 TK Incorporation in Reclamation Research	*Task 1 - Literature Review*	Complete				
	Task 2 - Review past and current TK projects at EKATI	Complete				
	Task 3 - Provide Annual Updates to Communities					
	Task 4 - Discuss Community Participation in Reclamation Research Plans					
	Task 5 - Conduct Mine Site Workshops with Communities to Discuss Reclamation Research Uncertainties					
7.2 Closure Criteria for Wildlife Safety	*Task 1 – Literature Review*	Complete				
	Task 2 - WEMP Reports Review	**COMPLETED**				
	Task 3 - Develop and Refine Wildlife Closure Objectives and Criteria	> > > >	> > > >			
7.3 Riparian Plant Species and Communities	*Task 1 - Identify Riparian Areas for Reclamation*	> > > >				
	Task 2 - Substrate Materials Assessment	> > > >				
	Task 3 - Identification of Riparian Tundra Plant Species & Communities	> > > >				
	Task 4 - Riparian Plant Sources, Collection, Storage and Propagation	> > > >				
	Task 5 - Assessment of Recultivation Techniques and Natural Colonization	> > > >				
	Task 6 - Assessment of Physical Conditions at Riparian Sites					
7.4 Upland Plant Species and Communities	*Task 1 - Identify Upland Areas for Reclamation*					
	Task 2 - Substrate Materials Assessment					
	Task 3 - Identification of Upland Tundra Plant Species & Communities					
	Task 4 - Upland Plant Sources, Collection, Storage and Propagation					
	Task 5 - Assessment of Recultivation Techniques and Natural Colonization					
	Task 6 - Assessment of Physical Conditions at Upland Sites					
7.5 Closure Criteria for Enhancement of Natural Recovery	*Task 1 - Identify Closure Objectives and Criteria That Demonstrate Recovery*	> > > >				
	Task 2 - Establish Reference Plant Communities	> > > >				
	Task 3 - Field Test Proposed Closure Objectives and Criteria	> > > >				
	Task 4 - Develop a Revegetation Standard for EKATI					
7.6 Closure Criteria for Geotechnical Stability	*Task 1 - WRSA Stability Following Quarry Work*					
	Task 2 - LLCF Internal Drainage Channels					
	Task 3 - PK Surface Stability					
	Task 4 - Channel Bank Stability					
	Task 5 - Remaining Dams and Dikes					
	Task 6 - Esker Quarry Sites					
	Task 7 - Camp Pads, Laydown Areas, Sumps, Roads and Airstrip					

Notes:

'Complete' in black indicates task completed previous to 2013

'**COMPLETED**' in bolded black text indicates task was completed in 2013

'COMPLETED' in bolded blue text indicates task was completed in 2014

in blue indicates all 2014 proposed changes to the schedule

> in white background indicate task was deferred

> in green background indicates research work on the task is ongoing

'>' in black indicates 2013 deferment of tasks or ongoing work

'>' in blue indicates 2014 deferment of tasks or ongoing work

Appendix D

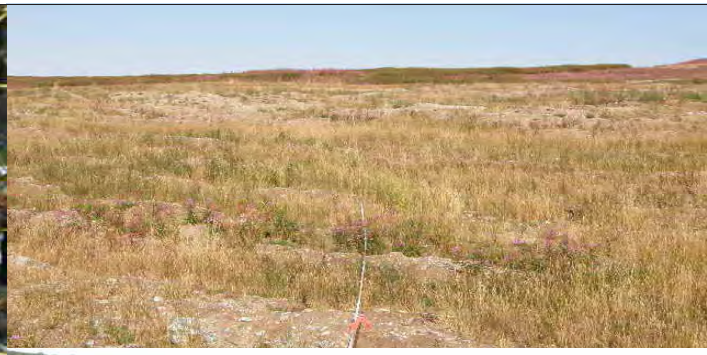
2014 Vegetation Annual Report

DOMINION DIAMOND

New Vision, New Focus, New Name

Ekati Diamond Mine
2014 Vegetation Annual Report

December 2014


Dominion Diamond Ekati Corporation

EKATI DIAMOND MINE
2014 Vegetation Annual Report

December 2014

Citation:
EcoSense. 2014. *Ekati Diamond Mine: 2014 Vegetation Annual Report*. Prepared for Dominion Diamond Ekati Corporation by EcoSense Environmental Inc.: Lethbridge, Alberta.

EKATI DIAMOND MINE

2014 Vegetation Annual Report

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1. INTRODUCTION

1.1 BACKGROUND

Dominion Diamond Ekati Corporation (DDEC) has been conducting progressive reclamation at areas no longer part of active operations at the Ekati mine since the start-up of mining in 1995 in support of the reclamation goals outlined in the Interim Closure and Reclamation Plan (ICRP; BHP Billiton 2012) for the mine.

The long-term goal of reclamation/revegetation work at the mine is to leave disturbed areas in a stable condition capable of supporting sustainable native tundra plant communities. A number of surface treatments and plant species combinations have been tried at various locations across the mine site and the results documented through scheduled monitoring. This report summarises revegetation and monitoring, and weed control and top soil salvage activities conducted in 2014.

In 2014, vegetation monitoring was conducted at the following locations: Pigeon Stream Diversion, Fay Bay Reclamation Site, Culvert Camp, Fred's Channel and Esker South, and at the Rock Pad Reclamation Study site (Figure 1.1-1).

1.2 MONITORING METHODS

The three primary methods used to describe vegetation throughout this report are percent ground cover, survival rates and plant size. Percent ground cover is derived by averaging repeated estimates of the portion of ground covered by individual species within a 0.10 m^2 Daubenmire frame. Ground covered by plant litter, bare ground and mosses and lichens is also recorded. At some sites permanent 30 m transects have been established along which the data is acquired and at others the frame is placed randomly. Typically, 10 to 20 frames are read and the data averaged. Plant size is determined by measuring two perpendicular axes of a plant's surface area and averaging them to come up with a single number indicating the plant's size and the rate of survival is simply the percentage of live plants out of the total number planted. Other attributes that may be noted are overall health and/or vigour, leaf colour or discoloration, height and the presence and number of tillers.

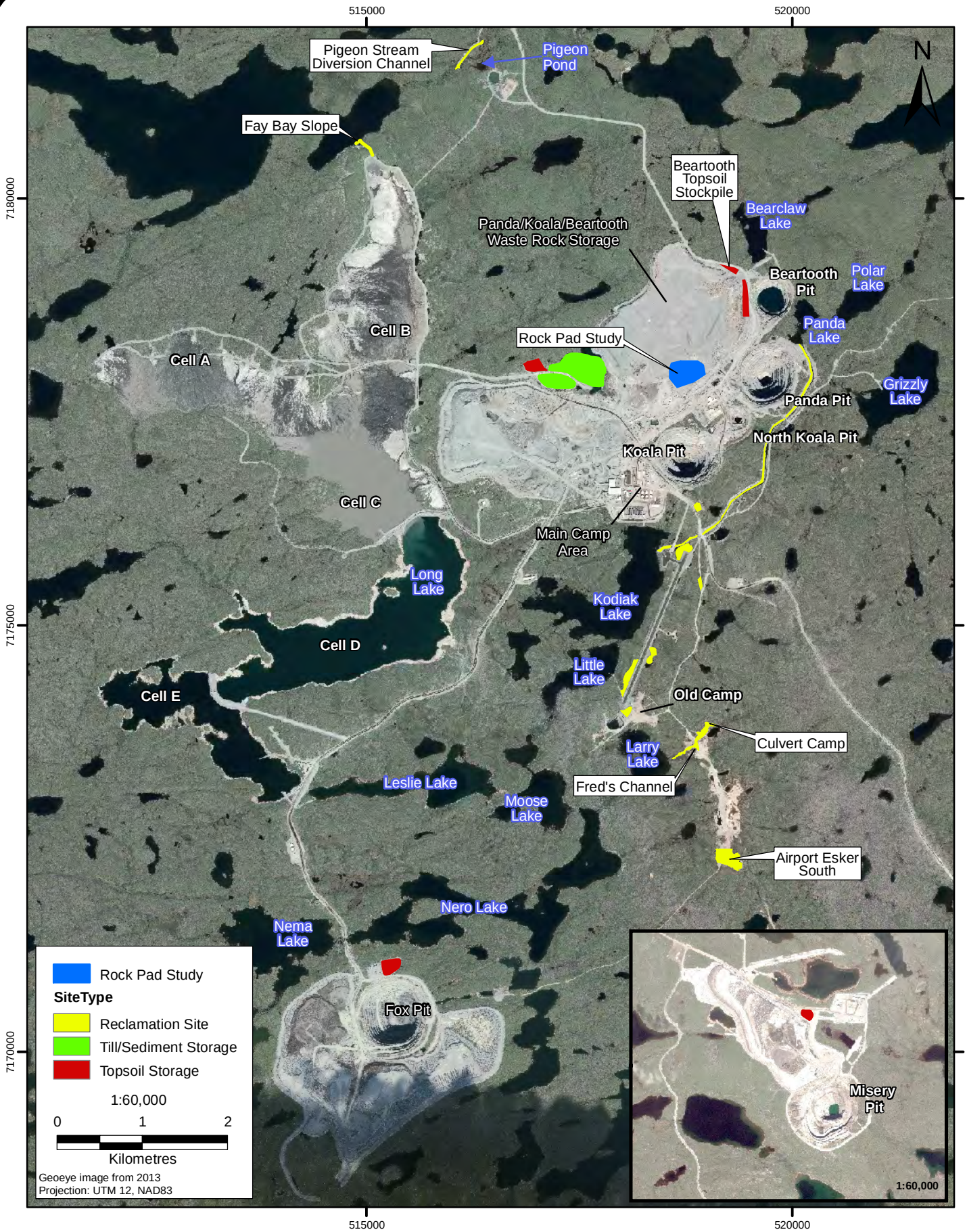

FIGURE 1.1-1

DOMINION DIAMOND

Vegetation Monitoring Locations, 2014

2. 2014 RE-VEGETATION AND MONITORING ACTIVITIES

2.1 PIGEON STREAM DIVERSION

2.1.1 Introduction

The Pigeon Stream Diversion (PSD) was constructed to divert water from Pigeon Pond and those sections of Pigeon Stream impacted by development of the Pigeon Pit. It is a 376-metre (m)-long lined channel, about 3 m wide by 50 centimetres (cm) deep; it is bordered by 4 to 6 m of rock crush, also underlain by a liner.

In the fall of 2012, topsoil hauled from the Beartooth topsoil stockpile, mixed with lake sediments and glacial till (salvaged from the Beartooth pit development), was placed at three locations (see Figure 2.1-1 below) on rock crush along the south bank of the constructed channel. The topsoil material is 20 to 30 cm deep and was seeded then covered with jute netting to control erosion during spring freshet. A native seed mix containing 38% tufted hairgrass (*Deschampsia ceaspitosa*), 25% bluejoint (*Calamagrostis canadensis*), 25% Arctared fescue (*Festuca rubra*) and 12% Polargrass (*Arctagrostis latifolia*) was broadcast at 12 kilograms (kg) per hectare (ha) followed by 24 kg/ha annual rye (*Secale cereale*), applied as a cover crop.

In 2013, 90 locally harvested willow (*Salix planifolia*) cuttings were planted at the topsoil plots in three parallel rows of 30 stems each (Figure 2.1-2) in the topsoil, in rock crush within one metre of the channel edge and in rock crush on the channel slope. In addition, 36 bog cranberry seedlings (*Vaccinium vitis idaea*), grown from locally harvested seed, were planted at each topsoil plot; 18 (in 2 rows of 9) in topsoil and 18 (in 2 rows of 9) in the adjacent rock crush (Figure 2.1-2).

In late June 2014, an additional 383 seedlings were planted. At each of the three plots 30 tall water sedge (*Carex aquatilis* var. *aquatilis*) and 60 tussock cotton grass (*Eriophorum vaginatum*) were planted. Twenty-eight nodding cotton grass (*Eriophorum angustifolia*) were planted at two of the plots and 27 at the third (most easterly plot). Finally, 30 short water sedge (*Carex aquatilis* var. *stans*) were planted at one (the western-most) plot. One row containing half the number of each species was planted on topsoil and the other half on the adjacent rock crush (see Figure 2.1-2 below). All the seed for these plants was harvested locally in 2013.

2.1.2 Monitoring Activities

Initial monitoring of this site was conducted in August 2013, when ground cover of planted species, willow survival and survival and size of cranberry seedlings was documented. Monitoring in 2014 consisted of repeating ground cover and cranberry size and survival measurements and documenting the survival of seedlings planted that year.

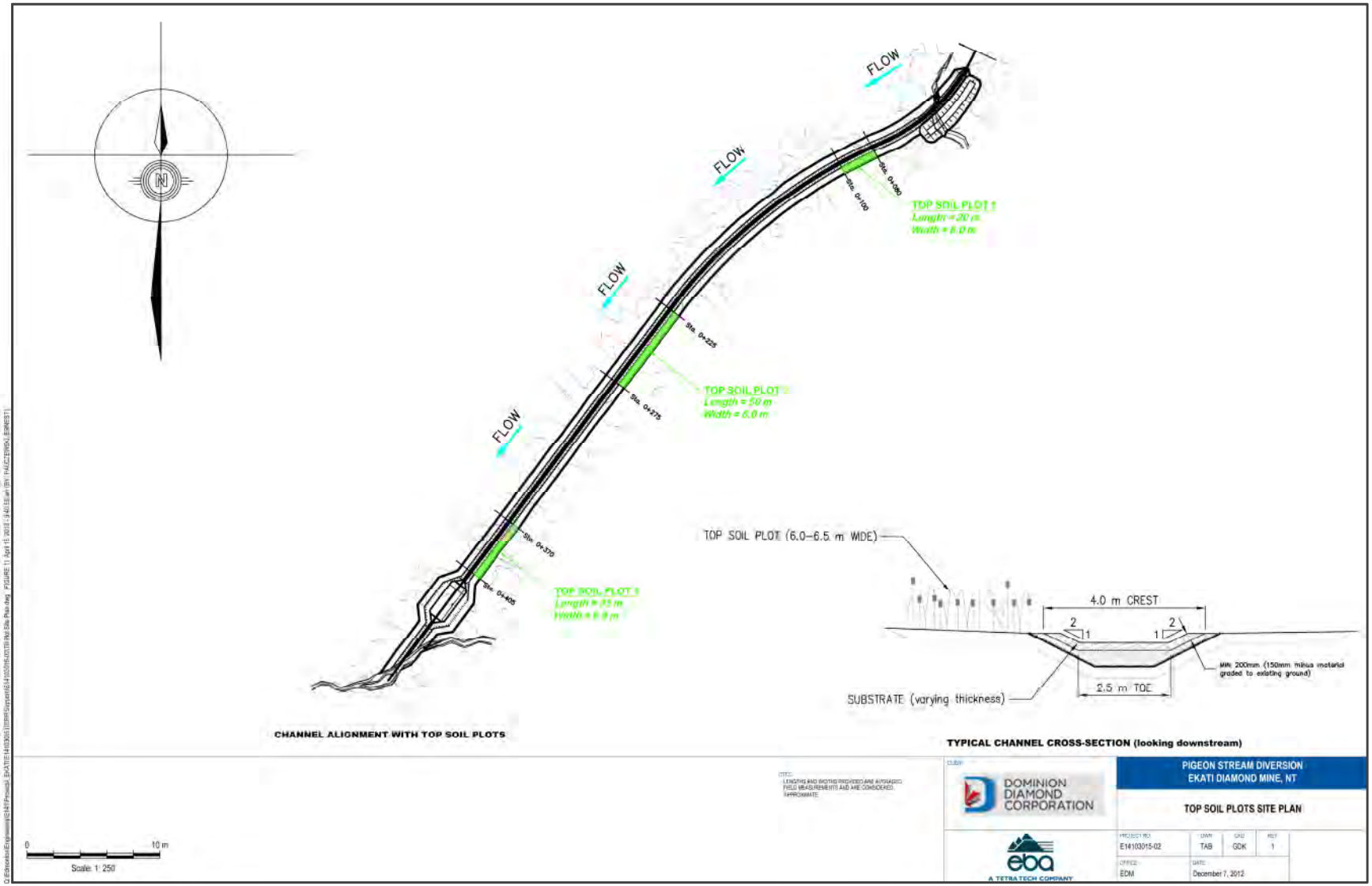

Figure 2.1-1. Topsoil Plot Locations along Pigeon Stream Diversion

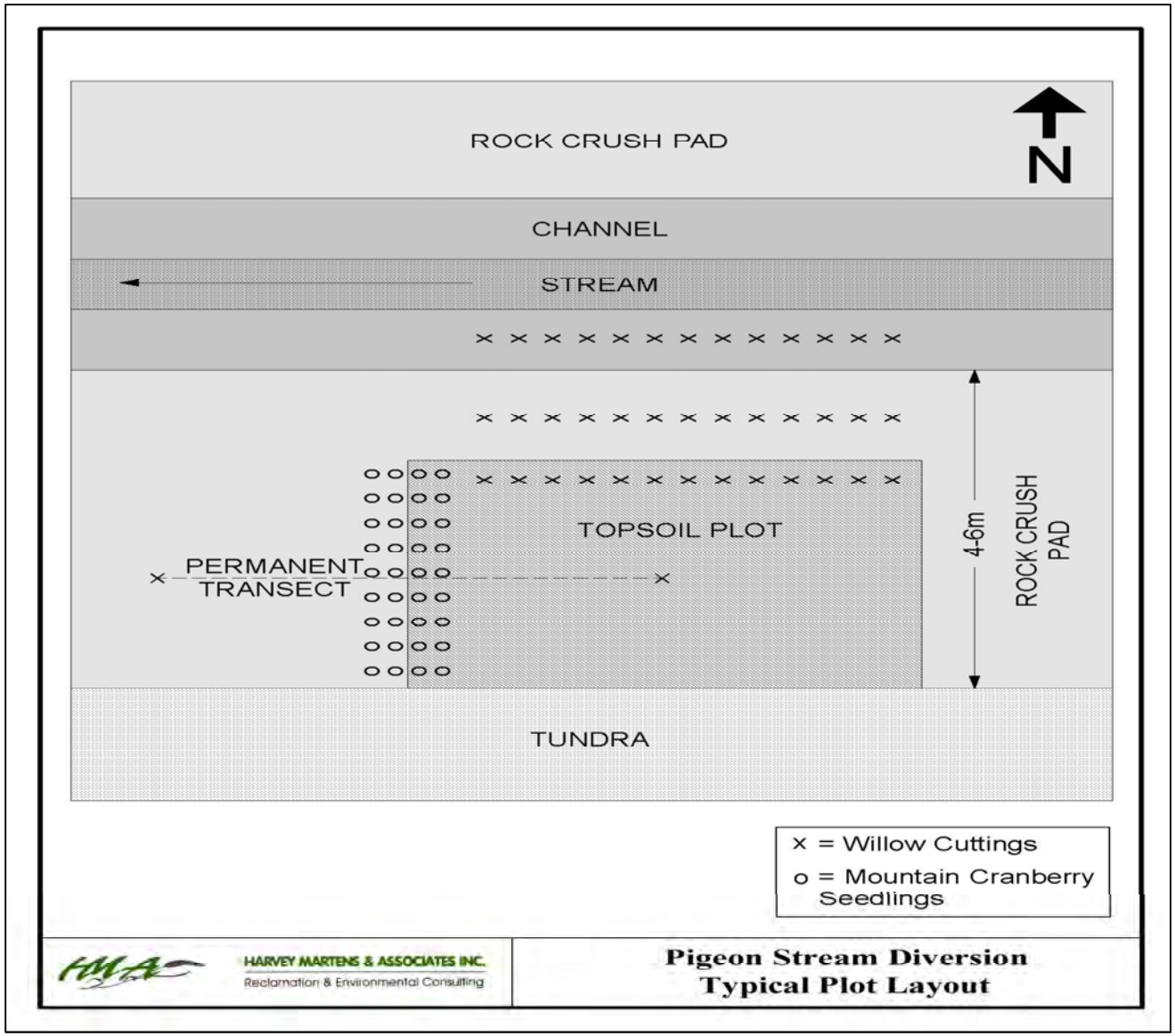

Figure 2.1-2. Typical Topsoil Plot Layout along Pigeon Stream Diversion

2.1.3 Results and Discussion

In 2013, percent ground cover by seeded grasses in topsoil averaged 22%, most of which was due to the contribution of annual rye, the cover crop (Martens, 2013). Average percent ground cover in topsoil increased to 25% in 2014 and annual rye was absent. Seedlings and small plants of each of the planted species were noted as were a few native colonizers. Although still very low percent ground cover on rock crush increased from 0.9% in 2013 to 2% in 2014 (see Table 2.1-1 and Plate 2.1-1 below.)

Table 2.1-1. Percent Ground Cover of Seeded Vegetation at Pigeon Stream Diversion Topsoil Plots

Location	Mean Percent Ground Cover	
	2013	2014
Topsoil		
East Plot	28	31
Middle Plot	20	24
West Plot	17	20
Mean	**22**	**25**
Rock Crush		
East Plot	0.2	2
Middle Plot	0.3	0.3
West Plot	2	3
Mean	**0.9**	**2**

Plate 2.1-1. View of seeded vegetation on the centre topsoil plot at Pigeon Stream Diversion in August 2014.

According to Martens (2013) all 108 cranberry seedlings planted in 2013 survived the first growing season and appeared healthy. By August 2014 the number of live cranberry seedlings had decreased slightly to an average of 96% in topsoil and 81% in the rock crush. The average size of the plants increased in both mediums but the rate of growth in topsoil was slightly higher at 14% compared to 11% in the rock crush (see Table 2.1-2 below).

Table 2.1-2. Percent Survival and Size of Cranberry Seedlings at Pigeon Stream Diversion

	Plant Survival (%)		Plant Size (cm)	
Location	2013	2014	2013	2014
Topsoil				
East Plot	100	100	8.7	10
Middle Plot	100	94	8.5	10
West Plot	100	94	8.2	9
Mean	**100**	**96**	**8.5**	**9.7**
Rock Crush				
East Plot	100	83	8.0	9
Middle Plot	100	94	7.6	9
West Plot	100	67	6.8	7
Mean	**100**	**81**	**7.5**	**8.3**

Survival rates of seedlings planted in 2014 are high, averaging 98% overall with a few plants developing tillers. Survival in both mediums (topsoil and rock crush) was virtually the same, averaging 97% and 99% respectively (Table 2.1-3). The high seedling survival rates are a testament to good quality seedlings and favourable moisture conditions at this site.

Table 2.1-3. 2014 Planted Seedling Survival Rates at Pigeon Stream Diversion

	Percent Survival by Plant Species			
Location	Tall Water Sedge	Short Water Sedge	Tall Cotton Grass	Tussock Cotton Grass
Topsoil				
East Plot	93	N/A	92	87
Centre Plot	100	N/A	86	100
West Plot	100	100	100	97
Mean	**98**	**100**	**93**	**95**
Overall Mean Topsoil				**97%**
Rock Crush				
East Plot	100	N/A	100	90
Centre Plot	100	N/A	100	93
West Plot	100	100	100	100
Mean	**100**	**100**	**100**	**94**
Overall Mean Rock Crush				**99%**

2.1.4 Conclusion and Recommendations

Since construction of the Pigeon Stream Diversion was completed in spring 2012 considerable effort has been directed towards revegetating its banks. That fall topsoil was placed at three locations along the south bank and those areas and adjacent rock crush were seeded with a native grass seed mix and covered with jute netting. In 2013, willow cuttings and cranberry seedlings (Plate 2.1-2) were planted; in 2014 additional native tundra seedlings were added (Plate 2.1-3). Percent ground cover by seeded grasses is much higher on topsoil than on the adjacent rock crush, but short-term survival rates of all the planted seedlings—which is very high—is comparable on both mediums. The average rate of growth of planted cranberry seedlings was slightly higher on topsoil than rock crush.

Plate 2.1-2. Cranberry seedling in a topsoil plot at Pigeon Stream Diversion.

It is recommended that, depending upon seedling availability, additional native species be added and that their survival and growth be monitored annually for three years. Monitoring frequency could be reduced to once every three to five years thereafter. Formal monitoring of seeded areas should also be conducted on a three to five year basis, making careful note for naturally colonizing native tundra plants.

Plate 2.1-3. A row of tall water sedge in rock crush at Pigeon Stream Diversion. August 2014.

2.2 FAY BAY RECLAMATION

2.2.1 Introduction

The disturbance at Fay Bay resulted from an overflow spill of processed kimberlite (PK) from Cell B (part of the Long Lake Containment Facility) in 2008. To facilitate equipment movement during cleanup, a rough road was constructed from the north end of Cell B downslope towards Fay Bay. Following cleanup a thin (0 – 2 cm) layer of PK remained on the ground surface in a 12 to 15 m wide band along the east side of the road base. In summer 2008, the road base was re-contoured and a number of sand bag dikes were installed to direct water from the disturbed area onto the adjacent tundra. That area was then covered with jute matting and seeded with an annual grass.

In summer of 2009 a perennial grass seed mix was applied to the area and three permanent transects were established along it to monitor its recovery (Martens, 2012). Two of the transects are located on the slope: they begin a few metres west of the road base, and then cross it, the affected area east of the road base, and finally extend 7 to 10 m into undisturbed tundra. The third transect is located in the level riparian area adjacent to Fay Bay. The eastern-most sections of the on-slope transects are used for control, but no control was established in the riparian zone (Martens, 2012).

2.2.2 Monitoring Activities

The site was last monitored in 2012 by measuring percent ground cover along the three permanent transects established in 2009. Observations regarding site stability were made and the area was photographed. These activities were repeated in 2014 and the results are discussed in the following sections.

2.2.3 Results and Discussion

As reported in Martens (2013) revegetation of the disturbance at Fay Bay was progressing well in 2012 and the slope showed no signs of erosion. Monitoring in 2014 suggest the slope has stabilized: once again no indications of erosion were observed and percent ground cover continues to increase to the point that it is now very similar to control (Plates 2.2-1 and 2.2-2).

Percent ground cover along the road base increased dramatically from 2012 to 2014. Most of that increase was due to grasses which now contribute the majority of ground cover there. For the first time herbaceous species were recorded along the upper transect and shrubs appeared in the lower transect.

Results in the eastern affected area were mixed. Ground cover along the upper transect increased from increases in grasses, shrubs and litter while a decrease in percent ground cover was recorded along the lower transect, due to slight decreases in cover by all cover types except litter. When averaged across the entire impacted area on the slope mean percent ground cover is virtually the same as control.

In the riparian area, percent ground cover increased from 2012 to 2014, primarily due to increased cover by mosses and sedges. Herbaceous species were recorded there for the first time in 2014 as well. Table 2.2-1 below summarises and compares conditions at Fay Bay in 2012 and 2014.

2.2.4 Conclusion and Recommendations

Final reclamation of the disturbance at Fay Bay was completed in 2009 when the site was seeded with a perennial grass seed mixture. As reported after monitoring the site in 2012 ground cover had increased from 2011 and no signs of erosion were noted anywhere along the slope (Martens, 2013). Monitoring results from 2014 indicate the site has stabilized: once again no erosion was noted and percent ground cover by plants and litter was virtually the same as control. Formal monitoring of the site is no longer required except to assess changes in the vegetation as it evolves towards the native tundra plant community, a process that will take many years to complete. To that end, monitoring every five years is recommended.

Plate 2.2-1. View of the revegetated riparian area adjacent to Fay Bay. August 2014.

Plate 2.2-2. View of the revegetated access trail facing upslope (south-southeast) from the slope's base.

Table 2.2-1. Mean Percent Ground Cover at Fay Bay in 2012 and 2014

		Mean Percent Ground Cover				
		Road Base		Eastern Affected Area		Control
Location	Cover Type	2012	2014	2012	2014	2014
Upper Transect	Graminoid	26.1	57	6.3	10	5.3
	Herbaceous	0	3.7	0	0.5	0.3
	Shrub	0	1.7	49	52.3	66
	Moss	26.7	26.7	30	25	18.3
	Litter	3.8	18	12.7	35	30.8
	Total	**56.6**	**107.1**	**98**	**122.8**	**120.7**
Lower Transect	Graminoid	24.4	41.3	25.8	8.3	5
	Herbaceous	28.8	17.3	39.8	12.1	0
	Shrub	0	0.67	10.6	20.3	36.5
	Moss	0	6.7	12.2	4.3	45
	Litter	43	38.3	30.1	42.1	7.5
	Total	**96.2**	**104.3**	**118.5**	**87.1**	**94**
Overall 2014 Mean Percent Ground Cover		**Impacted Area 105.3%**				**Control 107.4%**
Riparian Transect	Graminoid	39.6	40.6	N/A		N/A
	Herbaceous	0	1.9			
	Shrub	0.8	0.5			
	Moss	14.6	22			
	Litter	7.6	3.1			
	Total	**62.6**	**68.1**			

2.3 CULVERT CAMP

2.3.1 Introduction

Reclamation of the Culvert Camp area was initiated in 1997 when the buildings were removed and the site was re-contoured. In fall 1997, a seed mix containing native seed cultivars (polargrass (*Arctagrostis latifloia*), tufted hairgrass (*Deschampsia caespitosa*), Arctared fescue (*Festuca rubra*), and alpine bluegrass (*Poa alpina*)) was applied at 33 kg/ha along with 440 kg/ha of 16-16-16 fertilizer. It was first monitored in 2002 at which time total vascular plant cover was about 15%, the majority of which (12%) was Arctared fescue (Kidd and Max, 2002).

Due to poor soil nutrient conditions in 2002, maintenance fertilizing was recommended, and in fall 2003 250 kg/ha 16-16-16 was applied. Monitoring in 2005 showed improved health of the seeded grasses (due to the fertiliser) while cover by vascular plants remained about the same as in 2002 and Arctared fescue remained dominant (Martens, 2006).

According to Martens (2013), by summer 2010 the seeded grasses were once again showing signs of poor health and many appeared dead so in late June 2012 the site was deep-ripped with a D-10 cat to improve conditions for plant growth. By creating a series of troughs and ridges surface roughening by deep ripping creates a variety of microsites conducive to diverse plant community development. Remedial seeding with 6 kg/ha of a mix containing 15% alpine bluegrass, 10% tufted hairgrass, 15% Arctared fescue, 30% spike trisetum (*Trisetum spicatum*), 25% sheep fescue (*Festuca ovina*) and 5% tundra bluegrass (*Poa glauca*) was also conducted and 60 kg/ha 16-16-16 fertilizer was applied.

2.3.2 Monitoring Activities

To establish base line conditions following the remedial work done in June 2012 site monitoring was conducted in August that year. Percent ground cover by vascular plants (graminoids, herbs, and shrubs), mosses and lichens, and litter were measured along the two permanent transects in the area where remedial work was conducted (Transects 3 and 4). That same data was collected in August 2014.

2.3.3 Results and Discussion

According to Martens (2013) mean percent ground cover by vascular plants was 4.4% and 1.4% along Transect 3 and Transect 4 respectively. Cover by mosses and lichens was 36% along Transect 3 and 17% along Transect 4. The disturbance caused by surface roughening reduced ground cover by non-vascular plants (mosses and lichens) such that by August 2014 it was 16% along Transect 3 and 14% on Transect 4. However, ground cover by vasculars increased to 8% (Transect 3) and 5% (Transect 4) and herbaceous plants (primarily fireweed) had begun to make a small contribution to it. Shrubs also make up a small part of the plant community and were measured for the first time along Transect 4 in 2014 (see Table 2.3-1 and accompanying Plates 2.3-1 and 2.3-2).

Table 2.3-1. Mean Percent Ground Cover of Deep Ripped Areas at Culvert Camp in 2012 and 2014

	Mean Percent Ground Cover			
	Transect 3		Transect 4	
Cover Type	2012	2014	2012	2014
Graminoid	4.2	7.5	1.4	3.3
Herbaceous	0	0.2	0	1.4
Shrub	0.2	0.2	0	0.2
Total cover by vascular plants	**4.4**	**7.9**	**1.4**	**4.9**
Moss + Lichen	35.7	16.1	17	14.1
Litter	4.3	0.1	1.3	0.1
Total	**44.4**	**24.1**	**19.7**	**19.1**

2.3.4 Conclusion and Recommendations

Revegetation of Culvert Camp began in 1997 when the site was recontoured, seeded and fertilized. In 2003 additional fertilizer was applied but by 2010 plant nutrient deficiency was apparent again and one grass cultivar (Arctared fescue) dominated the plant community. To create conditions more

favourable for the development of a healthy and diverse plant community most of the site was deep ripped in June 2012 and it was lightly seeded and fertilized. In the two intervening years percent ground cover by the seeded species has increased and native herbaceous and shrub species have begun to colonize. It is recommended that the site be monitored in two more years to check that revegetation continues to progress along a desirable trajectory.

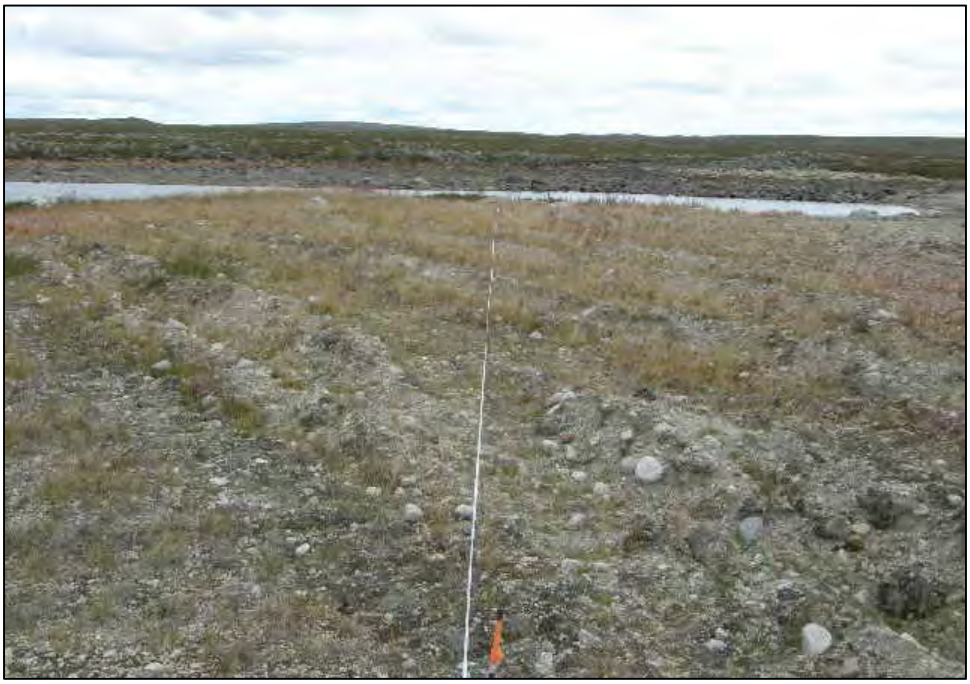

Plate 2.3-1. View facing southeast along Transect 3 at Culvert Camp. August 2014.

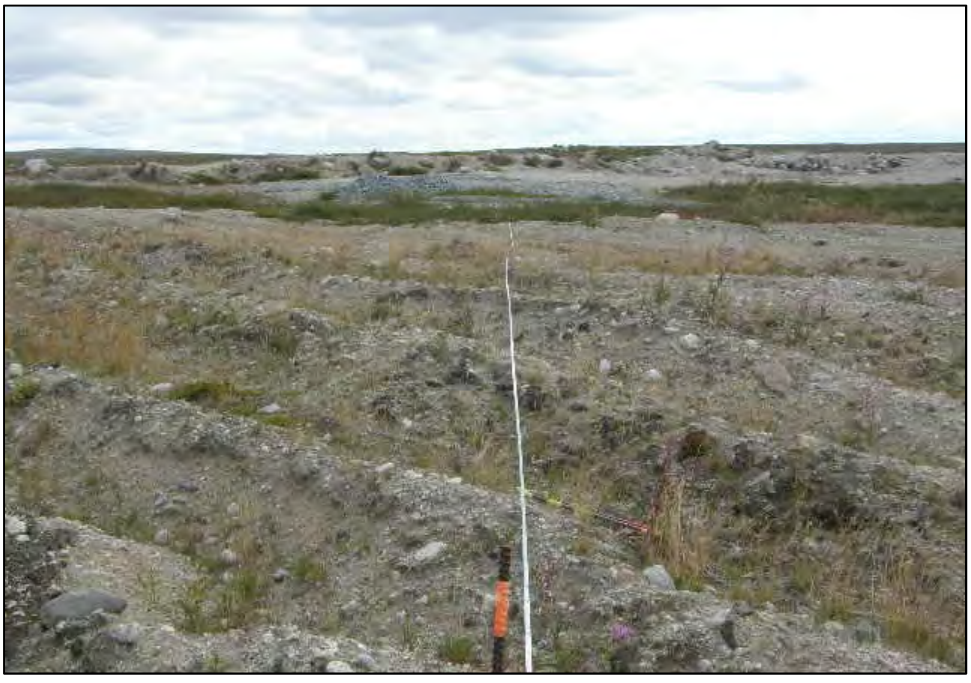

Plate 2.3-2. View facing southeast along Transect 4 at Culvert Camp. August 2014.

2.4 FRED'S CHANNEL AND ESKER SOUTH

2.4.1 Introduction

During construction of Old Camp surface soil from that area was salvaged and stockpiled nearby at Fred's Channel. In June, 2012 that material and stockpiled topsoil and pond sediment salvaged from Esker South prior to quarrying there was spread out and incorporated into the sand and gravel substrate adjacent to the stockpiles. The stockpiled surface material was spread approximately 15 cm thick and was incorporated by deep ripping. Deep ripping also served to improve site conditions for plant growth. The treated areas were then lightly seeded and fertilised with 6 kg/ha of a grass seed mix containing 15% alpine bluegrass, 10% tufted hairgrass, 15% Arctared fescue, 30% spike trisetum, 25% sheep fescue and 5% tundra bluegrass. Sixty kg/ha 16-16-16 fertiliser was applied.

2.4.2 Monitoring Activities

One permanent transect was established at each of the treated areas in 2013 and initial monitoring was conducted in August that year. Percent ground cover by plant species was measured along the transects and a grass seedling count was conducted. Monitoring in 2014 consisted of estimating percent ground cover by vascular plant species, moss and litter.

2.4.3 Results and Discussion

According to Martens (2014), mean percent ground cover by vascular plants (in this case graminoids and herbs only) in 2013 was 14.9% at Fred's Channel and 5.9% at Esker South. In 2014 ground cover by vascular plants remained virtually unchanged at Fred's Channel but small amounts of moss and litter were measured there for the first time (Plate 2.4-1). Some evidence of water erosion was observed in the upslope portion of the treated area at Fred's Channel: a few small rills running from northwest to southeast have formed. At Esker South total ground cover increased marginally due to an increase in herbaceous (fireweed) cover although cover by graminoid species remained unchanged. Neither moss nor litter were measured at Esker South. As is apparent in Plates 2.4-1 and 2.4-2 below, despite the measured ground cover remaining essentially unchanged between 2013 and 2014, the seeded grasses have grown well and are healthy and robust with good seed production in 2014. Given those conditions, ground cover is expected to increase over time and additional tundra species should colonize the sites. Table 2.4-1 provides a summary of the ground cover data; the succeeding photographs provide a visual comparison of site conditions in 2013 versus 2014.

2.4.4 Conclusion and Recommendations

In late June 2012, surface material that had been stockpiled during construction of Old Camp and prior to quarrying at Esker South was spread over the sand and gravel substrate adjacent to the piles and then incorporated by deep ripping. Following that the areas were lightly seeded and fertilized. In 2014, grass growth was vigorous and healthy and a diverse tundra plant community is expected to develop at these sites over time. Some soil erosion has occurred at Fred's Channel and the area should be inspected following spring freshet in 2015 and remedial action taken, if necessary. Formal vegetation monitoring should be conducted again in 2016.

Table 2.4-1. Mean Percent Ground Cover of Treated Areas at Fred's Channel and Esker South in 2013 and 2014

Cover Type	Mean Percent Ground Cover			
	Fred's Channel		Esker South	
	2013	2014	2013	2014
Graminoid	12.8	12.7	5.5	5.1
Herbaceous	2.1	2	0.4	1.5
Total cover by vascular plants	**14.9**	**14.7**	**5.9**	**6.6**
Moss	0	0.4	0	0
Litter	0	1.2	0	0
Total	**14.9**	**16.3**	**5.9**	**6.6**

Plate 2.4-1. Amended area at Fred's Channel: facing downslope (southeast) along the transect in 2013 on the left; upslope in 2014 on the right.

2.5 ROCK PAD RECLAMATION RESEARCH

2.5.1 Introduction

A research program designed to evaluate options for reclaiming rock pads (e.g., main camp site, Misery camp pad, laydown areas) at the minesite was set up in 2008 in an isolated location on top of the Panda/Koala waste rock storage area. Five pads with dimensions 20 m by 30 m were constructed on the waste rock, using top dressing material available on the mine site: 20 cm topsoil, 20 cm topsoil over 20 cm lake sediment, 20 cm glacial till, 0 to 5 cm lake sediment, and 20 cm of coarse kimberlite. Half of each of those pads was deep ripped, leaving furrows approximately 30 cm deep and 1.5 to 2.5 m apart. An additional concept being tested is the placement of topsoil in shallow "pockets" about 2 m by 2 m by 0.5 m deep, in a 5 m grid pattern with a few metres between each pocket (Plate 2.5-1).

Plate 2.4-2. Amended area at Esker South: facing west along the transect in 2013 on the left; 2014 on the right.

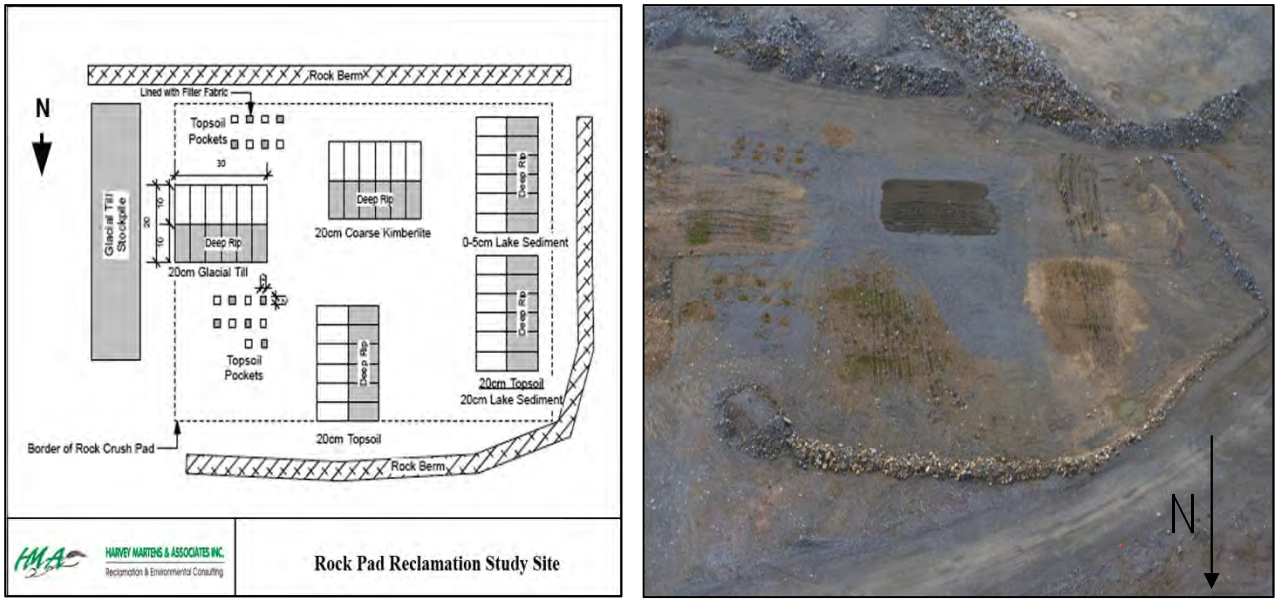

Plate 2.5-1. Rock Pad Reclamation Research Plot Layout.

Each of the top dressing pads was subsequently divided into six revegetation treatment areas and since 2008 propagules of several native plant species have been applied to them, either as seed, seedling plugs or contained in tundra transplant sods. Table 2.5-1 below lists the plant species and establishment methods used at the Rock Pad Study.

Table 2.5-1. Plant Species and Establishment Method Used at the Rock Pad Study

Species Established by Seed	Species Established as Seedlings or in Sods
Graminoid Species	**Herbaceous Species**
Alpine bluegrass (*Poa alpinum*)	Fireweed (*Epilobium angustifolium*)
Tufted hairgrass (*Deschampsia caespitosa*)	Reflexed locoweed (*Oxytropis deflexa*)
Creeping red fescue (*Festuca rubra*)	Licorice root (*Hedysarum mackenzii*)
Spike trisetum (*Trisetum spicatum*)	Moss campion (*Silene acaulis*)*
Herbaceous Species	**Shrub Species**
Reflexed locoweed (*Oxytropis deflexa*)	Dwarf birch (*Betula glandulosa*)
Licorice root (*Hedysarum mackenzii*)	Bog bilberry (*Vaccinium uliginosum*)
Maydell's oxytrope (*Oxytropis maydelliana)*	Bog cranberry (*Vaccinium vitus-ideae*)
	Crowberry (*Empetrum nigrum*)
	Labrador tea (*Ledum decumbens*)*
	Bearberry (*Arctostaphylos alpina*)*

** Established from tundra sod transplants.*

2.5.2 Monitoring Activities

The Rock Pad Study area has been monitored annually since 2009 by measuring individual species survival and growth and percent ground cover. Martens (2014) provides a detailed description of all the Rock Pad research activities until 2013. According to that report the key findings of the research to date are:

- Coarse kimberlite was found to be unsuitable as a growth material, as all seeded grasses and legumes and planted stock died after three growing seasons.
- The topsoil top dressing supported the greatest grass and legume cover followed closely by glacial till, when roughened. Seedling survival and growth is also greatest in topsoil.
- Surface roughening generally increased both seedling survival and annual growth.
- The greatest benefits of surface roughening to seedling performance and grass and legume growth was realized in the lake sediment and glacial till top dressings, in which soil moisture is most limiting.
- Survival of planted seedlings has been substantially reduced by Arctic hare. Many newly planted seedlings were either pulled out or browsed, often to ground level.
- The high mortality caused by Arctic hare was attributed to the lack of alternative food sources (e.g., seeded or natural vegetation) in the vicinity of research plots. Browsing of surviving shrubs has declined as the legume and grass cover in the study plots has increased.

Martens (2014) recommended no additional species be added to the plots and that scheduled monitoring be conducted. Monitoring in 2014 reflects a slight shift in focus away from survival and growth of individual plant species and towards tracking the development of plant communities on the different top dressings. To that end percent ground cover by plant species was measured across the entire ripped and un-ripped areas of each of the top dressings. Species richness, a simple count

of the number of different species (excluding moss) present, was also documented in each of the ripped and un-ripped treatments. No monitoring of the topsoil pockets was conducted in 2014.

2.5.3 Results and Discussion

Based on 2014 data topsoil followed by glacial till and topsoil over lake sediment are the best growth mediums in this study and deep ripping generally improves conditions for plant growth. Percent ground cover and species richness both rank highest to lowest in the above order and are, on average, greater in the deep ripped treatments. Neither lake sediment nor coarse kimberlite provide favourable conditions for plant growth although it is somewhat better in the ripped treatments. Deep ripping also has a positive influence on natural colonization.

Overall, the herbs fireweed and reflexed locoweed provided the most ground cover followed by the grass spike trisetum. The most successful shrub to date is bearberry. Three graminoid (grass or grass-like) species have colonized the site naturally, the most prevalent of which is goose grass (*Puccinellia borealis*). Plates 2.5-2 to 2.5-4 and Tables 2.5-1 to 2.5-3 provide a summary of the ground cover data collected in 2014.

Plate 2.5-2. Topsoil top dressing at the Rock Pad Study with the un-ripped treatment on the left and the deep ripped treatment on the right. August 2014.

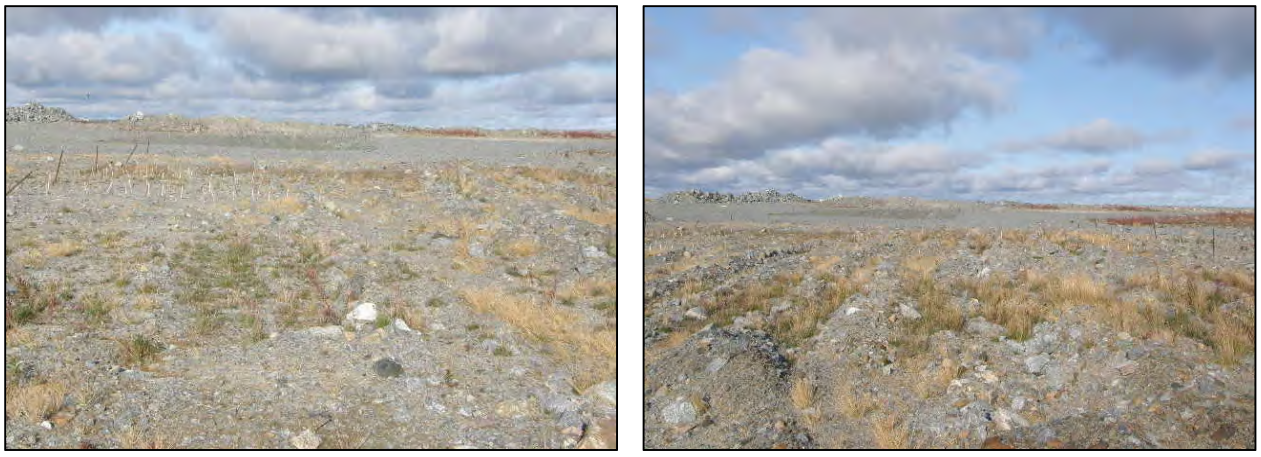

Plate 2.5-3. Un-ripped (left) and ripped (right) glacial till top dressings at the Rock Pad Study area. August 2014.

Plate 2.5-4. Tundra sod transplants at the Rock Pad Study area showing bearberry in the topsoil top dressing (left) and crowberry in the topsoil over lake sediment top dressing (right). August 2014.

Table 2.5-2. Mean Percent Ground Cover by Plant Species in the Deep Ripped Treatments of the Rock Pad Reclamation Study, August 2014

Plant Species	Top Dressing					Total by Species
	Topsoil	Topsoil over Lake Sediment	Lake Sediment	Coarse Kimberlite	Glacial Till	
Graminoid						
*Agrostis scabrella**	0.7	0	0	0	0	1
*Carex bigelowii**	0	0.4	0	0	0	0
Deschampsia caespitosa	0	0.8	0	0	0	1
Festuca rubra	1.1	1.0	0.5	0.3	4.6	7
*Puccinellia borealis**	0.1	2.7	0.3	0	0.6	4
Trisetum spicatum	1.2	3.5	0.4	0.4	3.9	9
Herbaceous						
Epilobium angustifolium	4.0	4.6	1.6	0	0.2	10
Oxytropis deflexa	6.8	1.3	1.0	0	7.9	17
Shrubs						
Arctostaphylos alpina	5.5	0	0	0	0	6
Betula glandulosa	0.5	0.5	0	0.5	0	2
Empetrum nigrum	0.8	2.0	0	0	0	3
Ledum decumbens	0.2	0	0	0	0	0
Vaccinium vitus-idaea	0.1	0	0	0	0	0
Vaccinium uliginosum	0	0	0	0	0	0
Moss	6.4	2.7	1.3	0	2.0	12
Litter	1.5	5.8	1.2	0.1	1.5	10
Total by Top Dressing	**29**	**25**	**6**	**1**	**21**	
Species Richness	**11**	**9**	**5**	**3**	**5**	

** Naturally occurring colonization.*

Table 2.5-3. Mean Percent Ground Cover by Plant Species in the Un-ripped Treatments of the Rock Pad Reclamation Study, August 2014

Plant Species	Top Dressing					Total by Species
	Topsoil	Topsoil over Lake Sediment	Lake Sediment	Coarse Kimberlite	Glacial Till	
Graminoid						
*Agrostis scabrella**	0.7	0	0	0	0	1
*Carex bigelowii**	0	0	0	0	0	0
Deschampsia caespitosa	0	0	0	0	0	0
Festuca rubra	0.7	0.7	0.5	0	1.3	3
*Puccinellia borealis**	0	1.3	0.2	0	1.1	3
Trisetum spicatum	2.3	0	0.7	0	1.1	4
Herbaceous						
Epilobium angustifolium	4.7	1	0.4	0	0.1	6
Oxytropis deflexa	3.2	1	0.8	0	5.4	10
Shrubs						
Arctostaphylos alpina	0	0	0	0	0.5	0.5
Betula glandulosa	0	0	0	0	0.1	0.1
Empetrum nigrum	1	0	0	0	0	1
Ledum decumbens	0	0	0	0	0	0
Vaccinium vitus-idaea	0	0	0	0	0.1	0.1
Vaccinium uliginosum	0.1	0	0	0	0	
Moss	1	0.7	0.4	0	7.9	10
Litter	1.5	1.2	0.2	0	0.5	3
Total by Top Dressing	**15**	**6**	**3**	**0**	**18**	
Species Richness	**7**	**4**	**5**	**0**	**8**	

** Naturally occurring colonization.*

2.5.4 Conclusion and Recommendations

A research study designed to provide insight into revegetating rock pads (e.g., main camp pad, laydown areas) was constructed on top of the Panda/Koala waste rock storage area in 2008. Five plots, each made with a top dressing material available on site, were set up and then one half of each plot was deep-ripped. Several native tundra plant species have since been sown using various establishment techniques. Monitoring of the developing plant communities to date indicates that vegetation performs best on top dressings of topsoil or glacial till and deep ripping generally enhances plant growth. This research supports the notion that revegetation of rock pads with native tundra plants is feasible. Future monitoring should be conducted biannually and should include documenting the spread of vegetation outwards from the topsoil pockets.

2.6 WEED CONTROL

Bluebur (an annual, nuisance weed) was observed around the Ekati main camp area in July 2013. Further investigation found it along the road to the Long Lake Containment Facility (LLCF) and in a laydown area at the southeast corner of Cell B of the LLCF. Control efforts were initiated: weeds were pulled, bagged and incinerated and a map showing its occurrences was prepared. Ten large plastic garbage bags full of weeds were disposed of.

Control efforts in 2014 resulted in the collection and disposal of only one bag of weeds and it was not observed in the laydown area at Cell B. Annual weed monitoring and control should be continued with the objective of eliminating any weeds noted. An updated map showing bluebur occurrences is included to facilitate ongoing monitoring and control (Plate 2.6-1).

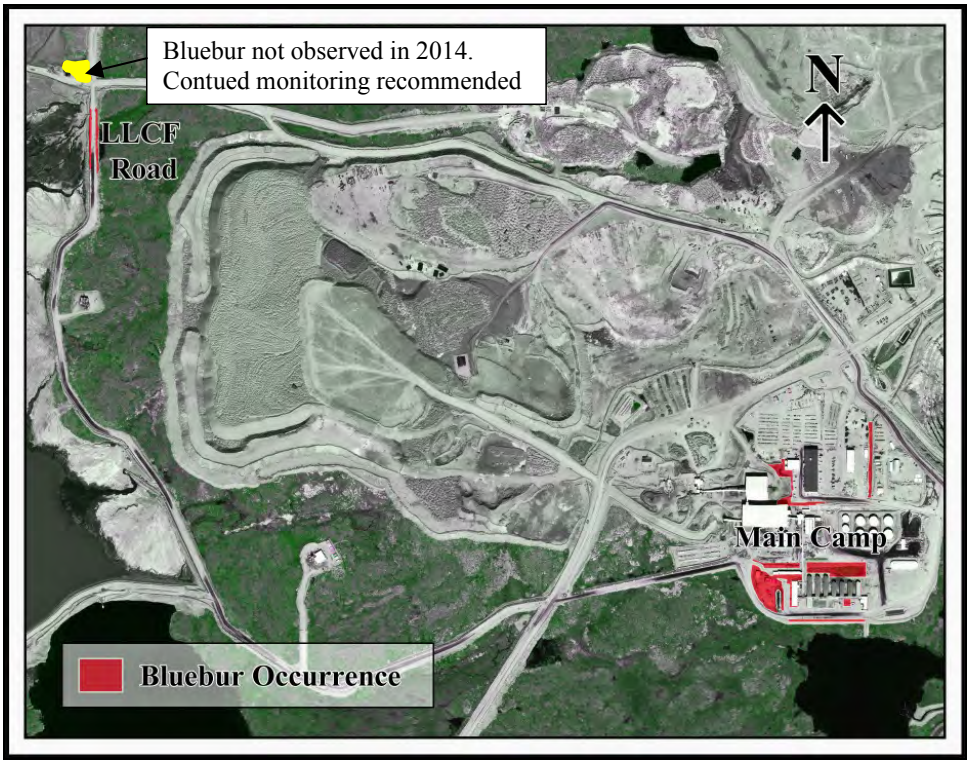

Plate 2.6-1. Site map showing the occurrence of bluebur in 2014.

2.7 TOPSOIL SALVAGE

Historically, topsoil has been salvaged prior to development of open pits at Ekati and stockpiled on or adjacent to the associated waste rock storage area. As part of the recent development of Pigeon Open Pit, Pigeon Waste Rock Pad and Pigeon water diversion berms surface soil material was salvaged and added to the Beartooth topsoil stockpile located in the northeast portion of the Panda/Koala Waste Rock Storage Area (Figure 1.1-1). Topsoil was salvaged from areas where it is feasible and practical to extract material that is relatively free of boulders without damaging equipment or compromising operator safety.

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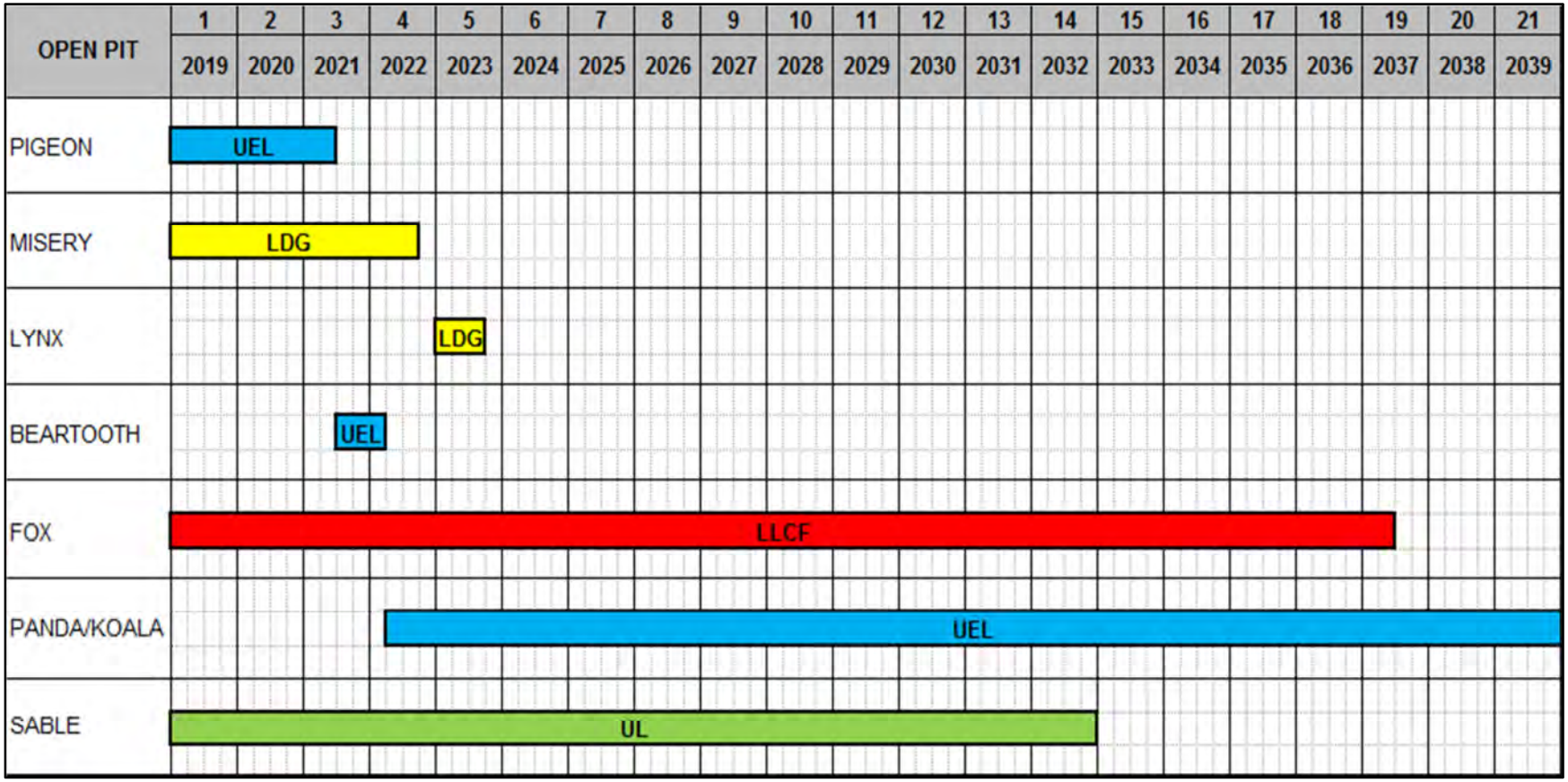
Appendix E

Updated Pit Flooding Schedule


OPEN PIT
1 2019
2 2020
3 2021
4 2022
5 2023
6 2024
7 2025
8 2026
9 2027
10 2028
11 2029
12 2030
13 2031
14 2032
15 2033
16 2034
17 2035
18 2036
19 2037
20 2038
21 2039
PIGEON
UEL
MISERY
LDG
LYNX
LDG
BEARTOOTH
UEL
FOX
LLCF
PANDA/KOALA
UEL
SABLE
UL

Appendix F

2014 RECLAIM Estimate

SUMMARY OF COSTS			June 17, 2013 WLWB Security Reasons for Decision	Change
OPEN PITS				
Misery		$6,651,276	$6,642,538	**$8,738**
Pigeon		$4,561,731	$4,009,893	**$551,838**
Sable		$5,476,081	$5,467,533	**$8,548**
Beartooth		$3,264,574	$3,257,729	**$6,845**
Fox		$7,506,874	$28,879,355	**$21,372,481**
Panda		$5,826,462	$7,901,263	**$2,074,801**
Koala North		$4,249,600	$5,216,350	**$966,750**
Koala		$3,480,937	$4,451,756	**$970,820**
Lynx		$1,584,605	$0	**$1,584,605**
OPEN PIT TOTAL:		**$42,602,140**	**$65,826,418**	**$23,224,278**
TAILINGS				
Cell A		$9,214,830	$8,161,015	**$1,053,815**
Cell B		$8,856,475	$8,438,762	**$417,713**
Cell C		$11,497,668	$12,803,307	**$1,305,639**
Cell D		$92,298	$76,487	**$15,811**
Cell E		$455,112	$387,127	**$67,985**
Phase 1		$599,954	$510,296	**$89,658**
TAILINGS TOTAL		**$30,716,337**	**$30,376,994**	**$339,343**
ROCK PILES				
Fox WRSA		$17,484,263	$18,050,254	**$565,991**
Misery WRSA		$2,504,800	$2,440,879	**$63,921**
Panda WRSA		$9,511,003	$14,633,924	**$5,122,920**
Pigeon WRSA		$105,000	$436,589	**$331,589**
Sable WRSA		$809,962	$736,747	**$73,215**
Lynx		$183,590	$0	**$183,590**
ROCK PILE TOTAL		**$30,598,619**	**$36,298,393**	**$5,699,774**
BUILDINGS AND EQUIPMENT		**$8,130,625**	**$11,385,860**	**$3,255,234**
WATER MANAGEMENT		**$2,332,011**	**$4,164,517**	**$1,832,506**
CHEMICALS AND SOIL CONTAMINATION		**$3,002,798**	**$2,860,999**	**$141,799**
UNDERGROUND MINE				
Panda		$679,621	$679,621	**$0**
Koala		$316,716	$316,716	**$0**
Koala North		$679,621	$679,621	**$0**
UNDERGROUND MINE TOTAL		**$1,675,958**	**$1,675,958**	**$0**
SUBTOTAL		**$119,058,488**	**$152,589,138**	**$33,530,651**
MOBILIZATION/DEMOBILIZATION		**$56,742,808**	**$55,176,971**	**$1,565,837**
POST-CLOSURE MONITORING AND MAINTENANCE		**$13,228,609**	**$12,322,971**	**$905,638**
PROJECT MANAGEMENT	5%	**$5,952,924**	**$8,245,605**	**$2,292,681**
ENGINEERING	5%	**$5,952,924**	**$8,245,605**	**$2,292,681**
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	0.5%	**$595,292**	**$0**	**$595,292**
BONDING/INSURANCE	0.5%	**$595,292**	**$0**	**$595,292**
CONTINGENCY (Open Pit Flooding)	15%	**$4,255,360**	**$7,725,517**	**$3,470,157**
CONTINGENCY (Capping)	15%	**$7,518,467**	**$8,996,162**	**$1,477,694**
CONTINGENCY (Buildings Decommissioning)	15%	**$865,067**	**$865,067**	**$0**
CONTINGENCY (Other Reclamation Activities)	20%	**$6,959,838.10**	**$9,533,426.94**	**$2,573,589**
GRAND TOTAL		**$221,725,070**	**$263,700,464**	**$41,975,394**
-SABLE COSTS		**$9,291,562**	**$9,798,547**	**$506,985**
-LYNX COSTS		**$2,543,929**	**$0**	**$2,543,929**
GRAND TOTAL EXCLUDING SABLE & LYNX		**$212,433,508**	**$253,901,916**	**$41,468,408**

Open Pit Name:	***Misery***						Pit #	***1***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	38,858	SBSBS	3.98	$154,826			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	122,711	RCSS	7.50	$920,330			
Dozing	**m3**	**79,762**	**DSL**	**0.95**	**$75,774**			
Substrate Produce and Place	m3	12,271	SCSTS	22.80	$279,756			
Sediment Berm Produce and Place	m3	1,227	SCSBS	24.21	$29,706			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	80	#N/A	181.52	$14,522			
Spillway Construction	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	4	PLS	195,000.00	$780,000			
Pipe Capital	m	2,872	PPLS	128.58	$369,282			
New Pipe Install	m	2,872	PPIS	50.00	$143,600			
Break and Install Pipe	m	0	PPBS	72.00	$0			
Pump Fuel	litre	3,344,477	FLONAS	0.92	$3,060,196			
Pumps Maintenance	yr*pump	15	PLMS	20,000.00	$308,235			
Access Road	L.S	1	#N/A	425,000.00	$425,000			
				Subtotal	$6,651,276			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Pigeon***						**Pit #**	***2***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	25,070	SBSBS	3.98	$99,888			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	79,168	RCSS	7.50	$593,761			
Dozing	**m3**	**51,459**	**DSL**	**0.95**	**$48,886**			
Substrate Produce and Place	m3	7,917	SCSTS	22.80	$180,488			
Sediment Berm Produce and Place	m3	792	SCSBS	24.21	$19,165			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	45	#N/A	79.05	$3,557			
Spillway Construction	m3	0	#N/A	0	$0			
Concrete	m3	0	#N/A	0	$0			
Pump Capital	each	2	PLS	195,000.00	$390,000			
Pipe Capital	m	7,400	PPLS	128.58	$951,492			
New Pipe Install	m	7,400	PPIS	50.00	$370,000			
Break and Install Pipe	m	0	PPIS	50.00	$0			
Pump Fuel	litre	1,113,469	FLONAS	0.92	$1,018,825	Ref 2013-3		
Pumps Maintenance	yr*pump	5.1	PLMS	20,000.00	$102,620	Ref 2013-3		
Access Road	L.S	1	#N/A	693,000.00	$693,000			
				Subtotal	$4,561,731			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Sable***						**Pit #**	***3***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	37,605	SBSBS	3.98	$149,832			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	118,752	RCSS	7.50	$890,642			
Dozing	**m3**	**77,189**	**DSL**	**0.95**	**$73,329**			
Substrate Produce and Place	m3	11,875	SCSTS	22.80	$270,731			
Sediment Berm Produce and Place	m3	1,188	SCSBS	24.21	$28,748			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	45	#N/A	79.05	$3,557			
Spillway Construction	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	1	PLS	195,000.00	$195,000			
Pipe Capital	m	4,000	PPLS	128.58	$514,320			
New Pipe Install	m	4,000	PPIS	50.00	$200,000			
Break and Install Pipe	m	0	PPIS	50.00	$0			
Pump Fuel	litre	3,038,112	FLONAS	0.92	$2,779,872			
Pumps Maintenance	yr*pump	14	PLMS	20,000.00	$280,000			
Access Road	L.S	0	#N/A	0.00	$0			
				Subtotal	$5,476,081			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Beartooth***						**Pit #**	***4***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	26,323	SBSBS	3.98	$104,882			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	83,127	RCSS	7.50	$623,449			
Dozing	**m3**	**54,032**	**DSL**	**0.95**	**$51,331**			
Substrate Produce and Place	m3	8,313	SCSTS	22.80	$189,512			
Sediment Berm Produce and Place	m3	831	SCSBS	24.21	$20,123			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	50	#N/A	233.96	$11,698			
Spillway Construction	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	0	PLS	195,000.00	$0			
Pipe Capital	m	10,164	PPLS	128.58	$1,306,887			
New Pipe Install	m	10,164	PPIS	50.00	$508,200			
Break and Install Pipe	m	0	PPBS	72.00	$0			
Pump Fuel	litre	355,893	FLONAS	0.92	$325,642			
Pumps Maintenance	yr*pump	2	PLMS	20,000.00	$32,800			
Access Road	L.S	0	#N/A	0.00	$0			
				Subtotal	$3,264,574			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Fox***						**Pit #**	***5***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	56,407	SBSBS	3.98	$224,747			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	178,128	RCSS	7.50	$1,335,962			
Dozing	**m3**	**115,783**	**DSL**	**0.95**	**$109,994**			
Substrate Produce and Place	m3	17,813	SCSTS	22.80	$406,097			
Sediment Berm Produce and Place	m3	1,781	SCSBS	24.21	$43,121			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	8,300	#N/A	20.5	$170,150			
Spillway Construction	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	1	PLS	195,000.00	$195,000	Ref 2013-5		
Pipe Capital	m	4,992	PPLS	128.58	$641,871	Ref 2013-5		
New Pipe Install	m	4,992	PPIS	50.00	$249,600	Ref 2013-5		
Break and Install Pipe	m	0	PPIS	50.00	$0	Ref 2013-5		
Pump Fuel	litre	4,011,548	FLONAS	0.92	$3,670,566	Ref 2013-5		
Pumps Maintenance	yr*pump	18.5	PLMS	20,000.00	$369,714	Ref 2013-5		
Access Road	L.S	0	#N/A	0.00	$0	Ref 2013-5		
				Subtotal	$7,506,874			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Panda***						**Pit #**	***6***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	45,126	SBSBS	3.98	$179,798			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	142,503	RCSS	7.50	$1,068,770			
Dozing	**m3**	**92,627**	**DSL**	**0.95**	**$87,995**			
Substrate Produce and Place	m3	14,250	SCSTS	22.80	$324,878			
Sediment Berm Produce and Place	m3	1,425	SCSBS	24.21	$34,497			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Connector Channel	m3	48,700	#N/A	10.9	$530,830			
Spillway Construction	**m3**	**42000**	**RC1H**	**17.8**	**$747,600**			
Concrete Weir Construction	**m3**	**225**	**CSFH**	**639.75**	**$143,944**			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	0	PLS	195,000.00	$0			
Pipe Capital	m	317	PPLS	128.58	$40,717			
New Pipe Install	m	317	PPIS	50.00	$15,833			
Break and Install Pipe	m	0	PPBS	72.00	$0			
Pump Fuel	litre	2,543,334	FLONAS	0.92	$2,327,150	Ref 2013-5		
Pumps Maintenance	yr*pump	11.7	PLMS	20,000.00	$234,400	Ref 2013-5		
Access Road	L.S	0	#N/A	0.00	$0			
Costs Split Amongst Three Pits				**Subtotal**	$5,826,462			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Koala North***						**Pit #**	***7***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	16,922	SBSBS	3.98	$67,424			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: CONSTRUCT LITORAL ZONES								
Blast Rim	m3	138,544	RCSS	7.50	$1,039,082			
Dozing	**m3**	**90,054**	**DSL**	**0.95**	**$85,551**			
Substrate Produce and Place	m3	13,854	SCSTS	22.80	$315,853			
Sediment Berm Produce and Place	m3	1,385	SCSBS	24.21	$33,539			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	0	#N/A	0	$0			
Drill and Blast Spillway	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	0	PLS	195,000.00	$0			
Pipe Capital	m	317	PPLS	128.58	$40,717			
New Pipe Install	m	317	PPIS	50.00	$15,833			
Break and Install Pipe	m	0	PPBS	72.00	$0			
Pump Fuel	litre	2,543,334	FLONAS	0.92	$2,327,150	Ref 2013-5		
Pumps Maintenance	yr*pump	11.7	PLMS	20,000.00	$234,400	Ref 2013-5		
Access Road	L.S	0	#N/A	0.00	$0			
Costs Split Amongst Three Pits				**Subtotal**	$4,249,600			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Koala***						**Pit #**	***8***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000			
Berm at Crest	m3	43,872	SBSBS	3.98	$174,803			
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500			
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**			
OBJECTIVE: COVER/CONTOUR SLOPES								
Blast Rim	m3	53,438	RCSS	7.50	$400,789			
Dozing	**m3**	**34,735**	**DSL**	**0.95**	**$32,998**			
Substrate Produce and Place	m3	5,344	SCSTS	22.80	$121,829			
Sediment Berm Produce and Place	m3	534	SCSBS	24.21	$12,936			
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**			
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	2,700	#N/A	10.9	$29,430			
Drill and Blast Spillway	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	0	PLS	195,000.00	$0			
Pipe Capital	m	317	PPLS	128.58	$40,717			
New Pipe Install	m	317	PPIS	50.00	$15,833			
Break and Install Pipe	m	0	PPBS	72.00	$0			
Pump Fuel	litre	2,543,334	FLONAS	0.92	$2,327,150	Ref 2013-5		
Pumps Maintenance	yr*pump	11.7	PLMS	20,000.00	$234,400	Ref 2013-5		
Access Road	L.S	0	#N/A	0.00	$0			
Costs Split Amongst Three Pits				**Subtotal**	$3,480,937			
						Pct Land	Total Land	Total Water

Open Pit Name:	***Lynx***						**Pit #**	***9***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Fence and Signs	each	1	FSS	10,000.00	$10,000	Ref 2014-4		
Berm at Crest	m3	25,070	SBSBS	3.98	$99,888	Ref 2014-4		
Block Roads (20 m ramp length)	m3	9,000	RCSS	7.50	$67,500	Ref 2014-4		
Dozing	**m3**	**9,000**	**DSL**	**0.95**	**$8,550**	Ref 2014-4		
OBJECTIVE: COVER/CONTOUR SLOPES								
Blast Rim	m3	71,251	RCSS	7.50	$534,385	Ref 2014-4		
Dozing	**m3**	**46,313**	**DSL**	**0.95**	**$43,998**	Ref 2014-4		
Substrate Produce and Place	m3	7,125	SCSTS	22.80	$162,439	Ref 2014-4		
Sediment Berm Produce and Place	m3	713	SCSBS	24.21	$17,249	Ref 2014-4		
Vegetation	**ha**	**1**	**VHFL**	**4,000.00**	**$4,000**	Ref 2014-4		
OBJECTIVE: WATER MANAGEMENT								
Outflow Channel	m3	45	#N/A	79.05	$3,557	Ref 2014-4		
Drill and Blast Spillway	m3	0	#N/A	0	$0			
Concrete Weir Construction	m3	0	#N/A	0	$0			
OBJECTIVE: FLOOD PIT								
Pump Capital	each	0	PLS	195,000.00	$0			
Pipe Capital	m	0	PPLS	128.58	$0			
New Pipe Install	m	0	PPIS	50.00	$0			
Break and Install Pipe from Misery	m	2,872	PPBS	72.00	$206,784	Ref 2014-4		
Pump Fuel	litre	423,225	FLONAS	0.92	$387,251	Ref 2014-4		
Pumps Maintenance	yr*pump	2	PLMS	20,000.00	$39,005	Ref 2014-4		
Access Road	L.S	0	#N/A	0.00	$0			
Costs Split Amongst Three Pits				**Subtotal**	$1,584,605			
						Pct Land	Total Land	Total Water

Tailings Impoundment Name: ***Cell A*** **Pond #** ***1***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: COVER TAILINGS								
Rock cover - Upper Zone								
Drill Blast Granite Rock	m3	369,204	GRCBLS	2.13	$784,656	Ref 2014-3, 2013-1		
Ripp Granite Rock	**m3**	**290,089**	**GRRPS**	**1.05**	**$304,593**	Ref 2014-3, 2013-1		
Load/Long Haul/Spread Compact	**m3**	**659,293**	**GRCLHSS**	**6.35**	**$4,187,352**	Ref 2013-1		
Rock cover - Central Zone								
Drill Blast Granite Rock	m3	106,924	GRCBLS	2.13	$227,241	Ref 2014-3, 2013-1		
Ripp Granite Rock	**m3**	**84,012**	**GRRPS**	**1.05**	**$88,212**	Ref 2014-3, 2013-1		
Load/Long Haul/Spread Compact	**m3**	**190,935**	**GRCLHSS**	**6.35**	**$1,212,683**	Ref 2013-1		
Rock cover - Water Interface Zone								
Drill Blast Granite Rock	m3	31,846	GRCBLS	2.13	$67,680	Ref 2014-3		
Ripp Granite Rock	**m3**	**25,021**	**GRRPS**	**1.05**	**$26,273**	Ref 2014-3		
Load/Long Haul/Spread Compact	**m3**	**56,867**	**GRCLHSS**	**6.35**	**$361,178**			
Vegetatation								
Vegetation Supplies (Seed, Fertilizer Plugs)	L.S	1	#N/A	963,000	$963,000			
Vegetation Equipment Capital Cost	L.S	1	#N/A	125,667	$125,667			
Vegetation Eqquipment Fuel	liter	41,667	FLONAS	0.92	$38,125			
OBJECTIVE: WEIR								
Excavate channel (Breach dike, dozer, unfrozen)	m3	0	SC3L	8.90	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJECTIVE: INTERNAL CHANNEL								
Excavate channel	**m3**	**30,800**	**SC3L**	**8.90**	**$274,120**			
Rip-rap	**m3**	**13,650**	**RR2H**	**20.65**	**$281,873**			
Transition material	**m3**	**8,190**	**RR2S**	**21.77**	**$178,288**			
Filter material - sand	m3	4,102	SCSH	22.89	$93,890			
OBJECTIVE: EXTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
OBJECTIVE: OUTLET DAM								
Excavate channel (Breach dike, dozer, unfrozen)	m3	0	SC3L	8.90	$0			
Excavate channel (Breach dike, dozer, frozen)	m3	0	RC3L	12.70	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJETIVE: PHASE 1 RECLAMATION POND								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip Rap	m3	0	RR2H	20.65	$0			
Granular Cap	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
				Subtotal	$9,214,830			
						Pct Land	Total Land	Total Water

Tailings Impoundment Name:	*Cell B*						Pond # *2*	
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: COVER TAILINGS								
Rock cover - Upper Zone								
Drill Blast Granite Rock	m3	257,584	GRCBLS	2.13	$547,434	Ref 2014-3, 2013-1		
Ripp Granite Rock	**m3**	**202,388**	**GRRPS**	**1.05**	**$212,507**	Ref 2014-3, 2013-1		
Load/Long Haul/Spread Compact	**m3**	**459,972**	**GRCLHSS**	**6.35**	**$2,921,409**	Ref 2013-1		
Rock cover - Central Zone								
Drill Blast Granite Rock	m3	124,081	GRCBLS	2.13	$263,704	Ref 2014-3, 2013-1		
Ripp Granite Rock	**m3**	**97,492**	**GRRPS**	**1.05**	**$102,367**	Ref 2014-3, 2013-1		
Load/Long Haul/Spread Compact	**m3**	**221,573**	**GRCLHSS**	**6.35**	**$1,407,270**	Ref 2013-1		
Rock cover - Water Interface Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Vegetatation								
Vegetation Supplies (Seed, Fertilizer Plugs)	L.S	1	#N/A	963,000	$963,000			
Vegetation Equipment Capital Cost	L.S	1	#N/A	125,667	$125,667			
Vegetation Eqquipment Fuel	liter	41,667	FLONAS	0.92	$38,125			
OBJECTIVE: WEIR								
Excavate channel (Breach dike, dozer, unfrozen)	**m3**	**1,755**	**SC3L**	**8.90**	**$15,621**			
Rip-rap	**m3**	**501**	**RR2H**	**20.65**	**$10,346**			
Transition material	**m3**	**357**	**RR2S**	**21.77**	**$7,775**			
OBJECTIVE: INTERNAL CHANNEL								
Excavate channel	**m3**	**48,400**	**SC3L**	**8.90**	**$430,760**			
Rip-rap	**m3**	**21,450**	**RR2H**	**20.65**	**$442,943**			
Transition material	**m3**	**12,870**	**RR2S**	**21.77**	**$280,167**			
Filter material - sand	m3	6,446	SCSH	22.89	$147,541			
OBJECTIVE: EXTERNAL CHANNEL								
Excavate channel	**m3**	**105,600**	**SC3L**	**8.90**	**$939,840**			
OBJECTIVE: OUTLET DAM								
Excavate channel (Breach dike, dozer, unfrozen)	m3	0	SC3L	8.90	$0			
Excavate channel (Breach dike, dozer, frozen)	m3	0	RC3L	12.70	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJETIVE: PHASE 1 RECLAMATION POND								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip Rap	m3	0	RR2H	20.65	$0			
Granular Cap	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
				Subtotal	$8,856,475			
						Pct Land	Total Land	Total Water

Tailings Impoundment Name:	***Cell C***						**Pond # *3***	
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: COVER TAILINGS								
Rock cover - Upper Zone								
Drill Blast Granite Rock	m3	356,124	GRCBLS	2.13	$756,856	Ref 2014-3, 2013-1		
Ripp Granite Rock	**m3**	**279,811**	**GRRPS**	**1.05**	**$293,802**	Ref 2014-3, 2013-1		
Load/Long Haul/Spread Compact	**m3**	**635,935**	**GRCLHSS**	**6.35**	**$4,038,999**	Ref 2013-1		
Rock cover - Central Zone								
Drill Blast Granite Rock	m3	195,447	GRCBLS	2.13	$415,377	Ref 2014-3, 2013-1		
Ripp Granite Rock	**m3**	**153,566**	**GRRPS**	**1.05**	**$161,244**	Ref 2014-3, 2013-1		
Load/Long Haul/Spread Compact	**m3**	**349,013**	**GRCLHSS**	**6.35**	**$2,216,677**	Ref 2013-1		
Rock cover - Water Interface Zone								
Drill Blast Granite Rock	m3	28,474	GRCBLS	2.13	$60,514	Ref 2014-3		
Ripp Granite Rock	**m3**	**22,372**	**GRRPS**	**1.05**	**$23,491**	Ref 2014-3		
Load/Long Haul/Spread Compact	**m3**	**50,846**	**GRCLHSS**	**6.35**	**$322,937**			
Vegetatation								
Vegetation Supplies (Seed, Fertilizer Plugs)	L.S	1	#N/A	963,000	$963,000			
Vegetation Equipment Capital Cost	L.S	1	#N/A	125,667	$125,667			
Vegetation Eqquipment Fuel	liter	41,667	FLONAS	0.92	$38,125			
OBJECTIVE: WEIR								
Excavate channel (Breach dike, dozer, unfrozen)	**m3**	**2,093**	**SC3L**	**8.90**	**$18,630**			
Rip-rap	**m3**	**594**	**RR2H**	**20.65**	**$12,272**			
Transition material	**m3**	**424**	**RR2S**	**21.77**	**$9,230**			
OBJECTIVE: INTERNAL CHANNEL								
Excavate channel	**m3**	**75,900**	**SC3L**	**8.90**	**$675,510**			
Rip-rap	**m3**	**33,638**	**RR2H**	**20.65**	**$694,614**			
Transition material	**m3**	**20,183**	**RR2S**	**21.77**	**$439,353**			
Filter material - sand	m3	10,109	SCSH	22.89	$231,371			
OBJECTIVE: EXTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
OBJECTIVE: OUTLET DAM								
Excavate channel (Breach dike, dozer, unfrozen)	m3	0	SC3L	8.90	$0			
Excavate channel (Breach dike, dozer, frozen)	m3	0	RC3L	12.70	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJETIVE: PHASE 1 RECLAMATION POND								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip Rap	m3	0	RR2H	20.65	$0			
Granular Cap	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
				Subtotal	$11,497,668			
						Pct Land	Total Land	Total Water

Tailings Impoundment Name:	***Cell D***							**Pond # *4***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: COVER TAILINGS								
Rock cover - Upper Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Central Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Water Interface Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Vegetatation								
Vegetation Supplies (Seed, Fertilizer Plugs)	L.S	0	#N/A	0	$0			
Vegetation Equipment Capital Cost	L.S	0	#N/A	0	$0			
Vegetation Eqquipment Fuel	liter	0	FLONAS	0.92	$0			
OBJECTIVE: WEIR								
Excavate channel (Breach dike, dozer, unfrozen)	**m3**	**4,982**	**SC3L**	**8.90**	**$44,336**			
Rip-rap	**m3**	**1,319**	**RR2H**	**20.65**	**$27,239**			
Transition material	**m3**	**952**	**RR2S**	**21.77**	**$20,723**			
OBJECTIVE: INTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
OBJECTIVE: EXTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
OBJECTIVE: OUTLET DAM								
Excavate channel (Breach dike, dozer, unfrozen)	m3	0	SC3L	8.90	$0			
Excavate channel (Breach dike, dozer, frozen)	m3	0	RC3L	12.70	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJETIVE: PHASE 1 RECLAMATION POND								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip Rap	m3	0	RR2H	20.65	$0			
Granular Cap	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
				Subtotal	$92,298			
						Pct Land	Total Land	Total Water

Tailings Impoundment Name:	***Cell E***							**Pond # *5***
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: COVER TAILINGS								
Rock cover - Upper Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Central Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Water Interface Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Vegetatation								
Vegetation Supplies (Seed, Fertilizer Plugs)	L.S	0	#N/A	0	$0			
Vegetation Equipment Capital Cost	L.S	0	#N/A	0	$0			
Vegetation Eqquipment Fuel	liter	0	FLONAS	0.92	$0			
OBJECTIVE: WEIR								
Excavate channel (Breach dam, dozer, frozen)	m3	0	RC3L	12.70	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJECTIVE: INTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
OBJECTIVE: EXTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
OBJECTIVE: OUTLET DAM								
Excavate channel (Breach dike, dozer, unfrozen)	**m3**	**19,197**	**SC3L**	**8.90**	**$170,853**			
Excavate channel (Breach dike, dozer, frozen)	**m3**	**6,399**	**RC3L**	**12.70**	**$81,267**			
Rip-rap	**m3**	**716**	**RR2H**	**20.65**	**$14,785**			
Transition material	**m3**	**8,646**	**RR2S**	**21.77**	**$188,206**			
OBJETIVE: PHASE 1 RECLAMATION POND								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip Rap	m3	0	RR2H	20.65	$0			
Granular Cap	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
				Subtotal	$455,112			
						Pct Land	Total Land	Total Water

Tailings Impoundment Name:	***Phase 1***						**Pond # *6***	
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: COVER TAILINGS								
Rock cover - Upper Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Central Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Water Interface Zone								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Vegetatation								
Vegetation Supplies (Seed, Fertilizer Plugs)	L.S	0	#N/A	0	$0			
Vegetation Equipment Capital Cost	L.S	0	#N/A	0	$0			
Vegetation Eqquipment Fuel	liter	41,667	FLONAS	0.92	$38,125			
OBJECTIVE: WEIR								
Excavate channel (Breach dike, dozer, unfrozen)	m3	0	SC3L	8.90	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
OBJECTIVE: INTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip-rap	m3	0	RR2H	20.65	$0			
Transition material	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
OBJECTIVE: EXTERNAL CHANNEL								
Excavate channel	m3	0	SC3L	8.90	$0			
OBJECTIVE: OUTLET DAM								
Excavate channel	m3	0	SC3L	8.90	$0			
Rip Rap	m3	0	RR2H	20.65	$0			
Granular Cap	m3	0	RR2S	21.77	$0			
Filter material - sand	m3	0	SCSH	22.89	$0			
OBJETIVE: PHASE 1 RECLAMATION POND								
Excavate channel	**m3**	**30,000**	**SC3L**	**8.90**	**$267,000**			
Rip Rap	**m3**	**3,100**	**RR2H**	**20.65**	**$64,015**			
Granular Cap	**m3**	**8,500**	**RR2S**	**21.77**	**$185,037**			
Transition material	**m3**	**2,000**	**SCSH**	**22.89**	**$45,778**			
				Subtotal	$599,954			
						Pct Land	Total Land	Total Water

Rock Pile Name:	***Fox WRSA***					Rock Pile #: ***1***		
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: WILDLIFE RAMPS								
Flatten slopes with dozer	**m3**	**357,120**	**DRL**	**1.05**	**$374,976**			
OBJECTIVE: WASTE ROCK COVER								
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	611,520	GRCBLS	2.13	$1,299,640	Ref 2014-3		
Ripp Granite Rock	**m3**	**480,480**	**GRRPS**	**1.05**	**$504,504**	Ref 2014-3		
Load/Short Haul/Spread Compact	**m3**	**1,092,000**	**GRCSHSS**	**6.04**	**$6,597,816**			
Rock cover -Waste Kimberlite								
Drill Blast Granite Rock	m3	609,000	GRCBLS	2.13	$1,294,285	Ref 2014-3		
Ripp Granite Rock	**m3**	**478,500**	**GRRPS**	**1.05**	**$502,425**	Ref 2014-3		
Load/Short Haul/Spread Compact	**m3**	**1,087,500**	**GRCSHSS**	**6.04**	**$6,570,627**			
OBJECTIVE: TOP AREA								
Dozer and contour	**m3**	**323,800**	**DRL**	**1.05**	**$339,990**			
				Subtotal	$17,484,263			
						Pct Land	Total Land	Total Water

Rock Pile Name:	***Misery WRSA***					Rock Pile #: ***2***		
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: WILDLIFE RAMPS								
Flatten slopes with dozer	**m3**	**357,120**	**DRL**	**1.05**	**$374,976**			
OBJECTIVE: WASTE ROCK COVER								
Rock cover - Exposed Metasediment								
Drill Blast Granite Rock	m3	175,000	GRCBL2S	5.28	$924,060			
Ripp Granite Rock	**m3**	**0**	**GRRPS**	**1.05**	**$0**	Ref 2014-3		
Load/Short Haul/Spread Compact	**m3**	**175,000**	**GRCSHSS**	**6.04**	**$1,057,342**			
OBJECTIVE: TOP AREA								
Dozer and contour	**m3**	**141,354**	**DRL**	**1.05**	**$148,422**			
				Subtotal	$2,504,800			
						Pct Land	Total Land	Total Water

Rock Pile Name:	***Panda WRSA***					Rock Pile #: ***3***		
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: WILDLIFE RAMPS								
Flatten slopes with dozer	**m3**	**499,968**	**DRL**	**1.05**	**$524,966**			
OBJECTIVE: WASTE ROCK COVER								
Rock cover - Landfill								
Drill Blast Granite Rock	m3	55,227	GRCBLS	2.13	$117,371	Ref 2014-3, 2013-4a		
Ripp Granite Rock	**m3**	**43,393**	**GRRPS**	**1.05**	**$45,562**	Ref 2014-3, 2013-4a		
Load/Short Haul/Spread Compact	**m3**	**98,619**	**GRCSHSS**	**6.04**	**$595,854**	Ref 2013-4		
Rock cover - Landfarm								
Drill Blast Granite Rock	m3	15,081	GRCBLS	2.13	$32,051	Ref 2014-3, 2013-2		
Ripp Granite Rock	**m3**	**11,849**	**GRRPS**	**1.05**	**$12,442**	Ref 2014-3, 2013-2		
Load/Short Haul/Spread Compact	**m3**	**26,930**	**GRCSHSS**	**6.04**	**$162,710**	Ref 2013-2		
Rock cover -CRSA								
Drill Blast Granite Rock	m3	543,064	GRCBLS	2.13	$1,154,153	Ref 2014-3		
Ripp Granite Rock	**m3**	**426,693**	**GRRPS**	**1.05**	**$448,028**	Ref 2014-3		
Load/Short Haul/Spread Compact	**m3**	**969,757**	**GRCSHSS**	**6.04**	**$5,859,227**			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
OBJECTIVE: TOP AREA								
Dozer and contour	**m3**	**517,751**	**DRL**	**1.05**	**$543,639**			
Aerial Seed	L.S.	1	#N/A	15000.00	$15,000			
				Subtotal	$9,511,003			
						Pct Land	Total Land	Total Water

Rock Pile Name:	***Pigeon WRSA***					Rock Pile #: ***4***		
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: WILDLIFE RAMPS								
Flatten slopes with dozer	**m3**	**0**	**DRL**	**1.05**	**$0**	Ref 2014-6		
OBJECTIVE: WASTE ROCK COVER								
Rock cover - Landfill								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Short Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Landfarm								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover -CRSA								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
OBJECTIVE: TOP AREA								
Dozer and contour	**m3**	**100,000**	**DRL**	**1.05**	**$105,000**			
				Subtotal	$105,000			
		100,000				Pct Land	Total Land	Total Water

Rock Pile Name:	***Sable WRSA***					Rock Pile #: ***5***		
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: WILDLIFE RAMPS								
Flatten slopes with dozer	**m3**	**571,392**	**DRL**	**1.05**	**$599,962**			
OBJECTIVE: WASTE ROCK COVER								
Rock cover - Landfill								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Landfarm								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover -CRSA								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
OBJECTIVE: TOP AREA								
Dozer and contour	**m3**	**200,000**	**DRL**	**1.05**	**$210,000**			
				Subtotal	$809,962			
						Pct Land	Total Land	Total Water

Rock Pile Name:	***Lynx WRSA***					Rock Pile #: ***6***		
ACTIVITY/MATERIAL	**Units**	**Quantity**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: WILDLIFE RAMPS								
Flatten slopes with dozer	**m3**	**142,848**	**DRL**	**1.05**	**$149,990**	Ref 2014-4		
OBJECTIVE: WASTE ROCK COVER								
Rock cover - Landfill								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Landfarm								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover -CRSA								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
Rock cover - Low Grade Kimberlite								
Drill Blast Granite Rock	m3	0	GRCBLS	2.13	$0			
Ripp Granite Rock	m3	0	GRRPS	1.05	$0			
Load/Long Haul/Spread Compact	m3	0	GRCLHSS	6.35	$0			
OBJECTIVE: TOP AREA								
Dozer and contour	**m3**	**32,000**	**DRL**	**1.05**	**$33,600**	Ref 2014-4		
				Subtotal	$183,590			
						Pct Land	Total Land	Total Water

Building / Equip Name: ***All Areas*** **Bldg / Equip #:** ***1***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: INFRASTRUCTURE DECONTAMINATION & HAZ. MATERIAL REMOVAL								
Main Camp (Clean/Strip)	day	44	BDCSS	7,339.00	$322,916			
Main Camp (Purge/Decon)	day	28	BDPDS	13,184.00	$369,152			
Fox (Clean/Strip)	day	1	BDCSS	7,339.00	$7,339			
Misery Camp (Clean/Strip)	day	12	BDCSS	7,339.00	$88,068			
Misery Camp Purge/Decon)	day	1	BDPDS	13,184.00	$13,184			
Koala (Clean/Strip)	day	8	BDCSS	7,339.00	$58,712			
Pump Houses (Purge/Decon)	day	7	BDPDS	13,184.00	$92,288			
OBJECTIVE: INFRASTRUCTURE DEMOLITION & DISPOSAL								
Main Camp (450 excavator)	day	227	BR450S	3,792.00	$860,784			
Main Camp (330 excavator)	day	257	BR330S	3,420.00	$878,940			
Main Camp (35 ton truck)	day	187	BR30S	3,612.00	$675,444			
Main Camp (Demolition Supervisor)	day	126	BRDSS	1,800.00	$226,800			
Main Camp (Foreman)	day	112	BRFRS	1,764.00	$197,568			
Main Camp (4 Labourers)	day	115	BRLBRS	4,500.00	$517,500			
Main Camp	day	108	BRLDS	1,620.00	$174,960			
Koala (450 excavator)	day	38	BR450S	3,792.00	$144,096			
Koala (330 excavator)	day	20	BR330S	3,420.00	$68,400			
Koala (35 ton truck)	day	22	BR30S	3,612.00	$79,464			
Koala (Demolition Supervisor)	day	23	BRDSS	1,800.00	$41,400			
Koala (Foreman)	day	20	BRFRS	1,764.00	$35,280			
Koala (4 Labourers)	day	20	BRLBRS	4,500.00	$90,000			
Koala (2 Lead Hands)	day	20	BRLDS	1,620.00	$32,400			
Misery Camp (450 excavator)	day	15	BR450S	3,792.00	$56,880			
Misery Camp (330 excavator)	day	30	BR330S	3,420.00	$102,600			
Misery Camp (35 ton truck)	day	10	BR30S	3,612.00	$36,120			
Misery Camp (Demolition Supervisor)	day	15	BRDSS	1,800.00	$27,000			
Koala (2 Lead Hands)	day	15	BRLDS	1,620.00	$24,300			
OBJECTIVE: LANDFILL FOR INFRASTRCUTURE DEMOLITION WA								
Drill Blast Granite Rock	m3	55,227	GRCBLS	2.13	$117,371	Ref 2014-3, 2013-4b		
Ripp Granite Rock	**m3**	**43,393**	**GRRPS**	**1.05**	**$45,562**	Ref 2014-3, 2013-4b		
Load/Long Haul/Spread Compact	m3	98,619	GRCLHSS	6.26	$616,998	Ref 2013-4b		
OBJECTIVE: GRADE AND CONTOUR								
Scarify Landscape	ha	14	SCFYL	3,960.80	$56,287			
Establish Vegetation	ha	360	VHFL	1,792.19	$645,728			
Capital Cost Seeding Equipment	L.S.	1	#N/A	109,969.24	$109,969			
Drill Blast Granite Rock for Concrete Slabs	m3	40,332	GRCBLS	2.13	$85,716	Ref 2014-3		
Ripp Granite Rock for Concrete Slabs	**m3**	**31,689**	**GRRPS**	**1.05**	**$33,274**	Ref 2014-3		
Cover Concrete Slabs	**m3**	**72,021**	**GRCLHSS**	**6.35**	**$457,427**			
OBJECTIVE: LINED SUMPS								
Drill Blast Granite Rock for Concrete Slabs	m3	26,878	GRCBLS	2.13	$57,122	Ref 2014-3		
Ripp Granite Rock for Concrete Slabs	**m3**	**21,118**	**GRRPS**	**1.05**	**$22,174**	Ref 2014-3		
Remove liner and place rock cover	**m3**	**47,996**	**GRCLHSS**	**6.35**	**$304,833**			
OBJECTIVE: RECLAIM ROADS & AIRSTRIP								
Scarify Access and Haul Roads	**ha**	**34**	**SCFYL**	**4300.00**	**$145,811**	Ref 2014-4		
Scarify Airstrip	**ha**	**11**	**SCFYL**	**4300.00**	**$47,300**	Ref 2014-4		
Dozer Road Berms	**m3**	**76,623**	**DSL**	**0.95**	**$72,791**	Ref 2014-4		
Remove Powerlines	L.S.	1	#N/A	50000.00	$50,000	Ref 2014-5		
Remove Culverts	L.S.	1	BRCLVS	27,620.79	$27,621			
Remove Bridges	L.S.	1	BRBRDGS	13,044.53	$13,045			
				Subtotal	$8,130,625		Total Land	Total Water

Post-Closure Monitoring & Maintenance: ***All Areas***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: MONITORING &REPORTING								
Site Water Monitoring (AEMP & SNP)	yrs	16	#N/A	150,000	$2,400,000			
During Pit Flooding - Pit Water Quality Monitoring (SNP)	years*pit lake	60.5	#N/A	20,000	$1,210,000	Ref 2014-4, 2013-3, 2013-5		
Post Flooding - Pit Water Quality Monitoring (AEMP & SNP)	years*pit lake	70	#N/A	30,000	$2,100,000	Ref 2014-4		
Geotechnical Inspections (Land)	yrs	13	#N/A	$50,000	$650,000			
Geotechnical Inspections (Permafrost)	yrs	13	#N/A	$40,000	$520,000			
Air Quality Monitoring Program (AQMP)	yrs	13	#N/A	$25,000	$325,000			
Wildlife Effects Monitoring Program (WEMP)	yrs	13	#N/A	$100,000	$1,300,000			
LLCF Vegetation Monitoring (VMP)	yrs	10	#N/A	$75,000	$750,000			
Site Vegetation Monitoring (VMP)	yrs	13	#N/A	$30,000	$390,000			
Seepage Monitoring Program	yrs	13	#N/A	$50,000	$650,000			
Archaeology Monitoring Program	yrs	6	#N/A	$10,000	$60,000			
Pit Flooding Annual Staff (5 Labourers)	**hrs**	**76650**	**lab-uss**	**37.49**	**$2,873,609**	Ref 2013-5		
				Subtotal	$13,228,609			
						Pct Land	Total Land	Total Water

Water Management : ***All Areas***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: BREACH EMBANKMENT								
Bearclaw Dam								
Breach dam, dozer, unfrozen	**m3**	**11,202**	**SC3L**	**8.90**	**$99,695**			
Breach dam, dozer, frozen	**m3**	**1,977**	**RC4L**	**13.50**	**$26,686**			
Rip-rap	**m3**	**512**	**RR2H**	**20.65**	**$10,583**			
Transition material	**m3**	**4,503**	**RR2S**	**21.77**	**$98,033**			
King Pond Dam								
Breach dam, dozer, unfrozen	**m3**	**4,860**	**SC3L**	**8.90**	**$43,254**			
Breach dam, dozer, frozen	m3	0	RC4L	13.50	$0			
Rip-rap	**m3**	**375**	**RR2H**	**20.65**	**$7,744**			
Transition material	**m3**	**1,744**	**RR2S**	**21.77**	**$37,960**			
Waste Rock Dam								
Breach dam, dozer, unfrozen	**m3**	**67,575**	**SC3L**	**8.90**	**$601,418**			
Breach dam, dozer, frozen	m3	0	RC4L	13.50	$0			
Rip-rap	**m3**	**731**	**RR2H**	**20.65**	**$15,100**			
Transition material	**m3**	**23,389**	**RR2S**	**21.77**	**$509,150**			
Two Rock Dam								
Breach dam, dozer, unfrozen	**m3**	**9,916**	**SC3L**	**8.90**	**$88,255**			
Breach dam, dozer, frozen	**m3**	**1,750**	**RC4L**	**13.50**	**$23,624**			
Rip-rap	**m3**	**379**	**RR2H**	**20.65**	**$7,821**			
Transition material	**m3**	**4,244**	**RR2S**	**21.77**	**$92,377**			
Two Rock Dike								
Breach dike, dozer, unfrozen	**m3**	**1,154**	**SC3L**	**8.90**	**$10,274**			
Rip-rap	**m3**	**357**	**RR2H**	**20.65**	**$7,372**			
Transition material	**m3**	**251**	**RR2S**	**21.77**	**$5,472**			
Pigeon Outlet Pit Berm								
Breach berm, dozer, unfrozen - 2 areas	**m3**	**784**	**SC3L**	**8.90**	**$6,978**			
Rip-rap	**m3**	**165**	**RR2H**	**20.65**	**$3,407**			
Transition material	**m3**	**379**	**RR2S**	**21.77**	**$8,250**			
East Coffer Dam								
Breach dam, dozer, unfrozen	**m3**	**726**	**SC3L**	**8.90**	**$6,460**			
Rip-rap	**m3**	**98**	**RR2H**	**20.65**	**$2,013**			
Transition material	**m3**	**366**	**RR2S**	**21.77**	**$7,958**			
West Coffer Dam								
Breach dam, dozer, unfrozen	**m3**	**135**	**SC3L**	**8.90**	**$1,202**			
Rip-rap	**m3**	**48**	**RR2H**	**20.65**	**$981**			
Transition material	**m3**	**89**	**RR2S**	**21.77**	**$1,943**			
OBJECTIVE: PANDA DIVERSION CHANNEL								
1.0 Ice Access (Labour and Equipment)	L.S.	0	#N/A	28,182.00	$0	Ref 2014-7		
2.0 Ice Ppad (Labour and Equipment)	L.S.	0	#N/A	540,128.00	$0	Ref 2014-7		
3.0 Drill/Blast (Labour and Equipment)	L.S.	0	#N/A	287,707.00	$0	Ref 2014-7		
4.0 Excavate (Labour and Equipment)	L.S.	0	#N/A	229,664.00	$0	Ref 2014-7		
5.0 Produce Material (Labour and Equipmer	L.S.	0	#N/A	162,123.00	$0	Ref 2014-7		
6.0 Scale (Labour and Equipment)	L.S.	0	#N/A	46,304.00	$0	Ref 2014-7		
7.0 Berm Placement (Labour and Equipmen	L.S.	0	#N/A	87,671.00	$0	Ref 2014-7		
8.0 Clean	L.S.	0	#N/A	77,558.00	$0	Ref 2014-7		
9.0 PM/Survey	L.S.	0	#N/A	398,376.00	$0	Ref 2014-7		
10.0 Fuel Operaiting Cost	liters	0	FLONAS	0.92	$0	Ref 2014-7		
OBJECTIVE: EKATI MINE								
Associated Streams - Re-establish drainage	L.S.	1	#N/A	275,000.00	$275,000			
OBJECTIVE: QUARRY SITE								
Regrade and armor channels	L.S.	1	#N/A	333,000.00	$333,000			
				Subtotal	$2,332,011			
						Pct Land	Total Land	Total Water

Chemicals and Soil Contamination: ***All Areas***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.								
HAZARDOUS MATERIALS AUDIT								
Phase (1,2,3) ESA (Drilling and Sampling)	L.S	1	#N/A	440,536.00	$440,536			
TANK DECONTAMINATION								
Main Camp (Tank Decontamination)	day	22	BDTKS	18,184.00	$400,048			
Fox (Tank Decontamination)	day	6	BDTKS	18,184.00	$109,104			
Koala (Tank Decontamination)	day	2	BDTKS	18,184.00	$36,368			
HAZARDOUS MATERIALS REMOVAL								
Waste batteries	kg	25,000	#N/A	0.50	$12,500			
Waste Oils Ship Off Site	liters	650,000	ORL	0.39	$255,626			
Glycols Ship Off Site	litre	20,000	#N/A	1.25	$25,000			
Paints	litre	1,500	#N/A	0.27	$405			
Solvents	litre	7,500	#N/A	0.75	$5,625			
Explosives	allow	1	#N/A	10,000.00	$10,000			
CONTAMINATED SOIL REMEDIATION								
Excavate, Load, Haul to Landfarm	**m3**	**25,000**	**SC4L**	**9.30**	**$232,500**			
Drill Blast Granite Rock	m3	14,000	GRCBLS	2.13	$29,754	Ref 2014-3		
Ripp Granite Rock	**m3**	**11,000**	**GRRPS**	**1.05**	**$11,550**	Ref 2014-3		
Backfill Excavations Granite Rock	**m3**	**25,000**	**GRCLHSS**	**6.35**	**$158,782**			
Remediate Soil	**m3**	**25,000**	**CSRL**	**47.00**	**$1,175,000**			
Technician and Analysis	L.S	1	#N/A	100,000.00	$100,000			
				Subtotal	$3,002,798			
						Pct Land	Total Land	Total Water

Underground Mine Name ***Panda*** **UG Mine #** ***1***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
OBJECTIVE: CONTROL ACCESS								
Portal - bulkhead and cover entrance	L.S.	1	PTS	362,904	$362,904			
Cap fresh air raise - concrete cap	L.S.	2	CC6S	158,358	$316,716			
				Subtotal	$679,621			
						Pct Land	Total Land	Total Water

Underground Mine Name	***Koala***					**UG Mine #** ***2***		
ACTIVITY/MATERIAL	**Unit**	**Qty**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Portal - bulkhead and cover entrance	L.S.	0	PTS	362,904	$0			
Cap fresh air raise - concrete cap	L.S.	2	CC6S	158,358	$316,716			
				Subtotal	$316,716			
						Pct Land	Total Land	Total Water

Underground Mine Name	***Koala North***						**UG Mine # *3***	
ACTIVITY/MATERIAL	**Unit**	**Qty**	**Cost Code**	**Unit Cost**	**Cost**	**% Land**	**Land Cost**	**Water Cost**
OBJECTIVE: CONTROL ACCESS								
Portal - bulkhead and cover entrance	L.S.	1	PTS	362,904	$362,904			
Cap fresh air raise - concrete cap	L.S.	2	CC6S	158,358	$316,716			
				Subtotal	$679,621			
						Pct Land	Total Land	Total Water

Mobilization: ***All Areas***

ACTIVITY/MATERIAL	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
MOBILIZE EQUIPMENT								
Pipe Shipping	m	30,378	PPSS	14.0	$425,292	Ref 2013-5		
Pump Shipping	each	8	PLSS	2500.0	$20,000	Ref 2013-5		
*Minor Tools and Equipment (Inlcuding Vegetation)	L.S.	1	#N/A	100,000	$100,000			
Exacavators, 3	L.S.	1	#N/A	37,710	$37,710			
Dump Trucks, 12	L.S.	1	#N/A	203,052	$203,052			
Dozers, 3	L.S.	1	#N/A	377,096	$377,096			
Demolotion Shears, 2	L.S.	1	#N/A	25,140	$25,140			
Crane, 3	L.S.	1	#N/A	37,710	$37,710			
*Truck Tires	L.S.	1	#N/A	50,000	$50,000			
DEMOBILIZE EQUIPMENT								
Exacavators, 3	L.S.	1	#N/A	37,710	$37,710			
Dump Trucks, 12	L.S.	1	#N/A	203,052	$203,052			
Dozers, 3	L.S.	1	#N/A	377,096	$377,096			
Demolotion Shears, 2	L.S.	1	#N/A	25,140	$25,140			
Crane, 3	L.S.	1	#N/A	37,710	$37,710			
MOBILIZE CAMP								
Reclamation Activities Camp	allow	1	#N/A	150,000	$150,000			
Pit Flooding Camp	allow	1	#N/A	75,000	$75,000			
MOBILIZE WORKERS								
Reclamation Activities Airfare (two flights a week)	each	312	DSH7S	9100	$2,839,200			
Pump Flooding Airfaire (one flight a week)	each	630	FLTSS	4500	$2,835,000	Ref 2013-5		
Monitoring Airfare (6 flights a year)	each	60	FLTSS	4500	$270,000			
MOBILIZE FUEL								
Fuel Freight (Open Pit Pump Flooding)	litre	19,916,726	FLMBS	0.219	$4,361,763	Ref 2014-4, 2013-3, 2013-5		
Fuel Freight (Reclamation Activities Equipment)	litre	16,500,000	FLMBS	0.219	$3,613,500			
Fuel Freight (Accomodations)	litre	3,500,000	FLMBS	0.219	$766,500			
Winter Road Usage (Diesel Density 0.832 kg/l)	tonnes	33,211	WRS	111.9	$3,717,201.1	Ref 2014-4, 2013-3, 2013-5		
WORKER ACCOMODATIONS								
Reclamation Activities	manmths	7200	ACCM1S	2280	$16,416,000	Ref 2014-2		
Pit Pump Flooding	manmths	2880	ACCML	1483	$4,271,599	Ref 2013-5		
INTERIM CARE & MAINTENANCE								
Interim Care & Maintenance	annual	3	#N/A	$2,223,639	$6,670,917			
FINAL CLOSURE PLAN								
Preparation of final Closure Plan	L.S.	1	#N/A	1,000,000	$1,000,000			
PUMP FLOODING AND VEGETATION STAFF								
Pit Flooding Annual Staff (5 Labourers)	**hrs**	**178,850**	**lab-uss**	**37.49**	**$6,705,087**	Ref 2013-5, 2013-6		
Vegetation Labour	**hrs**	**29,190**	**lab-uss**	**37.49**	**$1,094,333**			
* Assumed to include winter road usage				**Subtotal**	$56,742,808			
						Pct Land	Total Land	Total Water

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

ITEM	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	COMMENTS
Granite Rock Capping						
Drill Blast Granite Rock (Remined Rock)	GRCBL	m3	#NA	#NA	2.13	
Drill Blast Granite Rock (Intact Rock)	GRCBL2	m3	#NA	#NA	5.28	
Ripping Granite Rock	GRRP	m3	#NA	#NA	1.05	Using DRL value
Load/Long Haul/Spread Compact	GRCLHS	m3	#NA	#NA	6.35	Ekati Internal
Load/Short Haul/Spread Compact	GRCSHS	m3	#NA	#NA	6.04	Ekati Internal
Fuel						
Fuel Operating Cost Automotive	FLOA	litre	0.99	1.39	1.05	Based on internal operating data and including automotive tax
Fuel Operating Cost Non -Automotive	FLONA	litre	0.99	1.39	0.92	Based on internal operating data excluding automotive tax
Fuel Mobilizattion	FLMB	litre	0.22	0.42	0.22	Based on internal operating data for freight from edmonton to ekati excluding winter road
Dozing						
Doze Rock piles	DR	m3	1.05	2.40	#N/A	LOW cost: doze crest off dump
Doze overburden/Soil piles	DS	m3	0.95	3.80	#N/A	HIGH cost: push up to 300 m
Excavate Rock, Controlled						
RC1 (Drill, blast, load, short haul (<500m) Dump	RC1	m3	12.05	17.80	#N/A	low - foundation excavation, high - spillway excavation
RC1 (Drill, blast, load, short haul (<500m) Dump + spread and compact	RC3	m3	12.70	18.40	#N/A	LOW Reclaim Default value designated for blasting of frozen core damns and short haul
RC1 + long haul + spread and compact	RC4	m3	13.50	19.20	#N/A	LOW Reclaim Default value designated for blasting of frozen core damns/access ramps and long haul
Drill and Blast (Specified Activity)	RCS	m3	#N/A	#N/A	7.50	2004 RCSL value for low specified, blast & doze pit rim)
Excavate Rip Rap						
RR1 (Drill, blast, Load Short Haul (<500 m) Dump and Spread + Long Haul	RR2	m3	14.20	20.65	21.77	HIGH cost: quarry & place rip rap in channel SPECIFIED for transational material average of sand and rip rap
Excavate Soil, Controlled						
SC1 (Excavate, Load, Short Haul (<500 m), Dump) + Spread and Compact	SC3	m3	8.90	14.20	#N/A	LOW Reclaim Default value designated for breaching dykes and excavations and short haul
SC1 (Excavate, Load, Long Haul (<500 m), Dump) + Spread and Compact	SC4	m3	9.30	23.20	#N/A	LOW Reclaim Default value designated for breaching dykes and excavations and long haul
SC1 (Excavate, Load, Short haul (<500 m), Dump) + Specified activity	SCS	m3	#N/A	22.89	17.35	SPECIFIED cost: backfill adit with waste rock, High - sand bedding layer for liners
Produce and Place Littoral Substrate	SCST	m3	#NA	#NA	22.80	Internal Estimate 2011 EBA $16.27 produce + $ 6.53 average for placement)
Produce and Plate Littotal Sediment Berm	SCSB	m3	#NA	#NA	24.21	Internal Estimate 2011 EBA $10.85 produce + $ 13.36 average for placement)
Scarify						
Scarify Road	SCFY	ha	4,300.00	6,030.00	2150	LOW Reclaim Default
Vegetation						
Hydroseed, Flat	VHF	ha	4,000.00			
Excavate Soil, Bulk						
Construct and Reshape Berm	SBSB	m3	3.20	6.30	3.98	
Shaft, Raise & Portal Closures						
Portals - Type 7 and Type 8	PT	L.S.	#NA	#NA	362,904.30	SPECIFIED Source: McIntosh 2004 report - bulkhead (in rock), backfilling tunnel and covering the entrance with waste rock. See report for more details.
Concrete work						
Small pour, Formed	CSF	m3	426.50	639.75	#N/A	LOW Reclaim value used for Spillway Construction
Type 6 - concrete cap	CC6	L.S.			158,358.24	SPECIFIED Source: McIntosh 2004 report - ventilation raises (filling raises with waste rock and covering caps after construction). See report for more details.
Pumps						
Pump Capital Cost Large, >	PL	each	5,618.16	112,363.20	195,000.00	EBA Estimate
Pump Shipping	PLS	each			2,500.00	EBA Estimate
Pump Maintenance	PLM	yr/pump	25,000.00	25,000.00	20,000.00	Internal Estimate
PiPes						
Pipe - Large, > 6 inch diameter	PPL	m	1.12	202.25	128.58	EBA Estimate for 18" DR11 HDPE Pipe
Pipe Shipping	PPS	m			14.00	EBA Estimate for 18" DR11 HDPE Pipe
Pipe Install	PPI	m			50.00	EBA Estimate for 18" DR11 HDPE Pipe
Break and Install	PPB	m			72.00	EBA Estimate for 18" DR11 HDPE Pipe
Signs and Fence						
Signs and Fence	FS	each	#NA	#NA	10,000.00	Based on internal estimate per pit
Oil						
Remove from site	OR	litre	0.43	1.20		LOW Reclaim Default Value
Remediate on site	CSR	m3	47.00	146.00	#N/A	LOW cost: bio-remediate on-site. HIGH cost: ship off-site to landfil as haz. waste
Buildings - Decontaminate						
Clean/Strip	BDCS	days			7,339.00	Golder Report Site Specific Estimated Cost
Purge/Decon	BDPD	days	0.00	0.00	13,184.00	Golder Report Site Specific Estimated Cost
Tank Decontamination	BDTK	days			18,184.00	Golder Report Site Specific Estimated Cost
Buildings - Remove						
450 Excavator	BR450	days			3,792.00	Golder Report Site Specific Estimated Cost
330 Excavator	BR330	days			3,420.00	Golder Report Site Specific Estimated Cost
35 Ton Truck	BR30	days			3,612.00	Golder Report Site Specific Estimated Cost
Demolition Supervisor	BRDS	days			1,800.00	Golder Report Site Specific Estimated Cost
Demolition Foreman	BRFR	days			1,764.00	Golder Report Site Specific Estimated Cost
4 Demolition Labourers	BRLBR	days			4,500.00	Golder Report Site Specific Estimated Cost
2 Demolition Leadhands	BRLD	days			1,620.00	Golder Report Site Specific Estimated Cost
Culverts	BRCLV	L.S.			27,620.79	Komex estimate for removal of culverts
Bridges	BRBRDG	L.S.			13,044.53	Komex estimate for removal of bridges
Winter Road						
Usage Rate	WR	tonnexkm	#N/A	#N/A	111.93	Calculated from a rate of $0.2907 tonne/km multipled by 385 distance from Yellowknife to Ekati
Mobilize Workers						
Dash 7 Flight	DSH7	each	4500.00	9100.00	9,100.00	Ekati Cost
10 person plane	FLTS	each	4500.00	9100.00	4,500.00	AANDC Interim Care and Maintenance Value
Accomodation						
Primary Reclamation Activities	ACCM1	month			2280.00	Ekati Operational Cost
Pit Flooding	ACCM2	month			1483.19	Ekati Calculated Cost
Typical Labour & Equipment Rates						
labour - unskilled	lab-us	$/hr	31.00	43.98	37.49	Specific avergae of high and low RECLAIM values